Hopedale Hazard Mitigation Plan

Snowstorm, Police Department in Hopedale, Massachusetts

Adopted by the Select Board DATE

Prepared by the **Central Massachusetts Regional Planning Commission**
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&

Local Hazard Mitigation Team
Town of Hopedale, Massachusetts

< INSERT TOWN LETTERHEAD>

CERTIFICATE OF ADOPTION
SELECT BOARD
TOWN OF HOPEDALE, MASSACHUSETTS

A RESOLUTION ADOPTING THE *HOPEDALE HAZARD MITIGATION PLAN*

WHEREAS, the Town of Hopedale established a Committee to prepare the 2023 update of the *Hopedale Hazard Mitigation Plan*; and

WHEREAS, the updated *Hopedale Hazard Mitigation Plan* contains several potential future projects to mitigate potential impacts from natural hazards in the Town of Hopedale; and

WHEREAS, duly-noticed public meetings were held by the LOCAL HAZARD MITIGATION PLANNING TEAM on April 27, 2022 and September 26, 2022; and

WHEREAS, the Town of Hopedale authorizes responsible departments and/or agencies to execute their responsibilities demonstrated in the plan.

NOW, THEREFORE BE IT RESOLVED that the Town of Hopedale SELECT BOARD adopts the 2023 update of the *Hopedale Hazard Mitigation Plan*, in accordance with M.G.L. 40 or the charter and bylaws of the Town of Hopedale.

ADOPTED AND SIGNED this 27th day of March, 2023.

Name(s)	Glenda A. Hazard	Brian R. Keyes	Bernard J. Stock
Title(s)	Chair	Member	Member
Signature(s)	_____	_____	_____

ACKNOWLEDGEMENTS

This Hazard Mitigation Plan (HMP) update was funded by the Federal Emergency Management Agency (FEMA) via the Massachusetts Emergency Management Agency (MEMA). This report was prepared for the community of Hopedale by the Central Massachusetts Regional Planning Commission (CMRPC).

The Hopedale Select Board extends its thanks to participants in the Local Hazard Mitigation Team for their time and hard work in participating in this timely project. Core Team members include:

Diana Schindler, Former Town Administrator

Mark Giovanella, Police Department, Chief

Chris Nadeau, Highway Department, Superintendent

Thomas Daige, Fire Department, Chief

Tim Watson, Water and Sewer Department, Manager

David Butler, Water and Sewer Department

David Guglielmi, Conservation Commission

Marcia Matthews, Conservation Commission

Stephen Chaplin, Planning Board, Chair

In addition, thanks are extended to the staff of the Central Massachusetts Regional Planning Commission for process facilitation and preparation of this document.

Dani Marini, Associate Environmental Planner

Matthew Franz, GISP, Project Manager

Andrew Loew, Project Manager

Trish Settles, Deputy Director, RCCP

Thanks are also due to the Massachusetts Emergency Management Agency (MEMA) for guidance and feedback regarding this plan.

Contents

Acknowledgements 3

1.0 Introduction 6

1.1 Disaster Mitigation Plan 6
1.2 Plan Purpose 6
1.3 Planning Process 7

2.0 Community Profile and Development Trends 9

2.1 Regional and Community Profile 9
2.2 Development Trends 10

3.0 Critical Facilities and Vulnerable Populations 11

3.1 Critical Facilities Within Hopedale 11
3.2 Category 1 – Emergency Response Facilities 11
3.3 Category 2 – Non-Emergency Response Facilities 14
3.4 Category 3 – Dams 15
3.5 Category 4 – Facilities/Populations to Protect 16

4.0 HAZARD PROFILES, RISK ASSESSMENT & VULNERABILITIES 21

4.1 State-wide Overview of Hazards 21
4.2 Natural Hazard Identification and Analysis 22
4.3 Flooding 26
4.4 Severe Snowstorms / Ice Storms / Nor'easters 31
4.5 Hurricanes 35
4.6 Severe Thunderstorms / Wind / Tornado 41
4.7 Wildfires / Bush Fires 47
4.8 Earthquakes 52
4.9 Dam Failure 58
4.10 Drought 61
4.11 Extreme Temperatures 66
4.12 Other Hazards 71

5.0 EXISTING PROTECTION 72

5.1 Existing Protection Matrix 73

6.0 Status of Mitigation Measures From 2017 Plan 76

7.0 MITIGATION STRATEGY 81

7.1 Objective 81
7.2 Priority 81
7.3 Estimated Cost 82
7.4 Timeline 82
7.5 Strategy Types 83
7.6 Town of Hopedale 2023 Hazard Mitigation Strategies 84

