TOWN OF AGAWAM

HAZARD MITIGATION PLAN UPDATE 2023

Adopted by the Mayor of Agawam on _____

Prepared by:

Agawam Hazard Mitigation Committee

and

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Acknowledgements

The Agawam Mayor and Town Council extends special thanks to the Agawam Hazard Mitigation Planning Committee as follows:

Chet Nicora, Emergency Management Director
William Sapelli, Mayor
Jennifer Gannett, Mayor's Chief of Staff
Mario Mazza, DPW Superintendent
Michelle Chase, Town Engineer
Alan Sirois, Fire Chief
Eric Gillis, Police Chief
Michael Theroux, Health Agent
Kevin Duquette, Building Inspector
Michael Squindo, Executive Director, COA
Michael Nicora, Deputy Director, Emergency Management

The Agawam Mayor and Town Council offers thanks to the Massachusetts Emergency Management Agency (MEMA) for developing the Massachusetts State Integration Hazard Mitigation and Climate Adaptation Plan (https://www.mass.gov/service-details/massachusetts-integrated-state-hazard-mitigation-and-climate-adaptation-plan) which served as a model for this plan. In addition, special thanks are extended to the staff of the Pioneer Valley Planning Commission for professional services, process facilitation and preparation of this document.

The Pioneer Valley Planning Commission
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1: PLANNING PROCESS

Introduction

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 damage to buildings and infrastructure, such as water supplies, sewers, and utility transmission lines, as well as natural, cultural and historic resources.

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

Preparing, and updating every five years, a hazard mitigation plan before a disaster saves communities money and facilitates 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 their plan.

FEMA requires that a community adopt a hazard mitigation plan to be eligible for mitigation funding from the Hazard Mitigation Grant Program (HMGP), the Flood Mitigation Assistance Program (FMA), and the Building Infrastructure and Communities (BRIC) Program are programs with this requirement.

Hazard Mitigation Plan Committee

Planning for hazard mitigation in Agawam involved the following Committee members:

William Sapelli, Mayor
Chet Nicora, Emergency Management Director
Jennifer Gannett, Mayor's Chief of Staff
Mario Mazza, DPW Superintendent
Michelle Chase, Town Engineer
Alan Sirois, Fire Chief
Eric Gillis, Police Chief
Michael Theroux, Health Agent
Kevin Duquette, Building Inspector
Michael Squindo, Executive Director, COA
Michael Nicora, Deputy Director, Emergency Management

The process followed by the Agawam Hazard Mitigation Plan (HMP) Committee to update their existing HMP included the following tasks:

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

The key product of this process was the development of a list of prioritized new mitigation strategies to be implemented in the next five years.

Committee Meetings

Meetings of the HMP Committee, which took place at the Department of Public Works offices at 1000 Suffield Street, Agawam, were held on the dates listed below.

February 8, 2023
Overview of hazard mitigation planning, review and update of critical facilities, discussion of hazard identification and risk assessment, and review of existing mitigation strategies undertaken by the Town.

March 1, 2023
Review and update of critical facilities, discussion of the history of natural hazard events in the Town.

March 21, 2023
Complete Capability Assessment Worksheet, Review and update Existing Mitigation Capabilities Table.

April 13, 2023
Review previous mitigation actions and determine status of action; decide which actions to delete and which to carry over to new plan, Identify potential new mitigation actions.

May 2, 2023
Finalization of prioritized implementation strategies, Discussion of the plan adoption process and Procedures for regular maintenance of the plan.

Agendas and sign-in sheets for each meeting can be found in Appendix C. While not all members of the HMP Update Committee were able to attend each meeting, all members collaborated on the plan and were updated on progress by fellow Committee members after meetings occurred.

Participation by Stakeholders

A variety of stakeholders were provided with an opportunity to be involved in the update of the Agawam Hazard Mitigation Plan. The different categories of stakeholders that were involved, and the engagement activities that occurred, are described below.

Local and regional agencies involved in hazard mitigation activities

The Mayor's office assured input and participation from all Town Departments, providing verbal updates on the Hazard Mitigation planning process at his regular meetings with Town Department heads, and giving his department heads the opportunity to comment and provide input on the plan update process. All Town staff and departments were also informed of the public meetings on the plan update and had the opportunity to participate in those meetings as well as the meetings of the Hazard Mitigation planning committee as all meeting notices were posted per requirements of the State Open Meetings law. All input received was integrated into the plan. The kind of input received included local information not readily available through internet research, updates on the status of implementation of the previous action plan and changes in local rules and regulations as well as other updates on capabilities.

The Pioneer Valley Planning Commission is a regional planning agency for 43 towns and cities in Massachusetts' Hampden and Hampshire Counties. PVPC regularly engages with the Town of Agawam as part of its regional planning efforts, which include the following:

- Developing and regularly updating the Pioneer Valley Regional Land Use Plan, Valley Vision 2, which advocates for sustainable land use throughout the region and consideration for the impact of flooding and other natural hazards on development.

- Developing and regularly updating the Pioneer Valley Climate Action and Clean Energy Plan, which assesses the impact that climate change will have on the region and recommends strategies for mitigation that can be implemented by local municipalities and businesses.

- Developing and regularly updating Our Next Future Plan, a regional plan promotes strategies to create a more vibrant, competitive, sustainable, and equitable region.

- Collaborating with state agencies, such as the Department of Conservation and Recreation, to maintain inventories of critical infrastructure throughout the region.

- Collaborating with the Town of Agawam on climate change mitigation, adaptation and resilience measures through the Green Communities program and the Municipal Vulnerability Preparedness program.

All these PVPC initiatives consider the impact of natural hazards on the region and strategies for reducing their impact to people and property through hazard mitigation activities. The facilitation of the Agawam Hazard Mitigation Plan by PVPC ensured that the information from these plans was incorporated into the Hazard Mitigation Planning process.

In addition, the Pioneer Valley Planning Commission is actively involved in the Western Region Homeland Security Advisory Council (WRHSAC). WHRSAC, which includes representatives from Western Massachusetts municipalities, Fire Departments, Public Works Departments, Police Departments, area hospitals and regional transit from throughout the four counties of western Massachusetts, is responsible for allocating emergency preparedness funding from the US Department of Homeland Security. The representatives of these disciplines who serve on the WRHSAC are charged with sharing the information discussed at meetings with their colleagues at their regular meetings. Meetings of WRHSAC regularly involve discussion about how to improve emergency preparedness in western Massachusetts, and hazard mitigation activities are included in this discussion.

PVPC staff regularly present to their Executive Committee and Commission (representatives from the 43 cities and towns that comprise the Pioneer Valley), when new projects are launched and when funding opportunities are available. As result, all the communities in the region were informed of Agawam's Hazard Mitigation Plan update process and encouraged to comment. In addition, PVPC is facilitating Hazard Mitigation work in many other communities in Hampden and Hampshire Counties concurrent to working with Agawam, so all these municipalities were aware of and had the opportunity to share hazard mitigation information with one another. We did not receive any comments from these neighboring municipalities on Agawam's draft plan update.

Agencies that have the authority to regulate development:

The Agawam Planning Board is the primary Town board responsible for regulating development in Agawam. Other Town commissions, boards, and committees that have the authority to regulate development in Agawam include the Zoning Board of Appeals, the Town Council, the Conservation Commission, and the Building Inspector. The participation of the Mayor and the Building Inspector on the HMP Committee ensured feedback for the Town Council and to the Planning and Zoning Boards. In

addition, the Town Planner was consulted numerous times during the planning process about development in Town and about mitigation strategies being proposed.

Neighboring Communities

Emails were sent to all neighboring communities before both public meetings, inviting them to attend and to provide input on the plan. The press releases also encouraged citizens and municipal officials from nearby communities to comment on Agawam's plan by e-mailing or calling staff contacts at PVPC or the Town. The Pioneer Valley Planning Commission's regional scope ensured that residents and government officials throughout the Pioneer Valley saw the press releases and request for comments. Comments received?

Representatives of businesses, academia, and other private organizations:

Representatives from Six Flags New England Theme Park and large employers at the Agawam Industrial Park (Olympic Manufacturing Group and Diana's Bakery) were invited to attend the second public meeting as well as to review the draft plan. In addition, the Town Police and Fire Departments regularly communicate with the Six Flags emergency management team, and informally receive input on information in the HMP. The Committee sent the draft plan to the Urban and Regional Planning Department at Westfield State University with an invitation to review it, and also invited faculty and students to the second public meeting. (Update this section if necessary after 2nd public meeting)

Representatives of nonprofit organizations:

The director of Agawam's Council on Aging was a member of the HMP committee, and while the COA is not a nonprofit organization, his participation did ensure that the needs of older and disabled adults were prioritized during the planning process. In addition, representatives from the Agawam Housing Authority and Revitalize Community Development Corporation were invited to attend the public meetings and to review the draft plan. Both organizations work with vulnerable groups that are primarily low-income as well as minority populations.

Public Involvement in the Plan:

Two public planning sessions were held as part of the development of the Agawam plan – on April 13, 2023 and March 3, 2015. Both meetings occurred after the Hazard Mitigation Committee had provided input on hazards and mitigation strategies relevant to the community. Notice of both public meetings was posted at Agawam Town Hall in compliance with the Commonwealth of Massachusetts' open meeting law. Public meeting agendas and notices can be found in Appendix C.

On February 13, 2015, the Pioneer Valley Planning Commission sent a press release to all area media outlets announcing that the hazard mitigation planning process was underway and that the first public outreach meeting would be held on April 13th. A digital flyer publicizing the meeting was posted on the Town website and on the Town social media accounts. In addition, a printed flyer was posted at the public library and post office. Senior Agawam residents were directly invited to attend the public meetings and to comment on the plan by the director of the COA. On XX date, PVPC sent a press release to area media outlets announcing that the draft plan was available for review, with a link to the plan, and with the location and date for the second public meeting. Appendix C includes a screenshot of the town website where the plan was available for download. The press release also indicated that hard

copies of the plan were available at the Agawam Department of Public Works, and that all residents, businesses and other concerned parties of Agawam were encouraged to comment on the plan by e-mailing or calling staff contacts at PVPC or the Town.

Public participation will be a critical component of the Hazard Mitigation Plan maintenance process, as discussed in Chapter 6: Plan Review, Evaluation, Implementation, and Adoption.

Town Council Meeting

In 2022, the Town Council agreed to begin the process of developing a Hazard Mitigation Plan. Once the plan was provisionally approved by FEMA, the Council held a public hearing on the plan on XX Date and formally adopted the plan.

2: LOCAL PROFILE

Community Setting

Geography

Agawam is located in Hampden County within the Pioneer Valley region of Massachusetts. It is bordered by West Springfield to the north, Southwick to the west, Longmeadow to the east, Springfield to the northeast, Westfield to the northwest, and Suffield, Connecticut to the south. Agawam is also 25 miles north of Hartford, Connecticut.

Population Characteristics

There are 28,715 Agawam residents (2017-2021 ACS) and a total of 12,242 housing units (2017-2021 American Community Survey). The median household income is $78,619 with 7.0 percent of residents below the poverty line (ACS 2017-2021).

There are two Environmental Justice (EJ) block groups in Agawam based on income criteria. One group is on the northern side of Town abutting the Westfield River and Robinson State Park while the second is on the southern side of Town between Rt 159 and the Connecticut River.[1] Both populations are primarily white, but have a minority population of 22.7% in the northern block group and 16.8% in the southern block group. The northern EJ block group has a population of 1,054 individuals in 344 households and the southern EJ block group has a population of 1,430 individuals in 758 households, according to 2020 Census data.

Climate

Annual rainfall averages 48 inches per year in Massachusetts, with average monthly rainfall between 3 and 4 inches for the western part of the state. In addition to rain, snowfall averages approximately 40 inches per season. Prevailing winds from the south (and from the north/northwest to a lesser extent) generally reach their highest average speed during the month of April. In the past few decades, Agawam and all of New England have seen an increase in the number of extreme rainfall events, defined as large amounts of rain in a short period of time, as well as increased periods of drought. With the impacts of climate change, Agawam is likely to experience more intense spring downpours, drier summers and more intermittent droughts, increased flooding, diminishing snowfall and higher precipitation in winter and spring months. There will also be an increased risk of extreme weather events such as large storms that generate strong wind gusts.[2] In 2011, Agawam experienced both the large October snowstorm that caused electricity outages for up to 5 days in parts of Town, as well as large amounts of precipitation from Hurricane Irene that caused massive erosion and damage to a levy along the Westfield River.

[1] https://www.mass.gov/service-details/environmental-justice-policy
[2] Resilientma.gov

Infrastructure

Agawam's location in the center of the region and bordering the Connecticut state line has played a major role in facilitating its growth. Several major thoroughfares exist in the town and development patterns have followed these corridors. In addition, the town's physical characteristics and topography, coupled with its location, define its boundaries and guide its development.

Roads and Highways

Agawam is at the hub of major north-south and east-west transportation corridors in the Pioneer Valley. Major thoroughfares are:

- State Route 57 (Henry Bodurtha Highway)
- State Route 187 (Westfield Street)
- State Route 75 (Suffield Street)
- State Route 159 (Main Street)
- State Route 147 (Memorial Ave)

U.S. Route 5, a major regional transportation corridor, is also located in Agawam's northeastern corner and crosses over the Connecticut River to connect with Interstate 91 in Springfield.

Rail

There is no passenger or freight rail service in Agawam.

Public Transportation

Bus service is provided by the Pioneer Valley Transit Authority from Agawam to many locations throughout the Pioneer Valley, usually via the Springfield Bus Terminal. In addition, limited bus service is provided to the Agawam Regional Industrial Park, the Pheasant Hill Apartments, and the Heritage Nursing Home.

Water and Sewer

Agawam obtains its water from the Springfield Water and Sewer Commission, but operates its own system for the distribution of water among residents. The system is comprised of one pump station and approximately 151.8 miles of pipe, ranging in diameter from 4" to 16", and 11,646 service accounts, as of 2022. Residential water use accounted for 60 percent of total usage and overall annual consumption was in 2022 at 799,964,000 gallons.

The majority of Agawam is connected to its public sewer infrastructure, which was upgraded in the 1970s using state and federal dollars. Sewage is pumped to a treatment plant that is owned by the Town of Springfield on Bondi's Island. Agawam pays for its share of the maintenance and operating costs based on the volume and strength of the sewage that comes from the community.

Schools

Public schools serving Agawam include the Early Childhood Center, Benjamin J. Phelps School, Clifford M. Granger School, James Clark School, Robinson Park School, Roberta G. Doering School, Agawam Junior High School, and Agawam High School.

Natural Resources

Water Resources

Agawam has approximately 532 acres of open fresh water, most of which is contained in the Westfield and Connecticut Rivers. The Connecticut River runs along the eastern boundary of Agawam for 5 miles. The section of the Westfield River that runs along the northern boundary of Agawam is approximately 8 miles long, and runs from the Westfield town line to its confluence with the Connecticut River at Pynchon Point. Because Agawam is located at the confluence of these two rivers, much of the eastern portion of the community is in the 100-year floodplain.

Ponds that are over three acres include: Silver Lake, Mawaga Pond, Leonard Pond, Robinson Park Pond, Springfield Turnverein Lake, Hathaway Pond, and the Lake in the Meadows. In addition, Agawam has many small steams or brooks, including: Three Mile Brook, Tarkill Brook, Still Brook, Philo Brook, Miller Brook, Worthington Brook, and Adams Brook. There are also several smaller unnamed intermittent streams, wetlands, and vernal pools.

Forests and Vegetation

Agawam's rapid suburbanization over the past few decades has resulted in an appreciable loss of agricultural vegetation as those lands most suitable for agricultural use are also the most desirable for development. During this period, however, pockets of natural vegetation in the town's wetlands and hilly areas have been less severely impacted. Approximately 2,143 acres (14 percent) of Agawam is cropland or pasture and 5,093 acres (33 percent) is forested.

Development

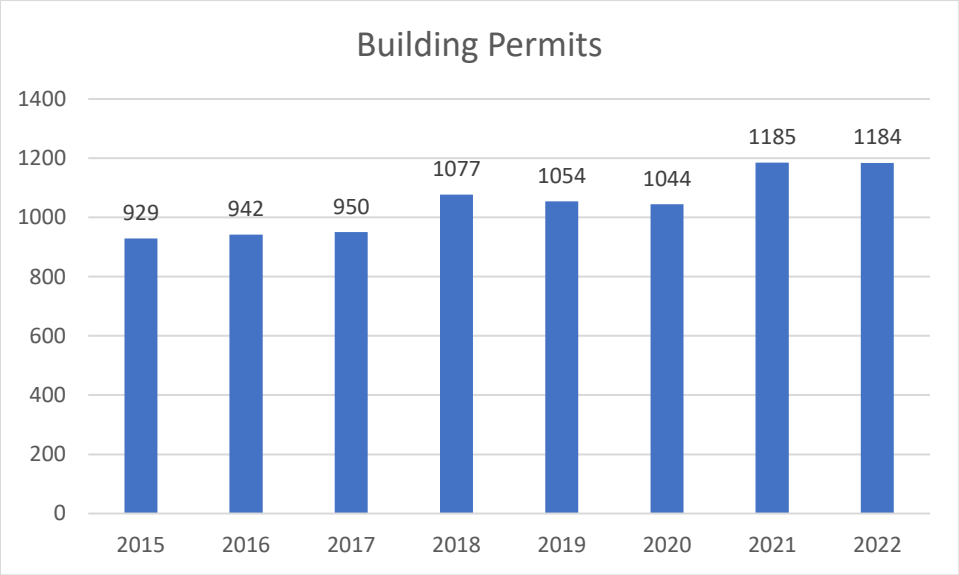
Agawam was established as a town in 1855 but remained primarily a farming community until as late as the 1950s, when the construction of highways facilitated suburban growth. Since this time, Agawam has witnessed a dramatic shift in land use patterns with over a 70 percent decrease in agricultural land. Between 1960 and 2010, Agawam's population increased by 81 percent. Most of the the town's developed land is for residential use. Today, Agawam is both a residential community for those who commute to Springfield and neighboring Connecticut, as well as a commercial and industrial center itself. The largest amusement park in New England, Six Flags New England, is also located in Agawam and attracts visitors from throughout the Northeast.

Most parts of Agawam are widely developed with the most concentrated development in north Agawam. The least developed area is on Provin Mountain, which is undeveloped primarily because of steep slopes. Parts of Feeding Hills and some areas along North and South Westfield Roads are also not heavily developed, due to a lack of sewer lines and soil inappropriate for septic systems.

Approximately ten percent of Agawam's land is permanently protected and about 1,336 acres are temporarily protected under the state's Chapter 61A Program. Agawam is approximately 33 percent forestland, most of which is fragmented, except along the western border on Provin Mountain and along the Westfield River in Robinson State Park.

According to the Town of Agawam's Department of Inspection Services, there have been 8,365 building permits issued between January 2015 and December 2022, for an average of about 1,046 per year.

Agawam Building Permits Issued 2015-2022



Zoning

Agawam has 13 zoning districts. The districts define the allowed uses and dimensional requirements in all parts of the town. These districts are:

- Residence A-1 Districts: Single family residences
- Residence A-2 Districts: Single-, 2- & 4-family residences
- Residence A-3 Districts: Apartments, garden-type apartments, & condominiums
- Residence A-4 Districts: Elderly housing
- Residence A-5 Districts: Age-restricted housing
- Residence A-6: Low density community
- Residence B Districts: Single- & 2-family residences
- Agriculture Districts: Single family residences, agriculture & administrative offices
- Business A Districts: Retail uses, all residential and agricultural uses
- Business B Districts: Mixed commercial, including light industrial
- Business C Districts: Mixed use
- Industrial District A: Industrial, mixed commercial & agricultural
- Industrial District B: Industrial, mixed commercial & agricultural

National Flood Insurance Program

Agawam is a participating member of the National Flood Insurance Program, and had the following NFIP policy and claim statistics as of 2023:

- Flood Insurance Maps (FIRMs) are used for flood insurance purposes and are on file with the Agawam Inspection Services at 1000 Suffield Street.
- FIRMs have been effective since February 1, 1978 with the current map in effect since July 16, 2013.
- Agawam has 130 in-force policies in effect for a total of $29,420,700 worth of insurance.
- There have been a total of 50 NFIP claims for which $132,936 has been paid.
- There are currently no "Repetitive Loss Properties" insured under the NFIP within the Town of Agawam.

The Town will maintain compliance with the NFIP throughout the next 5-year hazard mitigation planning cycle by monitoring its Floodplain Zone and ensuring that this zoning district accurately reflects the 100-year floodplain and FEMA Flood Insurance Rate Map.

Recent and Potential Development

Since 2016, the Town has approved two residential definitive subdivisions with a total of 22 single family lots. These subdivisions are known as Nicole Terrace and D'Amato Way. A private roadway with two residential lots was approved for Prouty, 891 South Westfield Street. One commercial subdivision was approved at Ace Precision Way, with 3 commercial lots at 1123 Suffield Street. Recently approved condominium projects include a 55+ project, "The Villas," at 466 South Westfield Street, with 46 age restricted units; and a condominium project on Corey Street (Sabrina Way) with 23 units. A revised condominium project was approved at 497 South Westfield Street with 81 units. In terms of potential development, plans for a 158 condo/apartment project at 685 South Westfield Street are currently before the Planning Board.

Major commercial development since 2016 includes: 2,400 sf Starbucks and a 5,200 sf walk-in medical facility at 10, 24 Main Street and 23 Suffield Street; a new 4,550 sf Pride Convenience location at 395 Main Street; a new 5,250 sf commercial landscape building at 1298 Suffield Street; Dollar General (9,100 sf) and professional office building (7,440 sf) approved at 255 and 267 South Westfield Street; 13,200 sf Agawam Organics Recycling Facility at 299 Main Street; Cumberland Farms Car Wash, 835 Suffield Street; CES Agawam Tuckahoe Solar4 LLC is leasing town-owned property at the former Tuckahoe property for a solar array. Additional major commercial developments approved include: a solar array by TJA Solar, 311 Shoemaker Lane; new Ace Precision building on Ace Precision Way (1123 Suffield Street); a new car wash for Soapy Noble was approved at the corner of Shoemaker Lane/South Westfield Street. Two self-storage facilities have been approved: 729 Silver Street (8 buildings) and 32 Shoemaker Lane (12 buildings). A commercial project at 1246, 1266 and 0 Springfield Street for Eagle Investments was approved and includes a 2,600-sf bank with drive-thru, and two 7,200 sf commercial/retail space buildings.

