

# The City of Springfield

## Local Natural Hazards Mitigation Plan



**Adopted by the Springfield City Council on October 17, 2016**

**Prepared by:**

**The Springfield Natural Hazards Mitigation Planning Committee**

## ACKNOWLEDGEMENTS

Springfield Mayor Domenic J. Sarno extends his special thanks to the Springfield Natural Hazards Mitigation Planning Committee as follows:

Bernard Calvi, Springfield Fire Department Commissioner

Lindsay Hackett, Deputy Chief Administrative Financial Officer

Melanie Acobe, Budget Director

Chris Cignoli, Department of Public Works (DPW) Director

Patrick Sullivan, Executive Director of Parks, Buildings & Recreation Management

Elyssa Parrish, Budget Analyst

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## INTRODUCTION

### Hazard Mitigation

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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 City of Springfield, 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.

Preparation of 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. FEMA requires that a community adopt a pre-disaster mitigation plan as a condition for mitigation funding. For example, the Building Resilient Infrastructure and Communities (BRIC) Program, the Flood Mitigation Assistance Program (FMA), and the Pre-Disaster Mitigation Program (PDM) are programs with this requirement.

### Planning Committee

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To facilitate the development of all action plans and implementation schedules, an ad-hoc working committee met regularly. The group was made up of representatives from public safety (police, fire, and centralized dispatch), emergency management, public health, public works, administration and finance, planning, and the Mayor's Office. Each representative was part of the entire process and provided their expertise as the plan was being created.

### Planning Process

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The natural hazard mitigation planning process for the City of 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 capabilities 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.

An important part of the planning process was reviewing and incorporating relevant plans, studies, report and technical information of current capabilities and areas of opportunity for future mitigation measures. The Natural Hazards Mitigation Planning Committee reviewed and incorporated, when possible, the following:

- Massachusetts State Hazard Mitigation Plan
- City of Springfield Capital Improvement Plan (CIP)
- City of Springfield Hazard Mitigation Plan 2015
- Open Space and Recovery Action Plan
- Comprehensive Emergency Management Plan (CEM Plan)
- Zoning Ordinances
- Subdivision Regulations
- National Flood Insurance Program
- Building/Housing Codes
- Flood Insurance Study for Hampden County
- Springfield Community Development Plan
- Springfield Landslide Hazards
- USACE Flood Damage Reduction Segment/System Inspection Report

Other resources used in the development of the Natural Hazards Mitigation Plan are documented as footnotes throughout this document.

## Public Committee Meetings

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*June 29, 2021, 10:00 am:* Working committee meeting held at Springfield City Hall, Conference Room 310. Kickoff Meeting for the Hazard Mitigation Plan, reassessed hazard severity levels facing the City of Springfield, discussed timetable for the Hazard Mitigation Plan completion.

*July 26, 2021, 1:00 pm:* Working committee meeting held via Zoom. Updated tables in Hazard Mitigation Plan, specifically effectiveness, potential improvements and expansions, and critically affected facilities.

*September 14, 2021, 1:00 pm:* Working committee meeting held via Zoom. The meeting was attended by planning committee members, and agenda items included updating the City's action plan and a prioritization of action items. (Appendix F), as well as specific parts of the 2016 plan, i.e. wildfires/brushfires, landslides and dam repair in Springfield.

The plan was posted on the City website and committee members made hard copies available at the Mayor's Office for all residents, businesses and other concerned parties. The plans were made available in this manner for 21 days. Springfield residents and citizens from adjacent

municipalities were encouraged to comment on Springfield's plan. In addition to posting the draft plan on the City's website, the committee complied with open-meeting laws by posting the meeting on the City's public calendar and by posting a notice on the public bulletin board providing the date, time, location, and agenda of the meeting.

## **Public Meetings**

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When originally drafted, the City of Springfield held several working meetings to update the 2015 Hazard Mitigation Plan, which was a collaborative project with the Pioneer Valley Planning Commission (PVPC). In 2007, PVPC began working with the City's Office of Emergency Preparedness to draft and execute the plan. Due to internal delays, the plan was put on hold and was revisited in the spring of 2012.

Beginning in October 2012, the Office of Emergency Preparedness presented a draft Local Natural Hazard Mitigation Plan to the working committee of City Officials (public safety, planning, public health and public works, legislative staff, etc.), as well as the public. The meetings were advertised in the local newspaper and on the City's public website<sup>1</sup>.

## **Public and Neighboring Jurisdiction Involvement in the Planning Process**

From 2007-2009 PVPC sent a series of press releases to all area media outlets to inform private citizens that the planning process for development of local Hazard Mitigation plans in the Pioneer Valley had commenced and that all residents of Springfield were invited to attend plan development sessions.

In addition to media outreach, all public meetings were posted at Springfield City Hall (Appendix G) in compliance with the Commonwealth of Massachusetts' open meeting law.

In the initial stages of the process for developing this mitigation plan, PVPC conducted a series of outreach efforts to make the public aware of the scope of the region's mitigation activities. The Planning Commission notified all Select Boards and Chief Elected Officials that their community could participate in the region's mitigation planning process. Again, in the following year, the Planning Commission mailed a notice of planning activities to all Chief Elected Officials and Select Boards in the Pioneer Valley. Both mailings explained the purpose of mitigation planning and invited communities to participate in either Round I or Round II of the region's mitigation planning process.

In addition to media outreach, all public meetings were posted at City Hall in compliance with the Commonwealth of Massachusetts' open meeting law.

On June 13, 2012 the City of Springfield's Office of Emergency Preparedness sent a press release (see Appendix G) to all area media outlets to inform the public that a draft of Springfield's Hazard Mitigation Plan was under development and how one could become engaged in the process. The release also provided a very brief synopsis of the plan's purpose.

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<sup>1</sup> Original copies of the advertisements were not available at the time of the plan's approval.

On October 17, 2012, Springfield posted its plan on its website and had hard copies available at the Mayor's Office for all residents, businesses and other concerned parties of Springfield and adjacent communities were encouraged to comment on the plan. The plans were made available in this manner for 21 days. Citizens from adjacent municipalities were also encouraged to comment on Springfield's plan through press releases sent out from the Office of Emergency Preparedness.

From April 2013 through June 2014 representatives from the Department of Public Works have incorporated hazard mitigation into discussions held at neighborhood and civic association meetings. At these meetings, members of the public were given the opportunity to ask questions and make comments, but none were received. The following is a sample of those meetings:

<b>Table 1.1: Initial Neighborhood &amp; Civic Association Meetings</b>	
<b>Date</b>	<b>Location</b>
April 2, 2013	Outer Belt Civic Assn.
June 4, 2013	Sixteen Acres Civic Assn.
June 12, 2013	East Forest Park Civic Assn.
August 13, 2013	Maple / High / Six Corners Neighborhood Assn.
September 11, 2013	East Forest Park Civic Assn.
September 17, 2013	Forest Park Civic Assn.
November 19, 2013	Sixteen Acres Civic Assn.
January 7, 2014	Outer Belt Civic Assn.
April 8, 2014	Pine Point Neighborhood Assn.
April 15, 2014	East Springfield Civic Assn.
May 12, 2014	South End Business Assn.
May 13, 2014	McKnight Neighborhood Council
June 3, 2014	Outer Belt Civic Assn.

In order to update the plan, internal planning sessions were held with key departments to discuss roles, responsibilities and project prioritization. Below is a sample of those meeting occurrences:

<b>Table 1.2: City Internal Planning Sessions</b>		
<b>Departments</b>	<b>Topic</b>	<b>Date &amp; Time</b>
SFD, A&F, DPW, Parks	Hazard Mitigation Plan Review	June 29, 2021, 10:00 AM
SFD, A&F, DPW	Hazard Mitigation Plan Review	July 26, 2021, 1:00 PM
Hazard Mitigation Planning Committee	Prioritized Action Plan	September 14, 2021 1:00 PM

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 Western Massachusetts since 2005. 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 officers, EMT's, municipal officials, dispatchers, and transit officials from all of Western Massachusetts have been educated about hazard mitigation planning in the region and have been specifically encouraged to review and comment on neighboring jurisdictions plans.



## Plan Implementation & Monitoring

The implementation of the Springfield Local Natural Hazards Mitigation Plan began following its formal adoption by the Springfield Mayor and approval by MEMA and FEMA. Specific City departments and boards have been responsible for ensuring the development of policies, ordinance revisions, and programs, since its formal adoption in 2015. Our Springfield Natural Hazards Planning Committee will continue to oversee the implementation of the plan upon its updated adoption in 2021.

The Springfield Local Natural Hazards Mitigation Plan has been incredibly successful. Since 2015, many projects have been started and completed to establish more disaster resilience for the City of Springfield. Once the Hazard Mitigation Plan was developed in 2015, Springfield became eligible for grant funds that helped the community become better equipped to respond to natural disasters. For example, using awarded Hazard Mitigation Grant Program (HMGP) Funds, we were able to begin projects on Tiffany St., and South Branch Parkway to minimize roadway flooding. Building disaster resilience has been a coordinated effort between elected officials, appointed bodies, city employees, along with regional and state agencies involved in disaster mitigation, and the general public.

The Springfield Natural Hazards Planning Committee has met annually 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 for strategies to remove obstacles to implementation. Responsible parties with a representative on the Springfield Natural Hazards Planning Committee, are tasked with seeing that the actions are implemented and will continue to report on their progress at the annual plan review meetings. Outreach to the public, surrounding communities, agencies, businesses, academia, non-profits, or other interested parties outside the City of Springfield has been done in advance of each annual meeting to solicit their participation in assessment of the plan. Following these discussions, it is anticipated that the committee may decide to reassign the roles and responsibilities for implementing mitigation strategies to different City departments and/or revise the goals and objectives contained in the plan. At a minimum, the committee will continue reviewing and updating the plan every five years.

To gain continual public input, the Hazard Mitigation Plan will be a topic open for discussion at regularly held City Open Space Committee meetings.

Various departments have been able to collaborate on a multitude of projects with the funds received from the Hazard Mitigation Grant Program (HMGP). The HMGP funds have been instrumental in accomplishing major projects in Springfield that improve our position against potential environmental and manmade disasters.

Some of the projects that the Department of Public Works has accomplished with these funds have been to improve the structural integrity of Connecticut River dikes, and to improve drainage capacities of roadways throughout the city by repairing drainage culverts. The Department of Parks, Buildings & Recreation Management has been able to make citywide dam improvements, and construct much needed bridge upgrades to city owned bridges, ensuring vehicular and pedestrian safety. Prior to receiving funding through the HMGP, this project had been deferred fifteen years, due to budgetary constraints.

To help build a resilient community for city officials and constituents, the City of Springfield has begun working on several projects to help increase disaster resilience. Across several departments, actions have been implemented since the initial Hazard Mitigation Plan was adopted in 2015. Since 2015, we have used the grant funds we were eligible for to improve the structural integrity of Connecticut River Dikes, remove debris from Watershops' pond to repair the dam, as well providing Watershops' pond with upgrades to restore hydropower. The Department of Public Works (DPW) has also been able to upgrade the flood prevention system, repair a box culvert on South Branch Parkway and dredge streams near Tiffany Street to control road flooding.

### **Plan Incorporation & Review**

The Springfield Natural Hazards Planning Committee includes in their regular business a periodic review of the plan, and assesses the need for any updates. The committee is proactive and mindful regarding any strategic opportunities to include defined hazard mitigation measures in other planning initiatives taken on by the City. For example, after the June 1, 2011 tornado hit the City, hazard mitigation measures were incorporated in the City's standing long-term recovery plan and capital improvement plan. This will serve as a model by which hazard mitigation should be prioritized, city-wide.

The City monitors this plan using a combination of annual meetings of the Natural Hazards Planning Committee and follow up on specific projects by responsible City staff. When needed, site visits and additional follow up with stakeholders occur for actions outlined in the mitigation strategy.

A scheduled annual review of the plan by the Natural Hazards Planning Committee will continue being conducted at a regular meeting. At that time, the Natural Hazards Planning Committee will review the hazard mitigation measures that have been implemented to that date, and determine whether these measures have positively affected the overall hazard and/or reduced vulnerability. This review may include follow-up site visits to appropriate locations where mitigation measures have been implemented. Mitigation measures that have not been implemented will be reviewed to determine if they still will minimize natural hazards, or if they are no longer a viable option. Additionally, the Natural Hazards Planning Committee team will determine any new options to include in future updates of the plan.

## LOCAL PROFILE

### Community Setting

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The City of Springfield is the largest City in the Pioneer Valley Region. It is the third largest community in the Commonwealth of Massachusetts. Together with the Cities of Holyoke and Chicopee, and their neighboring communities, Springfield comprises the fourth largest metropolitan area in New England.

A largely developed and urbanized City comprised of 33 square miles (approximately 21,147 acres), Springfield is located on the eastern bank of the Connecticut River in Western Massachusetts, just north of the Connecticut state line.

Settled in 1636, Springfield has several historic and distinct neighborhoods in addition to a newly revitalized Central Business District. These neighborhoods earned the City its nickname of the “City of Homes.” Springfield is also known as the “City of Firsts” paying homage to its history as the birthplace of the first gasoline-powered automobile and motorcycle, and the game of basketball.

Springfield is home to eight of the region’s twenty largest employers, including Baystate Medical Center, Mass Mutual Life Insurance, Eastman, and Smith & Wesson. Major visited attractions include MGM Springfield, Springfield Symphony Hall, City Stage, MassMutual Center, Springfield Amory National Historic Site, The Basketball Hall of Fame, Forest Park, and the Springfield Library and Museums Association – all of which are located in a historic downtown campus setting. Springfield is also home to four colleges and four hospitals.

MGM Springfield has committed to further developing the downtown metropolitan area of Springfield, providing 3,000 jobs to residents of Springfield and neighboring communities. MGM Springfield is contributing funds to revitalize Court Square, a historic location of Springfield by renovating Court Square Hotel property at 13-31 Elm Street. The property is expected to include 74 apartments, and retail/restaurant space on the first two floors.

### Infrastructure

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Springfield’s infrastructure reflects its dense, urban roots coupled with its location along the Connecticut River.

#### Roads and Highways

Springfield is located just south of the intersection of two of New England’s most significant interstate highways – Interstate 91, traveling north-south from Canada to the Connecticut shoreline, and Interstate 90 (the Massachusetts Turnpike), traveling east-west from Boston, MA to Seattle, WA. While Interstate 91 actually passes through the City, between the river and downtown Springfield, access to Interstate 90 from the City is provided by a bypass route, Interstate 291. Other key routes include Route 20, Route 83, and Route 21, in addition to several major thoroughfares.

## Rail and Transit

The region's interstate bus and Amtrak train stations are located in downtown Springfield. The City is also the hub of the regional bus service provided by the Pioneer Valley Transit Authority. In 2020, the city completed an \$80,000,000 renovation at Union Station which is now the intermodal hub for the Pioneer Valley.

## Public Water and Sewer Service

Springfield's public water and sewer service is managed through the Springfield Water and Sewer Commission.

The Commission's source of supply is the Little River in Western Massachusetts with raw water storage at its Borden Brook and Cobble Mountain Reservoirs. All water is filtered at the West Parish Filtration Plant in Westfield, and then stored in tanks at Provin Mountain, before flowing through 580 miles of distribution system piping to the Commission's customers in Springfield and Ludlow. All water flows by gravity from the reservoirs to the Commission's service area. In addition, the Commission owns and maintains four drinking water pumping stations to increase pressure in certain portions of the service area.

The Springfield Regional Wastewater Treatment Facility (SRWTF) is the largest of 171 activated sludge facilities in New England and second in size in the region only to Boston's primary treatment plant. Located in Agawam, Massachusetts, the SRWTF presently treats the domestic and industrial wastes from eight communities, including Springfield.

The Commission serves a total population of approximately 250,000. The Commission services approximately 43,500 water and 550 fire accounts throughout the water distribution system in Springfield and Ludlow. The Commission services approximately 36,400 accounts in the Springfield sewer system.

## Natural Resources

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Even as a regional center that is mostly built-out, Springfield is continually shaped by several of its natural resources and amenities.

### Water Resources

The most significant of Springfield's natural resources is the Connecticut River flowing along its western border.

There are 28 lakes and ponds in Springfield. These are: Bass Pond, Mill Pond, Breckwood Pond, Island Pond, Porter Lake, Watershops Pond, Loon Pond, Five Mile Pond, Long Pond, Mona Lake, Dimmock Pond, Quarry Pond, Van Horn Upper Reservoir, Van Horn Lower Reservoir, Carp Pond, Swan Pond, Barney Pond, Fountain Lake, Porter Lake, Duck Pond, Lower Duck Pond, Aquatic Gardens(5), Venture Pond, and Lake Lorraine.

There are several tributaries to the Chicopee and Connecticut Rivers. These are: Abby Brook, North Branch Mill River, South Branch Mill River, and Schneelock Brook.

Additionally, Springfield contains about 115 acres of wetlands, and several miles of inner riparian zone habitat.

These water resources all provide important wildlife habitat, flood storage capacity, and recreation outlets, and in some cases they are water supply sources as well.

### Forests and Fields

Almost 20% of the total acreage of Springfield remains forested, approximately 4,100 acres. The predominant forest habitat in Springfield is the northern hardwoods hemlock. Species vary with the topography but consist primarily of hemlock, beech, sugar maple, and yellow birch.

There are also a few hundred (approximately 383) acres of cropland, pastureland, and open land in Springfield, providing additional vegetation types and habitat opportunities.

It is worthwhile to note that the majority of these forested and open lands are within Springfield's public parks.

### Development

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Springfield's growth was initiated first by farmers, then by industry and commercial development, and more recently by commercial and residential redevelopment. But the City's topography, soils, and physiography (lakes, rivers, wetlands and watershed areas), shape and constrain these land use patterns.

In addition to other factors, zoning and other land use regulations constitute Springfield's "blueprint" for its future. Land use patterns over time will continue to look more and more like the City's zoning map until the City is finally "built out"—that is, there is no more developable land left. Therefore, in looking forward over time, it is critical that the City focus not on the current use and physical build-out, but on the potential future uses and build-out that are allowed under the City's zoning map and zoning ordinances. Zoning is the primary land use tool that the City 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 City's character.

The Springfield Zoning Ordinance was updated in August 2013, and establishes twenty base zones and six overlay zones:

- Seven residential districts: Residence A-1, Residence A, Residence B, Residence B-1, Residence C, Residence C-1 (Residential Project Districts), Residence C-2 (High-Rise Apartment Districts)
- One residence-office district: Office A (Residence-Office)
- Two commercial districts: Commercial P (Parking Lot), Commercial A (Neighborhood)

- Five business districts: Business A (General), Business B (Service), Business B-1 (Corporate Campus), Business C (CBD), Business D (Regional Shopping)
- Three industrial districts: Mixed Use Industrial, Industrial Park, Industrial A
- One open space district: Park and Open Space
- One riverfront district: Connecticut Riverfront
- Six overlay districts: West Columbus Urban Renewal District, Neighborhood Commercial District, Floodplain District, Smart Growth Overlay District, and Casino District.

Although all appropriate zoning is relevant to protecting the health and safety of the City residents, two of Springfield's districts are specifically relevant to natural hazard mitigation:

- Floodplain District - The floodplain overlay applies to those areas within the boundary of the one-hundred-year flood that are considered hazardous according to FEMA. It limits some uses in order to prevent potential flood damage.
- Connecticut Riverfront District - The purpose of this district is to protect and preserve the river from potentially damaging pollution or environmental degradation by regulating certain uses along its banks. The regulations state specific prohibited and restricted uses, 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 Springfield. This review allows the Special Permit Granting Authority the ability to review development to ensure that the basic safety and welfare of the people of Springfield are protected, and includes several specific evaluation criteria that are relevant to natural hazards.

### Current Development Trends

Today, the vast majority of Springfield's 17 square miles is residential land, totaling close to 10,729 acres. Undeveloped land is the second most prolific land use, totaling close to 4,510 acres. Land used for commercial and industrial uses constitutes a relatively large 1,718 acres, and 1,523 acres, respectively. There is also a significant amount of land characterized as urban open/public land at 1,593 acres, and there are 694 acres of outdoor recreational land. Agricultural land constitutes a relatively small 112 acres, as to be expected in an urbanized area.

Springfield's zoning laws and land use regulations reflect the needs of a mature community that is, for the most part, completely built out. The City encourages uses in commercial, residential and industrial locations, and promotes residential density in the downtown. Development occurs where public infrastructure already exists.

### Development in Hazard Areas

Hazards identified in this plan are regional risks and, as such, 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 87 insured residential structures located within the Special Flood Hazard Area (SFHA) in Springfield as of 2015, the most current records in the CIS for the City of

Springfield. It should be noted that Grochmal Avenue has several mobile homes located in the 100-year floodplain, and that the 500-year floodplain includes downtown parcels between Bliss Street and Leete Street.

## HAZARD IDENTIFICATION & ANALYSIS

### Natural Hazard Profiling Methodology<sup>2</sup>

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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, Impact, 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.

#### Location of Occurrence

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

<b>Table 3.1: Location of Occurrence, Percentage of City Affected of Given Natural Hazard</b>	
<b>Location of Occurrence</b>	<b>Percentage of City Affected</b>
Large	More than 50% of the City affected
Medium	10 to 50% of the City affected
Small	Less than 10% of the City affected

#### Impact

The impact an affected area could potentially suffer were classified according to the following scale:

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<sup>2</sup> 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).

<b>Table 3.2: Impact, Magnitude of Multiple Impacts of Given Natural Hazard</b>	
<b>Impact</b>	<b>Magnitude of Multiple Impacts</b>
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.
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 have 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:

<b>Table 3.3: Probability of Future Events of Given Natural Hazard</b>	
<b>Probability of Future Event</b>	<b>Annual Likelihood of Event</b>
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 capabilities 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

## Profiling the Natural Hazards

Historical research, conversations with local officials and emergency management personnel, available hazard mapping and other weather-related databases were used to identify and profile the natural hazards which are most likely to have an impact on Springfield.

Each of these hazards was assessed by the Committee for location of occurrence, impact, previous occurrences, and probability of future events. This resulted in a ranking of hazard, by risk, see Table 3.1. More detailed descriptions of each of the points of analysis are included in the Identification and Vulnerability Assessment (below).