8.0 PLAN ADOPTION, IMPLEMENTATION, AND MAINTENANCE 93

8.1 Plan Adoption 93

8.2 Plan Implementation 93
8.3 Plan Monitoring and Evaluation 94
8.4 Potential Federal and State Funding Sources 95

1.0 INTRODUCTION

1.1 DISASTER MITIGATION PLAN

Congress enacted the Disaster Mitigation Act of 2000 (DMA 2000) on October 10, 2000. Also known as the Stafford Act Amendments, the bill was signed into law by President Clinton on October 30, 2000, creating Public Law 106-390. The law established a national program for pre-disaster mitigation and streamlined the federal administration of disaster relief. Specific rules on the implementation of DMA 2000 were published in the Federal Register in February 2002 and required that all communities must have a Hazard Mitigation Plan in place in order to qualify for future federal disaster mitigation grants following a Presidential disaster declaration. The Hazard Mitigation Plan emphasizes measures that can be taken to reduce or prevent future disaster damage caused by natural hazards. In the context of natural hazard planning, Pre-Disaster Mitigation refers to any action that permanently reduces or eliminates long-term risks to human life and property.

1.2 PLAN PURPOSE

This plan identifies the natural hazards facing the Town of Hopedale, assesses the vulnerabilities of the area's critical facilities, infrastructure, residents, and businesses, and presents recommendations to mitigate the adverse effects of typical natural hazards.

New England weather is renowned for its mercurial and dramatic nature. Late summer hurricanes, major winter blizzards, and summer droughts are all part of the climatic atmosphere in Central Massachusetts. These occur frequently enough to be familiar scenes to residents of Hopedale. The intersection of these natural hazards with the built environment can transition these routine events into classified natural disasters. In addition, as climate change continues to progress, the severity and frequency of hazard risk will increase.

This planning effort has drawn on the knowledge of local municipal officials and residents. The recommendations presented in the following report are intended to be realistic and practical steps for mitigating natural hazards and preparing the community as best as possible for the effects of climate change. Implementation of these actions will translate into savings – fewer lives lost, less property destroyed, and less disruption to essential services and ecological systems.

1.3 Planning Process

This Plan is funded through a Fiscal Year 2019 Pre-Disaster Mitigation grant to the Town of Hopedale from the Federal Emergency Management Agency (FEMA) through the Massachusetts Emergency Management Agency (MEMA).

The planning process in Hopedale was composed of two distinct but related phases: 1.) data collection and technical review, and 2.) public input and planning. Identification of natural hazards impacting the Town of Hopedale was accomplished through review of available information from various sources. These included federal and state reports and datasets, existing plans, and in some cases engineering documents. An assessment of risks and vulnerabilities was performed primarily using geographic information systems (GIS) to identify the infrastructure (critical facilities, public buildings, roads, homes, businesses, etc.) at the highest risk for being damaged by hazards, particularly flooding. Local knowledge as imparted by Town officials, staff, emergency management volunteers and others was a critical element of this phase.

The second phase of the process was focused on outreach, public participation and input, and planning. This phase was critical to ensuring awareness of the planning process among a wide range of local officials, coordinating plan elements with other sectors of the community, and providing opportunities for public comment and input from a representative base of residents and other stakeholders in Hopedale. Through this engagement, CMRPC was better able to gauge community priorities for mitigation and to understand local resources and existing policies and procedures. With this information in hand, the planning team was able to develop an informed list of mitigation strategies for the Town.

The Hazard Mitigation Planning team contained a group of local staff and volunteers including:

Diana Schindler, Former Town Administrator

Mark Giovanella, Police Department, Chief

Chris Nadeau, Highway Department, Superintendent

Thomas Daige, Fire Department, Chief

Tim Watson, Water and Sewer Department, Manager

David Butler, Water and Sewer Department

David Guglielmi, Conservation Commission

Marcia Matthews, Conservation Commission

Stephen Chaplin, Planning Board, Chair

To discuss hazard areas, critical infrastructure and other assets, and plan priorities and strategies, the Hazard Mitigation Planning team met eight times on November 5, 2021, December 22, 2021, January 28, 2022, February 25, 2022, March 18, 2022, April 15, 2022, July 15, 2022, and August 2, 2022. Between meetings and during development of the draft and final plans, information and comments were shared among the local team and CMRPC. On January 14, 2022, the Hazard Mitigation Planning team launched a public survey to gauge residents' concerns about and experiences with natural hazards in Town. The survey was distributed on the Town's website and social media pages, was emailed to Town Department Heads and Board Members, and flyers were distributed around Town. Despite publicity on the Town's website, only a total of thirty-one responses were collected. Survey responses were discussed by the local planning team at its