A passive recreation project at the former Tuckahoe Turf Farm was approved and will include an access roadway, walking trails and replacement of the Nine Lot Dam as well as canoe/boat access to the pond.

Development in Hazard Prone Areas

Development in floodplains or areas prone to flooding (and approved by the Conservation Commission) include the new Pride facility at 395 Main Street and the Springfield Water and Sewer Commission's Connecticut River Crossing Project, which includes new sewer lines under the Connecticut River. The project, begun in 2019, involved the replacement of the York Street Pump Station in Springfield, and the installation of three new pipes under the river to carry wastewater from the pump station to Bondi's Island Wastewater Treatment Plant in Agawam. The project included measures that increase flood control protection and prevent up to 100 million gallons of combined sewer overflows from entering the Connecticut River annually.

The Town performed stream restoration of Still Brook (Paul Revere Drive). The Town received an Order of Conditions for a new Reed Street outfall (Westfield River) as well as replacement of a culvert under North Street. Plans for replacement of the May Hollow Culvert (North Westfield Street) are currently under review by the Conservation Commission. While located in flood-prone areas, these new developments will not increase the Town's vulnerability to flooding; in fact, the sewer project and the culvert replacements will reduce the Town's vulnerability to flooding.

In 2021, the Town was awarded a Municipal Vulnerability Preparedness grant of $216,750 to develop a stormwater master plan. The grant funded a municipal code review, impervious area mitigation assessment, and a climate impact assessment, as well as a culvert assessment, a priority storm drain structure evaluation, and a detention basin retrofit evaluation. The results of these assessments and evaluations were used to develop the comprehensive Stormwater master Plan and a Capital Improvement Plan that will be utilized by the Town to prioritize future improvements.

Following a thorough hazard vulnerability and risk assessment completed as part of this plan update process, which included mapping critical infrastructure, reviewing past hazards and analyzing new development as well as regulatory changes, the committee has determined that the development that has taken place since the previous HMP has not increased the Town's vulnerability to natural hazards.

3: HAZARD IDENTIFICATION AND RISK ASSESSMENT

This chapter examines all hazards identified by the Massachusetts State Hazard Mitigation and Climate Action Plan (2018) which are identified as likely to affect Agawam. Historical research, conversations with local officials and emergency management personnel, available hazard mapping and other weather-related databases were used to develop this list. Identified hazards are the following:

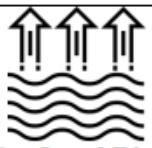
- Floods
- Severe snowstorms / ice storms
- Hurricanes / tropical storms
- Severe thunderstorms / wind / tornadoes / microbursts
- Wildfires / brushfires
- Earthquakes
- Dam failures
- Drought
- Extreme Temperatures

Massachusetts State Hazard Mitigation and Climate Adaptation Plan

The 2018 Massachusetts State Hazard Mitigation and Climate Adaptation Plan (SHMCAP); EEA and EOPSS) identified the natural hazards that can occur in the state along with the climate change interaction for each, and the representative climate change impacts. The one hazard without a climate change interaction is earthquakes. These are shown in Table 4.4 below from the SHMCAP.

Not all hazards included in the 2018 SHMCAP apply to the Town of Agawam. Given Agawam's inland location, coastal hazards and tsunamis would not affect the Town. The core team did not include landslides in their natural hazard inventory, as they have not previously occurred in the town. The plan also does not include invasive species as a natural hazard, although they are identified as a vulnerability. It is assumed that the entire Town of Agawam and its critical facilities are exposed to earthquakes, high wind events, hurricanes, winter storms, snow and ice, temperature extremes, and drought, to a similar extent. Flood risk from riverine flooding is elevated in the vicinity of flood zones.

Table 3.1: Natural Hazards and Climate Change Interactions

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

Natural Hazard Analysis Methodology

The hazard profiles were updated with information from the 2018 Massachusetts State Hazard Mitigation and Climate Adaptation Plan (SHMCAP; EEA and EOPSS, 2018), the Town's MVP community resilience building process and related report and additional research and assessment conducted by the project team. The HMP Committee provided local accounts of each hazard. The hazard analysis is

organized into the following sections: Hazard Description, Location, Extent, Previous Occurrences, Probability of Future Events, Impact, and Vulnerability. A description of each of these analysis categories is provided below.

Hazard Description

The natural hazards identified for Agawam are: floods, severe snowstorms/ice storms, hurricanes, severe thunderstorms / wind / tornadoes, wildfire/brushfire, earthquakes, dam failure, and drought. Many of these hazards can result in similar impacts to a community. For example, hurricanes, tornadoes, and severe snowstorms that may cause wind-related damage.

Location

Location refers to the geographic areas within the planning area that are affected by the hazard. Some hazards affect the entire planning area universally, while others apply to a specific portion, such as a floodplain or area that is susceptible to wildfires. Classifications are based on the area that would potentially be affected by the hazard, on the following scale:

Location of Occurrence, Percentage of Town Impacted by Given Natural Hazard	
Location of Occurrence	**Percentage of Town Impacted**
Large	More than 50% of the town affected
Medium	10 to 50% of the town affected
Small	Less than 10% of the town affected

Extent

Extent describes the strength or magnitude of a hazard. Where appropriate, extent is described using an established scientific scale or measurement system. Other descriptions of extent include water depth, wind speed, and duration.

Previous Occurrences

Previous hazard events that have occurred are described. Depending on the nature of the hazard, events listed may have occurred on a local, regional, or state-wide level.

Probability of Future Events

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

Frequency of Occurrence and Annual Probability of Given Natural Hazard	
Frequency of Occurrence	**Probability of Future Events**
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

Impact

Impact refers to the effect that a hazard may have on the people and property in the community, based on the assessment of the extent described above. Impacts are classified according to the following scale:

Impacts, Magnitude of Multiple Impacts of Given Natural Hazard	
Impacts	**Magnitude of Multiple Impacts**
Catastrophic	Multiple deaths and injuries possible. More than 50% of property in affected area damaged or destroyed. Complete shutdown of facilities for 30 days or more.
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 to quality of life. Temporary shutdown of facilities.

Vulnerability (hazard index rating)

Based on the above metrics, a hazard index rating was determined for each hazard. The hazard index ratings are based on a scale of 1 through 5 as follows:

1 – Very high risk
2 – High risk
3 – Medium risk
4 – Low risk
5 – Very low risk

The ranking is qualitative and is based, in part, on local knowledge of past experiences with each type of hazard. The size and impacts of a natural hazard can be unpredictable. However, many of the mitigation strategies currently in place and many of those proposed for implementation can be applied to the expected natural hazards, regardless of their unpredictability.

Vulnerability Assessment Methodology

In order to determine estimated losses due to natural hazards in Agawam, each hazard area was analyzed with results shown below. The data below was calculated using the methodology outlined in FEMA's mitigation planning guide, *Understanding Your Risks: Identifying Hazards and Estimating Losses (FEMA 386-2),* August 2001.

Total value of all structures in Agawam (Assessor's data, FY 2023): $3,691,126,257.00

Median value of an owner-occupied home in Agawam - American Community Survey (ACS) 2021 estimate: $252,000

Average household size: 2.40 persons (across roughly 11,785 households, ACS 2021)

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

Table 3.2: Hazard Identification and Analysis Worksheet for Agawam				
Type of Hazard	**Location of Occurrence**	**Probability of Future Events**	**Impact**	**Vulnerability**
Flooding	Medium	Moderate	Critical	2 – High Risk
Severe Snowstorms / Ice storms	Large	High	Critical	1 – Very High Risk
Hurricanes Tropical Storms	Large Large	Low Moderate	Critical Critical	2 – High Risk 2 – High Risk
Severe Thunderstorms / Wind / Tornadoes/Microbursts	Small	Very High High	Critical	3 – Medium Risk
Wildfires / Brushfires	Small	Very Low	Minor	4 – Low Risk
Earthquakes	Large	Low	Catastrophic	4 – Low Risk
Dam Failures	Medium	Low	Critical	3 – Medium Risk
Drought	Large	Moderate	Minor	4 – Low Risk
Extreme Temperatures	Large	High	Minor	3 – Medium Risk

Floods

Hazard Description

There are three major types of storms that can generate flooding in Agawam:

- **Continental storms** are typically low-pressure systems that can be either slow or fast moving. These storms originate from the west and occur throughout the year.

- **Coastal storms**, also known as nor'easters, usually occur in late summer or early fall and originate from the south. The most severe coastal storms, hurricanes, occasionally reach Massachusetts and generate very large amounts of rainfall.

- **Thunderstorms** form on warm, humid summer days and cause locally significant rainfall, usually over the course of several hours. These storms can form quickly and are more difficult to predict than continental and coastal storms.

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.

Location

There are approximately 1462.5 acres of land within the FEMA mapped 100-year floodplain and 262.4 acres of land within the 500-year floodplain in the Town of Agawam. Most of this area is located adjacent to the Connecticut River. This includes Bondi's Island where the Springfield Water and Sewer Commission operates its wastewater treatment plan and to which numerous sewer pipes flow.

Based on these locations, flooding has a "medium" location of occurrence, with 10 to 50 percent of land affected.

The following specific locations are prone to flooding:

River Road

The River Road neighborhood is located in the floodplain. It consists of 37 streets and approximately 370 residential homes northwest of River Road.

Northern Suffield Street (Route 75)
Localized flooding has occurred in the past on northern Suffield Street at the crossing with Westfield Brook. Flooding has occurred in this area in recent years due to inadequate culvert capacity.

Approximately 3 residential structures could be affected by localized flooding. There is potential for damage to Route 75.

Southern Suffield Street (Route 75)
Portions of southern Suffield Street have experienced localized flooding in the past. Flooding has occurred in this area in recent years due to inadequate culvert capacity and is exacerbated by beaver dams and culvert blockage due to debris. There are no structures in the area where the flooding occurs, though there is potential for damage to Route 75. A second private culvert is located just downstream on the Tennessee Gas property.

North Street
The road has experienced minor flooding, due to culvert problems over White Brook. While there are no records of flooding in this area, the upstream side of the culvert has become blocked during extreme rain events resulting in erosion of the area surrounding the inlet. Blockage of this culvert could be catastrophic for North Street and all utilities in the area. Approximately 4 residential structures and a sewer pump station could be affected by flooding at this location.

Leonard Pond

A 75-year storm in the 1980s caused significant damage to residential homes along Kathy Terrace. Approximately 15 residential structures could be affected by a flood incident at this location. Beaver issues contribute to flooding in this location.

Shoemaker Lane
During large storm events, a tributary of Worthington Brook overtops Shoemaker Lane just west of #49 Shoemaker. The Agawam DPW has had to close part of the road several times over recent years. Erosion and sediment appear to be the cause of the capacity issue up and downstream of this culvert.

Ramah Circle/Walnut Street Extension/Agawam Shopping Court
There has been a history of stormwater runoff issues in the Ramah Circle/Walnut Street Extension/Agawam shopping court area. The properties on the north side of Ramah Circle North have experienced flooding during large storm events due to runoff and stream flow from the west. This is due to capacity limitations of the existing stormwater system and sediment/debris blocking the inlet pipe located at 84 Ramah Circle North. Additional MS4 capacity limitations in this area have also been identified in the 2023 Woodward and Curran Stormwater Evaluation Report of Ramah Circle and Walnut Street Extension.

South Park Terrace
Localized flooding has been documented in the South Park Terrace and Raymond Circle area. The limited existing infiltration systems and challenging soil conditions particularly on the eastern end of South Park Terrace results in street and property flooding during intense and extended rainfall events. A small stormwater pump station discharges stormwater from the Town's MS4 to Three-Mile Brook to the east.

Extent

The Hazard Mitigation Committee indicated that all locations of localized flooding can receive high water marks of up to several feet during sufficiently large rainstorms. Water levels in Agawam's rivers,

streams, and wetlands rise and fall seasonally and during high rainfall events. High water levels are typical in spring, due to snowmelt and ground thaw. This is the period when flood hazards are normally expected. Low water levels occur in summer due to high evaporation and plant uptake (transpiration). At any time, heavy rainfall may create conditions that raise water levels in rivers and streams above bank full stage, which then overflow onto adjacent lands.

The worst flooding that likely occurred in Agawam's recent history would have been following Hurricane Diane in August 1955. While Agawam does not have records, the region recorded levels of nearly 20 inches in the greater Springfield area, according to the US Geological survey Report "Floods of August 1955 in the Northeastern States".[3] Westfield experienced extensive flooding due to high water levels in the Westfield River, and Agawam likely experienced significant flooding as well, although there are not records for this.

Floods can be classified as one of two types: flash floods and general floods.

Flash floods are the product of heavy, localized precipitation in a short period of time over a given location. 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).

General floods may last for several days or weeks and are caused by precipitation over a longer period of time in a particular river basin. 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).

The average annual precipitation for Agawam and surrounding areas in western Massachusetts is 46 inches.

Previous Occurrences

Historically, most flooding in Agawam has been localized, affecting particular neighborhoods or areas containing small ponds or wetlands that overflow when the town receives heavy rainfall. The locations mentioned above (lower and upper Suffield Street, North Street, and Leonard Pond) are places in Agawam at which flooding has occurred. Suffield Street experiences annual flooding due to inadequate culvert capacity and beaver dams, while North Street receives minor flooding on an annual basis and Leonard Pond flooded due to a storm in 1983.

In addition to Hurricane Diane, the largest flooding event on record occurred in March of 1936, when an unusually cold and snowy winter, followed by a spell of warm and rainy weather, turned the normal spring rising of the Connecticut River into an unprecedented natural catastrophe. The flood inundated Agawam, as well as Hadley, Hatfield, Northampton, and Springfield. In Massachusetts, the flood resulted

[3] chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://pubs.usgs.gov/circ/1956/0377/report.pdf

in 10 deaths and left 50,000 people homeless. Estimated damage statewide was $200 million in 1936 dollars, or $3.4 billion in 2014 dollars.

Flooding during Tropical Storm Irene in 2011 caused sheet piling in a 250' section of levy along the Westfield River to erode and fold, and the slope to erode. This was especially concerning because a sewer line ran along this section of slope. The DPW has completed the design work to relocate the sewer line, and the Town was recently awarded funding for the construction phase of the project from the U.S. Department of the Interior as part of an infrastructure earmark. The sewer main will be moved from the top of the embankment allowing discharge to flow into the nearby treatment plant instead of the river. The embankment will then be rebuilt to prevent future erosion from occurring.

The Town of Agawam has a gauge on the Connecticut River to indicate the height of river at the Campbell Road pump stations. The National Weather Service monitors flooding crests for the Connecticut River, at the nearest National Weather Service station located directly upstream from Agawam in Springfield, Massachusetts. There is also a station located in Westfield, Massachusetts to monitor the Westfield River. The NWS has various flooding classifications based on water level. These classifications and their definitions are:

Action Stage - the stage which, when reached by a rising stream, represents the level where the NWS or a partner/user needs to take some type of mitigation action in preparation for possible significant hydrologic activity. The type of action taken varies for each gage location. Gage data should be closely monitored by any affected people if the stage is above action stage.

Minor Flooding is defined to have minimal or no property damage, but possibly some public threat. A Flood Advisory product is issued to advise the public of flood events that are expected not to exceed the minor flood category. Examples of conditions that would be considered minor flooding include:

- water over banks and in yards
- no building flooded, but some water may be under buildings built on stilts (elevated)
- personal property in low lying areas needs to be moved or it will get wet
- water overtopping roads, but not very deep or fast flowing
- water in campgrounds or on bike paths
- inconvenience or nuisance flooding
- small part of the airstrip flooded, and aircraft can still land
- one or two homes in the lowest parts of the community may be cut off or get a little water in the crawl spaces or homes themselves if they are not elevated

Moderate Flooding is defined as having some inundation of structures and roads near the stream. Some evacuations of people and/or transfer of property to higher elevations may be necessary. A Flood Warning is issued if moderate flooding is expected during the event. Examples of conditions that would be considered moderate flooding include:

- several buildings flooded with minor or moderate damage
- various types of infrastructure rendered temporarily useless (i.e. fuel tanks cannot be reached due to high water, roads flooded that have no alternates, generator station flooded)
- elders and those living in the lowest parts of the village are evacuated to higher ground
- access to the airstrip is cut off or requires a boat
- water over the road is deep enough to make driving unsafe
- gravel roads likely eroded due to current moving over them
- widespread flooding, but not deep enough to float ice chunks through the community

- water deep enough to make life difficult, normal life is disrupted and some hardship is endured
- airstrip closed
- travel is most likely restricted to boats

Major Flooding is defined to have extensive inundation of structures and roads. Significant evacuations of people and/or transfer of property to higher elevations are necessary. A Flood Warning is issued if major flooding is expected during the event. Examples of conditions that would be considered major flooding include:

- many buildings flooded, some with substantial damage or destruction
- infrastructure destroyed or rendered useless for an extended period of time
- multiple homes are flooded or moved off foundations
- everyone in threatened area is asked to evacuate
- National Guard units assist in evacuation efforts
- erosion problems are extreme
- the airstrip, fuel tanks, and the generator station are likely flooded
- loss of transportation access, communication, power and/or fuel spills are likely
- fuel tanks may float and spill and possibly float downstream
- ice chunks floating though the community that could cause structural damage
- high damage estimates and high degree of danger to residents

The flood categories for the Connecticut River at the Springfield station are:

- Major flood stage: 24 feet
- Moderate flood stage: 22 feet
- Flood stage: 20 feet
- Action stage: 18 feet

The previous occurrences of these flooding categories being reached by the Connecticut River in Springfield are as follows:

Historic Crests of the Connecticut River in Springfield, MA		
Crest (feet)	**Date**	**Stage**
28.6	3/20/1936	Major flood
25.75	9/23/1938	Major flood
22.65	6/1/1984	Moderate flood
22.45	11/6/1927	Moderate flood
21.1	8/19/1955	Flood

Source: National Weather Service, http://water.weather.gov/ahps2/hydrograph.php?wfo=box&gage=spgm3

The flood categories for the Westfield River at the Westfield station are:

- Major flood stage: 20 feet
- Moderate flood stage: 16 feet
- Flood stage: 13 feet
- Action stage: 12 feet

The previous occurrences of these flooding categories being reached by the Westfield River in Westfield, Massachusetts are as follows:

Historic Crests of the Westfield River in Westfield, MA		
Crest (feet)	**Date**	**Stage**
34.2	8/19/1955	Major flood
27.2	3/18/1936	Major flood
25.41	11/4/1928	Major flood
22.66	6/16/1933	Major flood
22.13	4/7/1924	Major flood
22	12/31/1948	Major flood
21.79	10/16/1955	Major flood
19.95	3/22/1980	Moderate flood
19.92	8/28/2011	Moderate flood
18.78	4/16/2007	Moderate flood
18.26	2/25/1915	Moderate flood
17.91	4/5/1987	Moderate flood
17.9	9/22/1938	Moderate flood
17	4/13/1920	Moderate flood
16.63	10/9/2005	Moderate flood
16.54	4/12/1934	Moderate flood
16.51	11/26/1951	Moderate flood
15.45	1/10/1935	Flood stage
14.3	2/20/1981	Flood stage
14.25	3/7/2011	Flood stage
13.88	07/19/2021	Flood stage
13.72	09/02/2021	Flood stage
13.59	01/13/2018	Flood stage
13.25	3/22/1999	Flood stage
13.1	9/17/1999	Flood stage
12.93	11/03/2018	Action stage
12.92	9/26/1975	Action stage
12.9	10/15/2005	Action stage
12.87	4/3/2005	Action stage
12.8	1/28/1996	Action stage
12.55	6/7/2000	Action stage
12.47	4/5/1960	Action stage
12.22	3/29/1993	Action stage

Source: National Weather Service, http://water.weather.gov/ahps2/hydrograph.php?wfo=box&gage=wsfm3

Probability of Future Events

Based upon previous data, there is a moderate frequency (10 to 40 probability in any given year) of flash flooding or general flooding occurring in Agawam.

Flooding frequencies for the various floodplains in Agawam are defined by FEMA as the following:

- 10-year floodplain – 10 percent chance of flooding in any given year
- 25-year floodplain – 2.5 percent chance of flooding in any given year
- 100-year floodplain – 1 percent chance of flooding in any given year
- 500-year floodplain – 0.2 percent chance of flooding in any given year

Climate scientists predict that in the next few decades, climate change will increase the frequency and intensity of all storms that can cause flooding. There will also likely be an increased frequency in periods of intense rainfall, especially in the spring. Currently, floods are the costliest natural hazard in the United States, and climate change will only increase this damage. More information about the effect of Climate Change can be found in the Pioneer Valley Planning Commission's Climate Action Plan, available at www.sustainableknowledgecorridor.org.

Impact

The town faces a "critical" impact from flooding, with 25 percent of property in the affected area damaged or destroyed, from flooding.

Based on the town's median home value of $252,000 and an estimated 25 percent of damage to 100 percent of affected structures, the following are the estimated impacts from flooding:

- River Road neighborhood (100-year floodplain) - 370 structures, $23,310,000
- Lower Suffield Street - 3 structures, $189,000
- Upper Suffield Street - no structures, no impact
- North Street - 4 structures, $252,000
- Leonard Pond - 15 structures, $945,000

The cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included in this estimate.

Vulnerability

Based on the above analysis, Agawam has a hazard index rating of "2 - High Risk" for flooding.