**Table 3.4: Hazard Profiling and Risk Index Worksheet**

Type of Hazard	Location	Impact	Previous Occurrences	Probability of Future Events	Hazard Risk Index Rating
Flooding (100-year)	Medium Large	Minor	Yes	Very High	2
Flooding (localized)	Medium	Limited	Yes	Low	3
Hurricanes/Severe Wind	Large	Minor	Yes	Low	3
Severe Snow/Ice Storms	Large	Limited	Yes	Very High	3
Wildfire/Brushfire	Small	Minor	Yes	High	3
Man-Made Hazard: Hazardous Materials	Large	Limited	No	Very Low	2
Dam Failure	Small	Limited	No	Very Low	3

**Table 3.4: Hazard Profiling and Risk Index Worksheet**

Type of Hazard	Location	Impact	Previous Occurrences	Probability of Future Events	Hazard Risk Index Rating
Landslide	Small	Limited	Yes	Low	4
Tornado/Microburst	Small	Catastrophic	No	Very Low	4
Earthquake	Large	Catastrophic	No	Very Low	4
Drought	Small	Minor	No	Very Low	5
Extreme Temperature	Large	Minor	Yes	High	5
Tsunami*	N/A	N/A	No	N/A	N/A
Coastal Flooding*	N/A	N/A	No	N/A	N/A

\*The City of Springfield is not a coastal community, and as such, would harbor no threats of impact.

## Natural Hazard Identification and Vulnerability Assessment

The following is a description of natural and manmade disasters, and the areas affected by them, that have or could affect the City of Springfield. The *Past and Potential Hazards/Critical Facilities Map* (Appendix C) reflects the contents of this analysis.

### Vulnerability Assessment Methodology

In order to determine estimated losses due to natural hazards in 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 2021.

**Total Value of all Structures in Springfield (2013): \$6,696,353,300**

**Total Number of Housing Units (2019): 62,042**

**Median Value of a Home in Springfield (2015-2019): \$156,200**

**Average Household Size (2015-2019): 2.64 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 estimate 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.

## Flooding

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The average annual precipitation for Springfield and surrounding areas in north Western Massachusetts is 46 inches. There are three major types of storms that bring precipitation to Springfield. Continental storms, which originate from the west and 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. Precipitation from coastal storms, also known as nor'easters, that travel into New England from the south constitute the second major storm type. 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. The third type of storm is the result of local convective action. Thunderstorms that form on warm, humid summer days can cause locally significant rainfall.

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. Climate change has the potential to shift current rainfall and storm patterns, and the potential to increase precipitation and the intensity of regional flooding. Currently, floods occur and are one of the most frequent and costly natural hazards in the United States.

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 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 City of 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 Springfield, there are several floodplain areas – primarily along the Connecticut River, North Branch Mill River, South Branch Mill River, Mill Pond and Abby Brook. There are some smaller 500-year floodplains mapped as well, along Grochmal Street, Avocado Street and Fisk Avenue.

The major floods recorded in Western Massachusetts during the 20th century have been the result of rainfall alone or rainfall combined with snowmelt. Springfield has experienced many flooding events over the last decade. Generally, these small floods have had minor impacts, temporarily affecting roads and residents' yards. However, Citywide flooding on October 8, 2005 caused an apartment building's roof to collapse, the most recent Citywide flooding, on October 15, 2005, blocked sections of Interstate-91, and on July 11, 2006,<sup>3</sup> another large storm caused property damage in Springfield and several municipalities around the state.

As described above, flooding can happen on a range of scales. For the purposes of this analysis, the hazard has been broken into two separate types – **Flooding (100-year)** and **Flooding (localized)**. Risk and vulnerability assessment for these separate types of flooding are analyzed below.

## **Flooding (100-year base flood): Medium Risk**

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There are approximately 474 acres of land within the FEMA mapped 100-year floodplain and 674 acres of land within the 500-year floodplain within the City of Springfield. According to the Community Information System (CIS) of FEMA, there were 88 insured residential structures located within the Special Flood Hazard Area (SFHA) in Springfield as of August 2013, the most current records in the CIS for the City of Springfield.

Specific vulnerability assessments were estimated for sites within the SFHA which have been susceptible to 100-year floods in the past, they are described below (At this time the City of Springfield has no repetitive loss properties as defined by FEMA's NFIP).

### Location

#### *Connecticut and Mill Rivers Flooding*

The rising of the Connecticut and Mill Rivers would cause wide spread damage to the low lying areas. This would also cause a significant threat to the safety and health of the City's citizens. The

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<sup>3</sup> Information on 2005 and 2006, was accessed on National Climatic Data Center website ([www.ncdc.noaa.gov/oa/ncdc.html](http://www.ncdc.noaa.gov/oa/ncdc.html)) on December 10, 2007.

Connecticut River borders the City on western most edge, from Chicopee to the South End Bridge. The Mill River begins at Water Shops Pond and flows southwest to the Connecticut River. These areas are protected by levees that make up the City's Flood Protection System ("FPS"). The FPS was constructed by the United States Army Corps of Engineers ("USACE") between 1937 and 1941 in response to the flood of 1936. The FPS is made up of three levee structures which the USACE inspects and reports on annually. Springfield's current accreditation status for each of its three FPS structures that run the entire length of the City's Connecticut River borders and the Mill River conduit is minimally acceptable.

The City of Springfield's Flood Protection System (FPS) consists of 11,164 ft. of concrete flood wall and 3,895 ft. of earthen embankment. It also consists of five (5) pumping stations which are under the jurisdiction of the Springfield Water and Sewer Commission (SWSC). The FPS is on the western most portion of the City, along the Connecticut River, and protects the City beginning at the Chicopee line and continues southerly to the South End Bridge. The other portion of the FPS is the Mill River Conduit. This structure consists of 1600 ft. of concrete flood walls.

The Flood Map shows the areas that would be affected should the system fail during a flooding situation (Appendix D). The system is designed to withstand the "500 Year" flood. As mentioned, Springfield's current accreditation status is "minimally acceptable," should the system be deemed "unacceptable" and fall from accredited status due to a poor report by the USACE, the home and business owners in the areas shown on the map would have to obtain flood insurance.

By mandate, quarterly inspection reports are provided to the USACE. The DPW utilizes these reports as a basis for needed repairs. Repairs of a magnitude beyond the resources of the DPW are outsourced. In 2021, the FPS's Operation and Maintenance (O&M) manual was updated by outside consultants. The O&M is used as a guide by the Department for proper operation and maintenance of the system. The DPW will continue maintenance and monitoring of the FPS.

### Extent

A vulnerability assessment for a 100-year flood equals approximately \$22.9 million of damage to residential structures, with approximately 180 people impacted. In the North End of the City, Baystate Medical Center medical facilities along Wason Avenue, Birnie Avenue and Main Street would be affected. In the South End, the Downtown Business District would suffer millions in damage; properties in this area include the Basketball Hall of Fame, MGM Springfield, and numerous restaurants and large businesses like the Balise Car Dealerships. In addition, the damage to the small business owners would be insurmountable.

### Previous Occurrences

The DPW owned / controlled storm drainage systems, in general, have held up very well to the storm events that have occurred during the calendar year 2021. Where damage has occurred along City controlled systems was mostly at storm water outlet locations. These locations have been identified and are part of the Hazard Mitigation Plan and Capital Improvement Plan.

### Probability of Future Events

1-10% probability in the next year

## **Flooding (localized) – Medium/High Risk**

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

There are a total of 27 problem culverts or other localized flooding areas all over the City, and have been mapped on the Past and Potential Hazards/Critical Facilities Map (Appendix C). Most of the flood hazard areas listed here were identified due to past occurrences in the respective area. 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 the City tend to be impacted by beavers, so localized flooding can potentially occur at any culvert crossing.

To determine the vulnerability of the City to localized flood events, the property within identified areas was visually analyzed using aerial photography (*Pictometry*), which allowed structures to be identified and tallied. Specific vulnerability assessments were estimated for sites which have been susceptible to localized flooding in the past, and are described below.

### **Location**

#### ***Island Pond Flooding***

Island Pond receives storm water runoff from four (4) storm drainage areas and pond levels rise according to the size and frequency of the rain events. There is no outlet for the pond therefore the pond elevation continues to raise causing flooding to backyards and eventually residential cellars of the homes that abut the pond. Currently there is a pump in one of the inlet manholes that turns on at preset elevations and slowly pumps the pond into an adjacent sanitary sewer. This system pumps relatively clean storm runoff into the sanitary system and there is an unnecessary cost associated with the treatment of this water. During heavy rain events the system is unable to manage the flows and flooding occurs. In addition, there are pump breakdowns and inlet blockages that contribute to the problem.

#### ***Abbe Brook Flooding***

Abbe Brook has several problem areas that require mitigation. Several outlets have severe erosion which has undermined the headwalls and storm drains causing large areas of embankment to collapse and the siltation has decreased downstream capacities.

#### ***Drainage Culvert Reclamation***

The City has several miles of drainage ditches in need of enhanced capacity, most notably along Roosevelt Ave from Alton Street to Wilbraham Rd. parallel to Industry Ave. and cross-country from Peekskill Ave to Greenleaf Community Center. During heavy rain events Roosevelt Ave. floods under State Street. Also, there are concerns of flooding and property damage due to decreased capacity. Culvert restoration is also necessary for Tiffany Street, Dickinson Street and

South Branch Parkway locations. Both of these projects are under design at this time. South Branch Parkway has a 20' +/- deep manhole and pipe system that has failed causing sinkholes to occur. Project reconstruction has been approved by MEMA / FEMA under the HGMP program. The project will include complete replacement of the manhole structure and associated piping. On Tiffany Street, due to roadway drainage overflow, culvert sideslopes have severely deteriorated. This project has also been approved by MEMA / FEMA under the HMGP program. The project is currently under design and will result in additional streambank stabilization.

**TABLE 3.5 FLOOD HAZARD MITIGATION ASSESSMENT**

<b>Capability</b>		<b>Description</b>	<b>Effectiveness</b>	<b>Potential Improvements/Expansion</b>
Flood Control Structures		Twelve dams	Somewhat effective.	Improve or remove high-risk dams.
		Connecticut River Dikes	Very effective for managing floodwaters	Maintenance of dikes to maintain structural integrity.
Culvert Replacement		Island Pond storm water pump station project	Very effective for managing flood control needs.	Prevent localized flooding from high volume storm events
		South Branch Parkway Drainage improvement project	Very effective	
		Tiffany Street Entry Dingle Brook culvert and Stream channel repairs and improvements	Very effective	
Zoning Ordinances	Floodplain District	Overlay district to protect areas delineated as part of the 100-year floodplain and special permit requirements.	Moderately effective for preventing hazardous chemical facilities from entering the floodplain; allows some uses by right and requires a special permit for most hazardous chemical facilities.	Create a table of uses that clarifies which uses are allowed by-right, special permit or not at all; then modify table of uses to prohibit high-risk uses and future construction.
	Special Permit	Applied to those uses that the City of Springfield wants to control, should a proposed project not conform to the needs of a neighborhood.	Somewhat effective for preventing incompatible development.	Consider creating more performance-based evaluations, environmental standards.
	Connecticut Riverfront District	Accommodates and controls development along the riverfront; promotes tourism, recreation.	Somewhat effective at preventing development along the riverfront.	Include setbacks from waterways and prevent construction in identified floodplains.
Subdivision Regulations	Preliminary and Definitive Plan	Proposed storm drainage, sewer, water supply, and major site features (including natural features) must be included.	Somewhat effective for preventing incompatible development.	None.
	Design Standards	Environmental Analysis – includes impact analysis of recharge and infiltration.	Effective for protecting natural processes like flood mitigation.	None.
		Development Impact Statement – describes natural features, drainage systems	Effective for encouraging	None.

			compatible development.	
		Storm Drainage – determines impact of development to downstream. Storm Drainage analysis will utilize increased storm intensities due to climate change	Effective for mitigating impacts of development to downstream.	None.
		Site Preservation – significant natural and cultural sites must be noted and preserved when applicable.	Effective for protecting important natural features.	None.
		Excavation and Grading – regulates how earth removal must be conducted.	Effective for minimizing earth removal and preventing sedimentation.	None.
Springfield Community Development Plan		The CD Plan identifies key goals and actions to promote natural resource preservation in the City, including areas in the floodplain; such as wetlands, groundwater recharge areas, farms and open space, rivers, streams and brooks.	Effective at identifying key policy actions necessary to preserve open space.	Work to implement relevant goals and policies in Plan.
National Flood Insurance Program Participation		As of 2021, there were 87 homeowners with flood insurance policies.	Somewhat effective, provided that the City remains enrolled in the National Flood Insurance Program.	None.



## Hurricanes/Severe Wind – Medium Risk

Hurricanes are the most severe type of storms known as tropical cyclones, which are low pressure systems causing thunderstorm-like activity and rotate counterclockwise. According to the National Oceanic and Atmospheric Administration (NOAA):

*“A tropical cyclone that has winds of 38 mph (33 kt) or less is called a tropical depression. When the tropical cyclones winds reach 39-73 mph (34-63 kt), it is called a tropical storm. When the winds exceed 74 mph (64 kt), the storm is considered to be a hurricane.”*

Hurricanes generally occur between June and November and can result in flooding and wind damage to structures and above-ground utilities. Severe wind can also occur in the absence of a hurricane, especially impacting mountain tops. Climate change will increase the threat of hurricanes and severe wind as oceans and the atmosphere warms. Climate change research indicates that storms like hurricanes will become more intense and more frequent in the future.

Hurricanes are classified according to the Saffir-Simpson hurricane wind scale as follows:

Table 3.6: Saffir-Simpson Hurricane Wind Scale		
Category	Sustained Winds	Types of Damage Due to Hurricane Winds
1	74-95 mph 64-82 kt 119-153 km/h	<b>Very dangerous winds will produce some damage:</b> Well-constructed frame homes could have damage to roof, shingles, vinyl siding and gutters. Large branches of trees will snap and shallowly rooted trees may be toppled. Extensive damage to power lines and poles likely will result in power outages that could last a few to several days.
2	96-110 mph 83-95 kt 154-177 km/h	<b>Extremely dangerous winds will cause extensive damage:</b> Well-constructed frame homes could sustain major roof and siding damage. Many shallowly rooted trees will be snapped or uprooted and block numerous roads. Near-total power loss is expected with outages that could last from several days to weeks.
3 (Major)	111-129 mph 96-112 kt 178-208 km/h	<b>Devastating damage will occur:</b> Well-built framed homes may incur major damage or removal of roof decking and gable ends. Many trees will be snapped or uprooted, blocking numerous roads. Electricity and water will be unavailable for several days to weeks after the storm passes.
4 (Major)	130-156 mph 113-136 kt 209-251 km/h	<b>Catastrophic damage will occur:</b> Well-built framed homes can sustain severe damage with loss of most of the roof structure and/or some exterior walls. Most trees will be snapped or uprooted and power poles downed. Fallen trees and power poles will isolate residential areas. Power outages will last weeks to possibly months. Most of the area will be uninhabitable for weeks or months.
5 (Major)	157 mph or higher 137 kt or higher 252 km/h or higher	<b>Catastrophic damage will occur:</b> A high percentage of framed homes will be destroyed, with total roof failure and wall collapse. Fallen trees and power poles will isolate residential areas. Power outages will last for weeks to possibly months. Most of the area will be uninhabitable for weeks or months.

Source: NOAA - National Weather Service (<https://www.nhc.noaa.gov/aboutsshws.php>)

### Location

All of Springfield is at risk from hurricanes with ridge tops more susceptible to wind damage and the flood-prone portions of town to flooding from the heavy rains.

## Extent

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 City has experienced small blocks of downed timber and uprooting of trees onto structures.

## Previous Occurrences

In Massachusetts, 17 hurricanes have had landfall since 1851, three of which impacted Western Massachusetts. These include Hurricane Carol in 1954 and Hurricane Gloria in 1985. Hurricanes are usually ranked category 1-5, using the Saffir-Simpson Scale, with category 5 hurricanes being the most severe. Both Hurricane Carol and Gloria were category 1-2 storms, meaning winds ranged from 74-110 mph with the potential for some roofing or window damage to buildings, damage to unanchored mobile homes, trees, or poor construction, and/or some minor flooding.

- Connecticut River corridor at risk.
- 1938 hurricane was a major event - wind damage and flooding statewide.
- Power and phone lines - disruptions of services.
- Flooding/washing of evacuation routes.

**Table 3.7: Major Non-Winter Storms to Affect Springfield Area**

Hurricane/Storm Name	Year	Saffir/Simpson Category (when reached MA) <sup>4</sup>
Great Hurricane of 1938	1938	Unclear, 3 or 4
Great Atlantic Hurricane	1944	1
Carol	1954	3
Edna	1954	1
Diane	1955	Tropical Storm
Donna	1960	Unclear, 1 or 2
Groundhog Day Gale	1976	Not Applicable
Gloria	1985	1
Bob	1991	2
Floyd	1999	Tropical Storm
Allison	2001	Tropical Storm
Irene	2011	Tropical Storm
Henri	2021	Tropical Storm

## Probability of Future Events

Based upon the past events, it is reasonable to say that there is a low frequency of major hurricanes in Springfield (once every fifty years is less than a one percent chance of any such storm occurring

<sup>4</sup> According to the National Weather Service: "The Saffir-Simpson Hurricane Wind Scale is a 1 to 5 rating based on a hurricane's sustained wind speed. This scale estimates potential property damage. Hurricanes reaching Category 3 and higher are considered major hurricanes because of their potential for significant loss of life and damage. Category 1 and 2 storms are still dangerous, however, and require preventative measures."

<http://www.nhc.noaa.gov/aboutshws.php>

in a given year) while the possibility of a less severe hurricane or tropical storm affecting Springfield in any given year is approximately 10 percent.

<b>TABLE 3.8 EXISTING SEVERE WIND HAZARD MITIGATION MEASURES</b>				
<b>Existing Strategy</b>		<b>Description</b>	<b>Effectiveness</b>	<b>Potential Changes</b>
Zoning Ordinance	Mobile Homes/Trailers	Mobile homes are permitted with some additional regulations; trailers are only allowed as temporary living quarters.	Not effective for preventing damage to susceptible structures	Restricting location of mobile homes in high-hazard area and establish a buy-back program for high-risk mobile homes.
	Wireless Communications Structures and Facilities	Structures are required to be as minimally invasive as possible to the environment, have height restrictions, and must have be setback 200 % of the structure's height; 100% allowed for "stealth design towers".	Very effective for preventing damage in the case of a severe storm.	Done.
Subdivision Regs.	Design Standards	Utilities must be placed underground	Effective for preventing power loss.	Done.
State Building Code		The City has adopted the MA State Building Code.	Effective.	Done
Tree Management		List of dangerous trees created annually for Eversource.	Very effective, preventative collaboration.	Done

## Severe Snow/Ice Storm – Medium Risk

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Severe winter storms can pose a significant risk to property and human life because the rain, freezing rain, ice, snow, cold temperatures and wind associated with these storms can disrupt utility service, phone service, and make roadways extremely hazardous. Severe winter storms can also be deceptive killers. The types of deaths that can occur as a result of a severe winter storm include: traffic accidents on icy or snow-covered roads, heart attacks while shoveling snow, and hypothermia from prolonged exposure to cold temperatures. Infrastructure and other property are also at risk from severe winter storms and the associated flooding that can occur following heavy snow melt. Power and telephone lines, trees, and telecommunications structures can be damaged by ice, wind, snow, and falling trees and tree limbs. Icy road conditions or roads blocked by fallen trees may make it difficult to respond promptly to medical emergencies or fires. Prolonged, extremely cold temperatures can also cause inadequately insulated potable water lines and fire sprinkler pipes to rupture and disrupt the delivery of drinking water and cause extensive property damage.

### Location

Severe winter weather occurs regionally and therefore would impact the entire City,

### Extent

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.

The Northeast Snowfall Impact Scale (NESIS) 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 factor in the area affected by the snowstorm, the snow, and the number of people living in the path of the storm. The NESIS score 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.

In the past, heavy snowfall events (such as the blizzards of 1978, 1993, and 2011) can lead to more than 20 inches of snow falling on Springfield. This results in damage to utility lines and reduces mobility along high-traffic roadways. Winter storms with severe ice can extensively damage above-ground utility lines. As snow and ice accumulates, falling limbs can lead to damages to infrastructure and buildings. In addition, during heavy snow years, accumulations can reach several feet deep. Springfield's historic road network often creates some steep grades, dangerous

intersections, or narrow throughways, sometimes making plowing difficult and causing snow and ice hazards.

### Previous Occurrences

Springfield's recent history has not recorded any loss of life due to the extreme winter weather, but there are usually several incidents of property damage or personal injury each winter. In addition, during heavy snow years, accumulations can reach several feet deep. Springfield's historic road network often creates some steep grades, dangerous intersections, or narrow throughways, sometimes making plowing difficult and causing snow and ice hazards.

On October 31, 2011, the City of Springfield was hit with a freak snowstorm that crippled the City, leaving many residents without power for seven days, and the City with a cost of \$30 million to clean-up.

- Springfield has been subject to 23 winter storms categorized as major to extreme according to the NESIS scale since 1960. Additional historically significant winter storms to affect Springfield include the Great Snow of 1717 and the Blizzard of 1888
- Moderate risk citywide due to snow, ice and extreme cold.
- Elderly are affected by extreme weather.

### Probability of Future Events

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

**TABLE 3.9: SEVERE SNOW/ICE STORM HAZARD MITIGATION ASSESSMENT**

Capability		Description	Effectiveness	Potential Improvements/Expansion
Zoning Ordinance	Wireless Communication Structures and Facilities	Structures are required to be as minimally invasive as possible to the environment, have height restrictions, and must be setback 200 % of the structure's height; 100% allowed for "stealth design towers".	Very effective for preventing damage in the case of a severe storm.	None.
	Design Standards	Utilities must be placed underground at time of construction	Effective for preventing power loss.	None.
Subdivision Regulations		Street grade regulations (maximum 10%)	Effective.	None.
State Building Code		The City of Springfield has adopted the Massachusetts State Building Code.	Effective	Effective.
Backup Electric Power		Identified shelters have backup power, three mobile generators	Effective	Very effective in case of power loss.

Tree Management	List of dangerous trees created annually for Eversource	Effective	Very effective, preventative collaboration.
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## Wildfires/Brushfire – Medium 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 lightning. 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 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.

Hampden County has approximately 273,000 acres of forested land, which accounts for 67% of total land area. Forest fires are therefore a potentially significant issue.