February 2022 meeting and helped inform the development and prioritization of mitigation strategies. The local planning team and CMRPC held a public forum on April 27, 2022 from 6:00 – 8:00 pm to discuss the overall planning effort and to highlight best practices in mitigation efforts and policies. Representatives from the surrounding communities of Milford, Mendon, Upton, and Bellingham were invited to participate in the survey and public forum to gather input from surrounding communities who might have shared interests or concerns. As planning activities progressed, a public presentation was made by CMRPC and the local planning team on September 26, 2022, at a Hopedale Select Board meeting to provide a summary of key aspects of the draft Plan report then being finalized. The presentation was televised on the local cable access channel and the opportunity for public comment was emphasized. Materials and notes from the presentation and subsequent public discussion are included in the appendix. A full draft Plan was provided to the Town for distribution and made available online at CMRPC's website for public comment for two weeks starting on September 26, 2022. In addition, the final draft Plan was distributed to officials in all neighboring communities for review and input regarding shared hazards. No additional feedback was provided during the public forum or the public comment period.

The final draft Plan was submitted to MEMA for review on DATE, and was then relayed to FEMA for federal review. After receipt of FEMA's revisions on DATE, the plan was formally adopted by vote of the Board at the DATE meeting of the Select Board.

The Hopedale Planning Board is the primary Town agency responsible for regulating development in town. Feedback to the Planning Board was ensured through the participation of the Town Administrator on the local hazard planning team. In addition, CMRPC, the State-designated regional planning authority for Hopedale, works with all agencies that regulate development in its region, including the municipal entities listed above and state agencies, such as Department of Conservation and Recreation and MassDOT. This regular involvement ensured that during the development of the Hopedale Hazard Mitigation Plan, the operational policies and any mitigation strategies or identified hazards from these entities were incorporated.

2.0 Community Profile and Development Trends

2.1 Regional and Community Profile

The Central Massachusetts Regional Planning Commission (CMPRC) region occupies roughly 1,000 square miles in the southern two-thirds of Worcester County, Massachusetts. The area surrounds the City of Worcester, which is the second-largest city in Massachusetts and New England, with a population of 206,518 according to the 2020 United States Census. Nearly 588,141 people live in the CMRPC Region, of whom 6,309 reside in Hopedale.

The CMRPC area is framed on the west by the Central Massachusetts uplands, on the south by Rhode Island and Connecticut, on the east by the Boston metropolitan area, and on the north by the Montachusett region in northern Worcester County. The forty-community region has been divided for planning purposes into six sub-regions, determined by shared characteristics and roadway corridors. Hopedale is located in the Southeast sub-region consisting of 11 towns lying within the Blackstone River valley, including: Blackstone, Douglas, Grafton, Hopedale, Mendon, Millbury, Millville, Northbridge, Sutton, Upton, and Uxbridge.

Massachusetts has a humid continental climate, with maritime influences increasing from northwest to southeast. According to the National Oceanic and Atmospheric Association's National Weather Service, between 2000 and 2021, nearby Worcester saw monthly mean temperatures ranging from 20.7 degrees in January to 78.7 in July. Precipitation is relatively high at 49.38 inches annually, including 73.9 inches of snowfall. Some 30 miles from the Atlantic coast, Hopedale and its neighboring communities are subject to a variety of severe weather, including hurricanes, nor'easters, thunderstorms, and blizzards.

The Town of Hopedale, Massachusetts was incorporated in 1886. Hopedale is located between Route 146 to the west and I-495 to the east. The Town itself has Routes 140 and 16 running through it. Historically, Hopedale was a mill village of regional significance. Today, its employment base is still healthy: in 2010, Hopedale employed 1,584 people. Also, Route 140 has seen increases in commercial development as of late. Hopedale is considered a small bedroom community. Hopedale is bordered by Milford to the north, Upton to the west, Mendon to the south, and Bellingham to the east.

Hopedale has a total area of 5.3 square miles and a population of 6,017 (2020 US Census). Hopedale's population is projected to continue growing; according to the Central Massachusetts Regional Planning Commission's (CMRPC) Long Range Transportation Plan, Mobility 2040. Over the next 25 years, the Town of Hopedale is expected to grow 15%, reaching 6,309 residents. The number of residents grew 31% from 1980 to 1990, but this population boom slowed and only grew 6% between 1990 and 2020. Hopedale is a largely white community, with some 95.6% of residents identifying within that group. About 1.7% of residents identify as having Latino or Hispanic origins. According to the 2020 American Community Survey 5-year estimates, 24.8% of the population is under 18 years old, while 16.8% of the population is 65 years and over.