Severe Snowstorms / Ice Storms

Hazard Description

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

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

Location

The entire town of Agawam is susceptible to severe snowstorms, making the location of occurrence "large," with over 50 percent of land affected. Agawam has also had specific problems in the following areas:

- North Agawam, which has the oldest trees in town
- North Street
- North and South Westfield Street
- Pine Street
- Agawam High School
- Municipal buildings with flat roofs, including schools and DPW building
- Poplar Street
- Mill Street
- Springfield Street
- Barry Street

Extent

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 are a function of the area affected by the snowstorm, the amount of snow, and the number of people living in the path of the storm. The aerial distribution of snowfall and population information are combined in an equation that calculates a NESIS score which varies from around one for smaller storms to over ten for extreme storms. The raw score is then converted into one of the five NESIS categories. The largest NESIS values result from storms producing heavy snowfall over large areas that include major metropolitan centers. Based on data available from the National Oceanic and Atmospheric Administration, there were 14 winter storms in the Pioneer Valley between 2010 and 2021 that have registered on the NESIS scale and resulted in snowfalls of at least 10 inches, including in Agawam.

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

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

Previous Occurrences

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

On October 30, 2011, an early winter storm dumped more than 1 foot of heavy wet snow. Because many trees still had leaves the snow load caused trees and limbs to fall, downing power and phone lines, and crippling travel. A town wide power outage left many without electricity for up to 5 days. Damage was severe and the Town received FEMA funding to help recover. Approximately 186,000 cubic yards of debris was removed and hauled. Agawam received 20 inches of snow in the snowstorm of February 8 and 9, 2013, which resulted in a Federal Disaster Declaration for all of Massachusetts. While snowfalls were higher in the eastern part of the state, they were also significant in western Massachusetts.

Based on data available from the National Oceanic and Atmospheric Administration, there are 14 winter storms in the Pioneer Valley between 2010 and 2021 that have registered on the NESIS scale and resulted in snowfalls of at least 10 inches. These storms are listed in the table below in order of their NESIS severity.

Winter Storms Producing Over 10 inches of Snow in the Pioneer Valley, 2010 -2021			
Date	**NESIS Value**	**NASIS Category**	**NESIS Classification**
2/23/2010	5.46	3	Major
1/29/2015	5.42	3	Major
1/9/2011	5.31	3	Major
2/11/2014	5.28	3	Major
3/12/2017	5.03	3	Major
1/31/2021	4.93	3	Major
2/7/2013	4.35	3	Major
3/5/2018	3.45	2	Significant
3/4/2013	3.05	2	Significant
1/25/2015	2.62	2	Significant
3/11/2018	3.16	2	Significant
10/29/2011	1.75	1	Notable
1/3/2018	1.65	1	Notable
2/8/2015	1.32	1	Notable

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

Probability of Future Events

Based upon the availability of records for Hampden County, there is a "high" frequency (40 to 70 percent probability in any given year) that a severe snowstorm or ice storm will occur in Agawam.

Research on climate change indicates that there is great potential for stronger, more frequent storms as global and local temperatures increase. While annual snowfall amounts will likely decrease, the snowstorms that do occur may be more intense. There will also likely be an increased frequency of sleet and ice storms due to lower winter temperatures. More information about the effect of Climate Change can be found in the Pioneer Valley Planning Commission's Climate Action Plan, available at www.sustainableknowledgecorridor.org.

The SHMCAP has additional information about the impact of climate change and can be accessed at https://www.mass.gov/service-details/massachusetts-integrated-state-hazard-mitigation-and-climate-adaptation-plan

Impact

The impact of a potential severe snowstorm or ice storm would be "critical," with more than 25 percent of property in the affected area damaged or destroyed, and possible shutdown of facilities for a week or more.

To approximate the potential impact to property and people that could be affected by this hazard, the total value of all property of $ 3,691,126,257 is used. An estimated 25 percent of damage would occur to 10 percent of structures, resulting in a total of $ 92,278,156 worth of damage. The cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included in this estimate.

Vulnerability

Based on the above assessment, Agawam faces a hazard index rating of "1 - very high risk" from severe snowstorms and ice storms.

Hurricanes/Tropical Storms

Hazard Description

Hurricanes are classified as cyclones and defined as any closed circulation developing around a low-pressure center in which the winds rotate counter-clockwise in the Northern Hemisphere (or clockwise in the Southern Hemisphere) and whose diameter averages 10 to 30 miles across. The primary damaging forces associated with these storms are high-level sustained winds and heavy precipitation. Hurricanes are violent rainstorms with strong winds that can reach speeds of up to 200 miles per hour and which generate large amounts of precipitation. Hurricanes generally occur between June and November and can result in flooding and wind damage to structures and above-ground utilities.

Location

Because of the hazard's regional nature, all of Agawam is at risk from hurricanes, meaning the location of occurrence is "large," or over 50 percent of land area affected. Ridge tops are more susceptible to wind damage. Areas susceptible to flooding are also likely to be affected by heavy rainfall.

Extent

As an incipient hurricane develops, barometric pressure (measured in millibars or inches) at its center falls and winds increase. If the atmospheric and oceanic conditions are favorable, it can intensify into a tropical depression. When maximum sustained winds reach or exceed 39 miles per hour, the system is designated a tropical storm, given a name, and is closely monitored by the National Hurricane Center in Miami, Florida. When sustained winds reach or exceed 74 miles per hour the storm is deemed a hurricane. Hurricane intensity is further classified by the Saffir-Simpson Hurricane Wind Scale, which rates hurricane wind intensity on a scale of 1 to 5, with 5 being the most intense. According to the NOAA storms database, two category 3 hurricanes, one category 2 hurricanes, and three category 1 hurricanes have affected Agawam. There are also 4 tropical storms that have affected Agawam.

Saffir-Simpson Scale	
Category	**Maximum Sustained Wind Speed (MPH)**
1	74–95
2	96–110
3	111–129
4	130–156
5	157 +

Source: National Hurricane Center, 2021

Previous Occurrences

Hurricanes that have affected Agawam are shown in the following table. Tropical Storm Irene eroded a levy along the Westfield River that contains a sewer line, but otherwise storm impacts were minimal in Agawam.

Major Hurricanes and Storms Affecting Agawam		
Hurricane/Storm Name	**Year**	**Saffir/Simpson Category (when reached MA)**
Great Hurricane of 1938	1938	3
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
Irene	2011	Tropical Storm
Sandy	2012	Super Storm

Source: NOAA Storm Events Database

Probability of Future Events

Agawam'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. Taking into account the past occurrences of hurricanes as well as the impacts of climate change, it is reasonable to say that there is a "low" frequency of hurricanes in Agawam, or a 1 to 10 percent chance in the next year.

However, climate change research indicates that severe storms like hurricanes will become more intense and more frequent in the future. This is because warmer temperatures can hold more moisture, and both air and ocean temperatures are warming. Thus, the committee concurred that there is a "moderate" probability of tropical storms occurring in Agawam in the next year.

Impact

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

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

The impact of a hurricane would be “critical,” with more than 25 percent of property in affected areas damaged or destroyed, and potential shutdown of facilities for a week or more.

To approximate the potential impact to property and people that could be affected by this hazard, the total value of all property of $3,691,126,257 is used. Wind damage of 5 percent of structures would result in an estimated $ 184,556,312 damage. Flood damage of 10 percent of structures would result in $ 369,112,625 of damage. The cost of repairing or replacing roads, bridges, utilities, and contents of structures is not included in this estimate.

Vulnerability

Based on the above analysis, Agawam faces a hazard index rating of "2 - high risk" from hurricanes and tropical storms.

Severe Thunderstorms / Wind / Tornadoes/Microbursts

A thunderstorm is a storm with lightning and thunder produced by a cumulonimbus cloud, usually producing gusty winds, heavy rain, and sometimes hail. Effective January 5, 2010, the NWS modified the hail size criterion to classify a thunderstorm as "severe" when it produces damaging wind gusts in excess of 58 mph (50 knots), hail that is 1 inch in diameter or larger (quarter size), or a tornado (NWS, 2013).

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

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

Microbursts are localized columns of sinking air (downdrafts) within a thunderstorm. Wind speeds in microbursts can reach up to 100 mph, or even higher, which is equivalent to an EF-1 tornado. They can can cause extensive damage at the surface, and in some instances, can be life-threatening. Microbursts occur when the large core of rain/hail held up in the thunderstorm through an updraft suddenly plummets to the ground. As it hits the ground it spreads in all directions, but the location where the microburst first hits the ground experiences the highest winds and greatest damage.

Location

As per the SHMCAP, the entire town is at risk of high winds, severe thunderstorms, tornadoes, and microbursts. However, because the actual area affected by these hazards is usually quite isolated, the location of occurrence is “small," with less than 10 percent of land area affected.

Extent

An average thunderstorm is 15 miles across and lasts 30 minutes; severe thunderstorms can be much larger and longer. Thunderstorms can cause hail, wind, and flooding. As per the State Climate Adaptation and Hazard Mitigation Plan, there are approximately 10 to 30 days of thunderstorm activity in the state each year. There are typically 1 to 3 tornadoes somewhere in southern New England per year, however this number has been increasing due to the impacts of climate change. Just on one day, August 18, 2023, five tornadoes touched down in southern New England – three in Massachusetts, one in Connecticut and one in Rhode Island. And additionally, two other tornadoes touched down in Massachusetts in 2023 – one in July and one in early August. None of these tornadoes impacted Agawam, however in the past 50 years, three tornadoes have touched down in Agawam.
Tornadoes are measured using the enhanced F-Scale, shown with the following categories and corresponding descriptions of damage:

Enhanced Fujita Scale Levels and Descriptions of Damage			
EF-Scale Number	**Intensity Phrase**	**3-Second Gust (MPH)**	**Type of Damage Done**
EF0	Gale	65–85	Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages to sign boards.
EF1	Moderate	86–110	The lower limit is the beginning of hurricane wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off the roads; attached garages may be destroyed.
EF2	Significant	111–135	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.
EF3	Severe	136–165	Roof and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted.
EF4	Devastating	166–200	Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.

Previous Occurrences

Because thunderstorms and wind affect Agawam on an annual basis, there are not significant records available for these events. As per the State Climate Adaptation and Hazard Mitigation Plan, there are approximately 10 to 30 days of thunderstorm activity in the state each year.

There are typically 1 to 3 tornadoes somewhere in southern New England per year. Most occur in the late afternoon and evening hours, when the heating is the greatest. In the last fifty years, three known tornados have touched down in Agawam, and there have been several high-wind storms and hail events. One notable example occurred on October 3, 1979, when a tornado that reached category 4 (max. wind speeds 207-260 mph) tornado 4.1 miles away from the Agawam town center killed 3 people and injured 500 people and caused between $50,000,000 and $500,000,000 in damages. The tornado was likely less than category 4 when it reached Agawam.

In June 2011 an EF3 tornado traveled from Westfield to Charlton, ripping its way through Agawam along the northern part of town, including Robinson Park. While neighboring towns had significant impacts from the tornado, Agawam escaped the event with minimal damage.

In 2006, a microburst occurred along River Road, which damaged nearby trees and homes. In June of 2013, a microburst created two areas of straight-line wind damage. One occurred in the area of Harvey Johnson Drive and downed several trees, damaging a few houses. The other produced more significant damage around Meadow Street, uprooting 40 to 50 trees that damaged 6 to 8 vehicles. Estimated winds were 80 miles per hour. Severe thunderstorms and a possible microburst hit the southern section of Agawam in June 2021, impacting the Six Flags Amusement Park. Several trees came down and a ride was damaged. Park goers had to shelter in place during the storm and the park closed for two days to clean up the damage.

Probability of Future Events

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

Tornado Index for Hampden County	
Hampden County	138.23
Massachusetts	87.60
United States	136.45

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

Research indicates that warmer overall temperatures, which cause the air to hold more moisture, are likely to cause increased occurrences of strong storms such as severe thunderstorms, tornadoes, and microbursts. Based upon the available historical record, Agawam's location in a high-density cluster of state-wide tornado activity, and the likely increasing frequency of strong storms due to climate change, it is reasonable to estimate that there is a "high" frequency of tornado or microburst occurrence in Agawam, with a 40 to 70 percent chance in any given year.

As mentioned above, according to the State Climate Adaptation and Hazard Mitigation Plan, there are approximately 10 to 30 days of thunderstorm activity in the state each year. This frequency is likely increasing due to the impacts of climate change. Therefore, the probability for thunderstorms / winds is “very high," with a 70 – 100% percent chance in any given year.

Impact

The potential for locally catastrophic damage is a factor in any tornado, severe thunderstorm, or wind event. In Agawam, a tornado that hit the residential areas would leave much more damage than a tornado with a travel path that ran along the town’s forested uplands, where little settlement has occurred. Most buildings in the Town of Agawam have not been built to Zone 1, Design Wind Speed Codes. The first edition of the Massachusetts State Building Code went into effect on January 1, 1975, with most of the Town’s housing built before this date.

The estimated impact of a severe thunderstorm, wind, or tornado to Agawam is "critical," with potentially more than 25 percent of affected property damaged or destroyed. To approximate the potential impact to property and people that could be affected by this hazard, the total value of all property in town, $3,691,126,257, is used. An estimated 20 percent of damage would occur to 25 percent of structures, resulting in a total of $184,556,312 worth of damage. The cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included in this estimate.

Vulnerability

Based on the above assessment, Agawam has a hazard index rating of “3 – medium risk” for severe thunderstorms, winds, and tornadoes.

Wildfire / Brushfire

Hazard Description

Wildfires are typically larger fires, involving full-sized trees as well as meadows and scrublands. Brushfires are uncontrolled fires that occur in meadows and scrublands, but do not involve full-sized trees. Both wildfires, fires and brushfires can consume homes, other buildings and/or agricultural resources. FEMA has classifications for 3 different classes of wildfires:

- **Surface fires** are the most common type of wildland fire and burn slowly along the floor of a forest, killing or damaging trees
- **Ground fires** burn on or below the forest floor and are usually started by lightening
- **Crown fires** move quickly by jumping along the tops of trees. A crown fire may spread rapidly, especially under windy conditions

The wildfire season in Massachusetts usually begins in late March and typically culminates in early June, corresponding with the driest live fuel periods of the year. April is historically the month in which wildfire danger is the highest. However, wildfires can occur every month of the year. Drought, snowpack, and local weather conditions can expand the length of the fire season. The early and late shoulders of the fire season usually are associated with human-caused fires.

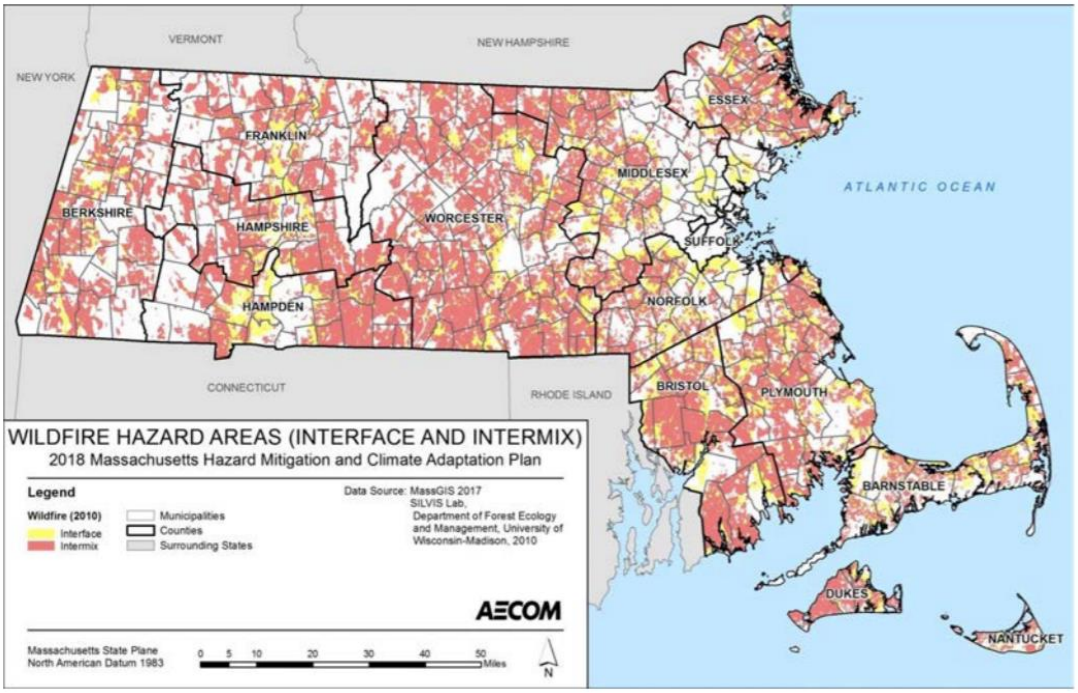
Location

The State Hazard Mitigation and Climate Adaptation Plan (EEA and EOPPS, 2018) states:

> Portions of the Commonwealth susceptible to wildfire, particularly at the urban-wildland interface…, are defined as those in the vicinity of contiguous vegetation, with more than one house per 40 acres and less than 50 percent vegetation, and within 1.5 miles of an area of more than 500 hectares (approximately 202 acres) that is more than 75 percent vegetated."

Figure 3.1 below shows wildland-urban interface and hazard areas in the state. Hazard areas are those most vulnerable to brush fire - primarily heavily wooded areas and forests directly adjacent to developed areas. A very small percentage of Agawam is in a wildfire hazard area. Thus, the location of occurrence would most likely be "small," with less than 10% of percent of land area affected.

Figure 3.1: Wildland-Urban Interface and Hazard Areas in Massachusetts



Source: Massachusetts State Hazard Mitigation and Climate Adaptation Plan

Hampden County has approximately 273,000 acres of forested land, which accounts for 67 percent of total land area. However, wildfire is unlikely to affect large areas of Agawam as most forest areas are fragmented. Areas on or near Provin Mountain and Robinson State Park are most at risk from wildfires. Due to the amount of timber within Robinson State Park, this 800-acre area has the potential to burn, especially during a drought season.

The location of occurrence of a wildfire in Agawam is determined to be "small," with less than 10 percent of total land affected.

Extent

Wildfires can cause widespread damage to the areas that they affect. They can spread very rapidly, depending on local wind speeds and be very difficult to control. Fires can last for several hours up to several days. As of 2019, approximately 5,093 acres (33 percent) of Agawam is forested.

There have not been any major wildfires recorded in Agawam. However, based on other major wildfires that have occurred in western Massachusetts, it is estimated that such a fire would likely destroy around 50 to 500 acres of forested area. The overall extent of wildfires is shown in the table below:

Wildfire Severity Rating		
Rating	**Basic Description**	**Detailed Description**
CLASS 1: Low Danger (L) **Color Code: Green**	Fires not easily started	Fuels do not ignite readily from small firebrands. Fires in open or cured grassland may burn freely a few hours after rain, but wood fires spread slowly by creeping or smoldering and burn in irregular fingers. There is little danger of spotting.
CLASS 2: Moderate Danger (M) **Color Code: Blue**	Fires start easily and spread at a moderate rate	Fires can start from most accidental causes. Fires in open cured grassland will burn briskly and spread rapidly on windy days. Woods fires spread slowly to moderately fast. The average fire is of moderate intensity, although heavy concentrations of fuel – especially draped fuel -- may burn hot. Short-distance spotting may occur, but is not persistent. Fires are not likely to become serious and control is relatively easy.
CLASS 3: High Danger (H) **Color Code: Yellow**	Fires start easily and spread at a rapid rate	All fine dead fuels ignite readily and fires start easily from most causes. Unattended brush and campfires are likely to escape. Fires spread rapidly and short-distance spotting is common. High intensity burning may develop on slopes or in concentrations of fine fuel. Fires may become serious and their control difficult, unless they are hit hard and fast while small.
CLASS 4: Very High Danger (VH) **Color Code: Orange**	Fires start very easily and spread at a very fast rate	Fires start easily from all causes and immediately after ignition, spread rapidly and increase quickly in intensity. Spot fires are a constant danger. Fires burning in light fuels may quickly develop high-intensity characteristics - such as long-distance spotting - and fire whirlwinds, when they burn into heavier fuels. Direct attack at the head of such fires is rarely possible after they have been burning more than a few minutes.
CLASS 5: Extreme (E) **Color Code: Red**	Fire situation is explosive and can result in extensive property damage	Fires under extreme conditions start quickly, spread furiously and burn intensely. All fires are potentially serious. Development into high-intensity burning will usually be faster and occur from smaller fires than in the Very High Danger class (4). Direct attack is rarely possible and may be dangerous, except immediately after ignition. Fires that develop headway in heavy slash or in conifer stands may be unmanageable while the extreme burning condition lasts. Under these conditions, the only effective and safe control action is on the flanks, until the weather changes or the fuel supply lessens.

Previous Occurrences

Agawam experiences 10 – 20 brushfires per year on average. According to the Deputy Fire Chief, there were 40 brush fires between January 2021 and April 2023. No damage to structures or people were associated with these brushfires. There is no record of wildfires occurring in Agawam. The Deputy Fire Chief also reported that 142 burn permits were issued for 2022, and that is a typical number of burn permits that is issued every year.

During the past 100 years, there have not been many wildfires occurring in the Pioneer Valley. However, several have occurred during the past 20 years, as shown in the list below:

- 1995 – Russell, 500 acres burned on Mt. Tekoa
- 2000 – South Hadley, 310 acres burned over 14 days in the Lithia Springs Watershed
- 2001 – Ware, 400 acres burned
- 2010 – Russell, 320 acres burned on Mt. Tekoa
- 2012 – Eastern Hampden County, dry conditions and wind gusts created a brush fire in Brimfield, and burned 50 acres
- 2016 –Montgomery, 60 acres burned on Mt. Tekoa
- 2019 – Russell and Montgomery, 200 acres burned on Mt. Tekoa

Probability of Future Events

In accordance with the State Climate Adaptation and Hazard Mitigation Plan, the Hazard Mitigation Committee found it is difficult to predict the likelihood of wildfires in a probabilistic manner due to the number of variables involved. However, the committee has determined that there is a "very low" likelihood of a future wildfire event, with a less than 1 percent chance in any given year.