Wildfires and Brushfires are classified according to the "Wildfire Burn Severity Classification" which identifies fire characteristics and potential damage caused:

<b>Table 3.10: WILDFIRE BURN SEVERITY CLASSIFICATION</b>			
	<b>General Statements</b>	<b>Indicators</b>	<b>Interpretations</b>
<b>Low Fire Severity (Type III)</b>	Primarily occur on rangeland	Duff and debris are partly burned	Root crowns and surface roots will resprout quickly (within one year)
	No sediment delivery	Soil is a normal color	Infiltration and erosion potential are not significantly changed
	Natural recovery likely	Hydrophobicity is low to absent	
		Standing trees may have some brown needles	
<b>Medium Fire Severity (Type II)</b>	Primarily occur on steep, lightly timbered slopes with grass	Duff is consumed	Root crowns will usually resprout
	Some sediment delivery	Burned needles are still evident	Roots and rhizomes below one inch will resprout
		Ash is generally dark colored	Most perennial grasses will resprout
		Hydrophobicity is low to medium on surface soil up to one inch deep	Vegetative recovery is one to five years
		Soil is brown to reddish-brown and up to two inches of soil is darkened from burning (below ash)	Soil erosion potential will increase due to the lack of ground cover and moderate hydrophobicity
		Roots are viable below one inch	

		Shrub stumps and small fuels are charred, but present	
		Standing trees are blackened but not charcoal	
<b>High Fire Severity (Type I)</b>	Primarily occurs in unprotected drainages on steep, timbered, north or east slopes with dense forest canopy	Duff consumed	Soil productivity is significantly reduced
		Uniformly gray or white ash (in severe cases ash is thin and white or light)	Some roots and rhizomes will resprout, but only those deep in soil
	Sediment delivery likely	No shrub stumps or small fuels remain	Vegetative recovery is five to ten years
	Natural recovery limited	Hydrophobicity medium to high - up to two inches deep	Soil erosion potential can be significantly increased
		Two to four inches of soil is darkened (soil color often reddish orange)	
		Roots burned two to four inches	
		Soil physically affected (crusting, crystallization, agglomeration)	
		Standing trees charcoal up to one inch deep	

Source: [http://www.nrcs.usda.gov/wps/portal/nrcs/detail/mt/programs/planning/ewpp/?cid=nrcs144p2\\_056249](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/mt/programs/planning/ewpp/?cid=nrcs144p2_056249)

### Location

No particular section of Springfield is more susceptible to wildfire because all of the forested areas are relatively isolated from each other. The largest contiguous area of woodland in Springfield is Forest Park in the southeast corner of the City.

### Extent

In Springfield, approximately 19% of the City's total land area is in forest, or about 4,114 acres, and is therefore at risk of fire.

### Previous Occurrences

Illegal brushfires are somewhat common in Springfield. The fires that occur are small and quickly contained. According to the Springfield Fire Department, there were approximately 337 unauthorized burns (or brushfires) in 2020.

However, high risk exists for potential wildfire incidents, especially near some of the City's forested, agricultural, and recreational lands. 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 the brushfire. In the past five years, the City has experienced several severe weather events that have increased the deadfall in the forested areas of the City.



### Probability of Future Events

Based upon the past events, it is reasonable to say that there is a moderate probability, 10-40% in the upcoming year, of wildfires in Springfield.

TABLE 3.11: WILDFIRE/BRUSHFIRE HAZARD MITIGATION ASSESSMENT				
Capability		Description	Effectiveness	Potential Improvements/Expansion
Zoning Ordinance	Wireless Communications Structures and Facilities	Fire Chief is involved in final review of site plan for structure.	Effective	None
Subdivision Regulations	General	Fire Chief may be consulted on any subdivision approval.	Effective	None
	Design Standards	Fire protection is included in the required Development Impact Statement and as a part of the rules regulating water supply to the subdivision.	Effective	None
Public Education/ Outreach		The Fire Department has an ongoing educational program in the schools.	Effective	None

## **Man-Made Hazards – Hazardous Materials – High Risk**

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Hazardous materials are chemical substances, which, if released or misused, can pose a threat to the environment or health. These substances 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) is 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.

Due to the development patterns of the City—residential growth radiated outwards from employment centers as the City grew—a large portion of the City's neighborhoods have evolved in and around industrial centers. This makes the risk from chemical releases significantly greater, due to the immediate impact this can have on large populations.

Springfield relies on the Massachusetts Department of Fire Services District 4 HazMat Team when responding to incidents involving hazardous materials, through a mutual aid agreement.

### **Location**

According to TRI, there are 30 industries currently releasing hazardous materials within Springfield's City limits. In addition, there are 110 sites in the City considered Tier II Hazardous Materials storage facilities, 12 of which are also included in TRI. All 128 sites are included on the Past & Potential Hazards/Critical Facilities Map (Appendix C). Finally, there are over 69 Tier II facilities reporting in Springfield, and 23 of those are listed as facilities that manage extremely hazardous substances.

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. 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.

### **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 in Springfield the extent could range from limited to critical.

### Previous Occurrences

The City of Springfield has had a high level of chemical spills and toxic events for the past several decades. Springfield's history as an industrial City has resulted in a high concentration of businesses and abandoned sites that contain hazardous chemicals. In addition to this, the ribbon of railways and roadways that weave across the City carries industrial freight that oftentimes contains hazardous chemicals. The rail network is a major connecting route between Boston and Chicago, and between Quebec and New York City. Only one major petroleum pipeline serves the region and Springfield which is the sole provider of products to both distributors and military customers. Finally, there are over 63 Tier II facilities reporting in Springfield, and 23 of those are listed as facilities that manage extremely hazardous substances.

The convergence of several factors has led to a series of accidents in Springfield. In 1984, a release of fuming nitric acid forced the evacuation of 10,000 people from their homes and businesses in a period of 12 hours. In 1986, two releases of fuming nitric acid caused the evacuation of 5,000 people for a period of eight hours *plus* the evacuation of 1,000 more people which led to the shutdown of all interstate and rail lines for the same amount of time. In 1988, a chlorine release from a warehouse forced the evacuation of more than 50,000 people for three days. In 1991, an accident with a truck carrying nuclear fuel rods on Interstate 91 caused the closure of the highway and the City's central business district for 14 hours. In 1993, a truck leaked hydrochloric acid in several portions of the City as it drove until emergency personnel stopped it. In 2002, a leak of 5,000 pounds of anhydrous ammonia placed the City at risk for 24 hours. In addition, the City has three major interstates that are within the City limits, along with and East-West freight rail that passes through the City. This critical transportation infrastructure carries a variety of Hazardous Materials through the City on a daily basis.

### Probability of Future Events

On average, there is one event per week in Springfield, but most of these events are related to small-scale releases of petroleum and the likelihood of a catastrophic release is very low.

## Dam Failure – Medium Risk

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. 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.

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 rise above, overtop, and then erode the material components of the dam.

### Location

According to DCR sources, as well as local knowledge, there are currently eleven (11) dams<sup>5</sup> in Springfield. The following table identifies the dams within the City as well as whether they are classified as low, significant, or high hazard.

<b>Table 3.12: Dams in Springfield</b>					
<b>Dam Name/ Date Built</b>	<b>ID</b>	<b>Owner</b>	<b>Purpose</b>	<b>Condition/Last Inspected</b>	<b>Hazard Risk</b>
Watershops Pond Dam	MA00569	City of Springfield	Recreation	Fair/ 08-20-19	High
Van Horn Park Lower Dam	MA00571	City of Springfield	Recreation	Rebuilt/ 2019-2021	High
Breckwood Pond	MA00570	City of Springfield	Recreation	Poor/04-09-2021	Significant
Forest Park Middle Pond Dam	MA02358	City of Springfield	Recreation	Poor/03-28-18	Significant
Forest Park Upper Pond Dam	MA00568	City of Springfield	Recreation	Poor/ 07-06-21	Significant
Plastic Park Dam	MA00573	USPS	Recreation	Breached/N/A	Low
Putnam’s Puddle Dam	MA00572	City of Springfield	Recreation	Unsafe, Partially Breached/ 03-25-18	Low
Baystate Plumbing & Heating Pond Dam	MA02007	City of Springfield	Non-functional power	City has indicated to Office of Dam Safety that this dam is not owned by the City; however, DPW is	Significant

<sup>5</sup> It is difficult to track down accurate records of dams, as ownership and exact location is not clear. Furthermore, many very old dams listed in DCR records are not in existence anymore, according to local knowledge. This list is compiled from a combination of sources, and then verified by the Committee.

				pursuing dam removal as a part of the flood control system	
Mill Pond Dam	MA00575	City of Springfield	Recreation	Fair/ 07-09-20	Low
Van Horn Park Upper Dam	MA00574	City of Springfield	Recreation	Poor/ 03-30-21	Low
Forest Park Lower Pond Dam	MA02357	City of Springfield	Recreation	N/A	Non-jurisdictional

### Extent

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 three hazard classifications for dams:

- High Hazard: Dams located where failure or improper operations 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.

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.

There are several small dams along the City's streams and rivers, but a thorough review of the dam inundation zones for these properties (conducted for the City's CEM Plan) indicated that there was little risk of damage to life and property from these structures. While these structures pose little risk, the Quabbin Reservoir Dams and the Cobble Mountain Dam pose a significant risk to the City.

The Quabbin Reservoir's Primary Dam is 170 feet high and holds back 412 billion gallons of water. This structure is located to the east along the Belchertown and Ware town boundaries. A breach of this dam would take 8 hours for the maximum damage to the City to be realized, during which the water levels of the Connecticut and Chicopee Rivers would crest 60 feet above their normal peaks; backwash into the North Branch and Mill Rivers would also result in severe local flooding. For a 48-hour period, the City would be divided into four isolated sections and once the flood waters receded, the impact and scope of the devastation would be catastrophic. The Massachusetts Water Resources Authority owns these dams and is responsible for maintenance and inspections.

The Cobble Mountain Reservoir Dam is located to the west in the Town of Russell. The failure of this dam would result in significant flooding of the Connecticut River. The Connecticut's water levels would rise 43 feet above normal levels in eight hours, and significant portions of the City would be under water. This dam is owned by the Springfield Water and Sewer Commission which is responsible for maintaining it.

Essential Power, LLC owns a dam in Indian Orchard at the Indian Orchard power substation along the Chicopee River. Failure of this would cause damage to a mobile home park located on Grochmal Avenue and to the Eastman (formerly Solutia) industrial complex. The mobile home park's location gives residents less than 30 minutes to evacuate their homes safely.

### Previous Occurrences

There have been two dam failures in Springfield's recent history. The first was "Putnam's Puddle" in August 1991, and was a result of Hurricane Gloria. An earthen dam, it self-breached as a result of the storm, and even though it was listed as a high-hazard dam, the impact, luckily, was minimal. The contents of the "Puddle" washed into Breckwood Pond. The Breckwood Pond Dam held and effluent proceeded to Watershops Pond and down the North Branch of the Mill River into the Connecticut River.

In the winter of 2006 the Plastics Park Dam, a high hazard dam, began to fail at its spillway. Its foot flooded as a result of downstream animal (beaver) activity. Beavers had blocked a culvert under a railroad spur along Worcester Street. Two large pumps on flatbed trailers were brought in to keep the lagoon from flooding onto Worcester Street. Solutia, in anticipation of the failure of the plastics Park Dam, partially breached the dam and stabilized the shoulders of the spillway. The beavers were relocated. CSX, Inc. repaired and upgraded the conduit under the railway spur to accommodate additional flow. In August 2011, during Hurricane Irene, the remaining structure of the Plastics Park Dam self-breached with little or no consequence.

### Probability of Future Events

Based upon the past events, it is reasonable to say that there is a low frequency of dam failure in Springfield.



## **Landslides – Medium/Low Risk**

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According to the United States Geological Survey (USGS), landslide is a general term used to describe the downslope movement of soil, rock, and organic materials under the effects of gravity and also the landform that results from such movement. There are various different classifications of landslides that are associated with specific mechanics of slope failure and the properties and characteristic of failure types.

A major cause of landslides in Springfield is escarpment saturation. An escarpment is a steep slope or long cliff that exists today due to the action of glaciers thousands of years ago. The escarpments generally occur at the margins of stream or glacial outwash terraces or are geological gullies in soft, water-deposited soil strata. Because of the environmental conditions present during their formation, escarpments are closely associated with freshwater wetlands and streams.

### **Location**

According to the “Soil Survey of Hampden County, Massachusetts” U.S. Department of Agriculture, a significant percentage of the land within the City of Springfield is composed of terrace escarpments (see Appendix E: Terrace Escarpments and Steep Slopes). Although the USDA Soil Survey has mapped significant portions of Springfield as Terrace Escarpments, many of the terrace-associated landforms within the City have been so altered or obscured by urban works and structures that identification of specific soils on a survey level is impossible, yet the landforms still bear the characteristics of the steep, often-unstable terrace slopes. To assist in identifying these areas, a slope analysis of the topography within the City of Springfield was applied to the 2005 Digital Elevation Model (DEM) obtained from the Commonwealth of Massachusetts, Office of Geographic Information (MassGIS). These areas are also identified on Appendix E.

### **Extent**

Due to their unconsolidated nature, steep slopes, and the presence of sands and gravels overlying silts and clays, terrace escarpments and associated landforms can easily become unstable, especially where historical development activities have occurred on or near these landforms. These soils can slowly or suddenly erode and/or slip, causing gullies, landslides, and even massive loss of soil. This is a natural process for these soils, which may be initiated or increased by human activities. Increased storm water runoff, concentrated storm water flows, and increased overburden weight can all act to promote excessive slope erosion or occasional large-scale slope failures, with resultant damages to infrastructure and the built environment, and attendant threats to human health and safety. Not only has soil erosion and slope failure on terrace escarpments resulted in damages to personal property and public infrastructure, these sometimes unpredictable phenomena have also severely impacted the City of Springfield's wetland resources, disrupting wildlife habitat and contributing to reductions in water quality.



### Previous Occurrences

In the past twenty-five years, the following locations have experienced landslide occurrences:

- Crest Street
- Dickinson Street
- Old Colony Road
- Magawiska Road
- South Branch Parkway
- Tiffany Street
- Trafton Road

All of these locations are on the perimeter of Forest Park which is a region identified to have a high volume of terrace escarpments.

### Probability of Future Events

Based on the State's Hazard Mitigation Plan, Springfield has a high susceptibility to landslides but low incidence.

## Tornadoes/Microbursts – Medium/Low Risk

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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.

The impact of a tornado is identified according to the Enhanced Fujita scale, which classifies tornadoes based on wind speeds and a various collection of observed damage.<sup>6</sup>

TABLE 3.13: ENHANCED FUJITA SCALE						
FUJITA SCALE			DERIVED EF SCALE		OPERATIONAL EF SCALE	
F Number	Fastest 1/4-mile (mph)	3 Second Gust (mph)	EF Number	3 Second Gust (mph)	EF Number	3 Second Gust (mph)
0	40-72	45-78	0	65-85	0	65-85
1	73-112	79-117	1	86-109	1	86-110
2	113-157	118-161	2	110-137	2	111-135
3	158-207	162-209	3	138-167	3	136-165
4	208-260	210-261	4	168-199	4	166-200
5	261-318	262-317	5	200-234	5	Over 200

Source: <http://www.spc.noaa.gov/efscale/ef-scale.html>

Within Massachusetts, tornadoes have occurred most frequently in Worcester County and in communities west of Worcester, including towns and cities in Hampden County.

Of additional concern are microbursts, which often do 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 rising temperatures resulting from climate change.

### Location

The hazard area for tornadoes in Springfield varies according to the intensity and size of the tornado. There have not been enough tornadoes in Springfield to accurately predict sections of town that are more likely to experience a tornado.

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<sup>6</sup> According to NOAA, "The Enhanced F-scale still is a set of wind estimates (not measurements) based on damage. Its uses three-second gusts estimated at the point of damage based on a judgment of 8 levels of damage to the 28 indicators listed below. These estimates vary with height and exposure. **Important:** The 3 second gust is not the same wind as in standard surface observations. Standard measurements are taken by weather stations in open exposures, using a directly measured, "one minute mile" speed."

## Extent

Because tornadoes and microbursts rarely occur 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 City of Springfield is vulnerable.

- Tornadoes/microburst hazard estimates 20% damage to 10% of structures in the City;
- Vulnerability assessment estimates in damages; \$162,882,101
- Estimated cost does not include building contents, land values or damages to utilities.

## Previous Occurrences

On June 1, 2011, an EF3 tornado<sup>7</sup> touched down in Springfield, damaging six miles of the City and destroying thousands of structures, schools and infrastructure that resulted in a five-day State of Emergency. The immediate aftermath brought a level of collaboration from public safety, health, engineering, as well as area nonprofits and businesses, which was unprecedented. For example, the Springfield Fire Department received 15,070 emergency calls and responded to 15,953 emergencies. Fire personnel responded to emergencies from residents on the street or outside their homes that were unable to call due to downed phone and power lines). For several weeks following the tornado the City's Office of Emergency Preparedness facilitated meetings between the City's leadership, local utility companies, the Pioneer Valley Red Cross, the Salvation Army and other critical businesses as needed.

After the critical response that followed for weeks/months afterward, the City of Springfield, working with DevelopSpringfield, the Springfield Redevelopment Authority, neighborhood councils, private businesses, concerned residents and others, used this catastrophic event as a catalyst to create the "Rebuild Springfield Master Plan". While the Rebuild Springfield initiative was created in response to the June 1st tornado, the scope of the initiative is far greater than rebuilding, and includes tools that will serve to rethink Springfield's future forever. Further, the Rebuild Springfield Plan incorporated previous plans, reports, and studies from a variety of organizations and stakeholders – to include City plans and documents, neighborhood plans, ULI reports, and many other studies.

Springfield's location in Hampden County places it within the vicinity of the part of Massachusetts that experiences tornadoes more frequently than other portions of the State. Four tornadoes with an F1 ranking have been recorded in Springfield since 1950, but none of them caused any known damage. In Western Massachusetts, the majority of sighted tornadoes have occurred in a swath east of Springfield, known as "tornado alley." Fifteen incidents of tornado activity (all F2 or less)<sup>8</sup> occurred in Hampden County between 1959 and 2005.

## Probability of Future Events

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<sup>7</sup> Beginning 1 February 2007, the National Weather Service began utilizing a tornado classification system referred to the "EF", or Enhanced Fujita, scale. Events noted in this plan occurring prior to 2007 are referred to on the original "F", or original Fujita, scale.

<sup>8</sup> F2 refers to a 113-157 mph tornado as classified by the commonly used Fujita Tornado Damage Scale which ranks tornados F0-F5 depending on estimated wind speeds and damages, with F5 the most severe.

Based upon the past events, it is reasonable to say that there is a low frequency of tornadoes in Springfield with one tornado occurring approximately every 15 years.

## Earthquakes – Medium/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.

Earthquakes are measured according to their magnitude and intensity on separate scales. Magnitude is measured by the moment magnitude (Mw) scale<sup>9</sup>, and the numerical Richter Scale, while intensity measurements are typically done according to Modified Mercalli scale.

<b>TABLE 3.14 MODIFIED MERCALLI SCALE INTENSITY</b>		
<b>Modified Mercalli Scale Intensity</b>		
<b>Intensity</b>	<b>Shaking</b>	<b>Description/Damage</b>
I	Not felt	Not felt except by a very few under especially favorable conditions.
II	Weak	Felt only by a few persons at rest, especially on upper floors of buildings.
III	Weak	Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations similar to the passing of a truck. Duration estimated.
IV	Light	Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.
V	Moderate	Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
VI	Strong	Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.
VII	Very strong	Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.
VIII	Severe	Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.
IX	Violent	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
X	Extreme	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.

<sup>9</sup> According to the USGS, “the moment magnitude (Mw) scale, based on the concept of seismic moment, is uniformly applicable to all sizes of earthquakes but is more difficult to compute than the other types. All magnitude scales should yield approximately the same value for any given earthquake.”

Source: USGS Earthquake Glossary – Magnitude: <http://earthquake.usgs.gov/learn/glossary/?term=magnitude>

According to the US Geological Survey “On the Richter Scale, magnitude is expressed in whole numbers and decimal fractions. For example, a magnitude 5.3 might be computed for a moderate earthquake, and a strong earthquake might be rated as magnitude 6.3.”

Because of its calculus, the Richter Scale is useful when gauging earthquake intensity in specific locations but because earthquakes “flow” and permeate over great distances, scales like the Moment-Magnitude are more broadly applicable.

<b>TABLE 3.15: Orders of Magnitude on the Richter Scale</b>	
<b>Magnitude</b>	<b>Effects</b>
1 to 3.5	Generally not felt, but recorded
3.5 to 5.4	Often felt, but rarely causes damage
Under 6.0	At most, slight damage to strong buildings
6.1 to 6.9	Destructive over 100km where people live
7.0 to 7.9	Major earthquake causing serious damage
8.0 or greater	Great earthquake causing damage over an area hundreds of kilometers across

Source: <http://mms.nps.gov/yell/ofvec/exhibits/eruption/earthquakes/quake2.htm>

Source: <http://earthquake.usgs.gov/learn/topics/mercalli.php>

## Location

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

The following charts show the location, magnitude and total number of earthquakes that have affected the New England area.

<b>Table 3.16: New England Earthquakes (1924-2002)<sup>10</sup> magnitude 4.2 or higher</b>		
<b>Location</b>	<b>Date</b>	<b>Magnitude</b>
Ossipee, NH	December 20, 1940	5.5
Ossipee, NH	December 24, 1940	5.5
Dover-Foxcroft, ME	December 28, 1947	4.5
Kingston, RI	June 10, 1951	4.6
Portland, ME	April 26, 1957	4.7
Middlebury, VT	April 10, 1962	4.2
Near NH Quebec Border, NH	June 15, 1973	4.8

<sup>10</sup> Northeast States Emergency Consortium Web site: [www.nesec.org/hazards/earthquakes.cfm](http://www.nesec.org/hazards/earthquakes.cfm)

West of Laconia, NH	Jan. 19, 1982	4.5
Plattsburg, NY	April 20, 2002	5.1

<b>Table 3.17: New England States Record of Earthquakes</b>		
<b>State</b>	<b>Years of Record</b>	<b>Number of Earthquakes</b>
Connecticut	1678 – 2016	115
Maine	1766 – 1989	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 (1568-1989)		1381

### Extent

Massachusetts introduced earthquake design requirements into their building code in 1975. 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 1975 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.

- Because many of the buildings were built before 1975 (an estimated 78% of 62, 706), there is potential for serious damage throughout Springfield;
- Structures are mostly wood frame construction, so loss estimates predict 20% of City assessed value, not including costs of repairing or replacing roads, bridges, power lines, telephone lines, or the contents of the structures;
- Vulnerability assessment estimates approximately \$1,628,821,008.

### 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.

Strong earthquakes in the Street Lawrence Valley in 1638, 1661, 1663, and 1732 were felt in Massachusetts. The 1638 and 1663 shocks damaged chimneys at Plymouth, Salem, and Lynn. On June 11, 1643, Newbury, Massachusetts, was strongly shaken. Again in 1727 (November 9) an earthquake described as "tremendous" in one report and "violent" in another caused much damage at Newbury. The shock was felt from the Kennebec River to the Delaware River and

from ships at sea to the extreme western settlements. Several strong aftershocks were reported from the area through February 1728.

Tables 3.3 & 3.4 contain information regarding most of the earthquakes, including all of affecting New England, the significant ones. None have been noted to cause any damage in Springfield or the surrounding area.

### Probability of Future Events

Based upon the past events, it is reasonable to say that there is a low frequency of major earthquakes in Springfield (there have been no earthquakes over 4.2 on the Richter scale in nearly 100 years). The possibility of a less severe earthquake, or tropical storm, affecting Springfield in any given year is slightly less than 1 percent, but these are unlikely to cause any significant damage.

<b>Table 3.18: Earthquake Hazard Mitigation Assessment</b>				
<b>Capability</b>		<b>Description</b>	<b>Effectiveness</b>	<b>Potential Improvements/Expansion</b>
Zoning Ordinance	Wireless Communications Structures and Facilities	Structures are required to be as minimally invasive as possible to the environment, have height restrictions, and must have be setback 1.25 times the structure's height.	Very effective for preventing damage in the case of an earthquake.	None.
State Building Code		The City of Springfield has adopted the State Building Code.	Effective for new buildings only.	Evaluate older structures categorized as critical facilities to determine if they are earthquake/disaster resistant.



## Drought – Low Risk

Drought is a normal, recurring climate feature. It occurs almost everywhere, though features vary from region to region. In the most general sense, 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.

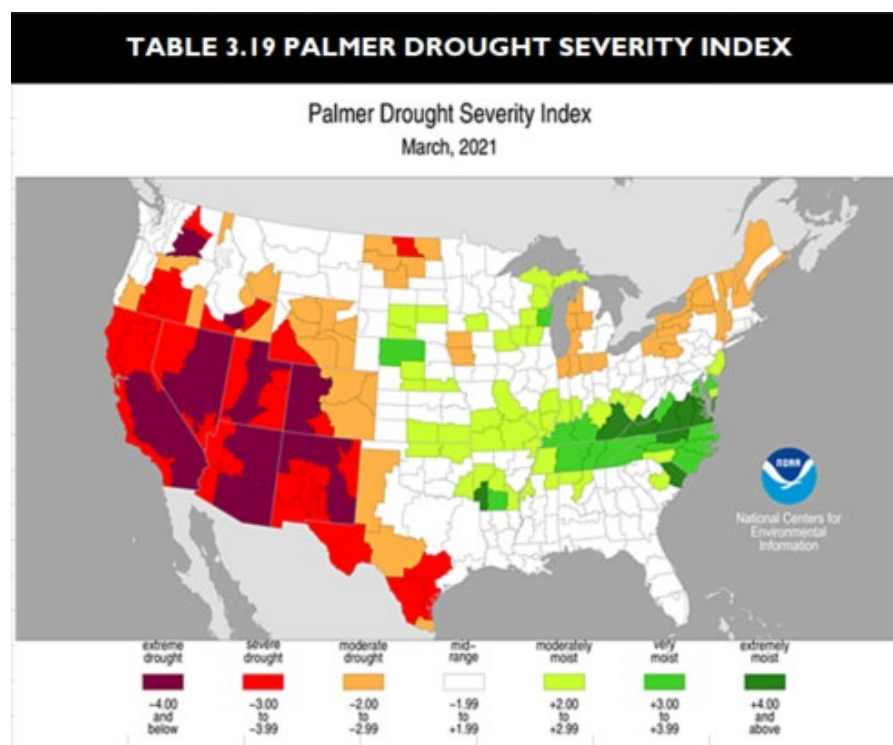
Reduced crop, rangeland, and forest productivity, increased fire hazard, reduced water levels, increased livestock and wildlife mortality rates, and damage to wildlife and fish habitat are a few examples of the direct impacts of drought. Of course, these impacts can have effects throughout the region and even the country.

### Location

A drought would affect all of Springfield.

### Extent

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, and 1995-2001. Furthermore, climate change 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 cause, among other things, the potential for more severe, longer-lasting droughts. Additionally, even minor droughts will increase the risk of wildfire, especially in areas of high recreational use.



### Previous Occurrences

In Massachusetts, six major droughts have occurred statewide since 1930. They range in severity and length, from three to eight years. 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.

Springfield has had limited experience with severe drought conditions. The City has not experienced a threat to its water supply, and doesn't anticipate any severe water shortages throughout the City.

### Probability of Future Occurrences

Springfield's water supply system was designed to accommodate a much larger population, so there is little historical evidence of water shortages in Springfield. The City's two reservoirs, Cobble Mountain and Borden Brook, have a combined daily DEP permitted daily safe yield of 79.1 million gallons per day and the average daily withdrawal is roughly 36 million gallons per day. There have been no documented water shortages and the City's Comprehensive Emergency Management Plan identifies the loss of water as a low risk for Springfield.

## Extreme Temperatures – Low Risk

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As per the Massachusetts Hazard Mitigation Plan, there is no universal definition for extreme temperatures, and extreme temperatures can be defined as those that are far outside the normal ranges. Extreme heat, for this climatic region, is usually defined as a period of three or more consecutive days above 90°F, but more generally a prolonged period of excessively hot weather, which may be accompanied by high humidity. Extreme cold, again, is relative to the normal climatic lows in a region. Temperatures that drop decidedly below normal and wind speeds that increase can cause harmful wind-chill factors.

Extreme temperature is a very dangerous state that can lead to medical emergencies in both extreme cold and extreme heat. The National Weather Service (NWS) has multiple alerts that are issued when the proper criteria are expected. Extreme heat is the leading cause of weather-related fatalities in the United States. The City of Springfield will typically have 5-10 days a year with temperatures in the 90's with the possibility of having a day where the temperature reaches above 100°F. Extreme cold can last for several days in the Springfield area. Extreme cold can bring health emergencies to the various populations such as the homeless, infirmed, elderly and children. The average temperatures for Massachusetts are:

- Winter (Dec-Feb) Average = 27.83°F
- Summer (Jun-Aug) Average = 71.33°F

### Location

Extreme temperatures occur regionally; therefore, the hazard would impact the entire city.

### Extent

Extreme heat, according to the Center for Disease Control (CDC), is when the temperature is substantially hotter and or more humid than average. CDC describes extreme cold as when temperatures drop below normal and can be very dangerous if it is windy.

The City of Springfield experiences extreme temperatures at least once or twice a year. Research shows that extreme temperatures are becoming more frequent due to climate change.

### *Extreme Heat*

The National Weather Service uses the heat index scale to measure extremely hot temperatures. The scale takes into consideration the air temperature and the humidity. With this information they are able to determine the risk to humans. The National Weather Service (NWS) uses this chart to determine if they need to release a Heat Advisory (100-104 degrees F for 2 or more hours) or an Excessive Heat Warning (105+ degrees F for 2 or more hours).

**TABLE 3.20 HEAT INDEX**

Heat Index

Relative Humidity (%)		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	96	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.										

### Extreme Cold

There is no exact definition for extreme cold according to the NWS they do calculate the intensity of cold temperature via the wind chill. The wind chill is determined by using the Wind Chill Index which takes into consideration what the temperature feels like outside for people and the rate in which the rate of heat is loss from exposed skin due to the wind and temperature. The NWS will use the chart to then determine if a wind chill warning needs to be issued based on whether the sustained wind and if it is -25 degrees F or below for 3 hours or more.

**TABLE 3.21 WIND CHILL TEMPERATURE CHART**

*Wind Chills*

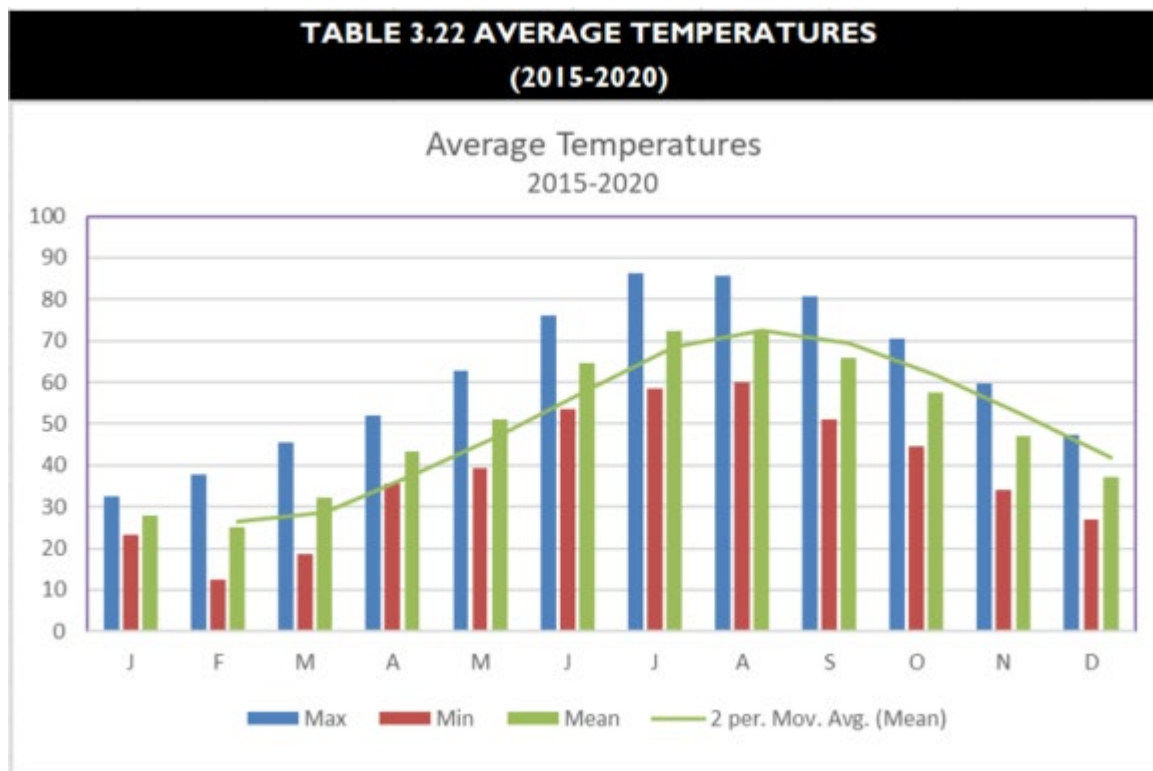
		Temperature (°F)															
		Calm	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30
Wind (mph)	5	36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52
	10	34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59
	15	32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64
	20	30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68
	25	29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71
	30	28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73
	35	28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76
	40	27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78
	45	26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79
	50	26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81
	55	25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82
	60	25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84

Frostbite Times: 30 minutes (light blue), 10 minutes (medium blue), 5 minutes (dark blue)

**Wind Chill (°F) = 35.74 + 0.6215T - 35.75(V<sup>0.16</sup>) + 0.4275T(V<sup>0.16</sup>)**  
 Where, T= Air Temperature (°F) V= Wind Speed (mph) Effective 11/01/01

### Previous Occurrences

The City of Springfield has experienced both extreme cold and heat conditions. The following chart shows the record temperature for heat and cold along with the mean within the last 5 years (2015-2020). All data was gathered from the NWS NOWData resource.



### Probability of Future Events

The probability of future extreme heat and extreme cold is considered to be “very high”, 70-100% chance of occurring in the next year. Multiple studies have shown that extreme temperatures are occurring more frequently due to climate change.

## 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

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

1. The first category contains facilities needed for Emergency Response in the event of a disaster.
2. 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 Springfield.
3. The third category contains Facilities/Populations that the Committee wishes to protect in the event of a disaster.
4. 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 C) identifies these facilities.

### Category I – Emergency Response Services

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The City 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: Raymond Sullivan Public Safety Complex - 1212 Carew Street

Secondary: Storm Operation Center- 70 Tapley Street

#### 2) Fire Stations

Fire Chief's Office - 605 Worthington St

Fire Dept.-Arson Squad - 1212 Carew St

Fire Dept.-Public Relations – 605 Worthington St

Fire Inspections & Permits – 605 Worthington St

Springfield Fire Dispatch – 1535 Roosevelt Ave

Station 2 – 1265 Parker Street

Station 3 – 382 White Street

Station 4 – 1212 Carew Street

Station 5 – 15 Odessa Street

Station 6 – 16 Massreco Street

Station 7 – 2729 Main Street

Station 8 – 33 Eastern Avenue

3) Police Station

75 Dwight Street

50 East Street

299 Page Boulevard

130 Pearl Street

4) Highway Department

70 Tapley Street

5) Water

Bondi's Island in Agawam

6) Emergency Fuel Stations

Department of Public Works – 70 Tapley Street, Springfield

7) Emergency Shelters

Central High School

Commerce High School

Kiley Jr. High School

Van Sickle Middle School

Elias Brookings Elementary School

8) Water Sources

Numerous locations in Springfield, any available.

9) Transfer Station/Waste Management

State Recycling Center – Birnie Ave

Bondi's Island in Agawam

10) Helicopter Landing Sites

Massachusetts State Police Springfield Barracks – Armory Street

Mercy Medical Center – Stafford Street

Baystate Medical Center – Chestnut Street

MassMutual Insurance Company – State Street

Van Horn Park- Armory Street

11) Communications

1500 Main Street

22 Birnie Avenue

101 West Street

1212 Carew Street

440 Tiffany Street

99 Arnold Avenue

224 Hancock Street

556-562 Saint James Avenue



1414 State Street

2025 Roosevelt Avenue

101 West Street

230 Verge Street

Bound By Main Street, Vernon Street, East Cumberland Street & Pynchon

## 12) Primary Evacuation Routes

Main Street – Indian Orchard

Main Street – Downtown Springfield

Plainfield Street

Route 141 (Worcester Street)

Route 21

Route 143

Route 291

Route 5

Route 83

## 13) Bridges/Culverts Located on Evacuation Routes

20 Park Avenue – Connecticut River

Allen Street – Mill River

Allen Street – Raceway

Belmont Avenue – Mill River

Flint Street – Mill River

Fox Road – Mill River

Hancock Street – Mill River

Interstate 91 – Water Mill River

Mill Street-Mill River

NBR Parkway – Mill River

Roosevelt Avenue – Watershops Pond

Sunrise Terrace – Mill River

## **Category 2 – Non Emergency Response Facilities**

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

### **1) Problem Culverts**

Abbe Brook

Acorn Street drainage ditch and culvert

Dickinson Street – towards Porter Lake Drive

North Brook culvert

Poor Brook drainage ditch

Roy Street drainage ditch and culvert

Senator Street drainage ditch and culvert

Worcester Street near Bircham Road

Several drainage areas around Forest Park into the Porter Lake system

## **Category 3 – Facilities/Populations to Protect**

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

### **1) Special Needs Population/ Elderly Housing/Assisted Living**

2-90 Barney Street 4-102 Trafton Street

603 Berkshire Ave. - 45

63-67 Florida Street Not In Use

Bay State Place - 414 Chestnut Street

Baystate Ambulatory Care Center 3300 Main Street **(Emergency Power)**

Baystate Med Ctr. - 759 Chestnut Street

Baystate Med Ctr. (South Campus) - 140 High Street **(Emergency Power)**

Beech Manor Rest Home 38 Warner St **(Emergency Power)**

Blue Spruce Rest Home 175 Bowdoin Street

Carpe Diem Apts. - 1228 Carew Street

Central Apartments - 347-367 Central Street

Chateau Apts. 5 Temple Street - -

Chestnut Park 115-185 Dwight Street

Christopher Ct Apts. 1118-1122 Street Ames Av

City Wide Assocs. - 11 Acushnet Ave.

Forest Park Manor 472 Dickinson St

Gentile Apartments - 85 Williams Street

Hampden House Rest 190 Kendall Street

Harrigan Apartments - 107 Belmont Street

Highland House - 250 Oak Grove Av.

Hobby Club Housing - 307 Chestnut Street

Hogan Apts. 138- St James Av

Hunter Place Apts. - 69 Andrew Street

Independence House 1475 Roosevelt Av

Indian Orchard Manor - 1-57 Milton Ct.

Johnny Appleseed - 500 Hancock Street

Kathryn Jones Apts. - 35-49 Pendleton Av

Kendall Commons - 200 Kendall Street

Keystone Woods (Under Construction) 942 Grayson Dr. -  
Linden Towers - 310 Stafford Street  
Maple Hill Rest Home - 156 Mill Street **(Emergency Power)**  
Marbetton-Wendall Apts. - 549 Main Street  
Mercy Hospital 271 Carew Street **(Emergency Power & Self Contained Ventilation)**  
Morgan Apartments 31-51 Morgan Street-  
Morris Street Sch Apts. - 45 Dewey Street  
Myrtle Street Sch Apts. 64 Myrtle Street I.O.  
Park View Specialty Hospital - 1400 State Street **(Emergency Power)**  
Pine Manor Nursing H 1190 Liberty Street  
Primus Mason Manor - 74 Walnut Street **(Emergency Power)**  
Providence. Care Center of Springfield - 370 Pine Street  
Reed's Landing - 807 Wilbraham Rd.  
Riverview Towers - 134 Sanderson St  
Shriners Hospital - 516 Carew Street **(Emergency Power)**  
Spruce Manor (Vacant) - 388 Central Street **(Emergency Power)**  
Street James Manor - 744 Street James Av.  
Tri-Towers - 35 Saab Court  
Wingate Health Care Ctr. - 215 Bicentennial Highway **(Emergency Power)**  
Wingate Health Care Ctr. - 22 Ridgewood Place **(Emergency Power)**

2) Day Care Centers / Group Homes / Community Centers

Academy Head Start - 1190 Liberty St  
Acorn Learning- 62 Noel St  
Acres Pre-School & Kindergarten - 850 Parker St

Anne McTier House - 20-6 Wilbraham Av

Armory Sq. Day Care -1 Armory Sq.-STCC

Association for Community Living - 1 Carando Dr.

Bergin Head Start - 15 Girard Av.

Boland Head Start - 426 Armory St

Brighter Future Child Care - 83 Main Street Indian Orchard

Brooks Children's House - 99 Revere St

Camp Angelina - 1252 S. Branch Pkwy.

Carew Street Head Start - 65 Carew St

Center for Human Development- 127 Orange St

Center for Mental Health - 503 State St (operates under Center for Human Development)

Champion Child Care - 30 Bowdoin St

Child Care Service

Children & Family Center of New north Citizens' Council - 2455 Main St

Children's Center at Mason Wright- 74 Walnut St

Children's Creative Center - 170 Edendale Street

Children's Creative Ctr. - 29 Logan Street

Children's Corner - 177 1/2 Hancock St

Children's Corner Day Care - 240 Walnut St

Children's House - 24 Chapin Terrace

Children's House -720 Wilbraham Rd.

Children's Study Home - 44 Sherman St

Clarendon Family Day Care - 774 State Street

Clinton Nursing School & Kindergarten 1590 Sumner Ave.

Community Care -40 Sierra Vista Rd

Community Care Center - 69 Sunrise (residence program)

Community Enterprises - 57 Pineywood Av. -

Community Enterprises Main Office - 1985 Main Street

Ctr. for Human Dev. - 25 27 Bonnyview St

Dunbar Community Center -33 Oak Street

Early Child Ctr. - 15 Catharine St

Early Childhood Center of Greater Springfield15 Catharine St

Early Childhood Center - 143 Eastern Ave.

Eastern Avenue Head Start - 162 Eastern Ave.

El Instituto De La Familia Community Care - 549 Chestnut St

ETHOS Alcohol Treatment 56 Temple St

Exper w/Travel - 85-87 White St

Forest Park Head Start - Alderman St

Foster Memorial Nursing Home - 36 Puritan Rd.

Gandara Mental Health Center - 2155 Main St

Gandara Mental Health Ctr. (old - W W Johnson Life Ctr.)- 736 State St

Gandara Recovery House - 33 Arch St

Gerena Head Start - 200 Birnie Ave

Giggle Garden's Child Care- 469 Tiffany Street

Giggle Gardens - 1400 State St

Grey House Center- 22 Sheldon St

Hampden County Program - 54 Manhattan St

Hampden City Assn. for Comm Living- 1230 Plumtree Rd.

HCS Headstart - 33 Wilbraham Av.

Hilltop Services -210-212 Centre Street

Hilltop Services -55 Blanding St

Horizons House 764 Alden St

I O Citizen's Council - 117 Main Street I.O.

Intensive Residential Prog - 80 Glenvale St

Jacqueline's Children's house - 403 Orange Street

Jewish Comm. Ctr 1160 Dickinson St

Jolly Juniors Child Care Center - 50 Massachusetts Av

Key Program - 156 Arnold Ave.

Key Program - 576 State Street

Key Program - 786 Wilbraham Rd.

Key Program -20 Parkwood Street

Kid Stop at Brunton -1801 Parker St

Kid Stop at Glickman - 120 Ashland St

Kid Stop at Sumner - 45 Sumner Av. -

Kid Stop at Zanetti - 59 Howard St

Kiddie Kollege - 797 State Street

Kim center Adult Day Care- 604 Cottage St

Kinder Care Learning -201 Cooley Street

Laragione Rehab Center - 163 Westminister St

Laragione Rehab Center - 166 Westminister St

Laragione Rehab Center - 186 Street James Ave

Laragione Rehab Center - 187 Westminister St

Laragione Rehab Center - 204 Street James Ave

Laragione Rehab Center (main) - 179 Street James Ave

Li'l Branches - 94 Anniversary St

Liberty Extended Day Program - 5 Nursery St

Loaves and Fishes Soup Kitchen - 287 State Street

Make Way for Ducklgs - 761 Sumner Ave.

Marathon House - 5 Madison Ave. -

Mason Sq Community Center - 756 State Street

Mason Square Head Start - 30 Madison Ave.

Mayflower Senior Ctr - 80 Arvilla St

Mental Health Assn - 15 Pratt St

Mental Health Assn. - 52 Avon Place -

Mental Health Assn. -110 Lloyd Ave.

Mental Health Assoc. - 65 Price St

Michele's Kids Care -700 Parker St

Mini and Winnie Day Care - 17 John St

Montessori-Pioneer Valley - 1524 Parker St

Moxon Early Childhood Center- 20 LaFrance Street I O

Muhammad's Learning Center. - 187 Main Street I.O.

Multi-Cultural Services - 27 Brittany Rd.

Multi-Cultural Services - 294-296 Oak St I O

My Sister's House- 89 Belmont Ave.

New Beginnings Child Care - 721 State Street

New North Citizen's Council Daycare2383 Main St



North End Com Center - 2383 Main St

Open Pantry - 95 Jefferson Ave.

Open Pantry Shelter - 68 70 Calhoun St

Opportunity House - 59 Street James Av

Opportunity House- 61 Street James Ave

Orchard Children's Corner - 459 Main Street I.O.

Potter's House- 92 Clifton Ave

Prospect House 103 Prospect St

Robins Playful Panda- 34 Westminster Street

Salvation Army - 170 Pearl St

Salvation Army - 285 Liberty Street

Sch Dept. Pre-School Program - 455 Island Pond Rd

Small Wonders Child Care - 58 Marlborough Street

South End Com Ctr - 29 Howard Street

Springfield Day Nursery 155 Chestnut St

Springfield Golden Age Club - 45 East Court Street

Springfield Rescue Mission - 19 Bliss St

Springfield Boys Club - 481 Carew Street

Springfield Day Nursery - 255 King St

Springfield Day Nursery- 55 State St -

Springfield Day Nursery- 52 Sumner Ave.