Climate scenarios project summer temperature increases between 2ºC and 5ºC and precipitation decreases of up to 15 percent. Such conditions would exacerbate summer drought and further promote high-elevation wildfires, releasing stores of carbon and further contributing to the buildup of greenhouse gases. Forest response to increased atmospheric carbon dioxide—the so-called "fertilization effect"—could also contribute to more tree growth and thus more fuel for fires, but the effects of carbon dioxide on mature forests are still largely unknown.

Hazard mitigation planning committee members also noted that active managed forestry seems to be on the decline on state and privately owned woodlands, including Provin Mountain, and in the future this could lead to greater incidence of fire.

Impact

The impact of this hazard is considered "minor," with minimal property damage.

Vulnerability

Based on the above assessment, Agawam faces a hazard index rating of "4 - low risk" from wildfires and brushfires.

Earthquakes

Hazard Description

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. 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. Ground shaking from earthquakes can rupture gas mains and disrupt other utility

service. They can also 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 most at risk during an earthquake.

Location

Because of the regional nature of the hazard, the entire Town of Agawam is susceptible to earthquakes. This makes the location of occurrence "large," or over 50 percent of the total land area affected.

Extent

The magnitude of an earthquake is measured using the Richter Scale, which measures the energy of an earthquake by determining the size of the greatest vibrations recorded on the seismogram. On this scale, one step up in magnitude (from 5.0 to 6.0, for example) increases the energy more than 30 times. The intensity of an earthquake is measured using the Modified Mercalli Scale. This scale quantifies the effects of an earthquake on the Earth's surface, humans, objects of nature, and man-made structures on a scale of I through XII, with I denoting a weak earthquake and XII denoting an earthquake that causes almost complete destruction. According to the Northeast States Emergency Consortium, there have not been any recorded large earthquakes that have affected western Massachusetts, including Agawam.

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

Source: US Federal Emergency Management Agency

Modified Mercalli Intensity Scale for and Effects			
Scale	**Intensity**	**Description Of Effects**	**Corresponding Richter Scale Magnitude**
I	Instrumental	Detected only on seismographs.	
II	Feeble	Some people feel it.	< 4.2
III	Slight	Felt by people resting; like a truck rumbling by.	

Modified Mercalli Intensity Scale for and Effects			
Scale	**Intensity**	**Description Of Effects**	**Corresponding Richter Scale Magnitude**
IV	Moderate	Felt by people walking.	
V	Slightly Strong	Sleepers awake; church bells ring.	< 4.8
VI	Strong	Trees sway; suspended objects swing, objects fall off shelves.	< 5.4
VII	Very Strong	Mild alarm; walls crack; plaster falls.	< 6.1
VIII	Destructive	Moving cars uncontrollable; masonry fractures, poorly constructed buildings damaged.	
IX	Ruinous	Some houses collapse; ground cracks; pipes break open.	< 6.9
X	Disastrous	Ground cracks profusely; many buildings destroyed; liquefaction and landslides widespread.	< 7.3
XI	Very Disastrous	Most buildings and bridges collapse; roads, railways, pipes and cables destroyed; general triggering of other hazards.	< 8.1
XII	Catastrophic	Total destruction; trees fall; ground rises and falls in waves.	> 8.1

Source: US Federal Emergency Management Agency

Previous Occurrences

The most recent earthquakes in the region are shown in the tables below.

Largest Earthquakes Affecting the Region, MA, 1924 – 2014		
Location	**Date**	**Magnitude**
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
West of Laconia, NH	Jan. 19, 1982	4.5
Plattsburg, NY	April 20, 2002	5.1
Bar Harbor, NH	October 3, 2006	4.2
Hollis Center, ME	October 16, 2012	4.6
Bliss Corner, MA	November 8, 2020	3.6

Source: Source: Northeast States Emergency Consortium, 2020 website: www.nesec.org/hazards/earthquakes.cfm

New England States Record of Historic Earthquakes		
State	**Years of Record**	**Number Of Earthquakes**
Connecticut	1668 - 2016	115
Maine	1766 - 2016	454
Massachusetts	1668 - 2016	408
New Hampshire	1638 - 2016	320
Rhode Island	1776 - 2016	34
Vermont	1843 - 2016	50
New York	1840 - 2016	551
Total Number of Earthquakes within the New England states between 1638 and 2016 is 1,932.		

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

The Agawam Hazard Mitigation Committee reports no effects from any of the earthquakes in the region in Agawam.

Probability of Future Events

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

Earthquake Index for Hampden County	
Hampden County	0.24
Massachusetts	0.70
United States	1.81

Based upon existing records, there is a “low” frequency of earthquakes in Agawam with between a 1 to 10 percent chance of an earthquake occurring in any given year.

Impact

Massachusetts introduced earthquake design requirements into their building code in 1975 and improved building code for seismic reasons in the 1980s. However, these specifications apply only to new buildings or to extensively modified existing buildings. Buildings, bridges, water supply lines, electrical power lines and facilities built before the 1980s may not have been designed to withstand the forces of an earthquake. This would certainly be true for a large number of the buildings in Agawam, where many of the buildings were built before 1975, and mostly of wood frame construction. The seismic standards have also been upgraded with the 1997 revision of the State Building Code.

The impact incurred from an earthquake would be “catastrophic," with more than 50 percent of property in the affected area damaged or destroyed. To approximate the potential impact to property and people that could be affected by this hazard, the total value of all property in town of $3,691,126,257 is used. An estimated 100 percent of damage would occur to 20 percent of structures, resulting in a total of $ 738,225,251 worth of damage. The cost of repairing or replacing roads, bridges, utilities, and the contents of structures is not included in this estimate.

Vulnerability

Based on this analysis, Agawam faces a hazard index rating of “4 - low risk” from earthquakes.

Dam Failure

Hazard Description

Dams, levees, and their associated impoundments can provide important benefits to a community, including water supply, recreation, hydroelectric power generation, and flood control. However, they also pose a potential risk to lives and property. Dam or levee 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 rapidly. Most dam failures occur when floodwaters overtop and erode the material components of the dam.

Many dams in Massachusetts were built during the 19th century without the benefit of modern engineering design and construction oversight. Dams of this age can fail because of structural problems due to age and/or lack of proper maintenance, as well as from structural damage caused by an earthquake or flooding.

The Massachusetts Department of Conservation and Recreation’s Office of Dam Safety is responsible for regulating dams in the state (M.G.L. Chapter 253, Section 44 and the implementing regulations 302 CMR 10.00). Dams regulated by the Office of Dam Safety must be in excess of 6 feet in height (regardless of storage capacity) and have more than 15-acre feet of storage capacity (regardless of height). Dams that fall below these parameters are known as non-jurisdictional dams. Hydropower dams, such as the West Springfield Dam/Strathmore Paper Co. Dam, are typically regulated through licensing they obtain through the Federal Energy Regulatory Commission.

Dam safety regulations enacted in 2005 transferred significant responsibilities for dams from the State of Massachusetts to dam owners. The financial burden associated with these responsibilities can vary greatly, depending on the number of dams for which an owner is responsible, and the dam’s condition and hazard index rating. A hazard index rating (see description of this rating in “Extent” section below) brings with it different requirements related to frequency of inspections by engineers and the need for development of emergency action plans. With these inspections, a dam determined to be in poor or unsafe condition can involve costly repairs.

In January 2013, the Governor signed into law additional provisions to promote greater dam safety by:

1. extending the requirement of emergency action plans to significant hazard dams (in addition to high hazard dams);
2. strengthening the authority of the Office of Dam Safety by increasing fines for noncompliance; and
3. establishing the Dam and Sea Wall Repair and Removal Fund, an annual grant and loan program available to local governmental bodies and charitable organizations.

Location

Agawam has 12 dams, both publicly and privately owned, located within Town boundaries. These are listed in the table below. It is important to note that while the Provin Mountain facility meets the definition of a dam, it is not a dam in the traditional sense. It consists of four water storage tanks with 60-million-gallon capacity on Provin Mountain.

The Nine Lot Dam is slated to be replaced as part of a project to convert the former Tuckahoe Turf Farm into a passive recreation area with trails, fishing, and kayaking. The property includes a former irrigation pond constructed in 1960 with a maximum capacity of 54 acre-feet, or approximately 17 million gallons of water. The dam's earth foundation construction received a rating of "poor" after a 2008 inspection by the U.S. Army Corps of Engineers.[4]

Table 3.3: Dams in Agawam

ID#	Dam	Hazard Index Rating	Condition	Last Phase I Inspection	Emergency Action Plan
MA00528	Provin Mountain Reservoir Dam	High	Satisfactory	11/09/2021	11/09/2019
MA00066	Silver Lake Dam	Significant	Satisfactory	11/11/2021	11/01/2022
MA00611	West Springfield Dam/Strathmore Paper Co. Dam	Low			Not Required (NR)
MA01813	Mawaga Dam	Low	Fair	9/20/2022	NR
MA01333	Nine Lot Dam	Low	Poor	11/30/2018	NR
MA01811	Rising Dam (Leonard)	Low	Poor	10/29/2020	NR
MA02527	Robinson Pond Dam	Low	Poor	04/12/2022	NR
MA00527	West Springfield Fish & Game Club Dam	Low	Fair	05/07/2021	NR
MA01812	Didonato Dam	Non jurisdictional	Poor – Significant structural, operational and maintenance deficiencies		NR
MA02686	Zerra Dam	Non jurisdictional			NR
MA00526	Provost Dam	Non jurisdictional	Poor	08/11/2022	NR
MA01810	Gogulski Dam	Non jurisdictional			NR

[4] https://www.thereminder.com/localnews/agawam/agawam-council-approves-2m-from-cpa-for-tuckahoe-d/

Source: Based on periodic and partial updates to PVPC's dams data base from the Massachusetts Office of Dam Safety.

Five dams in Town, the Didonato, Zerra, Provost, West Springfield Fish & Game Club, and Silver Lake (listed from upstream to down), are located in a series on Three Mile Brook and a failure at any upstream dam could cause the failure of downstream dams, enlarging the extent of damage from any individual dam.

It is also important to consider and plan for the potential critical failure of facilities on Provin Mountain and Cobble Mountain. Located in the town of Blandford, Cobble Mountain Reservoir is owned by the Springfield Water and Sewer Commission and is the main water supply for the municipalities of Agawam, Springfield, Ludlow, East Longmeadow, and Longmeadow. Water from Cobble Mountain is treated at the West Parish Water Filtration Plant in Westfield and then piped and stored in the four storage tanks on Provin Mountain in Agawam, as mentioned above. A breech in the dam on Cobble Mountain Reservoir, and/or any damage to the water tanks on Provin Mountain would have a catastrophic effect. In addition, the Town of Agawam would be at risk for flooding if the Holyoke Dam were to fail, and thus the EMD is involved in emergency action plans for the Holyoke Dam.

Based on this analysis, a dam failure is estimated to affect 10 to 50 percent of land in Agawam, meaning that the location of occurrence is "medium."

Extent

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.

Dams in Massachusetts are assessed according to their risk to life and property through a hazard index rating - a level of risk determined by the likelihood that a dam failure (an uncontrolled release of impounded water) would result in loss of life or substantial property damage. The state's Hazard Potential Classification for dams are:

- **High Hazard:** a dam located where structural failure will likely cause loss of life and serious damage to homes, industrial or commercial facilities, essential public utilities, main highways, or railroads.

- **Significant Hazard:** a dam located where structural failure may cause loss of life and damage to homes, industrial or commercial facilities, secondary highways or railroads or interruption of use or service of relatively important facilities.

- **Low Hazard:** a dam located where structural failure may cause minimal property damage and loss of life is not expected.

As shown in the table above, there is one high hazard dam, one significant hazard dam, six low hazard dams, and four non-jurisdictional dams in Agawam.

Previous Occurrences

There has been one recorded dam failure in Agawam in 1955. There are no records indicating the damage associated with the failure and this dam was not rebuilt.

Probability of Future Events

As Agawam's dams age, and if maintenance is deferred, the likelihood of a dam failure will increase. However, the current frequency of a dam failure is estimated to be "low," with a 1 to 10 percent chance in any given year.

With the more frequent extreme precipitation events and larger storm events in the northeastern United States due to climate change, dams will be tested, and the likelihood of dam failure may increase. The extreme storm flows produced by Tropical Storm Irene in 2011, for example, led to the failure of at least two dams in the Pioneer Valley region. An unnamed private dam in Blandford failed, sending a surge of water downstream to inundate and damage nearby roads. At the Granville Reservoir Dam owned by the City of Westfield, the spillway failed when waters overwhelmed and then undermined the structure. It was necessary for the city to spend $3 million on repairs and improvements to the dam and spillway.

These storm events raise questions about dams and their current capacity to pass more frequent extreme flows. Poor condition dams in the region—as may have been the case in Blandford—will certainly be tested, but so will other dams—such as the Granville Reservoir Dam, which was reportedly in fair condition at the time of the storm.

Impact

The impact from a dam failure in Agawam would be "critical," with more than 25 percent of property in affected areas damaged or destroyed.

To approximate the potential impact, the total value of all property in town, $3,691,126,257 is used. An estimated 100 percent of damage would occur to 20 percent of structures, resulting in a total of $738,225,251 worth of damage. The cost of repairing or replacing roads, bridges, utilities, and the contents of structures is not included in this estimate.

Vulnerability

Based on this analysis, Agawam faces a hazard index rating of "3 – medium risk" from dam failure.

Drought

Hazard Description

Drought is a normal, recurrent feature of climate. It occurs almost everywhere, although its 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. These impacts can have far-reaching effects throughout the region.

Location

Because of this hazard's regional nature, a drought would impact the entire town, meaning the location of occurrence is "large," or over 50 percent of total land area affected.

Extent

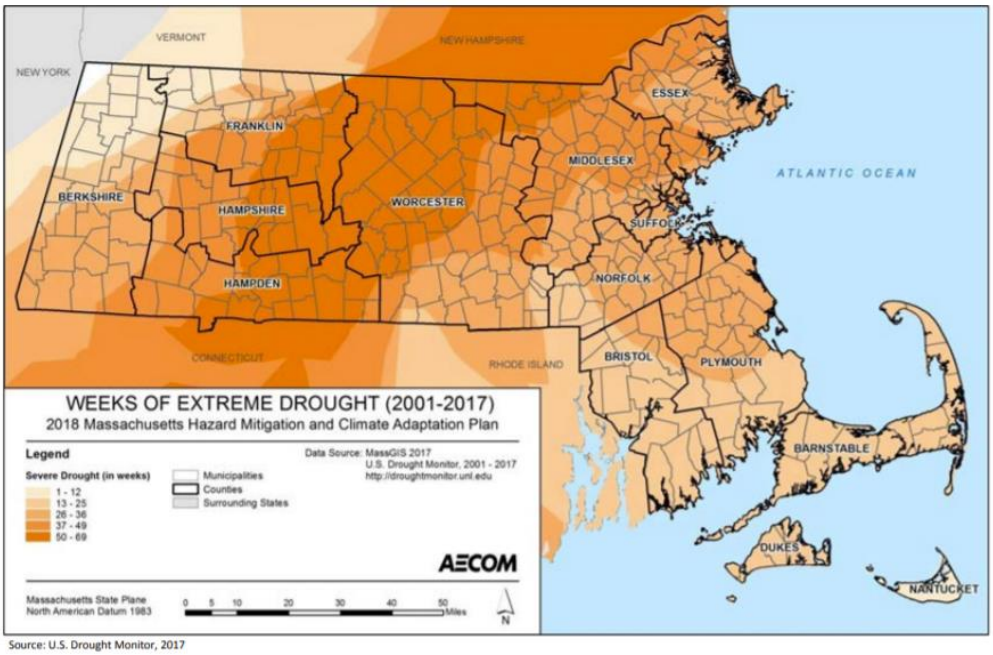
The U.S. Drought Monitor records information on historical drought occurrence. The U.S. Drought Monitor categorizes drought on a D0-D4 scale as shown below.

U.S. Drought Monitor		
Classification	**Category**	**Description**
D0	Abnormally Dry	Going into drought: short-term dryness slowing planting, growth of crops or pastures. Coming out of drought: some lingering water deficits; pastures or crops not fully recovered
D1	Moderate Drought	Some damage to crops, pastures; streams, reservoirs, or wells low, some water shortages developing or imminent; voluntary water-use restrictions requested
D2	Severe Drought	Crop or pasture losses likely; water shortages common; water restrictions imposed
D3	Extreme Drought	Major crop/pasture losses; widespread water shortages or restrictions
D4	Exceptional Drought	Exceptional and widespread crop/pasture losses; shortages of water in reservoirs, streams, and wells creating water emergencies

Source: US Drought Monitor, http://droughtmonitor.unl.edu/classify.htm

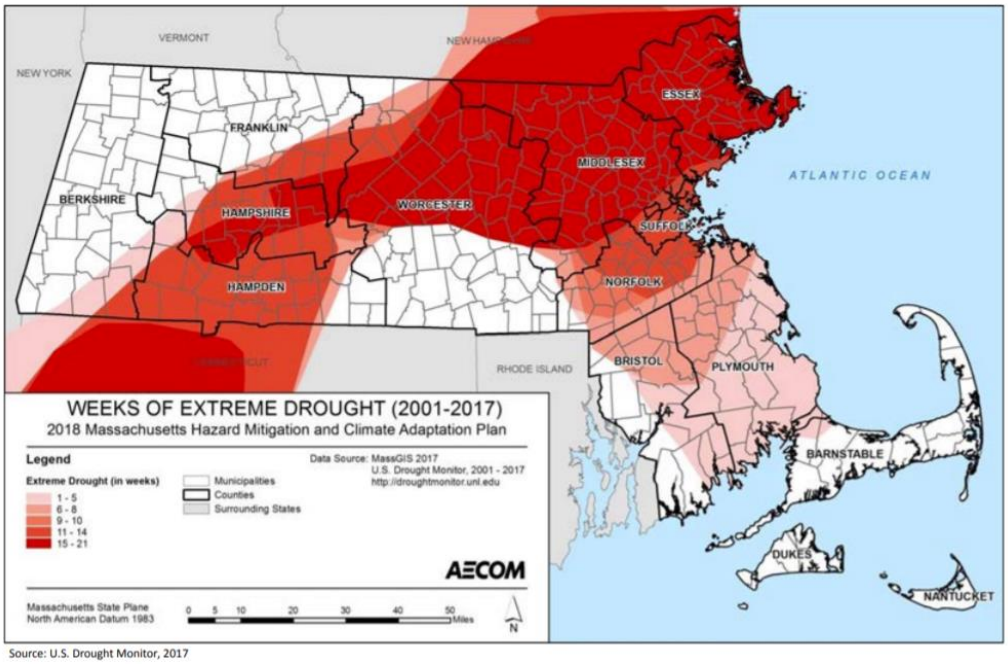
According to the Massachusetts SHMCAP, between 2001 and 2017 the Town experienced up to 49 weeks of Severe Drought and 14 weeks of Extreme Drought, as classified by the U.S. Drought Monitor. As can be seen in the two figures below, much of Hampden County, including Agawam, experienced both severe and extreme drought conditions between 2001 and 2017. Agawam experienced extreme drought conditions again in 2020 and 2022.

Figure 3.2: Weeks of Severe Drought in Massachusetts (2001-2017)



Source: U.S. Drought Monitor, 2017

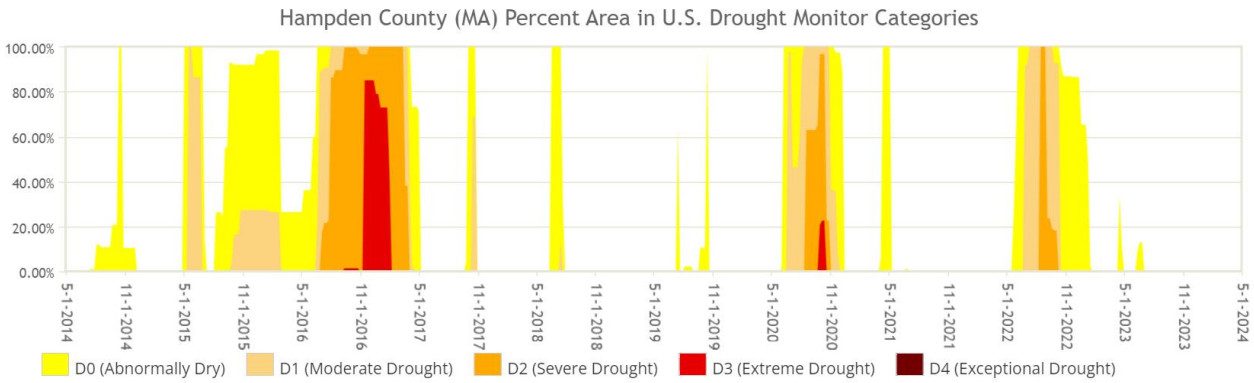
Figure 3.3: Weeks of Extreme Drought in Massachusetts (2001-2017)



Source: U.S. Drought Monitor, 2017

Droughts have been increasing in frequency as temperatures increase and precipitation becomes less regular due to the impacts of climate change. In the past decade, Hampden County has experienced three major droughts – in 2016/2017, 2020, and 2022/2023. The time series graph shown in Figure 3.2 below shows that Hampden County and Agawam experienced extreme drought in 2016/2017 and 2020, and severe drought in 2022. This data, shown in a time series graph, can be seen in Figure 3.4 below.