Springfield Girls Club PEP - 100 Acorn St

St Lukes Rest/Women - 85 Spring St

Sullivan Head Start- 160 Nursery St

Sunshine Nursery and Daycare1- 50 Quincy Street

The Kid's Place - 594 Cottage Street

Three Rivers Program - Ridgewood Terrace

Trinity Nursery School - 361 Sumner Ave.

Worthington House 769 Worthington St

Y.M.C.A. - 275 Chestnut St

### 3) Public Buildings/Areas

(Armory Street – I-291 Circle)

16 Acres Fire Sta - 1265 Parker Street

16 Acres Public Lib - 1187 Parker Street

American Convention Svc - 50 Turnbull St

American Red Cross - 506 Cottage Street

AMR Amb. Svc. - 595 Cottage Street

Amtrak Train Stat. - 66 Lyman Street

Ar Reserve Armory - 50 East Street

Armory Museum - 1 Armory Sq.

AT&T Telephone - 351 Bridge Street

Barrows Park Pool - Walnut & Oak Sts

Bask Hall of Fame - 1000 W. Columbus Av

Baystate Gas Co. - 2025 Roosevelt Ave.

Blunt Park Pool - Blunt Park Rd.

Boston Concessions Group - 1277 Main St

Brightwood Library - 359 Plainfield Street

Bus Sta/Peter Pan - 1776 Main Street

Camp Star-Park Dept Physically Handicapped Camp - 1385 Berkshire Ave.

City Hall - 36 Court Street

Civic Center - 1277 Main Street

Conn Valley Mus - 194 State Street

Cyr Arena - Forest Park

DPW Tapley St Facility - 70 Tapley Street

E. Spfld. F.S. - 933 Page Blvd.

E. Spfld. Pub Lib - 21 Osborne Terr.

Federal Bldg. - 1550 Main Street

Fire Alarm Center - 1535 Roosevelt Ave

Fire HQ - 605 Worthington Street(EMERGENCY POWER)

Forest Park Pool - Forest Park

Forest Park Pub Lib - 380 Belmont Ave.

Franconia Golf Course (Seasonal) 619 Dwight Rd.

Greenleaf Ctr - 1189 Parker Street

GWV Smith Art Mus - 222 State Street

Hampden County Sheriff Day Reporting Ctr. - 311 State Street..

Hampden Cty Ct House - 50 State Street

I.O. Fire Station - 15 Odessa Street

I.O. Pub Library - 44 Oak Street, I.O.

Liberty Pub Lib. - 773 Liberty Street

Ma Dept. Youth Serv. - 280 Tinkham Rd.

Mason Sq. F.S. 33 Eastern Ave. (EMERGENCY POWER)

Mason Square Lib. - 765 State Street

Mass Mutual Ctr. - 1277 Main St

Massreco Fire Station - 16 Massreco Street

Medcare Amb Svc - 345 Page Blvd.

Museum of Fine Art - 49 Chestnut Street

Museum of Science - 236 State Street

Nat Guard Arm - 1505 Roosevelt Ave

North End Fire Sta - 2729 Main Street **(EMERGENCY POWER)**

Old Water Dept. Yard - 71 Colton Street

(operates PVRTA, PVRTA located at 2808 Main Street)

Park Dept. Admin - Forest Park Park Rangers

Pine Point Pub Lib - 204 Boston Rd.

Police HQ - 130 Pearl Street **(EMERGENCY POWER)**

Purchasing Dept. - 233 Allen Street

Quadrangle Complex City Library - 220 State Street

R Sullivan Public Safety - 1212 Carew Street

Reg of Motor Veh – 1250 Street James Ave.

School Dept. - 195 State Street

School Time Transportation, Inc. - 99 Arnold Av.

Smead Skating Rink - 1780 Roosevelt Ave

Spfld. Area Transit Co., Inc. (SATCO) 2840 Main Street

State Office Bldg. - 436 Dwight Street

State Police - 600 Liberty Street

Sumner Ave. F.S. - 1043 Sumner Ave

U.S. Bulk Mail Ctr. - 190 Fiberloid Ave

U.S. Post Office - 1149 Main St

U.S. Post Office - 1500 Main St

U.S. Post Office - 1883 Main St

U.S. Post Office - 19 Oak St

U.S. Post Office - 190 Fiberloid St

U.S. Post Office - 3065 Main St

U.S. Post Office - 393 Belmont Ave

U.S. Post Office - 914 State St

US Sprint - 400 Taylor Street

US Water (Bondi Island Plant) - In City of Agawam

Veterans Golf Course - 1059 S. Branch Pkwy

Eversource - 300 Cadwell Dr.

Western Mass Kidney Center 2000 Main Street

WMass Corr Alcoh Ctr. - 26 Howard Street

Zoo in Forest Park - 1 Pecousic St

#### 4) Schools

Academy at Kiley – 180 Cooley Street

Academy Hill School - 1190 Liberty Street

Alfred G Zanetti Elementary School – 474 Armory Street

Alfred Glickman Elementary School - 120 Ashland Ave

Alice Beal Elementary School - 285 Tiffany St

Arthur Talmadge Elementary School - 1395 Allen St

Baystate Academy Charter School – 2001 Roosevelt Ave.

Brightwood-Lincoln Elementary School - 255 Plainfield St

Chestnut Accelerated Middle School - 355 Plainfield St

Curtis Blake Day School - 979 Dickinson St

Daniel Brunton Elementary School - 1801 Parker St

Deberry-Swan Elementary School – 670 Union Street

Edward Boland Elementary School - 426 Armory St

Elias Brookings Middle School – 433 Walnut Street

Forest Park Middle School - 46 Oakland St

Frank H Freedman Elementary School - 90 Cherokee Dr.

Frederick Harris Elementary School - 58 Hartford Ter.

Gates Expeditionary Learning School - 1170 Carew St

German Gerena Community School - 200 Birnie Ave

Glenwood Elementary School - 50 Morison Ter.

High School Of Commerce - 415 State St

Hiram Dorman Elementary School - 20 Lydia St

Horace Mann New Leadership Cs - 180 Ashland Ave

Indian Orchard Elementary – 95 Milton Street

John Duggan Middle School - 1015 Wilbraham Rd

John F Kennedy Middle School - 1385 Berkshire Ave

Kathleen Thornton School - 44 Sherman St

Kensington Avenue Elementary School - 31 Kensington Ave

Liberty Elementary School - 962 Carew St

Liberty Preparatory Academy – 37 Alderman Street

M Marcus Kiley Middle School - 180 Cooley St

Margaret C Ells Elementary School - 319 Cortland St

Martin Luther King Chart School - 649 State St

Mary A Dryden Veterans Memorial School - 190 Surrey Rd

Mary Lynch Elementary School - 315 N Branch Pkwy

Mary O Pottenger Elementary School - 1435 Carew St

Mary Walsh Elementary School - 50 Empress Ct,

Mill Pond School - 91 Old Acre Rd

Milton Bradley Elementary School - 22 Mulberry St

Pioneer Valley Christian School - 965 Plumtree Rd

Pioneer Valley Montessori School - 1524 Parker St

Rebecca Johnson Elementary School - 55 Catherine St

Robert M Hughes Charter School - 90 School St

Roger L Putnam Vocational Tech High School - 1300 State St

Sabis International Charter School - 160 Joan St

Safe - Berkshire St Campus - 90 Berkshire St

Safe - Eastern Avenue Campus - 118 Alden Street

Safe - Recovery School - 334 Franklin Street

Safe - Wilbraham Ave Campus - 140 Wilbraham Ave

Saint Michael's Academy - 153 Eddywood St

Samuel Bowles Elementary School - 24 Bowles Park

Springfield Central High School - 1840 Roosevelt Ave

Springfield High School Science & Tech - 1250 State Street

Springfield Honors Academy - 415 State Street

The Springfield Renaissance School – 1170 Carew Street

Sumner Avenue Elementary School - 45 Sumner Ave

Thomas Balliet Elementary School - 52 Rosewell Street

Thomas Balliet Middle School – 111 Seymour Ave

Van Sickle Middle School – 1170 Carew Street

Veritas Preparatory School – 370 Pine Street

Warner Elementary School – 493 Parker Street

Washington Elementary School – 141 Washington Street

White Street Elementary School – 300 White Street

Several private daycares throughout the City – see Past & Potential Hazards/Critical Facilities Map

## 5) Religious Buildings

### **Churches**

Acres Congregation-Jehovah - 1680 Wilbraham Rd

Alden Baptist Church - 649 State St

All Nations Church of God - 67 Kenyon St

Alpha & Omega Ministry - 2755 Main St

Apostolic Church - 34 Catharine St

Bethel African Methodist - 27 Pendleton Ave

Bethesda Ev Lutheran Church - 455 Island Pond Rd

Blessed Hope Advent Christian - 1516 Sumner Ave

Blessed Sacrament - 445 Plainfield St

Canaan Baptist Church-Christ - 42 Hobart St

Canaan Baptist Church-Christ - 1430 Carew St

Celestial Praise Church of God - 321 Wilbraham Rd

Christ Church Cathedral - 35 Chestnut St



Christ Presbyterian Church - 1597 Allen St

Christadelphian Chapel - 710 White St

Christian Embassy Church - 30 Bowdoin St

Christian Hill Baptist Church - 54 Bowdoin St

Christian Hope Ministry - 1657 Main St

Christian Life Ctr. - 1590 Sumner Ave

Church in the Acres Baptist - 1383 Wilbraham Rd

Church Of God - 135 Hancock St

Church Of Jesus Christ of LDS - 376 Maple St

Church of the Nazarene - 961 Wilbraham Rd

Citylights Ministry - 4 Garfield St

Daniel's New Bethel Church - 1321 Dwight St

Diocese of Springfield - 65 Elliot St

Diocese-Western Mass-Episcopal - 37 Chestnut St

Dr. Elouise Franklin Church Inc. - 104 Hancock St

East Church Congregational - 455 Island Pond Rd

Ebenezer Missionary Baptist - 44 Dearborn St

Faith United Church - 52 Sumner Ave

Family Church - 245 Bay St

First Korean Church-Nazarene - 212 Cottage St

First Park Memorial Baptist - 1 Garfield St

First Spiritualist Church - 33 Bliss St

Foster Memorial Church - 1234 Parker St

Freedom House of God Church - 563 Union St

Friendship Baptist Church - 68 Church St

Fuentes De Salvacion - 803 Liberty St

Gardner Memorial Ame Zion - 90 Carew St

Gethsemane Chr of Jesus Christ - 47 Harvey St

Glorious Gospel Church - 627 State St

Grace Baptist Church - 60 Bowles Park

Grace Church Of Christ - 336 Springfield St

Harvest Fellowship Church - 761 Sumner Ave

Heritage Baptist Church - 640 Plumtree Rd

Holiness Church of God Seventh - 398 Hancock St

Holy Cross Catholic Church - 221 Plumtree Rd

Holy Name Rectory - 323 Dickinson St

Holy Temple Church of God - 145 Bay St

Holy Trinity Church of God - 57 Bay St

House of Prayer Apostolic - 116 Walnut St

Iglesia Bautista Hispana - 18 Salem St

Iglesia Bautista Sinai - 134 Abbe Ave

Iglesia Cristina Senda Antiqua - 372 Walnut St

Iglesia De Dios Elsiloe Inc. - 17 Morgan St

Iglesia De Dios Pentecostal - 72 Orchard St

Iglesia Fe Victoriosa Inc. - 700 Berkshire Ave

Iglesia Pentecostal Fente De - 6 Talcott St

Iglesia Vision Misionera Voz - 744 Main St

J C Williams Community Ctr. - 116 Florence St

Jehovah's Witnesses - 131 Clifton Ave

Jehovah's Witnesses - 21 Sanderson St

Jehovah's Witnesses - 187 Stuart St

Latino Ministry Movement Juan - 254 Bridge St

Librerria Christiana Fuente De - 346 Orange St

Macedonia Church-God In - 201 King St

Martin Luther King Jr. Church - 14 Concord Ter.

Mary Mother of Hope Church - 840 Page Blvd

Mass Holy Assembly Church-All - 43 Homer St

Morning Star Church - 88 Lawton St

Mt Calvary Baptist Church - 17 John St

Mt Calvery Baptist Church - 981 Wilbraham Rd

Mt Zion Baptist Church - 368 Bay St

New Creation Discipleship - 893 Boston Rd

New England District Lutheran - 400 Wilbraham Rd

New Generation Christian Chr - 605 Liberty St

New Hope Pentecostal - 364 Central St

New Jerusalem Chr-God & Christ - 209 Quincy St

Oasis Ministries Intl Church - 121 Chestnut St

Old First Church - 50 Elm St

Our Lady of Rosary Parish Hall - 334 Franklin St

Our Lady of the Rosary Parish - 334 Franklin St

Our Lady-The Sacred Heart - 417 Boston Rd

Pentecostal Bethel Church - 8 Cass St

Pentecostal Church of God - 74 Oak St

Pentecostal Church of God - 25 Terrence St

Potter's House Pentecostal Chr - 761 Sumner Ave

Power International - 1655 Main St # 302

Praise & Glory Church - 145 State St

Progressive Community Baptist - 599 State St

Revival Time Evangelistic Ctr. - 132 Florence St

Sacred Heart Church - 395 Chestnut St

Salvation Army - 170 Pearl St

Seventh Day Adventist Church - 1118 Sumner Ave

Shepherd's Gate Christian - 336 Springfield St

Shiloh Church - 91 Jasper St

Shiloh Freewill Baptist Church - 26 Burr St

Shiloh Seventh Day Adventist - 797 State St

Solid Rock Community Baptist - 821 Liberty St

South Congregational Church - 45 Maple St

Spanish Christian Church - 565 Chestnut St

Spanish Christian Church Ed - 549 Chestnut St

Spring Of Hope Church of God - 35 Alden St

Springfield Hispanic Seventh - 124 Putnam Cir

Springfield Presbyterian Chr - 18 Spencer St

Springfield Wesleyan Church - 82 White St

St Barnabas & All Saints Chr - 41 Oakland St

St Catherine of Siena Parish - 1023 Parker St

St Francis of Assisi Chapel - 254 Bridge St

St George Greek Orthodox Chr - 22 Saint George Rd

St John's Congregational Chr - 643 Union St

St Joseph Parish - Po Box 70666

St Luke's Episcopal Church - 961 Saint James Ave

St Mark Armenian Church - 2427 Wilbraham Rd

St Mark's Cme Church - 64 Dresden St

St Michaels Catholic Cathedral - 260 State St

St Patrick's Church - 1900 Allen St

St Paul's RC Church - 235 Dwight Rd

St Peter & St Paul Russian Chr - 118 Carew St

St Peter's Episcopal Church - 45 Buckingham St

St Rachel's Holiness Church - 171 Eastern Ave

Strait to Heaven Church - 2 Orange St

Temple Of Praise - 433 Eastern Ave

Third Baptist Church - 149 Walnut St

Trinity Lutheran Church - 400 Wilbraham Rd

Trinity United Methodist Chr - 361 Sumner Ave

True Vine Church - 140 Andrew St

Union Church - 91 Jasper St

United House of Prayer - 331 Wilbraham Rd

Unity in Christ Deliverance - 45 Dearborn St

Wachogue Congregational Church - 80 Arvilla St

Wesley United Methodist Church - 741 State Street

Whole Truth Temple - 8 Norfolk Street

Word of Life Church - 282 White Street

Zion Community Baptist Church - 1140 Roosevelt Ave

### **Synagogues**

Beth El Temple - 979 Dickinson Street

Kesser Israel Synagogue - 19 Oakland Street

Kodimoh Synagogue - 124 Sumner Ave

Sinai Temple-Reform - 1100 Dickinson Street

### **Mosques**

Al Baqi Islamic Ctr. - 495 Union Street

## **6) Historic Buildings/Sites**

Apremont Triangle Historic District - Jct. Pearl, Hillman, Bridge, and Chestnut

Bangs Block - 1119 Main Street

Baystate Corset Block - 395-405 Dwight Street and 99 Taylor Street

Belle and Franklin Streets Historic District - 77--103 Belle Street and 240--298 Franklin Street

Bicycle Club Building - 264-270 Worthington Street

Burbach Block - 1113-1115 Main Street

Carlton House Block - 9-13 Hampden Street

Chapin National Bank Building - 1675-1677 Main Street

Colonial Block - 1139-55 Main Street

Court Square Historic District - Bounded by Main, State, Broadway, Pynchon St's., and City Hall Pl.

Cutler and Porter Block - Also known as 109 Lyman Street

Downtown Springfield Railroad District - Roughly bounded by Lyman, Main, Murray, and Spring St's.

Driscoll's Block - 211-13 Worthington Street

Edisonia Theater Block - 1156--1176 Main Street

Ethel Apartment House - 70 Patton St

First Church of Christ, Congregational - 50 Elm Street

Fitzgerald's Stearns Square Block - 300-308 Bridge Street

Forest Park Heights Historic District -Off MA 21

French Congregational Church - 33-37 Bliss Street

Fuller Block - 1531-1545 Main Street

Guenther & Handel's Block - 7--9 Stockbridge Street

Gunn and Hubbard Blocks - 463-477 State Street

Hampden County Courthouse - Elm Street

Hampden Savings Bank - 665 Main Street

Haynes Hotel Waters Building - 1386-1402 Main Street

Henking Hotel and Cafe - 15-21 Lyman Street

## 7) Employment Centers

American International College - 1000 State Street

Springfield College - 263 Alden Street

Western New England College - 1215 Wilbraham Rd

Baystate Health - 280 Chestnut Street

Baystate Medical Ctr. - 759 Chestnut Street

Baystate Medical Ctr. Specialty - 140 High Street

Hartford Hospital - 80 Seymour Ave

Mercy Medical Ctr. - 271 Carew Street

Park View Rehab & Nursing Ctr. - 1400 State Street

Shriner's Hospital - 516 Carew Street

Weldon Rehabilitation Hospital - 233 Carew Street



**Table 4.1: Critical Facilities and Evacuation Routes Potentially Affected by Hazard Areas**

Hazard Type	Hazard Area	Critical Facilities Affected	Evacuation Routes Affected
<b>Flooding</b>	Connecticut River Flooding	Baystate Medical Center campus and associated clinics on Main Street	Main Street, Springfield Street, Chestnut Street, Armory Street
		Springfield Housing Authority residences in the Brightwood Section of Springfield along Riverside Road	Worcester Street (Route 141), Cadwell Street, Bircham Street
		Grochmal Avenue Wastewater Treatment facility	Worcester Street (Route 141), Cadwell Street, Bircham Street
	Chicopee River Flooding	Grochmal Mobil Home Park	Worcester Street (Route 141), Cadwell Street, Bircham Street
		MA Fire Training Center	Worcester Street (Route 141), Cadwell Street, Bircham Street, Main Street (IO), Berkshire Avenue, Fiberloid Street
		Eastman	Main Street (Indian Orchard), Oak Street, Myrtle Street, Parker Street, Berkshire Avenue
		Water Street Section of Indian Orchard	Mill Street, Locust Street, Main Street, Belmont Avenue, Pine Street
<b>Hurricane/Severe Wind</b>	Citywide Impact	All critical facilities affected	Evacuation Routes will be main City Arterials such as: Main Street, East and West Columbus Ave, Sumner Ave, Parker St, Boston Road, Carew Street, Berkshire Ave., Page Blvd, State Street would be primary Routes.
<b>Severe Snow/Ice Storm</b>	Citywide Impact	All critical facilities affected	Evacuation Routes will be main City Arterials such as: Main Street, East and West Columbus Ave, Sumner Ave, Parker St, Boston Road, Carew Street, Berkshire Ave., Page Blvd, State Street would be primary Routes.

**Table 4.1: Critical Facilities and Evacuation Routes Potentially Affected by Hazard Areas**

Hazard Type	Hazard Area	Critical Facilities Affected	Evacuation Routes Affected
<b>Wildfire/Brushfire</b>	Limited Impact	Baystate Medical Center – Main Campus	Main Street, Springfield Street, Chestnut Street, Armory Street
		Buckeye Pipeline Terminal	Albany Street, Armory Street, Street James Avenue, Route 291
		FL Roberts Terminal (Buckeye Pipeline)	Albany Street, Armory Street, Street James Avenue, Route 291
		Sprague Oil Terminal (Buckeye Pipeline)	Albany Street, Armory Street, Street James Avenue, Route 291, Tapley Street, Bay Street
		Department of Youth Services Secure Residential Facility	Tinkham Road
		Mercy Hospital	Carew Street, Stafford Street, Armory Street, Chestnut Street
		Big Y Center	Roosevelt Ave., Cottage Street, Route 291, Industry Ave., Memorial Ave.
		Department of Youth Services Secure Residential Facility	Tinkham Road, Wilbraham Road, Stoney Hill Road (Wilb.)
		Forest Park	Sumner Ave, Dickenson Street, Route 5, Route 91 Longhill Street
<b>Hazardous Materials</b>	Buckeye Oil Terminal	CSX Rail Line	Albany Street, Armory Street, Street James Avenue, Route 291
		Eastman Kodak	Worcester Street (Route 141), Cadwell Street, Bircham Street, Main Street (IO), Berkshire Avenue, Fiberloid Street
		Astro Chemicals	Roosevelt Ave., Cottage Street, Route 291, Industry Ave., Memorial Ave.
		Richco	Roosevelt Ave., Cottage Street, Route 291, Industry Ave., Memorial Ave.

**Table 4.1: Critical Facilities and Evacuation Routes Potentially Affected by Hazard Areas**

Hazard Type	Hazard Area	Critical Facilities Affected	Evacuation Routes Affected
<b>Hazardous Materials</b>		Smith & Wesson	Roosevelt Ave., Cottage Street, Route 291, Industry Ave., Memorial Ave.
<b>Dam Failure</b>	Upper Van Horn Dam	Baystate Medical Center campus and associated clinics on Main Street	Main Street, Springfield Street, Chestnut Street, Armory Street, Chapin Street
		Baystate Medical Center Main Street campus	Springfield Street Chapin Terrace
		Springfield Housing Authority residences in the Brightwood Section of Springfield along Riverside Road	Plainfield Street, West Street, Wason Street, Main Street, Route 291, Route 91
		Grochmal Avenue Wastewater Treatment facility	Worcester Street (Route 141), Cadwell Street, Bircham Street
	Indian Orchard Dam	Grochmal Mobil Home Park	Worcester Street (Route 141), Cadwell Street, Bircham Street
		Eastman	Worcester Street (Route 141), Cadwell Street, Bircham Street
		Water Street section of Indian Orchard	Main Street (Indian Orchard), Oak Street, Myrtle Street, Parker Street, Berkshire Avenue
<b>Landslide</b>	Forest Park Neighborhood	Utility Failure	Interstate 91
<b>Earthquake</b>	Citywide Impact – especially pre-1975 construction	All critical facilities affected	Main Street – Indian Orchard Evacuation Routes Will be main City Arterials such as: Main Street, East and West Columbus Ave, Sumner Ave, Parker St, Boston Road, Carew Street, Berkshire Ave., Page Blvd, State Street would be primary Routes.

**Table 4.1: Critical Facilities and Evacuation Routes Potentially Affected by Hazard Areas**

<b>Hazard Type</b>	<b>Hazard Area</b>	<b>Critical Facilities Affected</b>	<b>Evacuation Routes Affected</b>
<b>Drought</b>	Citywide Impact	No critical facilities affected	No evacuations required
<b>Extreme Temperature</b>	Citywide Impact	No critical facilities affected	No evacuations required

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

## MITIGATION CAPABILITIES/STRATEGIES

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

### **Goal Statement**

To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to natural disasters; To provide adequate shelter, water, food and basic first aid to displaced residents in the event of a natural disaster and to provide adequate notification and information regarding evacuation procedures, etc., to residents in the event of a natural disaster.

For the purposes of this analysis, the Committee reviewed the following City documents:

- Zoning Ordinances
- Subdivision Rules and Regulations
- Springfield Open Space and Recreation Plan
- City of Springfield Capital Improvement Plan (CIP)
- USACE Flood Damage Reduction Segment/System Inspection Report
- Other relevant Guidelines as identified (Fire Department Burn Permit Procedures, Building Code, etc.)
- Comprehensive Emergency Management (CEM) Plan

### **What's the CEM Plan?**

An important existing general preparedness and response tool is 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 detailed steps for increasing preparedness.

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

## **General Mitigation**

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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.

## Existing Mitigation Capabilities

These general hazard-related capabilities are already in place and currently being used for tools for emergency preparedness. The Hazard Mitigation Planning Committee recognizes that these are also important recommendations for the City, and has included them here:

- Springfield has an active Local Emergency Planning Committee.
- The Springfield Department of Health & Human Services in cooperation with the Pioneer Valley Chapter of the American Red Cross and the Salvation Army has established a system to inventory supplies at existing shelters and developed a needs list and storage requirements.
- The Springfield Office of Emergency Preparedness is examining its current notification system, including the feasibility of a new siren warning system. The City has been using a reverse 911 system (Blackboard) for about five years.
- The Office of Emergency Preparedness and the Department of Health & Human Services hosts a web site and provides community instruction to disseminate information on emergency information, what to include in a “home survival kit”, how to prepare homes and other structures to withstand flooding and high winds, and the proper evacuation procedures to follow during a natural disaster.
- The Department of Information Technology has continued to upgrade infrastructure and technology systems to best protect the City’s data and operations management in the event of a natural disaster.

**Table 5.1 General Hazard Mitigation Assessment**

<b>Capability</b>	<b>Description</b>	<b>Effectiveness</b>	<b>Potential Improvements/Expansion</b>
Meetings of the Local Emergency Planning Committee	Consists of representatives from government, industry, utilities, public safety and the greater business community. This committee meets six (6) times a year.	Very effective.	Once approved, the City's HM committee will meet with the Local Emergency Planning Committee to review CIP and other plans when funding becomes available for potential projects to apply for FEMA grant funding
Emergency Notification System in place by way of reverse 911	The City uses reverse 911 in the event of storm, major crimes, hazardous material and terrorist notifications.	Very effective.	None.

**Table 5.1 General Hazard Mitigation Assessment**

Capability	Description	Effectiveness	Potential Improvements/Expansion
The Office of Emergency Preparedness and the Department of Health & Human Services hosts a web site and provides community instruction to disseminate information on emergency information	Information includes “home survival kit”, how to prepare homes for extreme weather, and evacuation routes	Very effective.	New educational documents for City residents for high/medium risk hazards
Fiber Mesh Network	The City has been working towards connecting public facilities within a fiber network for continued communication/operations during a disaster	Very effective.	Finish high speed ring from City Hall Main Datacenter to Tapley Street Alternate Datacenter via Office of Emergency Preparedness.
Data Center failover automation and analysis software	Software would create scripts and automate failing from City Hall to Tapley Datacenter and vice versa	Effective.	Automation software for virtual infrastructure.
Back up Datacenter	The City has established an alternate data center within City limits for continued operations if City Hall is somehow compromised	Effective.	Backup storage solution for long range deployment (>45 miles).
Emergency Communication Redundancy	Pearl Street is a backup for Roosevelt with a complete redundancy call answer point and communications center	Very effective.	Potential relocation with enhancements in the future

### Future Mitigation Measures

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

- Continued review of the City’s comprehensive plans when Hazard Mitigation grant opportunities arise.
- Research and implementation for new programs that will increase effectiveness for emergency communications between City officials/Public Safety and residents during a disaster.
- Public education and outreach for planning during a disaster.
- Continued improvements to the City’s IT programming and infrastructure to allow continued communication and operations during a disaster.

### Resource Gaps

In order to make continued progress on mitigation measures, the City would need to secure funding for these projects.



## 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 City's water bodies and waterways.

### Existing Mitigation Capabilities<sup>11</sup>

The City currently addresses this problem with a variety of mitigation tools and capabilities. Flood-related regulations and strategies are included in the City's zoning ordinance, subdivision regulations, as well as a proposed storm water management ordinance. 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 capabilities are outlined in the following table.

<b>Table 5.2 Flood Hazard Mitigation Assessment</b>				
<b>Capability</b>		<b>Description</b>	<b>Effectiveness</b>	<b>Potential Improvements/Expansion</b>
Flood Control Structures		Twelve dams	Somewhat effective.	Improve or remove high-risk dams.
		Connecticut River Dikes	Very effective for managing floodwaters	Maintenance of dikes to maintain structural integrity.
Culvert Replacement		Island Pond storm water pump station project	Very effective for managing flood control needs.	Prevent localized flooding from high volume storm events
		Abbe Brook bank stabilization project		
		Drainage Culvert Reclamation Project – Alton Street, Wilbraham Rd., Industry Ave., Roosevelt Ave., Peekskill Ave.		
		Tiffany St. Project		
		South Branch Parkway Construction		
Zoning Ordinances	Floodplain District	Overlay district to protect areas delineated as part of the 100-year floodplain and special permit requirements.	Moderately effective for preventing hazardous chemical facilities from entering the floodplain; allows	Create a table of uses that clarifies which uses are allowed by-right, special permit or not at all; then modify table of uses to

<sup>11</sup> City of Springfield current NFIP activity data retrieved from the NFIP BureauNet: <http://bsa.nfipstat.fema.gov/reports/1011.htm#MAT>

			some uses by right and requires a special permit for most hazardous chemical facilities.	prohibit high-risk uses and future construction.
	Special Permit	Applied to those uses that the City of Springfield wants to control, should a proposed project not conform to the needs of a neighborhood.	Somewhat effective for preventing incompatible development.	Consider creating more performance-based evaluations, environmental standards.
	Connecticut Riverfront District	Accommodates and controls development along the riverfront; promotes tourism, recreation.	Somewhat effective at preventing development along the riverfront.	Include setbacks from waterways and prevent construction in identified floodplains.
Subdivision Regulations	Preliminary and Definitive Plan	Proposed storm drainage, sewer, water supply, and major site features (including natural features) must be included.	Somewhat effective for preventing incompatible development.	None.
	Design Standards	Environmental Analysis – includes impact analysis of recharge and infiltration.	Effective for protecting natural processes like flood mitigation.	None.
		Development Impact Statement – describes natural features, drainage systems	Effective for encouraging compatible development.	None.
		Storm Drainage – determines impact of development to downstream.	Effective for mitigating impacts of development to downstream.	None.
		Site Preservation – significant natural and cultural sites must be noted and preserved when applicable.	Effective for protecting important natural features.	None.
		Excavation and Grading – regulates how earth removal must be conducted.	Effective for minimizing earth removal and preventing sedimentation.	None.
	Springfield Community Development Plan	The CD Plan identifies key goals and actions to promote natural resource preservation in the City, including areas in the floodplain; such as wetlands, groundwater recharge areas, farms and open space, rivers, streams and brooks.	Effective at identifying key policy actions necessary to preserve open space.	Work to implement relevant goals and policies in Plan.

National Flood Insurance Program Participation	As of 2015, there were 87 homeowners with flood insurance policies.	Somewhat effective, provided that the City remains enrolled in the National Flood Insurance Program.	Increase the number of homeowners with Flood Insurance to provide coverage to all properties on CIS list
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### What is the NFIP's Community Rating System?

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), 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.

### Springfield, MA - Current NFIP Policy Statistics (7/31/2015)

<b>Policies in Force:</b>	<b>87</b>
<b>Insurance in Force:</b>	<b>\$26,752,000</b>
<b>Written Premium in Force:</b>	<b>\$75,133</b>

The City has capabilities in place to ensure compliance with NFIP requirements. Several years ago FEMA completed an updated Flood Insurance Study for Hampden County. Following a rigorous review of the newly identified flood zones and elevations by Planning and DPW department employees, the City of Springfield City Council formally adopted the updated mapping effective July 16th, 2013. The updated digital floodplain boundaries have been added to the City's GIS mapping system and are available to the public via the City website mapping application.

All new projects proposing land alteration, including but not limited to grading and construction, within flood zones A and AE (the "100 year storm flood zone") are reviewed and approved by the Springfield planning department, DPW and Conservation Commission. Projects are permitted by the Commission when the applicant can prove compliance with local, state and federal regulations related to flood plain alteration. Although uncommon, when unpermitted work occurs within regulated flood zone areas, enforcement actions are performed by the Conservation Commission and the Department of Public Works.

### Future Mitigation Measures

Many mitigation measures for the City's flooding hazards are area specific. Several potential changes to the City's current strategies have been identified in the above table, and these, as well as recommendations for other future mitigation strategies, are compiled below:

- Connecticut and Mill Rivers Flooding: Repair and upgrade deficiencies as indicated by the USACE and quarterly inspection report, bringing accreditation status from minimally acceptable to acceptable.
- Island Pond Flooding: Install a storm water pump station and new storm drain that redirects storm water up Surrey Road and discharges to a conservation area in the Water shops Pond drainage basin.
- Abbe Brook Flooding: Bank stabilization, outlet reconstruction and channel restoration projects are all necessary to restore capacity to the bank.
- Drainage Culvert Reclamation: Clean and reestablished design capacities throughout the system.

### Resource Gaps

In order to make continued progress on mitigation measures, the City would need to secure funding for these projects.

## Hurricanes/Severe Wind (Including Tornado/Microburst Hazards)

Of all the natural disasters that could potentially affect 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 5-1 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.

### Existing Mitigation Capabilities

The City's current mitigation strategies to deal with severe wind are equally applicable to wind events such as tornadoes and microbursts. Therefore, the analysis of severe wind strategies is coupled with this hazard.

<b>Table 5.3 Existing Severe Wind Hazard Mitigation Measures (Including Hurricane, Tornado, Microburst Hazards)</b>				
<b>Capability</b>		<b>Description</b>	<b>Effectiveness</b>	<b>Potential Changes/Improvements</b>
Zoning Ordinance	Mobile Homes/Trailers	Mobile homes are permitted with some additional regulations; trailers are only allowed as temporary living quarters.	Not effective for preventing damage to susceptible structures	Restricting location of mobile homes in high-hazard area and establish a buy-back program for high-risk mobile homes.
	Wireless Communications Structures and Facilities	Structures are required to be as minimally invasive as possible to the environment, have height restrictions, and must have be setback 200% of the structure's height; 100% allowed for "stealth design towers".	Very effective for preventing damage in the case of a severe storm.	Done.
Subdivide. Regs	Design Standards	Utilities must be placed underground	Effective for preventing power loss.	Done.
State Building Code		The City has adopted the MA State Building Code.	Effective.	Done.

Tree Management	List of dangerous trees created annually for Eversource.	Very effective, preventative collaboration.	Done.
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### Future Mitigation Measures

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

- Restricting location of mobile homes in high-hazard area and establish a buy-back program for high-risk mobile homes.
- Introduce tree management program to reduce power outages from storms producing high winds.
- Disaster resistance evaluation of critical City-owned facilities.
- Work with Eversource to facilitate the underground placement of new utility lines in general and existing utility lines in locations where repetitive outages occur (as applicable).
- Participate in the creation of a Regional Debris Management Plan.

### Resource Gaps

In order to make continued progress on mitigation measures, the City would need to secure funding for these projects.

## Severe Snow/Ice Storm

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 measure must focus on preparedness prior to a severe snow/ice storm.

### Existing Mitigation Capabilities

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

Note: For damages from a winter storm that can be caused by flooding, all of the flood protection mitigation measures described in Table 5.2 in the previous section can also be considered as mitigation measures for severe snow/ice storms.

**Table 5.4 Severe Snow/Ice Storm Hazard Mitigation Assessment**

Capability		Description	Effectiveness	Potential Improvements/Expansion
Zoning Ordinance	Wireless Communications Structures and Facilities	Structures are required to be as minimally invasive as possible to the environment, have height restrictions, and must have be setback 200 % of the structure’s height; 100% allowed for “stealth design towers”.	Very effective for preventing damage in the case of a severe storm.	None.
Subdivision Regulations	Design Standards	Utilities must be placed underground at time of construction	Effective for preventing power loss.	None.
		Street grade regulations (maximum 10%)	Effective.	None.
State Building Code		The City of Springfield has adopted the Massachusetts State Building Code.	Effective.	None.
Backup Electric Power		Identified shelters have backup power, three mobile generators	Very effective in case of power loss.	None.
Tree Management		List of dangerous trees created annually for Eversource.	Very effective, preventative collaboration.	Reduce power outages resulting from wind, snow and ice storms.

## Future Mitigation Measures

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

- Work with Eversource to facilitate the underground placement of new utility lines in general and existing utility lines in locations where repetitive outages occur (as applicable).
- Determine if existing generators at shelters are effective, replace if not effective.
- Increase enforcement of restrictions prohibiting residents from plowing snow into the road.
- 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.

## Resource Gaps

In order to make continued progress on mitigation measures, the City would need to secure funding for these projects.



## Wildfire/Brushfire

Although somewhat common, the vast majority of brushfires in 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.

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

<b>Table 5.5: Wildfire/Brushfire Hazard Mitigation Assessment</b>				
<b>Capability</b>		<b>Description</b>	<b>Effectiveness</b>	<b>Potential Improvements/Expansion</b>
Zoning Ordinance	Wireless Communications Structures and Facilities	Fire Chief is involved in final review of site plan for structure.	Effective.	None.
Subdivision Regulations	General	Fire Chief may be consulted on any subdivision approval.	Effective.	None.
	Design Standards	Fire protection is included in the required Development Impact Statement and as a part of the rules regulating water supply to the subdivision.	Effective.	None.
Public Education/ Outreach		The Fire Department has an ongoing educational program in the schools.	Effective.	None.

### Future Mitigation Measures

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

- Increase public education to recognize the dangers of fire, including the fire hazards that smoking-related materials pose.

### Resource Gaps

In order to make continued progress on mitigation measures, the City would need to secure funding/staff to facilitate these projects.

## Hazardous Materials

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Hazardous materials are in existence throughout City, and are constantly being moved on 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 Springfield has some regulations currently in place to mitigate the impacts of a hazardous materials disaster.

**Table 5.6: Hazardous Materials Hazard Mitigation Assessment**

Capability	Description	Effectiveness	Potential Improvements/Expansion
Zoning Ordinance	All hazardous materials usage or storage must be registered with the Fire Chief.	Effective.	None.

### Future Mitigation Measures

Potential changes to the City's current capabilities have been identified in the above table, and are compiled below:

- Update definitions to be consistent with State definitions.

### Resource Gaps

In order to make continued progress on mitigation measures, the City would need to secure staff to complete this project.

## Dam Failure

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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.

### Existing Mitigation Capabilities

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.

<b>Table 5.7: Dam Failure Hazard Mitigation Assessment</b>			
<b>Capability</b>	<b>Description</b>	<b>Effectiveness</b>	<b>Potential Improvements/Expansion</b>
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.	Remove or improve dam impoundments that have been identified as non-essential high-hazard dams.

### Future Mitigation Measures

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

- Develop and implement plan to remove unnecessary high and significant hazard dams. Plastics Park Dam and the Baystate Plumbing & Heating Pond Dam have already been identified as candidates
- Improve or remove dams that have been identified as non-essential high-hazard dams.

### Resource Gaps

In order to make continued progress on mitigation measures, the City would need to secure funding for these projects.

## Landslide

Landslides are infrequent occurrences and an incidence would have limited impact. Throughout the years, Springfield has placed simple mitigation efforts in affected areas that have minimized the damaging impacts of landslides.

### Existing Mitigation Capabilities

In an effort to mitigate future landslide occurrences, the City of Springfield has invested in two key ground erosion controls through the installation of various dropped manhole systems and gabion walls around the affected regions. These have proven to be very effective.

Table 5.8: Landslide Hazard Mitigation Assessment				
Capability		Description	Effectiveness	Potential Improvements/Expansion
Zoning Ordinance	Planning Board Site Plan Review Criteria	The Planning Board may impose conditions designed to ensure that the proposed use, development or structure will avoid significant detrimental environmental impacts, including storm water runoff, erosion or sedimentation.	Effective.	None.
Dropped Manhole Systems		In the past 25 years, the City has installed multiple dropped manhole systems in an effort to control storm water runoff that would otherwise cause further erosion to terrace escarpments.	Very Effective.	Upgrade existing manholes to a dropped system.
Gabion Walls		Gabion walls have been installed for earth retention, erosion control and flood control.	Very Effective.	Installation of more gabion walls.

### Future Mitigation Measures

In order to continue mitigating potential landslide occurrences, the City could invest in upgrading existing manholes to a dropped system and installing more gabion walls. This will ensure that erosion occurs in a controlled manner and not cause landslide to the City's current terrace escarpments.

### Resource Gaps

In order to make continued progress on mitigation measures, the City would need to secure funding for these projects.

## Earthquake

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Although there are five mapped seismological faults in Massachusetts, there is no discernible pattern of previous earthquakes along these faults nor is there a reliable 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 City's recovery from an earthquake.

### Existing Mitigation Capabilities

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

Table 5.9: Earthquake Hazard Mitigation Assessment				
Capability		Description	Effectiveness	Potential Improvements/Expansion
Zoning Ordinance	Wireless Communications Structures and Facilities	Structures are required to be as minimally invasive as possible to the environment, have height restrictions, and must have be setback 1.25 times the structure's height.	Very effective for preventing damage in the case of an earthquake.	None.
State Building Code		The City of Springfield has adopted the State Building Code.	Effective for new buildings only.	Evaluate older structures categorized as critical facilities to determine if they are earthquake/disaster resistant.

### Future Mitigation Measures

Potential changes to the City's current capabilities have been identified in the above table and are compiled below:

- Evaluate older structures categorized as critical facilities to determine if they are earthquake/disaster resistant.

### Resource Gaps

In order to make continued progress on mitigation measures, the City would need to secure funding for this project.

## 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.

### Existing Mitigation Capabilities

While Springfield has limited drought risk—there are no City wells or recreation areas—several water protection regulations are in place, as evidenced by the section on flooding. Additional regulations and mitigation options, specific to drought mitigation, are included here.

Table 5.9: Drought Hazard Mitigation Assessment				
Capability		Description	Effectiveness	Potential Improvements/Expansion
Subdivision Regulations	Preliminary and Definitive Plan	Proposed storm drainage, sewer, water supply, and major site features (including natural features) must be included.	Effective for ensuring adequate water supply and preventing drainage problems.	None.
	Design Standards	Environmental Analysis – includes impact analysis of recharge and infiltration.	Effective for protecting natural processes like flood mitigation.	None.
		Site Preservation – significant natural and cultural sites must be noted and preserved when applicable.	Effective for protecting important natural features including bodies of water.	None.
		Excavation and Grading – regulates how earth removal must be conducted.	Effective for minimizing earth removal and preventing sedimentation.	None.
Springfield Community Development Plan		Makes several relevant recommendations regarding preventing drought, protecting water supply and quality.	Potentially effective step, if taken.	Implement recommendations.

### Future Mitigation Measures

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

- Implement recommendations from the Springfield Community Development Plan, dealing protection of water supply and quality.
- Create Water Conservation Guidelines, as education to City residents.

### Resource Gaps

In order to make continued progress on mitigation measures, the City would need to secure funding for these projects.



## Extreme Temperature

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The City of Springfield experiences extreme temperatures at least once or twice a year. Research shows that extreme temperatures are becoming more frequent due to climate change. The impact of extreme temperatures is citywide.

### Existing Mitigation Capabilities

To mitigate extreme heat, the Springfield Department of Health and Human Services (SDHHS) opens up cooling sites to the general public from 11 am to 8 pm when there is a heat warning. To mitigate extreme cold, the SDHHS also has a Cold Weather Emergency Response Plan that is activated at the Health Commissioner's discretion.

<b>Table 5.10: Extreme Temperatures Hazard Mitigation Assessment</b>			
<b>Capability</b>	<b>Description</b>	<b>Effectiveness</b>	<b>Potential Improvements/Expansion</b>
Cooling Centers	Several Citywide sites with air conditioning are made available to the public to prevent heat stress in residents.	Very Effective.	None.
Cold Weather Emergency Response Plan	Plan increases awareness of cold weather precautions for the general public and implements a comprehensive response plan to provide temporary overnight shelter to homeless and inadequately housed individuals.	Very Effective.	None.

### Future Mitigation Measures

The City of Springfield will continue to implement its current mitigation strategies through the implementation of the Cold Weather Emergency Response Plan and the opening of cooling centers.

### Resource Gaps

No additional funding is necessary.

## PRIORITIZED IMPLEMENTATION SCHEDULE

### Summary of Critical Evaluation

The Springfield Hazard Mitigation Planning Committee reviewed each of the recommendation future mitigation measures identified, and used the following factors to prioritize mitigation projects:

- 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

### Project Prioritization

The Springfield Hazard Mitigation Planning Committee created the following schedule for implementation of prioritized items. These projects are prioritized using the criteria detailed in earlier sections of this plan, and that used in the City's Capital Improvement Plan. The FY22-26 Capital Improvement Plan states that: "limited resources exist for competing projects."

"This requires that each project's full impact on the City's budget be considered in rating and evaluating projects. Projects that are self-funded or have a large proportion of external funding will receive higher ratings than those that do not, as these projects have less impact on the funding portion of our capital budget."