Figure 3.4: Incidences of drought in Hampden County from 2014 – 2023



https://droughtmonitor.unl.edu/DmData/TimeSeries.aspx

Previous Occurrences

Massachusetts has suffered significant droughts several times in the last century, with three major droughts within the last 10 years (2016-2017, 2020, and 2022), as mentioned above. Other major droughts occurred in 1929-1932, 1939-1944, 1961-1969, and 1980-1983. While these droughts affected Agawam as well, they were more impactful in other areas of the state and in communities with less reliable water supplies. In many of these droughts, water-supply systems in some communities were found to be inadequate. Water was piped into urban areas, and water-supply systems were modified to permit withdrawals at lower water levels. The following table indicates previous occurrences of drought since 2000, based on the US Drought Monitor:

Annual Drought Classification Status in Massachusetts	
Year	**Maximum Severity**
2000	No drought
2001	D2 conditions in 21% of state
2002	D2 conditions in 99% of state
2003	No drought
2004	D0 conditions in 44% of state
2005	D1 conditions in 7% of state
2006	D0 conditions in 98% of state
2007	D1 conditions in 71% of state
2008	D0 conditions in 57% of state
2009	D0 conditions in 44% of state
2010	D1 conditions in 27% of state
2011	D0 conditions in 0.01% of state
2012	D2 conditions in 51% of state
2013	D1 conditions in 60%, D0 in 99.9% of state
2014	D1 conditions in 26%, D0 in 99.99% of state
2015	D1 conditions in 72%, D0 in 100 % of state
2016	D3 conditions in 52%, D2 in 90%, D1 in 98%, D0 in 100% of state
2017	D3 conditions in 9%, D2 in 69%, D1 in 98%, D0 in 99% of state

Annual Drought Classification Status in Massachusetts	
2018	D1 conditions in 36%, D0 in 85% of state
2019	D0 in 85% of state
2020	D3 conditions in 37%, D2 in 83%, D1 in 96%, D0 in 100% of state
2021	D1 conditions in 2.5%, D0 in 6% of state
2022	D3 conditions in 39%, D2 in 96%, and D1 in 100% of state

Source: US Drought Monitor

Probability of Future Events

In Agawam, the probability of drought occurring is “moderate," with a 10 to 40 percent chance in any given year.

Based on past events and current criteria outlined in the Massachusetts Drought Management Plan, it appears that western Massachusetts may be more vulnerable than eastern Massachusetts to severe drought conditions. However, many factors, such as water supply sources, population, economic factors (i.e., agriculture-based economy), and infrastructure, may affect the severity and length of a drought event. Climate change is likely to increase the risk of drought. Projected higher average temperatures, combined with the likelihood of increased consecutive days without precipitation in summer and fall, will increase the probability of more severe and longer-lasting droughts.

Impact

Due to the water richness of western Massachusetts and the reliability of the Town’s water supply, Agawam is unlikely to be adversely affected by anything other than a major, extended drought. While such a drought would require water saving measures to be implemented, there would be no foreseeable damage to structures or loss of life resulting from the hazard. Because of this, the Hazard Mitigation Committee has determined the impact from this hazard to be "minor," with minimal damage to people and property.

Vulnerability

Based on the above assessment, Agawam has a hazard index rating of “4 - low risk” from drought.

Extreme Temperatures

Hazard Description

Massachusetts has four clearly defined seasons. Extreme temperatures are considered outliers, or temperatures that fall outside the typical range for each season. Extreme temperatures can last from an afternoon to a few days. Day and nighttime temperature fluctuations also factor into the overall effects of temperature. For example, when the temperature does not cool off at night during an extreme heat wave, the risk of heat related illnesses is intensified.

Extreme Cold

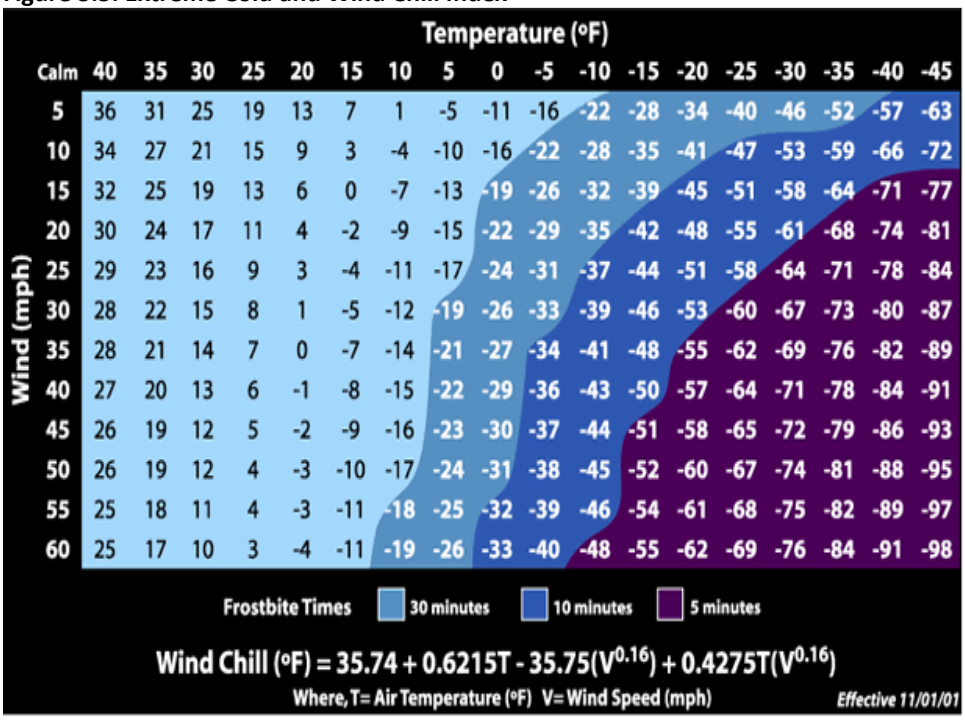
Extreme cold does not have a threshold temperature, but rather is defined as prolonged periods of excessively cold weather. This may vary by region based on average temperatures in the region. In Massachusetts, where temperatures regularly go below freezing during winter months, the community is often used to these temperatures. However, this does not lessen the risk. Extremely cold temperatures can create dangerous conditions for homeless populations, stranded travelers, and residents without sufficient insulation or heat in their homes. The homeless, the elderly, and people with disabilities are often most vulnerable. In Agawam, 20.4% of the population is over 65 years old and 12.7% of the population has a disability (American Community Survey 5-year estimates, 2021). Cold weather events can also have significant health impacts such as frostbite and hypothermia. Furthermore, power outages during cold weather may result in inappropriate use of combustion heaters, cooking appliances, and generators in poorly ventilated areas, which can lead to increased risk of carbon monoxide poisoning. During extreme cold, pipes may freeze and burst in many buildings with unreinforced masonry.

Extent

Extremely cold temperatures are measured using the Wind Chill Temperature Index provided by the National Weather Service (NWS). This can be seen below in Figure 3.5. The updated index was implemented in 2001 and helps explain the impact of cold temperatures on unexposed skin. According to NOAA's National Centers for Environmental Information Storm Events Database records data for extreme cold events, between 2000 and September 2020, Massachusetts experienced 20 extreme cold and wind chill events. None of these events were reported for Hampden County, where Agawam is located, however.[5]

[5]https://www.ncdc.noaa.gov/stormevents/listevents.jsp?eventType=%28Z%29+Extreme+Cold%2FWind+Chill&beginDate_mm=11&beginDate_dd=01&beginDate_yyyy=1999&endDate_mm=11&endDate_dd=30&endDate_yyyy=2021&county=ALL&hailfilter=0.00&tornfilter=0&windfilter=000&sort=DT&submitbutton=Search&statefips=25%2CMASSACHUSETTS

Figure 3.5: Extreme Cold and Wind Chill Index



Source: National Weather Service[6]

Extreme Heat

Extreme heat is when the maximum temperature reaches above 90°F during the day. Projected heat days and heat waves can have an increased impact in areas with a greater amount of impervious surface, such as buildings, roads, parking lots, and driveways. These can become "heat islands" as dark asphalt and roofs store the heat from the sun. Impacts from heat stress can exacerbate pre-existing respiratory and cardiovascular conditions.

Extent

The NWS issues a Heat Advisory when the Heat Index is forecast to reach 100-104˚ F for two or more hours (NOAA, n.d.). The Heat Index can be seen in Figure 3.6 below. The NWS issues an Excessive Heat Warning if the Heat Index is forecast to reach 105˚+F for two or more hours. Heat waves cause more fatalities in the U.S. than the total of all other meteorological events combined. According to the NOAA storm events database, there have been two extreme heat events reported for Hampden County between 2000 and 2023, one in July 2010 and the other in July 2011.

[6] NWS, 2020. https://water.weather.gov/ahps2/river.php?wfo=box&wfoid=18682&riverid=205004&pt%5B%5D=145908&allpoints=145908%2C146659&data%5B%5D=impacts&data%5B%5D=stage&data%5B%5D=crests

Figure 3.6: Heat Index Chart

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

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

. Source: NOAA, n.d

Because most heat-related deaths occur during the summer, people should be aware of who is at greatest risk and what actions can be taken to prevent a heat-related illness or death. According to the Centers for Disease Control and Prevention, the populations most vulnerable to extreme heat impacts include the following:

- People over the age of 65
- Children under the age of five
- Individuals with pre-existing medical conditions that impair heat tolerance
- Individuals without proper cooling
- Individuals with respiratory conditions
- Individuals that overexert themselves during extreme heat events

Location

Because of this hazard's regional nature, extreme temperatures would impact the entire town, resulting in a "large" location of occurrence, or more than 50 percent of total land area affected.

Previous Occurrences

NOAA's National Centers for Environmental Information Storm Events Database provides data on excessive heat. Between 2000 and 2023, Massachusetts experienced 16 excessive heat days, which did not result in any injury or property damage. Two of these events were reported for Hampden County, in July 2010 and July 2011.[7] Extreme temperatures are classified as medium frequency events. As defined by the 2013 State Hazard Mitigation and Climate Adaptation Plan, these events occur from once in 5 years to once in 50 years or have a chance of occurrence of 2% to 20% per year. According to the 2018

[7]https://www.ncdc.noaa.gov/stormevents/listevents.jsp?eventType=%28Z%29+Excessive+Heat&beginDate_mm=11&beginDate_dd=01&beginDate_yyyy=1999&endDate_mm=11&endDate_dd=30&endDate_yyyy=2021&

Massachusetts State Hazard Mitigation and Climate Adaptation Plan, between four and five heat waves (3 or more consecutive days of 90˚+F temperatures) occur annually in Massachusetts.

July is generally the hottest month in Agawam, and the average daytime high temperature in July is approximately 85ºF (NEIC, 2021). There has been some use of cooling centers in Agawam by residents during heat waves. Approximately 10-15 residents use the Senior Center or Library for cooling down on hot days each summer. While there may not have been a great need for air conditioning in the past, as the occurrence of high heat days over 90° increases, the need for cooling centers for residents without air conditioning will increase, or for whom running air conditioners is cost prohibitive. The Town might also consider promoting air source heat pumps as a more energy-efficient alternative to air conditioners.

Probability of Future Events

Extreme heat events that can result in illness or loss of life have been relatively rare in Agawam, although the probability of such events is increasing due to the impacts of climate change. The baseline (1971-2000) average temperature for the Westfield River Basin was 45 degrees, and in 2021 it was approximately 47 degrees. By the end of the century, it is predicted to rise between 4.2 and 11.2 degrees, depending on greenhouse gas emissions. Both the average temperature and the number of extreme heat days are predicted to increase in future climate conditions.

The number of extreme cold events is likely to decrease with overall warming temperatures, but there will still be occasional instances of extreme cold that the Town needs to be prepared for, especially if these events occur in conjunction with a snow or ice storm that causes a loss of power.

Based on past occurrences as well as the increased likelihood of extreme temperatures, heat in particular, due to the impacts of climate change, the committee has determined that the probability of extreme weather events in Agawam is “high” with a 40 – 70% probability of occurrence in any given year.

Impact

Agawam’s largest concern during heat waves is older adults (over 65) that make up 20.4% of the population and are more likely to have pre-existing health conditions. In addition, children under five years old make up 5% of the population (ACS, 2021 5-year estimates). There are also individuals with medical conditions who are vulnerable to extreme heat, and even young adults and healthy individuals can succumb to heat if they participate in strenuous physical activities during hot weather. Some behaviors that put people at greater risk include drinking alcohol, taking part in strenuous outdoor physical activities in hot weather, and taking medications that impair the body’s ability to regulate its temperature or that inhibit perspiration. The primary concern during extreme cold events is residents that may also have lost power due to a snow or ice storm, especially vulnerable groups such as older adults. During both extreme heat and cold events, the Town opens cooling/warming centers for any residents who don’t have adequate cooling or warmth at home.

Vulnerability

Based on the above assessment, Agawam has a vulnerability of "3-Medium” from extreme temperatures.

Other Hazards

In addition to the hazards identified above, the Hazard Mitigation Committee reviewed the full list of hazards listed in the Massachusetts Hazard Mitigation Plan. Due to the location and context of Agawam, coastal erosion, landslides, and tsunamis were determined to not be a threat.

The Committee noted that Tennessee Gas' natural gas pipeline that extends across the southern part of town from east to west presents a hazard in itself. It is understood that gas is transmitted through the pipeline at 800 pounds per square inch. The severity of an event based on any one of the hazards noted above would increase greatly if it were to impact the pipeline in any way.

4: 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 community residents and property
- Would create a secondary disaster if a hazard were to impact it

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

- Facilities needed for emergency response in the event of a hazard event.

- Facilities identified as non-essential and not required in an emergency response event, but which are considered essential for the everyday operation of the town.

- Facilities or institutions that include special populations which would need additional attention in the event of a hazard event.

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

Category 1 – Emergency Response Services

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

1. **Emergency Operations Center**
   Emergency Management Office – 1000 Suffield Street

2. **Fire Station**
   Agawam Fire Department Headquarters – 800 Main Street
   Fire Station #2 – 1200 Springfield Street

3. **Police Station**
   Agawam Police Department – 681 Springfield Street; New Police Station currently being built at 1070 Suffield Street – will take effect summer 2024.

4. **Highway Garage**
   Department of Public Works Headquarters– 1000 Suffield Street

5. **Water Department**
   Department of Public Works Headquarters– 1000 Suffield Street

6. **Emergency Fuel Stations**

Department of Public Works Headquarters– 1000 Suffield Street

7. Emergency Electrical Power Facility (with emergency back-up generators)

Agawam Senior Center – 954 Main Street
Department of Public Works Headquarters– 1000 Suffield Street
Town Hall – 36 Main Street
Police Station – 681 Springfield Street (1070 Suffield Street as of summer 2024)
Fire Station – 800 Main Street
Fire Station #2 – 1200 Springfield Street
Agawam Junior High School – 1305 Springfield Street (generator for lights only)
Agawam Middle School/Roberta G. Doering School – 68 Main Street (generator for lights only)
Public Library – 750 Cooper Street

8. Emergency Shelters

Agawam Senior Center – 954 Main Street
Agawam Junior High School – 1305 Springfield Street
Agawam Middle School/Roberta G. Doering School – 68 Main Street
Public Library (Cooling and Warming Center - 750 Cooper Street

9. Dry Hydrants - Fire Ponds - Water Sources

None

10. Transfer Station

None currently; USA Waste and Recycling will be opening a transfer station at the site of the former Covanta Springfield Resource Recovery facility at 188 M Street.

11. Utilities

Electrical Substations – Silver Street, Moylan Drive, Springfield Street
Tennessee Gas Compressor Station – Suffield Street; Pipeline - across southern part of town from east to west
Tennessee Gas Substation – Springfield Street
Verizon Switch Station – Rowley Street
Provin Mountain Water Tanks - Provin Mountain

12. Helicopter Landing Sites

Tennessee Gas – 1615 Suffield Street
Industrial Lane – 80 Industrial Lane
High School - 760 Copper Street

13. Communications

MEMA Antenna, 1000 Suffield Street
Police 911
Municipal Cell Towers: 1000 Suffield Street, Agawam Municipal Golf Course - Southwick Street

14. Primary Evacuation Routes

Route 57
Southwick Street (Route 57)
Route 75 (Suffield Street)
Route 187 (Pine Street, South Westfield Street, North Westfield Street)

Route 147 (Springfield Street)
Route 159 (Main Street)
Route 5

15. Bridges Located on Evacuation Routes

Morgan-Sullivan Bridge – Springfield, Suffield and Main Streets
Julia Buxton Memorial Bridge – Route 5 North
Strathmore Bridge – Bridge and River Streets

Category 2 – Non Emergency Response Facilities

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

1. Water Supply

Cobble Mountain Reservoir (Towns of Blandford and Granville)
Provin Mountain Storage Reservoir
Water Transmission Lines (3) from Provin Mountain (60", 42", 54/48")
Water Pump Stations: Halladay Drive

2. Sewer Infrastructure (Pump Stations) - all have back-up generators

Water Treatment Plant – 188 M. Street
983 River Road
380 River Road
Hendon Drive
Losito Lane
233 Main Street (rear HP Hood Inc.)
North Street
895 N. Westfield Street
100 Pleasant Valley Road
Riverview Avenue
School Street
South Street
Valley Street

3. Problem Culverts

Suffield Street at Worthington Brook
North Street at White Brook
North Westfield Street at May Hollow
Shoemaker Lane near Suffield Street
Elm Street at Three Mile Brook
Carr Avenue (two culverts) at Three Mile Brook

Category 3 – Facilities/Populations to Protect

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

1. Special Needs Population

Sunshine Village Day Developmental Program - Southbridge Rd
Residential Group Home – 1205 Suffield Street

2. Elderly Housing/Assisted Living

Atrium – 153 Cardinal Drive
Colonial Haven – 886 Colonial Haven Drive
Country View Apartments – 95 N. Westfield Street
Danahy School House – 51 Maple Street
Heritage Hall East – 464 Main Street
Heritage Hall North – 65 Cooper Street
Heritage Hall South – 100 Harvey Johnson Drive
Heritage Hall West – 61 Cooper Street
Meadowbrook Manor – 66 Meadowbrook Manor
Pheasant Hill Estates – S. West Street
Quail Run Estates – 50 Cardinal Drive
Heritage Woods – 462 Main Street

3. Recreation Areas

Agawam Municipal Golf Course – 128 Southwick Street
Crestview Country Club – 281 Shoemaker Lane
Oak Ridge Golf Club – 850 S. Westfield Street
Perry Lane Park – 108 Perry Lane
Robinson State Park – 428 North Street
School Street Park - 511 School Street, Corey Street
Six Flags New England – 1623 Main Street
St. Anne Country Club – 781 Shoemaker Lane
Shea's Field (athletic fields, dog park, skate park) – Armory Drive
Gerald J. Mason Memorial Pool – Maynard Street
Tuckahoe Recreation Area – Meadow Street
Borgatti Park – River Road
Wade Park – Franklin Street Extension

4. Schools

Agawam Middle School/Roberta G. Doering School - 68 Main Street
Agawam Junior High School - 1305 Springfield Street
Agawam High School - 760 Cooper Street
Bambi Nursery School – 22 Vernon Street
Benjamin J. Phelps School - 689 Main Street
Clifford M. Granger School - 31 South Westfield Street
Department of Special Education - 760 Cooper Street
Early Childhood Center - 108 Perry Lane
James Clark School - 65 Oxford Street
Jump Start – 605 Springfield Street

Robinson Park School - 65 Begley Street
Smart Start Pre-School (F.H. Congregational Church) – 21 N. Westfield Street

Westfield Head Start – 733 Main Street
Strive Program – 66 Meadowbrook

5. Houses of Worship

Agawam Congregational Church – 745 Main Street
Agawam United Methodist Church – 459 Mill Street
Bethany Assembly of God – 580 Main Street
Church of Redemption – 50 Maple Street
Faith Bible Church – 370 Shoemaker Lane
First Baptist Church – 760 Main Street
Greater Springfield Korean Church – 22 Hunt Street
Kingdom Hall – 326 N. Westfield Street
Lighthouse Christian Center – 522 Springfield Street
Sacred Heart Church - 1065 Springfield Street
St. John's Church – 823 Main Street
St. David's Episcopal Church – 699 Springfield Street
Hope Community Church – 152 South Westfield Street

6. Historic Buildings/Sites

Agawam Center Historic District (24-196 Elm St.; 551-1008 Main St.)
Capt. Charles Leonard House – 663 Main Street
Puchase-Ferre House – 1289 Main Street
Thomas and Esther Smith House – 251 North West Street
Annie Sullivan Memorial – Springfield Street
Granger School – 31 S. Westfield Street
Agawam Historical and Fire House – 35 Elm Street

7. Apartment Complexes (over 8 units)

Coach Light Apartments – Beldon Court (88)
Elizabeth Manor – 238 Maple Street (40)
Gramacy Park Apartments – 156 Suffield Street (32)
Hale Haven Apartments – 21 River Road (12)
Hallmark Apartments – 24 Dwight Street (38)
Hillside Apartments – 49 North Street (8)
Lamplighter Apartments – 23-42 Amherst Avenue (87)
Lantern Court Apartments – 438 Springfield Street (16)
Maple Garden Apartments (Sutton Place) – 191 Maple Street (96)
Meadow House Apartments – 408-410 Meadow Street (36)
Mill House Apartments – 643 Suffield Street (32)
Pheasant Hill Village – Pheasant Hill Drive (200)
Rivervista Apartments – 110 through 122 Main Street (52)
Riviera Apartments – Riviera Drive (120)
Royal Lane Apartments – 415 Springfield Street (10)
Shibley Court Apartments – 33 Norman Terrace (119)
Stockade Apartments – 619 Springfield Street (10)
Town Crier Apartments – 873 Springfield Street (28)
Village Apartments – 77 High Street (24)

Country Manor (Village Arms Apartments) – 59-63 South Westfield Street (60)
Walnut Hill Apartments – 21 Dwight Street (22)
Soldier On Independent Living – 702 S. Westfield Street (51)
Wayfinders – 586 Mill Street (52)

8. Townhomes/Condominium Developments (over 8 units)

Beekman Place Estates – 430 Main Street
Castle Hills – 0 Castle Hill Road
Corey Colonial – 60 Corey Street
Heritage – 418 Meadow Street
Longbrook Estates – 1485 Suffield Street
Mansion Woods – 562 Suffield Street
Maple View Commons - 232 Garden Street
Northfield Common – 420 Main Street
Overlook – 140 Autumn Street
Plantation – 0 Plantation Street
Regency – 391 Meadow Street
Sheri Lane – Sheri Lane
Sabrina Way – Corey Street
Villas at Pine Crossing – Villa Drive
William Pynchon Condos – 336 Meadow Street (10)
William Pynchon Condos – 338 Meadow Street (50)
William Pynchon Condos – 350 Meadow Street (10)
Worthy Mills - 5 Walnut Street (12)

9. Employment Centers

Six Flags New England (seasonal) – 1623 Main Street
Country Estates of Agawam – 1200 Suffield Street
HP Hood Inc. – 233 Main Street
Genesis Health Care – 462 Main Street
Heritage Hall East – 464 Main Street
Heritage Hall North – 55 Cooper Street
Heritage Hall South – 100 Harvey Johnson Drive
Heritage Hall West – 61 Cooper Street
Agawam Regional Industrial Park – Bowles Road:

- Olympic Manufacturing Group – 153 Bowles Road
- Simmons Co. – 320 Bowles Road
- Diana's Bakery – 120 Bowles Road

10. Camps

Perry Lane Summer Camp

11. Mobile Home Parks

72-74 Springfield Street

5: MITIGATION CAPABILITIES & STRATEGIES

One of the steps of this Hazard Mitigation Plan update process is to evaluate all the Town's existing policies and practices related to natural hazards and identify potential gaps in protection. Agawam's local Hazard Mitigation Committee worked with PVPC to complete a Capability Assessment using the FEMA Capability Assessment Worksheet as a guide.

Agawam has most of the no cost or low-cost hazard mitigation capabilities in place and is a certified MVP community by the Commonwealth of Massachusetts. Land use zoning, subdivision regulations and an array of specific policies and regulations that include hazard mitigation best practices, such as limitations on development in floodplains, stormwater management, tree maintenance, etc. Agawam also has appropriate staff dedicated to hazard mitigation-related work for a community its size, including an involved Mayor, an Emergency Management Director, a professionally run Department of Public Works, a Building Inspector, a Planner, and a Tree Warden, and Agawam has recommended plans in place, including a Master Plan, an Open Space and Recreation Plan, and a Comprehensive Emergency Management Plan. Not only does Agawam have these capabilities in place, but they are also deployed for hazard mitigation as appropriate. The Town also has very committed and dedicated volunteers who serve on Boards and Committees and in Volunteer positions. The Town collaborates closely with surrounding communities and is party to Mutual Aid agreements through the MEMA. Agawam is also an active member community of the Pioneer Valley Planning Commission (PVPC) and can take advantage of no cost local technical assistance as needed provided by the professional planning staff at the PVPC.

Agawam's most obvious hazard mitigation need is for federal funds to implement prioritized actions. While Agawam is a well-managed fiscally sound Town, it is not a wealthy community and with state constraints on municipalities raising their own funds, Agawam has very limited financial resources to invest in costly hazard mitigation measures. Agawam is, however, committed to locally matching all HMGP grants received.

After reviewing existing policies and mitigation capabilities, as well as the hazard identification and assessment, the Hazard Mitigation Committee developed a set of hazard mitigation strategies to implement over the next five years.

The Town of Agawam has developed the following goal to serve as a framework for mitigation of the hazards identified in this plan.

Goal Statement

To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to the following hazards: flooding, severe snowstorms/ice storms, severe thunderstorms, hurricanes, tornadoes, wildfires/brushfires, earthquakes, dam failures, and drought.

Overview of Mitigation Capabilities by Hazard

An overview of the general concepts underlying mitigation strategies for each of the hazards identified in this plan is as follows:

Flooding

The key factors in flooding are the water capacity of water bodies and waterways, the regulation of waterways by flood control structures, and the preservation of flood storage areas and wetlands. As more land is developed, more flood storage is demanded of the town's water bodies and waterways. The Town of Agawam currently addresses this problem with a variety of mitigation tools and strategies. Flood-related regulations and strategies are included in the Town's zoning bylaw and subdivision regulations, such as ensuring adequate driveway drainage, restricting development in the floodplain, requiring drainage easements where applicable for subdivisions, and following the Wetlands Protection Act. The Town regularly inspects and clears culverts, and has a prioritization plan for culvert replacement that includes regularly seeking or providing funding for culvert replacements. The Town implements green infrastructure to absorb floodwater and encourages low impact development. The Town also participates in the National Flood Insurance Program.

Severe Snowstorms / Ice Storms

The Town's mitigation strategies include restricting the location and height of telecommunications facilities, maintaining trees to prevent damage to utility lines, and limiting road grades in new developments. The Town works with Utility to identify and prune trees near power lines, which reduces the potential of power outages caused by falling branches. The State Building Code provides minimum snow load requirements for roofs, that also assist in mitigation of severe snowstorms and ice storms. To the extent that some of the damages from a winter storm can be caused by flooding, flood protection mitigation measures also assist with severe snowstorms and ice storms.

Hurricanes

The flooding associated with hurricanes can be a major source of damage to buildings, infrastructure, and a potential threat to human lives. Flood protection measures can thus also be considered hurricane mitigation measures. The high winds that often accompany hurricanes can also damage buildings and infrastructure, similar to tornadoes and other strong wind events. Meeting the requirements of the State Building code also reduces damages from hurricanes. Maintaining trees, restricting cell tower height, and prohibiting new mobile homes also mitigate impacts from hurricanes.

Severe Thunderstorms / Winds / Tornadoes

Most damage from tornadoes and severe thunderstorms come from high winds that can fell trees and electrical wires, as well as generate hurtling debris. Adherence to the Massachusetts Building Code is a primary current mitigation strategy. Maintaining trees, restricting cell tower height, and prohibiting new mobile homes also mitigate impacts from strong storms and tornadoes.

Wildfires / Brushfires

Residents must notify the Fire Department and get a burn permit when they plan to have a controlled burn on their property. In addition, the Town conducts local outreach to schools and the senior center about fire safety.

Earthquakes

Most buildings and structures in the state were constructed without specific earthquake resistant design features. However, the State Building Code helps maintain the structural integrity of structures and helps to mitigate potential impacts from earthquakes.

Dam Failure

The mitigation measures currently in place focus on regular inspections and permitting process required by the Massachusetts DCR. The Town is also involved in Emergency Action Plans for Provin Mountain Reservoir Dam, Silver Lake Dam, and the Holyoke Dam (not located in Agawam but would impact the Town if it were to fail).

Drought

The Town regularly inspects its water system to identify and repair leaks. In the event of severe droughts, the Town can issue water use restrictions in order for residents to conserve water.

Existing Mitigation Capabilities

The Town of Agawam currently has a variety of mitigation capabilities put in place that existed prior to the previous Hazard Mitigation Plan. These strategies are listed on the following pages and have been evaluated in the "Effectiveness" column.

Table 5.1 Existing Mitigation Capabilities

Existing Action	Description	Hazards Mitigated	Effectiveness	Potential Changes
State Building Code	Agawam continues to follow the Massachusetts State Building Code.	All hazards	Effective	None
Standby personnel	A list of DPW emergency contacts and personnel on duty each weekend is readily available so that in the case of an urgent problem with sewer, water, highway, parks, and grounds, etc., police or fire can make contact and the appropriate personnel will respond quickly to the scene.	All hazards	Effective	None
Social media	Town uses Facebook, Twitter, and its web page to get information out about coming hazards, including road closures and any information put out by National Weather Service and MEMA.	All hazards	Effective	None
Vehicle and equipment repair crew	Town has crew that can repair town vehicle or equipment at any time of day or night as needed.	All hazards	Effective	None
StormReady Community	As of June 18, 2008, the Town of Agawam has been recognized as a StormReady community by the National Weather Service.	All hazards	Effective	None
Warning System – Reverse 911, Code Red, other	The Town uses CodeRed emergency alert system. Residents must enroll to get notifications.	All Hazards	Effective	Increase enrollment
CEMP	The CEMP ensures a coordinated response to emergencies. It delineates the roles and responsibilities of all Town departments, agencies, government orgs, volunteers and community partners that may be involved in response operations	All Hazards	Effective	None

Table 5.1 Existing Mitigation Capabilities				
Existing Action	**Description**	**Hazards Mitigated**	**Effectiveness**	**Potential Changes**
Agawam Stormwater Management Ordinance (Ch. 175-35): Peak Discharge	New development projects must maintain pre-development peak stormwater discharge rates, reducing the possibility of flooding. Redevelopment projects must meet stormwater standards to the maximum extent practicable and at the very least be designed to improve existing conditions.	Flooding	Effective	Anticipate revisions based on complying with forthcoming EPA NPDES Small MS4 permit
Culvert clearing and outfall inspections	The DPW routinely clears and inspects outfalls to reduce the chances of drainage blockages that would cause localized flooding. This includes follow up on any complaints relative to the stormwater drainage system.	Flooding	Effective	Inspections will likely increase with forthcoming Small MS4 permit
Culvert Replacement	The Town has a prioritization plan for culvert replacement, and regularly seeks and provides funding for culvert replacement projects.	Flooding	Effective	None
Agawam Zoning Ordinance: Site Plan Review	Site plan must delineate adjacent topography, wetlands, waterways, and floodplains, as well as erosion control, and drainage infrastructure.	Flooding	Effective	None
Agawam Zoning Ordinance: Floodplain Zone	Areas delineated as part of the 100-year floodplain are protected by strict use regulations that prevent structures from being constructed that will be damaged by flooding.	Flooding	Effective	Any changes to FEMA flood maps will be incorporated into regulation.
Wetlands Ordinance	Town enforces the standards established by Wetlands Protection Act.	Flooding	Effective	None
Participation in the National Flood Insurance Program	The Town currently participates in the National Flood Insurance Program, which includes enforcing the requirements of the Floodplain Zone.	Flooding	Effective	Town to stay updated with any changes to Floodplain maps.
Agawam Subdivision Regulations (Ch. 159, Sec. 12)	The Town recommends that building lots, beyond setback area, shall not drain to roadways and be managed insofar as possible, within the lots themselves using swales, yard drains, etc.	Flooding / Severe Snowstorms / Ice storms	Effective	None

Table 5.1 Existing Mitigation Capabilities				
Existing Action	**Description**	**Hazards Mitigated**	**Effectiveness**	**Potential Changes**
Open Space and Recreation Plan/Comprehensive or Master Plan	The Town regularly updates the OSRP (every 7 years). The current update was completed in 2019. The Comprehensive Plan was completed in 2004.	Flooding	Effective	The Town should update the Comprehensive Plan, and also continue to implement actions from the OSRP
Open Space Residential Development Ordinance	Open space residential development (OSRD) is a residential development adjacent to permanently preserved open space. It is allowed by right in the Residence A-1, Residence A-2, and Agricultural Districts.	Flooding	Effective if utilized – None to date	The Town should pursue ways to educate and make this tool more attractive to developers.
Agawam Roadway Design Recommendations	The Town recommends that roads within all new subdivision developments have a maximum road grade of 8 percent.	Severe Snowstorms / Ice storms	Effective	None
Tree Management	Complaints to DPW/Tree Warden are forwarded immediately to Eversource, which has become extremely aggressive in addressing tree issues relative to utility lines since the problems with the October ice storm in 2011.	Severe snowstorms / ice storms	Effective	None
Agawam Zoning Regulations: Wireless Communication District (Chapter 180-94)	The Town has a Wireless Telecommunications Overlay District for cell phone towers that restricts towers to specific locations in town through special permit application.	Severe Snowstorms / Ice storms Hurricane Severe Thunderstorm / Wind / Tornado	Effective	None
Zoning Regulations: Mobile Homes	Mobile homes are prohibited in all zoning districts.	Flooding/Hurricane/ Severe Thunderstorm / Wind / Tornado	Effective	None

Table 5.1 Existing Mitigation Capabilities				
Existing Action	**Description**	**Hazards Mitigated**	**Effectiveness**	**Potential Changes**
Burning Permits	Residents are required to obtain a burning permit from the Town to have a controlled burn on their property.	Wildfire / Brushfire	Effective	None
Subdivision Review: Fire Safety	The Fire Department is involved in the review of subdivision plans to ensure design does not increase risk of wildfire or brushfire.	Wildfire / Brushfire	Effective	None
Public Education/Outreach	Yes, in schools and with COA, smoke detector in conjunction with Red Cross	Wildfire/Brushfire	Effective	None
Winter road management planning	Department of Public Works has a planning map for road plowing, sanding, and salting with 15 different routes through Town. Mapping helps with deployment and coordination of town and hired contractors during major winter storms.	Severe snowstorms / ice storms	Effective	None
Interdepartmental coordination	In advance of severe winter storms, Mayor calls meeting to facilitate coordination among all Town departments.	Severe snowstorms / ice storms	Effective	None
Mass notification system	Agawam has town-wide notification system (Code Red) to let people know about parking bans during severe winter storms	Severe snowstorms / ice storms	Effective	None
Communication/coordination with dam owners	Get inspection reports from Silver Lake Dam and EAP from Holyoke Dam	Dam Failure	Effective	None
Identification and Reduction of Water System Leaks	The Department of Public Works routinely inspects and repairs water system leaks.	Drought	Effective	None

Status of Previous Mitigation Strategies

The following table lists the mitigation strategies identified in the previous version of Agawam's Hazard Mitigation Plan. The status column indicates whether the strategies were completed, are in process, or were never implemented. The table also indicates whether strategies not completed will be included in the update or deleted, and the reason for deletion.

Table 5.2 Status of Previous Mitigation Strategies

Mitigation Action	Status – Completed or not, if not give reason	Description	Hazards Mitigated	Timeframe *(from when funding becomes available)*	Priority	Include in Update?
Culvert replacements	Carr Avenue Complete; North St. to be constructed in 2023; N. Westfield St. to be constructed in 2024; Suffield and Elm St. need to be replaced	Replace culverts on Suffield and Elm Streets	Flooding, Hurricanes, Severe Thunderstorms	Apply after announcement of availability 1 Year after receipt of funds	Very high	Include in Update
Relocate sewer line and stabilize slope along Westfield River	Design Completed; construction in process	Move sewer line away from slope that becomes increasingly destabilized with each large storm.	Flooding, Hurricanes, Tropical Storm, Severe Thunderstorms	Start design July 2016-Dec 2016	Very High	Include in Update
Back-up generators	All buildings that need generators have them, but some need to be replaced, and all need to be maintained	Replace old generators and maintain existing back-up generators at shelters to ensure all shelters have sufficient back-up utility service.	All, except Drought	Spring maintenance check starting April 2017.	Very High	Include in Update

Table 5.2 Status of Previous Mitigation Strategies						
Mitigation Action	**Status – Completed or not, if not give reason**	**Description**	**Hazards Mitigated**	**Timeframe *(from when funding becomes available)***	**Priority**	**Include in Update?**
Open space planning: promote preservation of floodplains	Some has been completed; Ongoing, need to preserve additional acreage	Encourage clustered residential development while conserving valuable open space, which increases the amount of pervious surface and reduces potential flooding in accordance with the Open Space and Recreation Plan.	Flood, Hurricane, tropical storm, severe thunderstorm	Initiate regulatory change in Jan 2018-May 2019	Very High	Include in Update
Reduce fuel material in local forests that would promote larger wildfires	Ongoing – communicate with landowners and DCR	Promote more active forest management with owners of more than 10 acres of woodland, including both public and private landowners	Wildfires/ brushfires	Start Spring 2017-Spring 2019	High	Include in Update

Table 5.2 Status of Previous Mitigation Strategies						
Mitigation Action	**Status – Completed or not, if not give reason**	**Description**	**Hazards Mitigated**	**Timeframe *(from when funding becomes available)***	**Priority**	**Include in Update?**
Emergency Broadcast	Completed	Implement developed agreement with WHYN Radio station to provide emergency information to residents including how to prepare homes for emergencies and proper evacuation procedures.	All	April 2016 and annually	High	Delete – Not in use, emergency communication now conducted through Code Red
Sandbag inventory	Completed but ongoing – need to maintain supply	Maintain inventory of 5,000 sandbags to ensure adequate supply.	Flooding, Hurricanes	Complete	Medium	Include in Update

Table 5.2 Status of Previous Mitigation Strategies						
Mitigation Action	**Status – Completed or not, if not give reason**	**Description**	**Hazards Mitigated**	**Timeframe *(from when funding becomes available)***	**Priority**	**Include in Update?**
Emergency Action Plans (302 CMR 10:11)	**Completed** but ongoing	High hazard dams must have an Emergency Action Plan approved by the Office of Dam Safety which includes a list of available equipment and materials, procedure for informing emergency agencies, inundation map and procedure for warning residents.	Dam failures	Review and update annually Jan-March 2018	Medium	Include in Update

Table 5.2 Status of Previous Mitigation Strategies						
Mitigation Action	**Status – Completed or not, if not give reason**	**Description**	**Hazards Mitigated**	**Timeframe *(from when funding becomes available)***	**Priority**	**Include in Update?**
Dam Inspections (302 CMR 10:07)	Completed but Ongoing	Facilitate Dam owners to have dams inspected by a professional engineer according to a schedule based on a dam's hazard index rating. High hazard dams - every 2 yrs Significant hazard dams - every 5 yrs Low hazard dams - every 10 yrs	Dam failures	Jan-March 2017: communicate responsibilities to dam owners and explain resources to assist	Medium	Include in Update
Dam failure impact identification - Obtain from Reports for Provin Mountain and Silver Lake Dam	Completed	Determine which critical facilities would be impacted in case of dam failure at these locations.	Dam failures	Jan 2017-June 2017	Medium	Delete from Update - Completed

Table 5.2 Status of Previous Mitigation Strategies						
Mitigation Action	**Status – Completed or not, if not give reason**	**Description**	**Hazards Mitigated**	**Timeframe *(from when funding becomes available)***	**Priority**	**Include in Update?**
Water Conservation bylaw	Not Completed – Determined to not be necessary	Adopt a Water Conservation bylaw.	Drought	Start Jan 2018-Oct 2016	Low	Delete from Update – Unnecessary as can be addressed on a case-by-case basis
Become part of FEMA's Community Rating System	Not completed – still in research phase	Town has adopted the latest versions of the FEMA Flood Insurance Rate Maps and will now act on CRS	Flooding	July 2017-June 2018	Low	Include in Update

Prioritized Implementation Plan

Several of the action items previously identified in the previous version of this plan are currently continuing, either because they require more time to secure funding, or their construction process is ongoing. In addition, the Hazard Mitigation Committee identified several new strategies that are also being pursued. These new strategies are based on experience with currently implemented strategies, as well as the hazard identification and risk assessment in this plan.

Prioritization Methodology

The Hazard Mitigation Committee reviewed and prioritized a list of previously identified and new mitigation strategies using the following criteria:

Estimated benefit – Strategies which would provide the highest degree of reduction in loss of property and life are given a higher priority. This estimate is based on the Hazard Identification and Analysis Chapter, particularly with regard to how much of each hazard's impact would be mitigated.

Application to multiple hazards – Strategies are given a higher priority if they assist in the mitigation of several natural hazards.

Time required for completion – Projects that are faster to implement, either due to the nature of the permitting process or other regulatory procedures, or because of the time it takes to secure funding, are given higher priority.

Cost effectiveness – In order to maximize the effect of mitigation efforts using limited funds, priority is given to low-cost strategies. For example, regular tree maintenance is a relatively low-cost operational strategy that can significantly reduce the length of time of power outages during a winter storm. Strategies that have identified potential funding streams, such as the Hazard Mitigation Grant Program or the Municipal Vulnerability Preparedness (MVP) Program, are also given higher priority.

Eligibility Under Hazard Mitigation Grant Program – The Hazard Mitigation Grant Program (HMGP) provides grants to states and local governments to implement long-term hazard mitigation measures after a major disaster declaration. The purpose of the HMGP is to reduce the loss of life and property due to natural disasters and to enable mitigation measures to be implemented during the immediate recovery from a disaster. Funding is made available through FEMA by the Massachusetts Emergency Management Agency. Municipalities apply for grants to fund specific mitigation projects under MEMA requirements.

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

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

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

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

Very High – extremely beneficial projects that will greatly contribute to mitigation of multiple hazards and the protection of people and property. These projects are also given a numeric ranking within the category.

Several hazard mitigation strategies identified in the previous Hazard Mitigation Plan have not yet been completed, but were changed in priority during the update of this plan by the Hazard Mitigation Committee. The Committee changed priorities by evaluating the entire list of mitigation strategies in a comprehensive manner according to the factors listed above.

Prioritized mitigation strategies in the previous Hazard Mitigation Plan were listed within a single table of Priority Mitigation Actions and were not prioritized with the same rankings as described above. For purposes of comparison, strategies that were listed as a high priority in the previous Hazard Mitigation Plan are listed in bold in the table below.

Cost Estimates

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

- **Low** – cost less than $50,000
- **Medium** – cost between $50,000 – $100,000
- **High** – cost over $100,000

Cost estimates take into account the following resources:

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

Project Timeframe

Each strategy is provided with an estimated length of time it will take for implementation. Where funding has been secured for the project, a specific future date is provided for when completion will occur. However, some projects do not currently have funding and thus it is difficult to know exactly when they will be completed. For these projects, an estimate is provided for the amount of time it will take to complete the project once funding becomes available.