Employing this rationale in conjunction with the hazard criteria detailed in previous sections, should result in improved prioritization of mitigation projects because of their eligibility for external funding.

The capital project prioritization criteria and ratings are derived from the following processes and criteria. A more detailed explanation may be found in Appendix H.

Capital projects are categorized into one of seven categories:

- Building

- Infrastructure
- Equipment
- Equipment (Other)
- Land/Parks/Fields
- Technology
- Salary

Each project is further classified into one of five different types of projects:

- New
- Reconstruction/Replacement
- Demolition
- Major Repair/Renovation
- Repair

The City's Capital Improvement Committee is responsible for identifying and prioritizing the City's needs and coordinating them with the operating budget. The Capital Improvement Committee reviews each submission. After appropriate review and consideration, the committee establishes project priorities given quantitative measures of need and justification as established by the rating department and reviewed by the committee.

1. Criteria	Weight: 5
2. Impact on Service to Public	Weight: 3
3. Promotes Economic Development	Weight: 3
4. Legal Obligations and Compliance	Weight: 3
5. Urgency of Maintenance Needs	Weight: 2
6. Prior Phases	Weight: 2
7. Resiliency	Weight: 1
8. Perception	Weight: 1

Each criterion above receives a different weight. Each project is assigned to one of four priority levels based on the overall weighted score. These scores were considered by the Planning Committee when ranking the following list of projects:

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

**Table 6.1 Implementation Schedule- Action Plan**

Priority	Mitigation Action	Responsible Department/Board	Proposed Timeframe in Months	Specific Actions	Funding Source	Incorporation into Existing Plans
1	Improve structural integrity of Connecticut River Dikes	DPW	6 Design/ 24 Construction	Enhance capability for dike structures.	HMGP/FMA	USACE Report Quarterly DPW Inspections
2	Baystate Plumbing & Heating Pond Dam Removal	DPW/Parks	8 Design / 14 Construction	Demolish and remove existing dam.	BRIC	USACE Report Quarterly DPW Inspections
3	Citywide dam improvements	DPW/ Parks	8-12 Design/ 14 Construction	Survey and make necessary enhancements.	FMA/HMGP/ MA "Seawall" Grant	CIP
4	Tiffany Road Flood Control	Emergency Management, DPW	6 Design / 12 Construction	Dredge streams to return to original path, and fortify banks	HMGP	CIP
5	Fps (Sps) Curtain Drains All Sections	DPW	6 Design/ 12 Construction	Locate, clean, televise and enhance capability of the curtain drains as required by the USACE.	FMA	CIP USACE Report Quarterly DPW Inspections
6	Mill River Channel Improvement- Rifle Street	DPW	12 Design/12-36 Construction	Maintains integrity of city's flood control system as well as keeps the city in compliance with FEMA. Failure to stay in compliance will result in a decertified flood control system which will result in fines. City is currently under a mandated repair order from acoe to address various components of the flood control system by maintaining the flood control system, the residents who live and work in the flood zone remain safe from flood. If the city's system falls out of compliance, then those located within the flood zone will be required to purchase flood insurance. Concrete/brownstone supporting walls are eroding. The structural integrity is being compromised. The army corps of engineers has reported that repairs are required to maintain certification with the flood protection system.	BRIC/CITY FUNDS	CIP
7	Citywide Fire Debris Removal	Emergency Preparedness, Fire Department, Parks Department	6 Design / 12 Construction	Remove slash and all tree debris	BRIC	Open Space Plan
8	Prevent further construction in identified floodplains in the Connecticut Riverfront District	Planning Department	12 Implementation	Update ordinance, get City Council approval	City Funding	No
9	Once approved, the City's HM committee will review CIP and other plans when funding becomes available for potential projects to apply for FEMA grant funding	Natural Hazards Mitigation Committee	4 Implementation	Watch for funding opportunities, review City plans annually	City Funding	
10	Education for reporting illegal dumping in stormwater drains, other bodies of water	Natural Hazards Mitigation Committee, DPW	Ongoing	Utilize existing City websites and social media	General Fund	No
11	South Branch Parkway Box Culvert Repair	Emergency Management , DPW, Park Department	8 Design / 12 Construction	Resize box culvert to withstand 100-year storm and regrade drainage	HMGP	No
12	Island Pond Road Flood Control	Emergency Preparedness, Department of Public Works, Parks Department	4 Design / 8 Construction	Repair outlet and fortify flood control culverts	HMGP/FMA	Open Space/ CIP
13	Repair Culvert Outlets Citywide	Emergency Preparedness, Department of Public Works, Parks Department	12 Design / 24 Construction	Rebuild outlets, and install erosion protection systems	HMGP	Open Space/ CIP
14	Abbey Brook Flooding Avoidance	Emergency Preparedness, Department of Public Works, Parks Department	6 Design / 12 Construction	Redesign drain system and stabilize slopes to mitigate varved clay and protect adjacent wetlands	HMGP	No
15	Disaster resistance evaluation of critical City-owned facilities	Emergency Management, Facilities Department	24 Design	Conduct Seismic surveys	PMA	No

**Table 6.1 Implementation Schedule- Action Plan**

Priority	Mitigation Action	Responsible Department/Board	Proposed Timeframe in Months	Specific Actions	Funding Source	Incorporation into Existing Plans
16	New educational documents for City residents for high/medium risk hazards	Natural Hazards Mitigation Committee	6 Implementation	Create informational webpage	General Fund	No
17	Citywide - Pond Dredging	Parks Department	12-24 Implementation	Remove sediment build up to maintain water bodies city wide. Maintain sediment retention basins including maintenance or replacement of gabion sediment retention systems	FMA/CPA	CIP
18	Stormwater Outfall Improvements	DPW	36 Implementation	Stormwater outfalls identified as poor or failed are to be rehabilitated to functioning status. Includes infrastructure repair or replacement in environmentally sensitive areas.	BRIC	CIP
19	Police Operations Redundancy at 50 East Street	Department of Information Technology/Police Department	5 - 8 Implementation	Data/Operations redundancy at second Police facility for servers, records and communications systems for continued operations during a disaster.	HMGP	No
20	Magawisca Road Reconstruction	Emergency Preparedness, Department of Public Works, Parks Department	6 Design / 12 Construction	Redesign drain system and stabilize slopes to mitigate varved clay and protect adjacent wetlands	BRIC	Open Space/ CIP
21	Duck Pond / Aquatic Gardens Outlet Reconstruction	Emergency Management, Park Department	6 Design / 14 Construction	Redesign drain system and stabilize slopes to mitigate varved clay and protect adjacent wetlands	BRIC	Open Space/ CIP
22	Drainage culvert reclamation project	DPW	6 Design / 14 Construction	Improve drainage along city roadways.	BRIC/ General Fund	No
23	Create table of uses for Floodplain District - right, special permit, and not at all	Planning Department	12 Implementation	Review ordinance, make Table of Uses available to public	City Funding	No
24	Create performance based evaluation and environmental standards for Special Zoning Permits	Planning Department	12 Implementation	Update ordinance, get City Council approval	City Funding	No
25	Introduce tree management program to reduce power outages from wind, snow and ice storms	Parks Department	12-16 Implementation	Develop program	MVP Grant	No
26	Restrict location for mobile homes within Zoning Ordinance	Planning Department	12 Implementation	Update ordinance, get City Council approval	City Funding/FMA	No
27	Update definitions within Zoning Ordinance to be consistent with State definitions	Planning Department	12 Implementation	Update ordinance, get City Council approval	FMA	No
28	Upgrades to City Owned Bridges	DPW/ Parks/Department of Capital Asset Construction	12-24 Implementation	The repair of city owned bridges is necessary to maintain their structural integrity and to insure vehicular and pedestrian safety. Maintenance of the city owned bridges has been deferred for approximately 15 years due to budgetary constraints. The city needs to establish a maintenance schedule to insure the bridges' structural integrity and vehicular and pedestrian safety. A recent update from mass dot has confirmed our bridge assessment. In response to the mass dot report, we've raised our request to \$500,000 a year.	BRIC/MassDot	CIP
29	Update Tree Replacement Program	Parks Department	12-24 Implementation	Continue tree replacement for city streets and public parks in accordance with the tree master plan, asset inventory and upgrades to the city's tree keeper inventory program	BRIC/CDBG/City Funding	CIP
30	Wireless Backhaul Project	Department of Information Technology	6 Implementation	Wireless backhaul to assist in building alternate paths aside from the fiber to provide resilience in the event of a fiber cut. With mission critical police and fire radio traffic as well as city telecommunications riding over the existing infrastructure, this has become a focus while we build out the existing infrastructure. Cellular becomes less effective during a catastrophe.	HMGP	CIP
31	Automation software for virtual infrastructure.	Department of Information Technology	1 Implementation	Datacenter failover automation and analysis software that would create scripts and automate failing from City Hall to Backup Datacenter and vice versa.	HMGP	CIP
32	Backup data storage solution for long range deployment (>45 miles).	Department of Information Technology	5 - 8 Implementation	Backup storage solution for long range deployment (>45 miles).	HMGP	CIP

## PLAN ADOPTION & IMPLEMENTATION

### Plan Adoption

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

FEMA issued an official “approval pending adoption,” and the Mayor signed off on the final version of the plan. The Mayor’s signature constituted formal plan adoption.

### Plan Implementation

The implementation of the Springfield Local Natural Hazards Mitigation Plan began following its formal adoption by the Springfield Mayor and approval by MEMA and FEMA. Specific City departments and boards are responsible for ensuring the development of policies, ordinance revisions, and programs. The Springfield Natural Hazards Planning Committee oversees the implementation of the plan, and consists of representatives from the following City offices:

Office of Emergency Preparedness	Department of Public Works
Police Department	Mayor’s Office
Fire Department	Health & Human Services
Planning & Economic Development	Office of Management & Budget
Parks & Facilities	Law Department

### Plan Monitoring and Evaluation

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

To monitor this plan there will be a Natural Hazards Planning Committee that 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. Responsible parties will have a representative

on the Springfield Natural Hazards Planning Committee, and will be responsible for seeing that the actions are implemented and progress reported on at the annual plan review meetings.

### Continued Public Involvement

Outreach to the public, surrounding communities, agencies, businesses, academia, non-profits, or other interested parties outside of the City of Springfield will be done in advance of each annual meeting in order to solicit their participation in assessment of the plan. Community members will be invited to attend the City's Open-Space committee meeting through regular meeting postings, and will be encouraged to submit feedback and comments regarding the plan and proposed mitigation measures. Open-Space Committee meetings are held in accordance with the open meeting laws of the Commonwealth and the City.

Following these discussions, it is anticipated that the committee may decide to reassign the roles and responsibilities for implementing mitigation strategies to different City 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 fall of 2015. The meetings of the committee will be organized and facilitated by the Emergency Management Director or the Mayor of Springfield.

### Evaluation

Evaluation of the hazard mitigation plan in its entirety will be done on a 5-year basis in accordance to the Disaster Mitigation Act of 2000 or after any significant natural hazard disaster. Any new problems that arise will be reviewed by the hazard mitigation team and incorporated in to the hazard mitigation plan. The plan will be updated with possible new mitigation measures and plans of action as determined from the evaluation. This allows for updates to be made as the City grows and changes.

Through the use of a reassessment, evaluation of the plan will include a review of the goals and actions and whether each still addresses current and expected conditions to determine if these measures have impacted the overall hazard and/or reduced vulnerability. The frequency of, and magnitude of the identified hazards will be reviewed.

Local fiscal issues, administrative challenges, or major regulation changes will also be discussed during this evaluation process, as well as local development and land use changes.

### Update

The Office of Emergency Preparedness will oversee the Natural Hazards Planning Committee's involvement in the review and updating process. As noted in the Monitoring and Evaluation Sections, at least once a year the committee will convene to review the new information and make recommendations for ongoing changes or updates.

The official update process will commence approximately 18 months prior to this plan's expiration date. The committee will be responsible for conducting this review and update. The update will

be in conformance with federal requirements and will evaluate effectiveness of whether previously approved plan's method and schedule for monitoring, evaluating, and updating the plan worked, and what elements or processes, if any, need to be changed or modified to provide a more successful outcome in future plans.



**CERTIFICATE OF ADOPTION**  
**CITY OF SPRINGFIELD, MASSACHUSETTS**  
**CITY COUNCIL**  
**A ORDER ADOPTING THE CITY OF SPRINGFIELD**  
**LOCAL NATURAL HAZARDS MITIGATION PLAN**

WHEREAS, the City of Springfield established a Committee to prepare the Local Natural Hazards Mitigation Plan; and

WHEREAS, several public planning meetings were held during 2021 regarding the development and review of the Local Natural Hazards Mitigation Plan; and

WHEREAS, the Local Natural Hazards Mitigation Plan contains several potential future projects to mitigate hazard damage in the City of Springfield, and

WHEREAS, a duly-noticed public hearing was held by the Springfield City Council on \_\_\_\_\_, 2021 to formally approve and adopt the Springfield Local Natural Hazards Mitigation Plan.

NOW, THEREFORE BE IT ORDERED that the Springfield City Council adopts the Local Natural Hazards Mitigation Plan.

ADOPTED AND SIGNED this \_\_\_\_\_, 2021.

Domenic J. Sarno, Mayor

City of Springfield

ATTEST:

## APPENDICES

### Appendix A – Technical Resources (in the event of an emergency)

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#### I) 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
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; Taunton, 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
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.

### 3) Internet Resources

Sponsor	Internet Address	Summary of Contents
Natural Hazards Research Center, U. of Colorado	<a href="http://www.colorado.edu/litbase/hazards/">http://www.colorado.edu/litbase/hazards/</a>	Searchable database of references and links to many disaster-related websites.
Atlantic Hurricane Tracking Data by Year	<a href="http://wxp.eas.purdue.edu/hurricane">http://wxp.eas.purdue.edu/hurricane</a>	Hurricane track maps for each year, 1886 – 1996
National Emergency Management Association	<a href="http://nemaweb.org">http://nemaweb.org</a>	Association of state emergency management directors; list of mitigation projects.
NASA – Goddard Space Flight Center “Disaster Finder:	<a href="http://www.gsfc.nasa.gov/ndrd/dis-aster/">http://www.gsfc.nasa.gov/ndrd/dis-aster/</a>	Searchable database of sites that encompass a wide range of natural disasters.
NASA Natural Disaster Reference Database	<a href="http://ltpwww.gsfc.nasa.gov/ndrd/main/html">http://ltpwww.gsfc.nasa.gov/ndrd/main/html</a>	Searchable database of worldwide natural disasters.
U.S. State & Local Gateway	<a href="http://www.statelocal.gov/">http://www.statelocal.gov/</a>	General information through the federal-state partnership.
National Weather Service	<a href="http://nws.noaa.gov/">http://nws.noaa.gov/</a>	Central page for National Weather Warnings, updated every 60 seconds.
USGS Real Time Hydrologic Data	<a href="http://h20.usgs.gov/public/realtime.html">http://h20.usgs.gov/public/realtime.html</a>	Provisional hydrological data
Dartmouth Flood Observatory	<a href="http://www.dartmouth.edu/artsci/geog/floods/">http://www.dartmouth.edu/artsci/geog/floods/</a>	Observations of flooding situations.
FEMA, National Flood Insurance Program, Community Status Book	<a href="http://www.fema.gov/fema/csb.html">http://www.fema.gov/fema/csb.html</a>	Searchable site for access of Community Status Books
Florida State University Atlantic Hurricane Site	<a href="http://www.met.fsu.edu/explores/tropical.html">http://www.met.fsu.edu/explores/tropical.html</a>	Tracking and NWS warnings for Atlantic Hurricanes and other links
The Tornado Project Online	<a href="http://www.tornadoproject.com/">http://www.tornadoproject.com/</a>	Information on tornadoes, including details of recent impacts.
National Severe Storms Laboratory	<a href="http://www.nssl.uoknor.edu/">http://www.nssl.uoknor.edu/</a>	Information about and tracking of severe storms.
Independent Insurance Agents of America IIAA Natural Disaster Risk Map	<a href="http://www.iaaa.iix.com/ndcmap.html">http://www.iaaa.iix.com/ndcmap.html</a>	A multi-disaster risk map.
Earth Satellite Corporation	<a href="http://www.earthsat.com/">http://www.earthsat.com/</a>	Flood risk maps searchable by state.

USDA Forest Service Web	<a href="http://www.fs.fed.us/land">http://www.fs.fed.us/land</a>	Information on forest fires and land management.

## Appendix B – List of Acronyms

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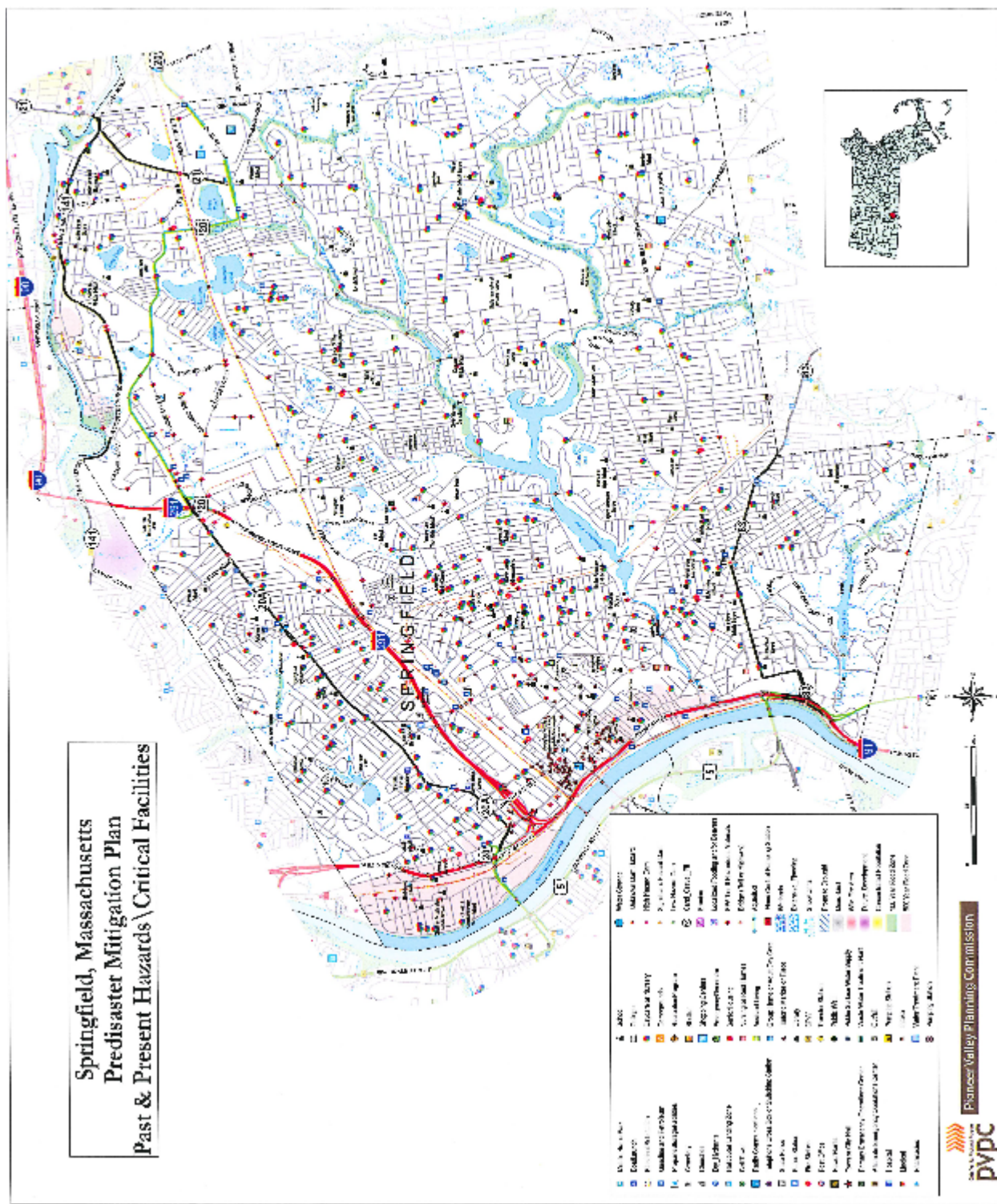
FEMA	Federal Emergency Management Agency
MEMA	Massachusetts Emergency Management Agency
PVPC	Pioneer Valley Planning Commission
EPA	Environmental Protection Agency
DEP	Massachusetts' Department of Environmental Protection
NWS	National Weather Service
HMGP	Hazard Mitigation Grant Program
BRIC	Building Resilient Infrastructure & Communities
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
TRI	Toxics Release Inventory
FIRM	Flood Insurance Rate Map
NFIP	National Flood Insurance Program
CRS	Community Rating System
BOH	Board of Health
LEPC	Local Emergency Planning Committee
EMD	Emergency Management Director
Con Com	Conservation Commission
EOC	Emergency Operations Center

CEM Plan      Comprehensive Emergency Management Plan

HAZMAT      Hazardous Materials

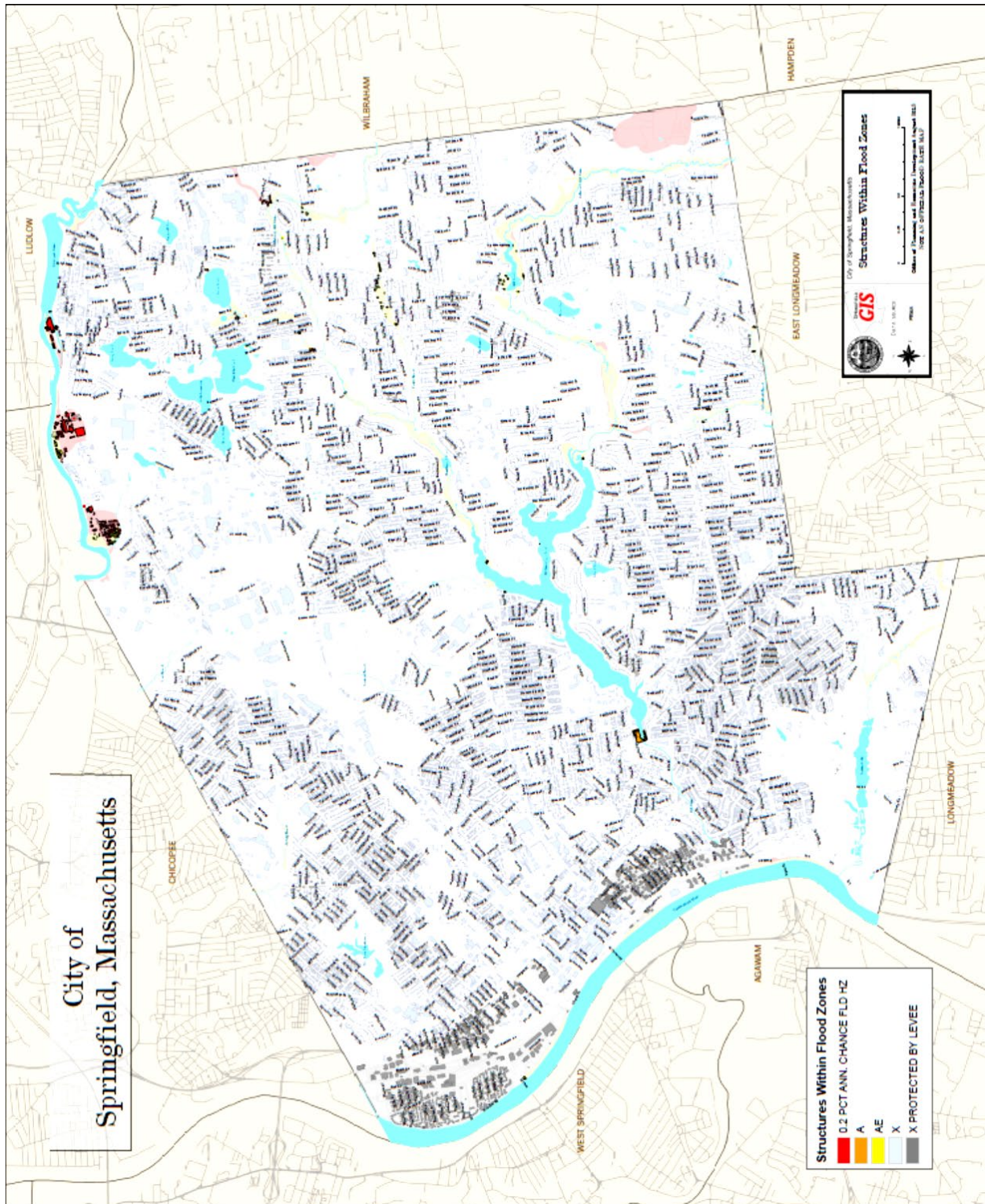


## Springfield Local Natural Hazards Mitigation Plan



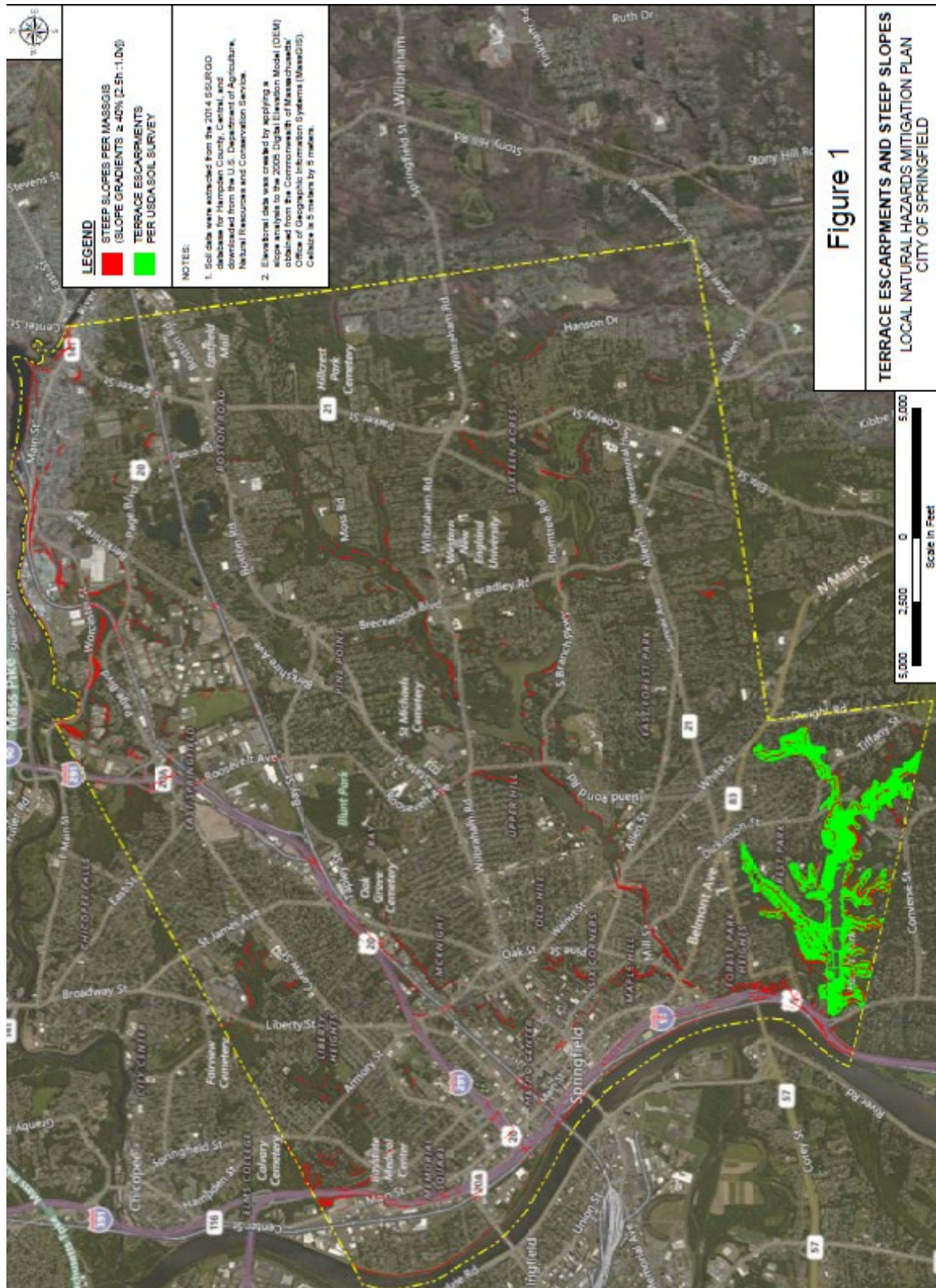


## Appendix D – Structures Within Flood Zones Map





## Appendix E – Terrace Escarpments and Steep Slopes



## **Appendix F – Documentation of the Planning Process**

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### **Springfield Hazard Mitigation Planning Committee**

**Meeting #1 June 29, 2021 at 10 a.m.**

**Springfield City Hall Conference 310, 36 Court St.**

#### **AGENDA**

- Review purpose of hazard mitigation plan
- Renewal process (Exp. 10/28/2021)
- Hazard Identification and Analysis Matrix
- Critical Facilities and Evacuation Routes
- Existing Mitigation Capabilities
- Action Plan
- Next Steps

**CITY CLERK: Please Post this notice per M.G. L. Chapter 39, Section 23 A-C**

**\*\*Note: The public is encouraged to attend\*\***

**Springfield Hazard Mitigation Planning Committee**

**Meeting #2, July 26, 2021, 1 p.m.**

**Zoom**

**AGENDA**

- Section Addressing Climate Change
  - Only received responses from 2 people – please respond
- Critical Facilities List
- Review Tables from HMP 2015 Document
  - Table 5-0 General Hazard Mitigation Assessment
  - Table 5-1 Flood Hazard Mitigation Assessment
  - Table 3-5 Dams in Springfield
  - Table 5-6 Dam Failure Hazard Mitigation Assessment
  - Table 5-4 Wildfire/Brushfire Hazard Mitigation Assessment
  - Wildfire Burn Severity Classification
  - Table 5-9 Earthquake Hazard Mitigation Assessment
  - Table 5-3 Existing Severe Wind Hazard Mitigation Measures
  - Table 3.2 Major Non-Winter Storms to affect Springfield Area
  - Table 5-2 Severe Snow/Ice Storm Hazard Mitigation Assessment
  - Table 6.1 Implementation Schedule Action Plan

**CITY CLERK: Please Post this notice per M.G. L. Chapter 39, Section 23 A-C**

## **Springfield Hazard Mitigation Planning Committee**

**Meeting #3, September 14, 2021, 1:00 p.m.**

**Zoom**

### **AGENDA**

- Update Action Plan
- Pat Sullivan
  - Island Pond Flooding (description of problem and work being done)
  - Mill River Conduit
  - Dams in Springfield Table
  - Tree Management program for heavy winds
- Chris Cignoli
  - Destruction of Sewage manholes
    - Summer 2021 heavy rainfall, negative impact?
  - # of pumping stations in Springfield
  - Mill River Conduit
  - Operation & Maintenance Manual Updates
  - Flood damage to residential structures
  - Landslide Occurrences
    - Magawiska Rd.
    - Old Colony Rd.
    - Converse St.
    - Trafton Rd.
    - Dickinson St.
- BJ Calvi
  - Brushfires 2020
  - Specific Wildfire events
  - # of companies emitting hazardous materials in Springfield
  - Tier 2 facilities reporting?
  - Man Made hazard accidents since 2002.

**CITY CLERK: Please Post this notice per M.G. L. Chapter 39, Section 23 A-C**

### **PRESS RELEASE**

CONTACT: Elyssa Parrish, Budget Analyst, Office of Administration & Finance (413) 784-4890

FOR IMMEDIATE RELEASE

#### **Pre-Disaster Mitigation Plans Under Development**

The Springfield Office of Emergency Preparedness is beginning the process of drafting pre-disaster mitigation plans for the City of Springfield.

This planning effort is being undertaken to help the City assess it faces 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.

Individuals interested in their community's Hazard Mitigation plan can contact Office of Administration & Finance (413-784-4890 or [eparrish@springfieldcityhall.com](mailto:eparrish@springfieldcityhall.com)) to request information on their community's plan development. When Springfield's plan is approved it will be eligible for Building Resilient Infrastructure & Communities (BRIC) grant program funding from the Massachusetts Emergency Management Agency.

## **PRESS RELEASE**

CONTACT: Elyssa Parrish, Budget Analyst, Office of Administration & Finance (413) 784-4890

FOR IMMEDIATE RELEASE

### **Pre-Disaster Mitigation Plans Public Comment Period**

The City of Springfield Office of Emergency Preparedness, in conjunction with representatives from the City's Police, Fire, Health, Public Works and Planning Departments, has produced a final draft of its Hazard Mitigation Plan. The plan is currently available for public review and comment on the City of Springfield's website ([http://www3.springfield-ma.gov/cos/dept\\_emergency.0.html](http://www3.springfield-ma.gov/cos/dept_emergency.0.html)). Paper copies of the plans may be obtained at the Mayor's Office. The plans will be available for the next two (2) weeks.

This planning effort is being undertaken to help the City assess the risks it faces 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. Communities with approved plans are eligible for Hazard Mitigation Grant Program funding from the Massachusetts Emergency Management Agency.



## Appendix H – Capital and Hazard Mitigation Project Prioritization

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### Capital Improvement Process

Departments submit capital requests to the Finance Department electronically along with necessary supporting documentation (See Implementation Schedule for a summary of requested projects). Requests are captured in a database maintained by the Finance Department and are reviewed by the Capital Improvement Committee. This process is required by City ordinance and is consistent with best practices regarding capital investment.

### Database Requirements

All capital requests are submitted in electronic format and include the following information:

- |                            |                          |
|----------------------------|--------------------------|
| • Project Category         | • Project Urgency        |
| • Project Type             | • Project Benefits       |
| • Department Priority      | • Fiscal Impact          |
| • Estimated Project Cost   | • Legal Obligations      |
| • Proposed Funding Sources | • Public Service Impact  |
| • Project Description      | • Completed Prior Phases |

### Categories

Capital projects are categorized into one of seven categories:

- Building – This includes acquisition, replacement, renovation, and addition to, construction or long-term lease of a building or a major component thereof.
- Infrastructure – This category includes roadwork, sidewalks, traffic signals, drainage systems and other improvements of a lasting nature that are not building structures.
- Equipment (Vehicular) – This includes equipment capable of self-propulsion from one location to another.
- Equipment (Other) – This includes all other equipment that meets the definition of a capital project item but is not capable of self-propulsion.
- Land/Parks/Fields - This category includes the acquisition, replacement, renovation, addition to, construction or long-term lease of parks and playing fields. If the acquisition

of land is associated with the acquisition of a building or an infrastructure project, the project would be categorized in those respective categories.

- Technology – This category includes all purchases that meet the definition of a capital item in the area of technology such as computers, digital copiers, printers, telephone systems and software programs.
- Salary – This category includes salary for staff associated with a specific project and helps to determine what, if any, operating costs are included in the project plan.

### Types

Each project is further classified into one of five different types of projects:

- New – The purchase, acquisition or construction of new capital, as distinct from the purchase of new capital items to replace existing capital.
- Reconstruction/Replacement – The substantial reconstruction or replacement of a capital asset, such as a street, building or a piece of capital equipment. This may entail the demolition of an existing asset or the abandonment of an asset and the construction or acquisition of a new asset to replace it.
- Demolition – This includes commercial and residential building demolition.
- Major Repair/Renovation – Large-scale renovations and repairs to capital assets, such as building system replacements, equipment overhauls and other items intended to extend the useful life of an existing capital asset.
- Repair – Smaller scale capital repairs that extend the useful life of a capital asset.

### Capital Improvement Committee

The Capital Improvement Committee is responsible for identifying and prioritizing the City's needs and coordinating them with the operating budget. The Committee is comprised of the Chief Administrative and Finance Officer, the Director of Finance, the Director of Public Works, the Director of Parks, Buildings and Recreation, the Director of the City's Capital Asset Construction Department and the Director of Economic Development and Planning for the City and a representative of the City Council. Any member who has an interest in any item before the committee must recuse him or herself from deliberations on that item. For the FY22 planning process the Committee members included:

- Chief Administrative and Financial Officer – Timothy J Plante
- Deputy Chief Administrative and Financial Officer – Lindsay Hackett
- Budget Director – Melanie Acobe
- Director of Department of Public Works – Christopher Cignoli
- Director of Parks, Building/Recreation – Patrick Sullivan
- Director of Capital Asset and Construction – Peter Garvey

- Chief Development Officer – Timothy Sheehan
- City Council Representative – Timothy Allen
- Deputy Director of Economic Development – Brian Connors
- Capital Improvement Analyst – Erin Hand

The Capital Improvement Committee reviews each submission. After appropriate review and consideration, the committee establishes project priorities given quantitative measures of need and justification as established by the rating department and reviewed by the committee.

### Criteria

Each project is ranked on six criteria:

- Overall fiscal impact - Will the project bring in additional revenue or will it cost additional money to operate? Are their funding sources other than the general fund for this project?
- Legal obligations – Does the project improve compliance with federal law, state law, or local ordinance?
- Impacts on service to the public - Will residents receive better service if the project is conducted? Will it address a public health, safety, accreditation or maintenance need?
- Urgency of maintenance needs - Is the asset currently broken and in need of immediate replacement?
- Prior phases - If the project is a multiyear project, have prior phases been previously conducted?
- Department priority – What priority does the department place on the projects based on the departmental mission, goals and objectives.

Each criterion above receives a different weight. Each project is assigned to one of four priority levels based on the overall weighted score.

The capital plan is intended to be a fluid document that will be subject to change each year as priorities change and additional information becomes available. All final requests approved by the Capital Improvement Committee will be submitted for final review and approval to the Mayor and the City Council.

### Rating Criteria

#### CRITERIA I – OVERALL FISCAL IMPACT

Weight: 5

**Rationale:** Limited resources exist for competing projects. This requires that each project’s full impact on the City’s budget be considered in rating and evaluating projects. Projects that are self-

funded or have a large proportion of external funding will receive higher ratings than those that do not, as these projects have less impact on the funding portion of our capital budget.

**Considerations:** Ratings for this factor will consider these major points:

- A. Capital cost of the project relative to all other project requests.
- B. Impact of the project on City operating costs and personnel levels.
- C. Whether the project requires City appropriation or is funded from agency, grant funds, matching funds or generated revenue.
- D. Impact on the City's tax revenue or fee revenue.
- E. Will external funding be lost should the project be delayed?

**Illustrative Ratings:**

- 5 - Project requires less than 10% City funding.
- 4 - Project requires less than 30% City funding.
- 3 - Project requires less than 50% City funding.
- 2 - Project requires more than 50% City funding, decreases operating costs.
- 1 - Project requires more than 50% City funding, operating costs remain the same.
- 0 - Project requires more than 50% City funding, increases operating costs

Note: Projects which do not impact either revenues or operating costs will receive the score of a project that is more favorable in the category (for revenue, the score will be the "increasing revenue" score and for costs, the "decreasing costs" score). This score will then be reduced by 0.5 to reflect the lack of actual increase in revenue or decrease in costs.

**CRITERIA 2 – IMPACT ON SERVICE TO THE PUBLIC** **Weight: 3**

Rationale: Consideration will be given to capital projects that address health, safety, accreditation or maintenance issues as well as those that improve the services provided by a department. Service is broadly defined, as are the City's objectives in meeting the health, safety or accreditation needs of our residents and/or improved operations of an existing department.

**Considerations:** Ratings for this factor will consider these major points:

- A. Whether the project focuses on a service that is currently a "high priority" public need.

- B. Whether the project has immediate impact on service, health, safety, accreditation or maintenance needs.
- C. Whether the service is already being provided by existing agencies.

**Illustrative Ratings:**

- 5 – Project would address an immediate public health or safety need.
- 4 – Project would improve service and addresses a public health or safety need.
- 3 – Project would improve service to meet current desired goals.
- 2 – Project would address deficiencies or problems with existing services; would establish new service.
- 1 - Project would maintain existing standard of service.
- 0 – Project not related to maintaining an existing standard of service.

**CRITERIA 3 – PROMOTES ECONOMIC DEVELOPMENT** **Weight: 3**

**Rationale:** Some projects offer a regional, citywide, or neighborhood benefit, enticing home buyers and business owners by making the City an attractive place to live or work. Criteria 3 assesses projects based on the impact to the City’s economic development efforts

**Considerations:** Ratings for this factor will consider these major points:

- A. Whether the project enhances the City’s economic vitality by stimulating the local economy, increasing revenue, improving government effectiveness, or reducing operating costs.

**Illustrative Ratings:**

- 5 – Significant regional benefit.
- 4 – Citywide improvement.
- 3 – Benefits large portion of City.
- 2 – Benefits one neighborhood.
- 1 – Assists in the elimination of slum and blight.
- 0 – No impact.

#### **CRITERIA 4 - LEGAL OBLIGATIONS AND COMPLIANCE**

**Weight: 3**

**Rationale:** Some projects are essentially mandatory due to court orders, federal mandates, or state laws that require their completion. These projects should receive higher consideration than those which are considered discretionary. Criteria 2 evaluates both the severity of the mandate and the degree of adherence to state and federal laws.

**Considerations:** Ratings for this factor will consider these major points:

- A. Whether the City is under direct court order to complete this project.
- B. Whether the project is needed to meet requirements of federal or state legislation.

#### **Illustrative Ratings:**

- 5 – City or Department is currently under court order to take action.
- 4 – Project is necessary to meet existing state and federal requirements.
- 3 – Legislation is under discussion that would require the project in the future.
- 2 – There is no legal or court order or other requirement to conduct the project.
- 1 – Project requires change in state or law to proceed.
- 0 – Project requires change in federal or law to proceed.

#### **CRITERIA 5 – URGENCY OF MAINTENANCE NEEDS**

**Weight: 2**

**Rationale:** The City's most immediate goal in both capital and operating finance is to maintain current service levels for our citizens, businesses and visitors. Capital projects that are essential to maintain services, protect investments, or restore service that have been interrupted due to failure of capital assets will receive the highest rating in this criterion.

**Considerations:** Ratings for this factor will consider these major points:

- A. Whether a service is currently interrupted.
- B. Whether the project as requested will result in full restoration of an interrupted service.
- C. Whether the project is the most cost-effective method of providing or maintaining a service.
- D. Where a service is not currently interrupted, the likelihood that it will be in the next five years if the project is not funded.
- E. Whether costs of the project will increase (beyond inflation) if the project is delayed.

F. Whether the agency has prepared a comprehensive maintenance/rehabilitation/ replacement schedule and the project is due under that schedule.

**Illustrative Ratings:**

5 – Service is currently interrupted and the project will restore service in the most cost-effective manner possible.

4 – Service is likely to be disrupted in a five-year horizon if the project is not funded.

3 – The project is necessary to maintain an orderly schedule for maintenance and replacement.

2 – The cost of the project will increase in future (beyond inflation) if it is delayed at this time.

1 – There is a minor risk that costs will rise or service will be interrupted if the project is not funded.

0 – There is no financial or service risk in delaying or not funding the project.

**CRITERIA 6 – PRIOR PHASES**

**Weight: 2**

**Rationale:** Some projects are developed in phases due to their complexity or size. In such cases, the need has already been established by a prior commitment of funding. Therefore, continuation of the project will be given higher consideration.

**Considerations:** Ratings for this factor will consider these major points:

- A. Whether the project has received prior funds.
- B. Whether the project requires additional funding to be operational.

**Illustrative Ratings:**

5 – All but the final phase has been fully funded.

4 – Multiple phases have been fully funded.

3 – Multiple phases have been partially funded.

2 – The first phase has been fully funded.

1 – The first phase has been partially funded.

0 – No prior phases have been funded or partially funded.

## **CRITERIA 7 – RESILIENCY**

**Weight: 1**

**Rationale:** Some projects are developed in an effort to mediate unseen risks or disasters the City could face. These projects take a proactive approach to alleviating chronic stresses to the City to assist with resilience efforts after a disaster.

**Considerations:** Ratings for this factor will consider these major points:

- A. Whether the project addresses stresses that weaken the fabric of a city on a daily or cyclical basis, examples include: High unemployment, Overtaxed or inefficient public transportation system, Endemic violence, Chronic food and water shortages.
- B. Whether the project addresses response to a vulnerable population after a disaster. A vulnerable population is a group or community whose circumstances present barriers to obtaining or understanding information or accessing resources. Typically, lower-income persons are considered vulnerable populations since they are less able to recover from the effects of disasters.

### **Illustrative Ratings:**

- 5 – Relieves chronic stressors to the City.
- 4 – Resolves response to vulnerable population after shock.
- 3 – Improves chronic stressors to the City.
- 2 – Improves response to vulnerable population after shock.
- 1 – Enhances natural resources.
- 0 – No impact.

## **CRITERIA 8 – PERCEPTION**

**Weight: 1**

**Rationale:** This criterion refers to project assessment of the extent of public support or interest group advocacy and/or opposition

**Considerations:** Ratings for this factor will consider these major points:

- A. Whether the project has been identified by a plan, Government official or public organization.
- B. The public's perception of the project, positive or negative.

### **Illustrative Ratings:**



- 5 – Identified in comprehensive plan, project plan or other study.
- 4 – Specific project request from the City Council.
- 3 – Project request from neighborhood organization of other group.
- 2 – Public perception of need known to City department.
- 1 – Knowledge of public perception of need unknown.
- 0 – Public opposition.