Table 5.3 Mitigation Strategies to Implement								
Mitigation Action	**Action Type**	**Description**	**Hazards Mitigated**	**Responsible Entity**	**Timeframe *(from when funding becomes available)***	**Funding Source**	**Cost**	**Priority**
Culvert replacements	Capital construction	North St. to be constructed in 2023; N. Westfield St. to be constructed in 2024; Suffield and Elm St. need to be replaced	Flooding, Hurricanes	DPW, Conservation Commission, Private	1 Year after grant funding awarded.	HMGP	High	Very high
Relocate sewer line and stabilize slope along Westfield River	Slope Stabilization Complete; Design complete and funding secured – construction likely completed by 2024	Move sewer line away from slope that becomes increasingly destabilized with each large storm.	Flooding, Hurricanes, Tropical Storm	DPW, Army Corps of Engineers	End of 2024	US Department of Interior and the Environment	High	Very High
Back-up generators	Replacement and Maintenance	Some of the older generators need to be replaced, and all need to be maintained to ensure all shelters have sufficient back-up utility service.	All, except Drought	EMD	End of 2023 for Sewer Pump station, end of 2025 for Fire Department	Town Staff Time	N/A	Very High

Table 5.3 Mitigation Strategies to Implement								
Mitigation Action	**Action Type**	**Description**	**Hazards Mitigated**	**Responsible Entity**	**Timeframe *(from when funding becomes available)***	**Funding Source**	**Cost**	**Priority**
Open space planning: promote preservation of floodplains	Planning	Encourage clustered residential development while conserving valuable open space, which increases the amount of pervious surface and reduces potential flooding in accordance with the Open Space and Recreation Plan.	Flood, Hurricane	Planning Board, Conservation Commission	Ongoing	Town Staff Time, State District Local Technical Assistance (DLTA)	N/A	Very High
Reduce fuel material in local forests that would promote larger wildfires	Education and outreach	Promote more active forest management with owners of more than 10 acres of woodland, including both public and private landowners	Wildfires/ brushfires	Fire Department	Ongoing	Town Staff Time, DCR	Low	High
Conduct outreach to increase Code Red Enrollment	Education and Outreach; Emergency Preparedness	Send an insert in water bills to encourage residents to enroll in Code Red	All Hazards	Mayor's Office, EMD	By end of 2024	Town General Fund	Low	High
Sandbag inventory	Emergency preparedness	Maintain inventory of 5,000 sandbags to ensure adequate supply.	Flooding, Hurricanes	EMD	Ongoing	Town Staff time	Low	Medium

Table 5.3 Mitigation Strategies to Implement								
Mitigation Action	**Action Type**	**Description**	**Hazards Mitigated**	**Responsible Entity**	**Timeframe *(from when funding becomes available)***	**Funding Source**	**Cost**	**Priority**
Emergency Action Plans (302 CMR 10:11)	Planning	Ensure receipt of EAPs and review. High hazard dams must have an EAP approved by the Office of Dam Safety that includes a list of equipment, procedure for informing emergency agencies, inundation map and procedure for warning residents.	Dam failures	Department of Public Works – Engineering	Ongoing	Town Staff Time	N/A	Medium
Dam Inspections (302 CMR 10:07)	Planning	Communicate with Dam owners to ensure dams are inspected by a professional engineer according to a schedule based on a dam's hazard index rating. High hazard dams - every 2 yrs Significant hazard dams - every 5 yrs Low hazard dams - every 10 yrs	Dam failures	Department of Public Works – Engineering, DCR	Ongoing	Town Staff Time	N/A	Medium

Table 5.3 Mitigation Strategies to Implement								
Mitigation Action	**Action Type**	**Description**	**Hazards Mitigated**	**Responsible Entity**	**Timeframe *(from when funding becomes available)***	**Funding Source**	**Cost**	**Priority**
Rehabilitation of Former Tuckahoe Turf Farm	Planning/Construction	Installation of an access road, parking lots, gravel walking trails, improvements to an existing boat launch, rehabilitation of low-hazard dam, installation of stormwater treatment systems to promote infiltration, construction of stream crossings, and wetland/riverfront replication and restoration.	Flooding	DPW, Planning, Conservation Commission	Ongoing for any new developmen; Tuckahoe Project – end of 2024	CPA, Town-owned Solar Revenue; MVP	Medium - High	Medium
Nitrogen Reduction and Green Infrastructure Projects	Planning/Construction	Retrofitting of contributing Town-owned properties for removal of nitrogen. A conceptual design plan for retrofitting an area of Robinson Park School to capture and infiltrate additional stormwater runoff has been selected. Other identified locations include all of Agawam's schools, the Library, Town Hall, and Borgatti Park.	Flooding	DPW, Conservation Commission, Planning	By end of 2028	Capital Funding, MVP, CPA	Medium - High	Medium

Table 5.3 Mitigation Strategies to Implement								
Mitigation Action	**Action Type**	**Description**	**Hazards Mitigated**	**Responsible Entity**	**Timeframe *(from when funding becomes available)***	**Funding Source**	**Cost**	**Priority**
Enact Green Infrastructure Subdivision Code	Planning	Subdivision Code would encourage sustainable green infrastructure by reducing impervious area (reducing roadway widths and lengths), and encouraging infiltration of stormwater runoff. Reviews and updates would promote tree and forest-friendly practices.	Flooding	Planning, DPW	2024-2025	Town Staff Time, DLTA	Low	Medium
Become part of FEMA's Community Rating System	Planning	The Town will research and consider participation in the CRS in order to reduce vulnerabilities to flooding and lower the cost of flood insurance for policy holders.	Flooding	Mayor, Town Council	2024-2025	Town Staff Time	Low	Low

6: PLAN REVIEW, EVALUATION, IMPLEMENTATION, AND ADOPTION

Plan Adoption

Upon completion of the draft Hazard Mitigation Plan, a public meeting was held by the town staff and the Pioneer Valley Planning Commission on November ___, 2023 to present and request comments from residents. The Hazard Mitigation Plan was then submitted to the Massachusetts Emergency Management Agency (MEMA) and the Federal Emergency Management Agency for their review. Upon receiving conditional approval of the plan by FEMA, the plan was presented to the Town Council and adopted by the Mayor.

Plan Implementation

The implementation of this plan begins upon its formal adoption by the Town Council and approval by MEMA and FEMA. Those Town departments and boards responsible for ensuring the development of policies, ordinance revisions, projects and programs as described in Chapter 5 of this plan will be notified of their responsibilities immediately following approval. The Hazard Mitigation Committee will oversee the implementation of the plan.

Incorporation with Other Planning Documents

Existing plans, studies, reports and municipal documents were incorporated throughout the planning process. This included a review and incorporation of significant information from the following key documents:

- ***Agawam Comprehensive Emergency Management Plan*** - used to identify critical infrastructure, current emergency operations, and special needs populations
- ***Agawam Zoning Ordinance and Subdivision Regulations*** - used to identify existing mitigation strategies
- ***Agawam Open Space and Recreation Plan –*** used to identify and prioritize open space to conserve, including floodplain and other lands that can store floodwaters to mitigate flooding
- ***Agawam Municipal Vulnerability Preparedness Summary of Findings – Community Resilience Building Workshop –*** used to identify climate resilience and natural hazard mitigation vulnerabilities and strategies
- ***Massachusetts' State Hazard Mitigation and Climate Adaptation Plan (2018)*** - used to ensure consistency with state identification of mitigation strategies, critical infrastructure, natural hazards, and impacts of climate change

During regular update meetings for the Hazard Mitigation Plan, the Hazard Mitigation Committee will review whether any of these plans are in the process of being updated. If so, the Hazard Mitigation

Committee will provide copies of the Hazard Mitigation Plan to relevant Town staff and brief them on the content of the Hazard Mitigation Plan. The Hazard Mitigation Committee will also review current Town programs and policies to ensure that they are consistent with the mitigation strategies described in this plan.

After this plan has been approved by both FEMA and the local government, the plan will be emailed to all appropriate Town staff, boards, and committees, with a reminder to review the plan and work to incorporate its contents, especially the action plan, into other planning processes and documents.

Members of the local Hazard Mitigation committee do not have written evidence that the previous Hazard Mitigation plan was formally integrated into Town plans that may have been developed and/or updated since the previous plan was approved. However, it is the understanding of the members of the local Hazard Mitigation committee that this was the case. Going forward, the process of cross integration will be more closely monitored.

Plan Monitoring, Evaluation and Maintenance

The Town's Emergency Management Director will call meetings of all responsible parties to review plan progress yearly, as well as needed based on occurrence of hazard events. The public will be notified of these meetings in advance through a posting of the agenda at Town Hall. Responsible parties identified for specific mitigation actions will be asked to submit their reports in advance of the meeting.

Meetings will involve evaluation and assessment of the plan, regarding its effectiveness at achieving the plan's goals and stated purpose. The following questions will serve as the criteria that is used to evaluate the plan:

Plan Mission and Goal

- Is the Plan's stated goal and mission still accurate and up to date, reflecting any changes to local hazard mitigation activities?

- Are there any changes or improvements that can be made to the goal and mission?

Hazard Identification and Risk Assessment

- Have there been any new occurrences of hazard events since the plan was last reviewed? If so, these hazards should be incorporated into the Hazard Identification and Risk Assessment.

- Have any new occurrences of hazards varied from previous occurrences in terms of their extent or impact? If so, the stated impact, extent, probability of future occurrence, or overall assessment of risk and vulnerability should be edited to reflect these changes.

- Is there any new data available from local, state, or Federal sources about the impact of previous hazard events, or any new data for the probability of future occurrences? If so, this information should be incorporated into the plan.

Existing Mitigation Strategies

- Are the current strategies effectively mitigating the effect of any recent hazard events?

- Has there been any damage to property since the plan was last reviewed?
- How could the existing mitigation strategies be improved upon to reduce the impact from recent occurrences of hazards? If there are improvements, these should be incorporated into the plan.

Proposed Mitigation Strategies

- What progress has been accomplished for each of the previously identified proposed mitigation strategies?
- How have any recently completed mitigation strategies affected the Town's vulnerability and impact from hazards that have occurred since the strategy was completed?
- Should the criteria for prioritizing the proposed mitigation strategies be altered in any way?
- Should the priority given to individual mitigation strategies be changed, based on any recent changes to financial and staffing resources, or recent hazard events?

Review of the Plan and Integration with Other Planning Documents

- Is the current process for reviewing the Hazard Mitigation Plan effective? Could it be improved?
- Are there any Town plans in the process of being updated that should have the content of this Hazard Mitigation Plan incorporated into them?
- How can the current Hazard Mitigation Plan be better integrated with other Town planning tools and operational procedures, including the zoning bylaw, the Comprehensive Emergency Management Plan, and the Capital Improvement Plan?

Following these discussions, it is anticipated that the committee may decide to reassign the roles and responsibilities for implementing mitigation strategies to different town departments and/or revise the goals and objectives contained in the plan. The committee will update the Hazard Mitigation Plan every five years. The process to update the plan will begin the year before it is due to expire. At that point, the Emergency Management Director and the HMP Committee may decide to undertake the plan update themselves or to hire a consultant to assist with the process. They will familiarize themselves with current hazard mitigation planning guidelines and begin the process of applying for funding from FEMA for the update.

Public participation will be a critical component of the Hazard Mitigation Plan maintenance process. The Hazard Mitigation Committee will hold all meetings in accordance with Massachusetts open meeting laws and the public will be invited to attend. The meetings will be publicized on the Town website and social media accounts. The public will be notified of any changes to the Plan via the meeting notices board at Town Hall, and copies of the revised Plan will be made available to the public at Town Hall as well as on the Town website.

CERTIFICATE OF ADOPTION

TOWN OF AGAWAM, MASSACHUSETTS

MAYOR WILLIAM P. SAPELLI

A RESOLUTION ADOPTING THE

AGAWAM HAZARD MITIGATION PLAN UPDATE 2023

WHEREAS, the Town of Agawam established a Committee to prepare the Agawam Hazard Mitigation Plan Update 2023; and

WHEREAS, several public planning meetings were held between April and June 2023 regarding the development and review of the Agawam Hazard Mitigation Plan Update 2023; and

WHEREAS, the Agawam Hazard Mitigation Plan Update 2023 contains several potential future projects to mitigate hazard damage in the Town of Agawam; and

WHEREAS, a duly-noticed public hearing was held by the Agawam Town Council on _____, 2023 to formally approve and adopt the Agawam Hazard Mitigation Plan Update 2016.

NOW, THEREFORE BE IT RESOLVED that the Mayor of Agawam adopts the Agawam Hazard Mitigation Plan Update 2023.

ADOPTED AND SIGNED this _____, 2023.

_____
William P. Sapelli
Mayor

ATTEST

7: APPENDICES

Appendix A: Technical Resources

1) Agencies

Massachusetts Emergency Management Agency (MEMA)……..508/820-2000
Hazard Mitigation Section 617/626-1356
Federal Emergency Management Agency (FEMA) 617/223-4175
Selected MA Regional Planning Commissions:
Berkshire Regional Planning Commission (BRPC)……..413/442-1521
Franklin Regional Council of Governments (FRCOG)……..413/774-3167
Metropolitan Area Planning Council (MAPC)……..617/451-2770
Pioneer Valley Planning Commission (PVPC)……..413/781-6045
MA Board of Building Regulations & Standards (BBRS)……617/227-1754
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 1……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……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

The identification of funding sources is the initial step in seeking funds and may vary depending on numerous factors. These factors include, but are not limited to, if a mitigation measure is conceptual or has been studied, evaluated, or designed. In most cases, the measure will require a combination of funding sources. The funding sources identified are not a guarantee that a specific project will be eligible for, or receive, funding. Upon adoption of this plan, the local representatives responsible for implementation should begin to explore potential funding sources in more detail.

Traditional funding sources within the Town of Agawam, such as funding from the operating and capital budgets, may be able to cover some of the costs associated with the action items detailed in Table 6-2. State revolving funds and other no- or low-interest loans may also be of interest. There is a great variety of funding available for Massachusetts municipalities, both through the state and federal governments. A full list of funding opportunities can be found on the Community Grant Finder webpage. The Community Grant finder provides a streamlined interface where municipalities can easily learn about grant opportunities. Specific funding options related to action items developed by Ludlow are listed in the table below.

Category	Agency/Grant	Description	Limitations & Stipulations
Community Development	MassWorks Infrastructure Program	Provides grants to communities to help them prepare for success and contribute to the long-term strength and sustainability of the Commonwealth.	None
Dam Repair and Removal	Dam and Seawall Program, EOEEA	Provides funding for repair or removal of dams	None
Dam Removal	Division of Ecological Restoration (DER)	Provides funding to remove dams and restore river processes.	Must provide a high enough ecological benefit
Drinking Water Supply Protection	Drinking Water Supply Protection (DWSP) Grant Program, MassDEP	Financial assistance for the purchase of land for protection of existing DEP-approved public drinking water supplies; protection of planned future public drinking water supplies; or groundwater recharge	For public water systems and municipal water departments
Emergency Management and Planning	Flood Mitigation Assistance Grant Program (FMA)	Implement cost-effective measures that reduce or eliminate the long-term risk of flood damage.	For buildings and other structures insured under the NFIP
Emergency Management and Planning	Hazard Mitigation Grant Program (HMGP)	Provides funding after a disaster to significantly reduce or permanently eliminate future risk to lives and property from natural hazards.	None
Emergency Management and Planning	Building Resilient Infrastructure & Communities (BRIC)	Provides funds for hazard mitigation planning and the implementation of mitigation projects prior to a disaster event, with a focus on infrastructure projects and "community lifelines." Replaced FEMA's Pre-Disaster Mitigation (PDM) Program.	None
Emergency Management and Planning	MEMA Citizen Corps Program (CCP) Grant	Supports local Community Emergency Response Teams (CERT) and Volunteers in Police Service (VIPS) in preparing for all-hazards. Can be used for planning activities, equipment, training, and exercises.	None

Category	Agency/Grant	Description	Limitations & Stipulations
Energy	Department of Energy Resources (DOER)	The DOER provides grant funding for clean energy-related programs.	None
Energy	Green Communities Designation and Grant Program	Provides a road map along with financial and technical support to municipalities that pledge to cut municipal energy and meet other criteria.	None
Environment	Community Forest Grant Program	Funding to establish community forests.	None
Environment, Flood Mitigation	Culvert Replacement Municipal Assistance Grant Program	Grant to replace undersized, perched, and/or degraded culverts located in an area of high ecological value.	Culvert replacements must meet Massachusetts Stream Crossing Standards to the maximum extent feasible.
Environment	US Forest Service Community Forest Grant Program	Funding to acquire private forest land threatened by conversion and establish community forests.	None
Environment	Conservation Assistance Grant Program	Provides funding for property appraisals, OSRPs, other land conservation planning.	Towns with 6,000 residents or fewer
Environment	604b Grant Program	Water quality assessment and management planning.	None
Environment	Land Use Planning Grants	Support effort to plan, regulate, and act to conserve and develop land consistent with the Massachusetts' Sustainable Development Principles.	None
Environment	LAND Grant Program (Division of Conservation Services)	Helps cities and towns acquire land for conservation and passive recreation.	Municipality must have an approved OSRP
Environment	Federal Land & Water Conservation Fund (DCS)	Funding for the acquisition, development, and renovation of parks, trails, and conservation areas.	Municipality must have an approved OSRP
Environment	MassTrails Program	Trail protection, construction, and stewardship projects.	None
Environment	MVP Program	Provides support to implement climate change resiliency priority projects.	None
Environment	Natural Resource Damages Program	Funding for restoration projects. Funding comes from settlements, so it is does not follow a set schedule.	None
Public Safety	Emergency Management Performance Grant (EMPG)	Reimbursable grant program to assist local emergency management departments to build and maintain an all-hazards emergency preparedness system.	Reimbursable
Public Safety	Public Assistance Program	The state reimburses governments and other applicants for disaster related costs.	75% reimbursable
Public Works & Transportation	Chapter 90 Program	Reimbursable grants on approved projects.	None

Category	Agency/Grant	Description	Limitations & Stipulations
Public Works & Transportation	Community Transit Grant Program	Funding to meet the transportation and mobility needs of seniors and people with disabilities.	Depends on project type
Public Works & Transportation	Municipal Small Bridge Program	Funding for small bridge replacement, preservation, and rehab projects.	Bridges with spans between 10 ft and 20 ft
Transportation	Transportation Alternatives (TA)	Funding for smaller-scale transportation projects such as pedestrian and bicycle facilities, recreational trails, safe routes to school projects, community improvements such as historic preservation and vegetation management, and environmental mitigation related to stormwater and habitat connectivity.	None

Appendix B: List of Acronyms

FEMA	Federal Emergency Management Agency
MEMA	Massachusetts Emergency Management Agency
PVPC	Pioneer Valley Planning Commission
EPA	Environmental Protection Agency
MassDEP	Massachusetts' Department of Environmental Protection
NWS	National Weather Service
HMGP	Hazard Mitigation Grant Program
FMA	Flood Mitigation Assistance Program
SFHA	Special Flood Hazard Area
CIS	Community Information System
DCR	Massachusetts Department of Conservation and Recreation
FERC	Federal Energy Regulatory Commission
TRI	Toxics Release Inventory
FIRM	Flood Insurance Rate Map
NFIP	National Flood Insurance Program
CRS	Community Rating System
DPW	Department of Public Works
LEPC	Local Emergency Planning Committee
EMD	Emergency Management Director
Con Com	Conservation Commission
Ag Com	Agricultural Commission
EOC	Emergency Operations Center
CEMP	Comprehensive Emergency Management Plan
EMA	Emergency Management Agency
HAZMAT	Hazardous Material

Appendix C: Documentation of Planning Process

Committee and Public Meeting Agendas and Records of Attendance

Agawam Hazard Mitigation Plan Update Committee
Meeting #1 Agenda

February 8, 2023: 10 – 11 am

Agawam DPW Building

1. Introductions
2. Overview of Hazard Mitigation Planning Process
    a. Purpose and Benefits
    b. Plan Components
    c. Planning Steps and Schedule
    d. MEMA/FEMA Review
3. Review/Update Hazards and Hazard Risk Assessment for Town
4. Review/Update Critical Facilities
5. Go over information needed for next meeting
6. Schedule next meeting and first public meeting

Agawam Hazard Mitigation Plan Committee
~~Kickoff~~ Meeting

Agawam DPW, 1000 Suffield Street
February 8, 2021, 10 – 11 am

Name	Signature
Eric Gillis	
Kevin Duquette	
Michael Squindo	
Frank Matuszczak	
CHESTER NICORA, JR	
Jennifer Gannett	
Bill Sgobelli	
Michelle Chase	
Mario Mazza	
Mimi Kaplan	

Agawam Hazard Mitigation Plan Update Committee
Meeting #2 Agenda

March 1, 2023: 10 – 11 am

Agawam DPW Building

1. Review/update critical facilities and populations to protect – in the plan and on the map (pp 52-57 in 2016 plan)
2. Review/update locations and previous occurrences for flooding, snowstorms/ice storms, severe thunderstorms/wind/tornadoes, wildfire/brushfire, dams, drought, extreme temperatures) – pp 17-49 in 2016 plan
3. Schedule next meeting and first public meeting

Agawam Hazard Mitigation Plan Committee
~~Kickoff~~ Meeting #2

Agawam DPW, 1000 Suffield Street
March 1, 2023, 10 – 11 am

Name	Signature
Mimi Kaplan, PVPC	
Frank Matuszczak, AFD	
Michael A. Squires	
Kevin Dupuette	
Michelle Chase	
Eric Gillis	
Mario Mazza	
Jennifer Gannett	

Agawam Hazard Mitigation Plan Update Committee
Meeting #3 Agenda

March 21, 2023: 2 – 3:30 pm

Agawam DPW Building

1. Complete Capability Assessment Worksheet
2. Review and update Existing Mitigation Capabilities Table
3. Discuss recent and potential development, and development in hazard prone areas, if time
4. Plan for public meeting on April 18
5. Schedule next committee meeting

Agawam Hazard Mitigation Plan Committee
Meeting #3

Agawam DPW, 1000 Suffield Street
March 21, 2023, 2 – 3:30 pm

Name	Signature
Kevin Duquette	
Frank Matuszczak	
CHET NICORA JR	
Jennifer Gannett	
Michelle Chase	
Eric Gillis	
Mario Mazza	
Mimi Kaplan	

Agawam Hazard Mitigation Plan Update Committee
Meeting #4 Agenda

April 13, 2023, 10 – 11 am

Agawam DPW Building

1. Discuss recent and potential development, and development in hazard prone areas
2. Review previous mitigation actions and determine status of action; decide which actions to delete and which to carry over to new plan; re-prioritize
3. Identify potential new mitigation actions
4. Schedule next committee meeting

Agawam Hazard Mitigation Plan Committee
Meeting #4

Agawam DPW, 1000 Suffield Street
April 13, 2023, 10 – 11 am

Name	Signature
Kevin Duquette	
Lauren Kennedy	
Frank Matuszcza K	
CHESTER I. NICORA, JR	
Jennifer Gannett	
Michelle Chase	
Eric Gillis	
Mario Mazza	
Mami Kaplan, PVPC	

Agawam Hazard Mitigation Plan Update Committee
Meeting #5 Agenda

May 2, 10 – 11 am

Agawam DPW Building

1. Finish identifying new mitigation actions, and determine implementation schedule, prioritization, and responsible parties
2. Review outstanding items if time
3. Go over final steps and schedule

Agawam Hazard Mitigation Plan Committee
Meeting #4

Agawam DPW, 1000 Suffield Street
May 2, 2023, 10 – 11 am

Name	Signature
Kevin Duquette	
CHET NICORA, JR	
Frank Matuszczak	
Michelle Chase	
Mimi Kaplan	
Jennifer Gannett	
Mario Mazza	

Public Meeting Agendas, Presentations, and Records of Attendance

Agawam Hazard Mitigation Planning Committee
HMP Public Meeting #1
Agawam DPW
Conference Room
1000 Suffield St. Agawam MA
April 13, 2023 11 am

Agenda

1. Overview of the Hazard Mitigation Planning Process

    a. Background on Hazard Mitigation Planning
    b. Planning process and requirements
    c. Components of a Hazard Mitigation Plan
    d. Role/Importance of public input

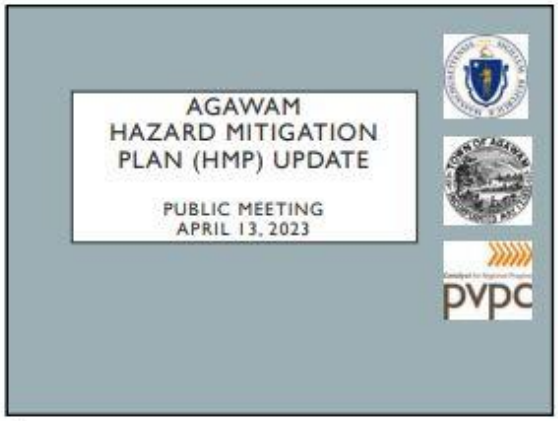
2. Question and Comment Period
3. Brief overview of next steps

Agawam Hazard Mitigation Plan Committee
Public Meeting #1

Agawam DPW, 1000 Suffield Street
April 13, 2023, 11 am – 12 pm

Name	Signature
Edward Cecchi	
Jennifer Gannett	
CHESTER J. NICORA, JR	
Mimi Kaplan, PVPC	

Public Meeting Presentation:



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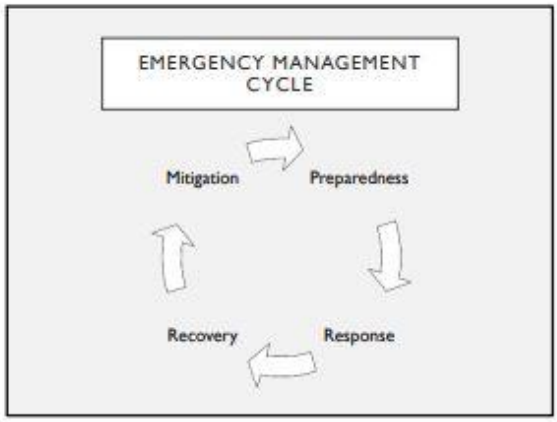

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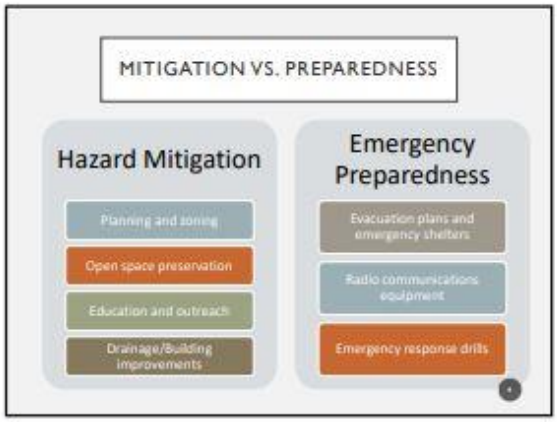

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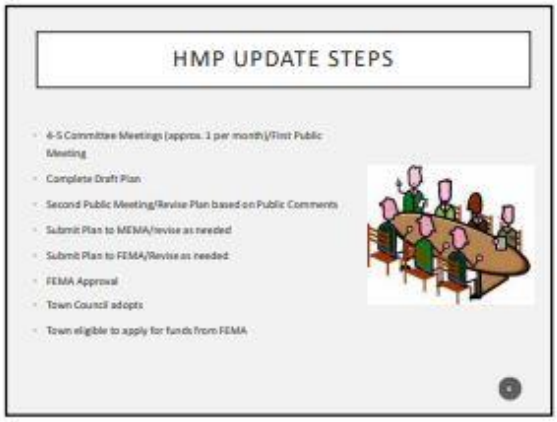

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PARTICIPANTS

Town

- Chet Nicora, EMD
- William Sapelli, Mayor
- Jennifer Gannett, Mayor's Chief of Staff
- Mario Mazza, DPW Superintendent
- Michelle Chase, Town Engineer
- Alan Sirois, Fire Chief
- Eric Gillis, Police Chief
- Michael Theroux, Health Agent
- Kevin Duquette, Building Inspector
- Michael Squindo, Executive Director, COA
- Michael Nicora, Deputy Director, Emergency Mngmt

Other

- Consultant-Pioneer Valley Planning Commission
- General public via public meetings

7

COMPONENTS OF A HAZARD MITIGATION PLAN

- Hazard identification
- Analysis of vulnerabilities – how hazards impact buildings, property, and residents, especially vulnerable populations
- Identification/mapping of critical infrastructure
- Existing mitigation capabilities
- Existing and new mitigation strategies
- Schedule for implementation of mitigation strategies

8

NATURAL HAZARD ASSESSMENT 2016 HMP

Hazard Identification and Analysis Worksheet for Agawam				
Type of Hazard	Location of Occurrence	Probability of Future Events	Impact	Vulnerability
Flooding	Medium	Moderate	Critical	2 – High Risk
Severe Snowstorms / Ice storms	Large	High	Critical	1 – Very High Risk
Hurricanes / Tropical Storms	Large Large	Low Moderate	Critical Critical	2 – High Risk 3 – High Risk
Severe Thunderstorms / Wind / Tornadoes/Microbursts	Small	High	Critical	3 – Medium Risk
Wildfires / Brushfires	Small	Very Low	Minor	4 – Low Risk
Earthquakes	Large	Low	Catastrophic	4 – Low Risk
Dam Failures	Medium	Low	Critical	3 – Medium Risk
Drought	Large	Moderate	Minor	4 – Low Risk

9

INVENTORY OF 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.
- **The following are identified as critical facilities and services, and populations to protect:**
  - Police, Fire
  - DPW, Water and Sewer
  - Roads, bridges/culverts
  - Access to Power
  - Communications
  - Historic Buildings and Sites
  - Vital records
  - Evacuation Routes
  - Vulnerable Populations (elderly, disabled, special needs)

10

EXISTING MITIGATION CAPABILITIES

- Zoning Ordinance, Bylaws, Codes
  - Floodplain District, Open Space Residential Development, Stormwater Regulations, design standards, etc.
  - State Building code
- Existing plans: CEMP, OSRP
- NFIP enrollment
- Burn Permit Requirement
- Cooling/Heating Center
- Tree Management
- Fire Safety Education
- Emergency Communication

11

EXISTING MITIGATION STRATEGIES – HIGH PRIORITY

Previously Identified and New Strategies Prioritized by the Town of Agawam									
Mitigation Action	Status	Action Type	Description	Hazards Mitigated	Responsible Entity	Timeframe (from when funding becomes available)	Funding Source	Cost	Priority
New - Culvert replacements	[illegible]	Capital construction	[illegible]	Flooding, Hurricanes	DPW, Conservation Commission, Private	[illegible]	HMGP	High	Very High
New - Relocate sewer line and stabilize slope along Westfield River	[illegible]	Engineering design and implementation	[illegible]	Flooding, Hurricanes, Tropical Storms	DPW, Army Corps of Engineers	[illegible]	[illegible]	High	Very High
Back-up generators	Completed [illegible]	Maintenance	[illegible]	All, except Drought	EMD	[illegible]	Town Staff	N/A	High
Open space planning; promote preservation of floodplains	[illegible]	Planning	[illegible]	Flood, Hurricane	Planning Board, Conservation Commission	[illegible]	Town Staff, State EEA	N/A	High

12


EXISTING MITIGATION STRATEGIES – HIGH PRIORITY

13


PUBLIC COMMENT PERIOD
Please ask any questions or provide comments about the Hazard Mitigation Plan or planning process at this point.

14


THANK YOU!
PLEASE CONTACT ME AT THE EMAIL OR PHONE NUMBER BELOW WITH ANY ADDITIONAL QUESTIONS OR COMMENTS
Mimi Kaplan
Pioneer Valley Planning Commission
mkaplan@pvpc.org
413-285-1188

15

Public Meeting Notification

Catalyst for Regional Progress
PVPC
Kimberly H. Robinson, MUP
Executive Director

MEDIA RELEASE

CONTACT: Mimi Kaplan, PVPC Senior Planner, (413) 285-1188 or mkaplan@pvpc.org

FOR IMMEDIATE RELEASE
April 5, 2023

Town of Agawam to hold Public Engagement Event for Hazard Mitigation Plan Update

Agawam residents, businesses, and surrounding community residents and representatives are invited to learn about and provide input on the Town of Agawam Hazard Mitigation Plan on Thursday, April 13, 2023 at 11 am in the Conference Room at the Agawam Department of Public Works Building, 1000 Suffield Street, Agawam.

The purpose of the Hazard Mitigation Plan is to identify and assess Agawam's natural hazard risks and vulnerabilities, and to determine how to best mitigate these. A mitigation action is any action taken to reduce or eliminate the long-term risk to human life and property from hazards.

The meeting will include an overview of the hazard mitigation planning process, a discussion of natural hazards in Agawam, and the mitigation strategies currently in place. Municipal officials and PVPC staff will be available to answer questions and respond to comments about the project. The meeting provides an opportunity for you to share your opinions and participate in the mitigation planning process. All members of the public, representatives from surrounding communities and other interested parties are welcome to attend the event. Public participation and input is essential!

The plan is being updated by the Town with assistance from the Pioneer Valley Planning Commission and is funded by the Federal Emergency Management Agency (FEMA) and the Massachusetts Emergency Management Agency (MEMA).

Upon completion, the plan will be submitted to MEMA and FEMA for review and approval. A FEMA approved plan makes the community eligible for federal and state mitigation grant funding.

For more information, please contact PVPC's Mimi Kaplan at mkaplan@pvpc.org or (413) 285-1188.

Pioneer Valley Planning Commission 60 Congress Street, Springfield, MA 01104-3419
phone 413.781.6045 fax 413.732.2593 TTY 413.781.7168 www.pvpc.org

Agawam Hazard Mitigation Plan Update Public Meeting Notification

KM

Kaplan, Mimi

To Kaplan, Mimi; Chet Nicora

Bcc 'jdearborn@longmeadow.org'; tdenson@springfieldcityhall.com; ema@southwickma.net; wflaherty@townofwestspringfield.org; steve.malochleb@cityofwestfield.org; jspencer@suffieldct.gov; mwhite@valleyopp.com

Reply | Reply All | Forward

Mon 4/10/2023 9:44 AM

04102023_Agawam Hazard Mitigation Planning Committee HMP Public_.pdf
120 KB

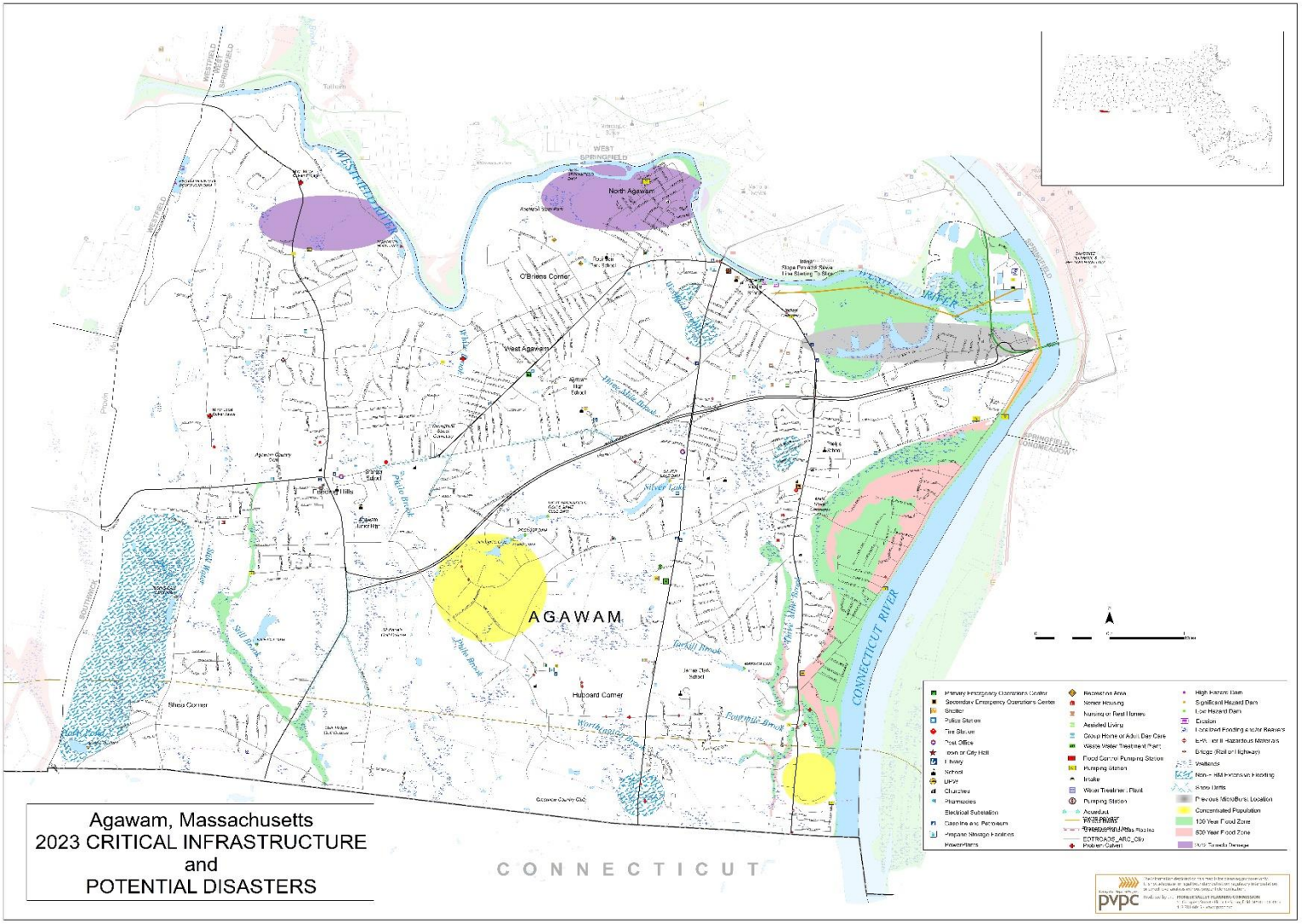
Good morning,

I am assisting the Town of Agawam with the update of their Hazard Mitigation Plan. We will be holding a public meeting on Thursday, April 13 at the Agawam DPW from 11 am – 12 pm to provide an overview of the plan update and to solicit public input on the proposed plan and the planning process. Please see the attached meeting agenda for more information, and feel free to reach out to me with any comments or questions that you have.

Thank you,
Mimi Kaplan

Mimi Kaplan
Senior Land Use and Environment Planner
Pioneer Valley Planning Commission
60 Congress Street – Floor 1
Springfield, MA 01104
413 • 781 • 6045 *main*
413 • 285 • 1188 *direct*
mkaplan@pvpc.org
www.pvpc.org

Appendix D: Hazard Mitigation Map



Appendix E: Mitigation Capabilities Assessment

Worksheet 4.1 Capability Assessment Worksheet

Jurisdiction: ____Agawam_____

Local mitigation capabilities are existing authorities, policies, programs, and resources that reduce hazard impacts or that could be used to implement hazard mitigation activities. Please complete the tables and questions in the worksheet as completely as possible. Complete one worksheet for each jurisdiction.

Planning and Regulatory

Planning and regulatory capabilities are the plans, policies, codes, and ordinances that prevent and reduce the impacts of hazards. Please indicate which of the following your jurisdiction has in place.

Plans	**Yes/No Year**	**Does the plan address hazards? Does the plan identify projects to include in the mitigation strategy? Can the plan be used to implement mitigation actions?**
Comprehensive/Master Plan	Y 1997	Yes, will review
Capital Improvements Plan	Y, every year	Yes, storm drains, water/sewer
Economic Development Plan	Y, 2010	Yes
Local Emergency Operations Plan	Y, last 5 years	Yes
Continuity of Operations Plan	Yes, last 5 years	Part of CEMP, Yes
Transportation Plan	No	
Stormwater Management Plan	Yes	Yes
Community Wildfire Protection Plan	No	
Other special plans (e.g. brownfields, redevelopment, disaster recovery, coastal zone management, climate change adaptation)	Yes	MVP SOF, OSRP - yes

Building Code, Permitting, and Inspections	**Y/N**	**Are codes adequately enforced?**
Building Code	Yes	Yes
Building Code Effectiveness Grading Schedule (BCEGS) Score	?	
Fire Department ISO Rating	Yes	3
Site plan review requirements	Yes	Yes

Land Use Planning & Ordinances	**Y/N**	**Is the ordinance an effective measure for reducing hazard impacts?**

		Is the ordinance adequately administered and enforced?
Zoning Ordinance	Yes	Yes
Subdivision ordinance	Yes	Yes
Floodplain ordinance	Yes	Yes
Natural hazard specific ordinance (stormwater, steep slope, wildfire)		Yes
Flood insurance rate maps	Yes	Recently updated by FEMA but not adopted yet
Acquisition of land use for open space and public recreation uses	Yes	Yes
Other		

How can these capabilities be expanded and improved to reduce risk?

Administrative & Technical

Identify whether your community has the following administrative and technical capabilities. These include staff and their skills and tools that can be used for mitigation planning and to implement specific mitigation actions. For smaller jurisdictions without local staff resources, if there are public resources at the next higher level of government that provide technical assistance, indicate so in your comments.

Administration	Y/N	Describe capability Is coordination effective?
Planning Board	Yes	Yes
Mitigation Planning Committee	Yes	Yes
Maintenance programs to reduce risk (e.g. tree trimming, clearing drainage systems)	Yes	Yes
Mutual aid agreements	Yes	Yes

Staff	Y/N FT/PT	Is staffing adequate to enforce regulations? Is staff trained on hazards and mitigation? Is coordination between agencies and staff effective?
Chief Building Official	Yes, FT	
Floodplain Administrator	Yes	Under Zoning
Emergency Manager	Y, PT	
Community Planner	Y, FT	
Civil Engineer	Y, FT	
GIS Coordinator	N	Have to communicate with Tighe and Bond for GIS, different departments do this. A GIS coordinator is needed
Other		

Technical	Y/N	Describe capability Has capability been used to assess/mitigate risk in the past?
Warning systems/services	Y	Code Red, effective. Need to get more residents signed up.

(Reverse 911, outdoor warning signals)		
Hazard data and information	Y	
Grant writing	Y	Don't have a designated grant writer, but one would be effective. Done through individual departments
Hazus analysis	N	
Other		

How can these capabilities be expanded and improved to reduce risk?
Increase enrollment for CodeRed. Hiring a GIS coordinator for the Town as well as a grant writer (could be shared with another town).

Financial

Identify whether your jurisdiction has access to or is eligible to use the following funding resources for hazard mitigation.

Funding Resource	**Access Eligibility Y/N**	**Has the funding resource been used in the past and for what type of activities? Could the resource be used to fund future mitigation actions?**
Capital Improvements Project funding	Y	Storm drains
Authority to levy taxes for specific purposes	Y	
Fees for water, sewer, gas or electric services	Y	Water and Sewer, permit fees
Impact fees for new development	Not yet	In the works
Storm water utility fee	N	
Incur debt through general obligation bonds and/or special tax bonds	Y	
Community development block grants	Y	
Other federal funding programs	Y	
State funding programs	Y	
Other		

How can these capabilities be expanded and improved to reduce risk?

Education & Outreach

Identify education and outreach programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information.

Program/Organization	**Y/N**	**Describe program/organization and how it relates to disaster resilience and mitigation**

Local citizens groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.		Energy committee, stormwater advisory task force – not active Recycling programs, rain barrels
Ongoing public education or information program (e.g. responsible water use, fire safety, household preparedness, environmental education)	Y	SAFE officers, outreach to schools and seniors, smoke detector programs with Red Cross
Natural disaster or safety related school programs	Y	Safety officer
StormReady certification	Y	Only one of three in western MA
Firewise Communities certification	N	
Public-private partnership initiatives addressing disaster-related issues	Y	Evacuation sites in affiliation with private orgs/additional sites if needed. Red Cross alignments
Other		

How can these capabilities be expanded and improved to reduce risk?