The median age in Town is 47.0 years old, which is comparatively higher than the State's median age at 39.9. At $108,611, median household annual income is somewhat higher than the State at $89,645 and Worcester County $84,952. The poverty rate is 5.2%, about half of the State's and Worcester County's rates at 10.4% and 10.0% respectively. With a median value of owner-occupied housing units at $354,600, housing costs in Town are relatively lower compared to the State at $398,800, and relatively higher compared to Worcester County at $295,300. According to 2020 ACS 5-year estimates, 69.3% of occupied homes are detached or semi-detached single-

family homes, and 30.7% are multi-unit structures. With a 2.9% vacancy rate, vacancies in Hopedale are relatively lower than the State and Worcester County with 8.3% and 5.7% vacancy rates respectively. Most homes are relatively new, with 47.3% built before 1940.

2.2 Development Trends

Town of Hopedale Development Projects between 2018 - 2023

Name	Status	Year	Housing Units	Commercial SQ Feet	Project Type
138 Hopedale Street	Projected	TBD		7,000	Commercial/Office
11 Rosenfeld Drive	Completed	2020		14,000	Commercial/Industrial
Laurelwood Condominiums	Completed	2020	8		Residential
57 Mill Street	Completed	2020	1		Residential
18 Steele Road	Completed	2020	1		Residential
47 Mellen	Construction	TBD	2		Residential
140 Hartford Ave	Completed	2022		4,522	Commercial
336R South Main Street	Completed	2022	1		Residential
333 South Main Street	Construction	2023		11,250	Commercial/Industrial
Hopedale Ridge	Projected	TBD	10		Residential

Town of Hopedale Potential Future Development

Name	Status	Year	Housing Units	Commercial SQ Feet	Project Type
Hopedale Ridge	Planning Board	TBD	10		Residential
75 Plain Street	ZBA	2023		600,000	Commercial/Industrial
Hopedale Center	Planning	TBD	300+	TBD	Mix-use
364 West Street	Litigation	TBD		TBD	Commercial/Industrial

The majority of the Town of Hopedale is built out with very little room for future development. In the table above is a list of future developments the Town may see soon. 75 Plain Street will consist of tearing down an old cement making facility and construction of a 600,000 square foot commercial building. This project is believed to improve Hopedale's vulnerability as it will remedy site contamination as well as increase ground water recharge with the site's new stormwater plan. This sight borders Hopedale's largest municipal drinking water producing wellfield site. Hopedale Center is a project that involved demolishing a 1,000,000 square foot old textile mill with plans to create a mix-use area of both housing and commercial buildings. As it stands now, demolishing the old mill improved Hopedale's resilience by reducing large fire hazard which had no fire suppression system. Lastly, 364 West Street is planned to

provide over 20 mega warehouses with access to rail. This has impaired Hopedale resilience as to complete this project, 155 acres of forestland was cleared bordering the Mill River, Hopedale Pond, and is upgradient of municipal drinking water sources. This may impair groundwater recharge, lead contamination as well as flooding.

3.0 Critical Facilities and Vulnerable Populations

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

3.1 Critical Facilities Within Hopedale

The Critical Facilities List for the Town of Hopedale has been identified utilizing several sources, and the knowledge and expertise of the team:

- Hopedale's Comprehensive Emergency Management Plan
- MassGIS data
- Critical infrastructure mapping undertaken by CMRPC under contract with the Central Region Homeland Security Advisory Council, which is charged by the Executive Office of Public Safety and Security to administer and coordinate the State Homeland Security Grant for central Massachusetts.

Hopedale's Hazard Mitigation Team has broken up this list of facilities into four categories:

- Emergency Response Facilities needed in the event of a disaster
- Non-Emergency Response Facilities that have been identified by the Team as non-essential. These are not required in an emergency response event, but are considered essential for the everyday operation of Hopedale
- Dams
- Facilities/Populations that the Team wishes to protect in the event of a disaster

Critical infrastructure and facilities are mapped in Appendix A.

3.2 Category 1 – Emergency Response Facilities

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

Type	Name	Address	Details	Has Emergency Generator?
Emergency Operations Center/Police Station	Hopedale Police Department/EOC	70 Hopedale Street	The Police Department is in need of an upgraded roof. Ice dams and other issues cause leaking in the building, creating water damage.	Yes, the Police Department has a 20-year-old generator. It is serviced twice a year.
Fire Station	Fire Station	40 Dutcher Street	This facility has a backup radio system.	Yes
	EOC (basement of Fire Department)			
Communications Facilities	Radio Repeater/Antenna - Hopedale Water Treatment Site	212 Hopedale Street	This facility is vulnerable to severe storms, high wind, and lightning.	Yes
	Radio Repeater/Antenna - Memorial School	6 Prospect Street	This facility is vulnerable to severe storms, high wind, and lightning.	
	Radio Repeater/Antenna - Water Tank/Tower	Williams Street	This facility is vulnerable to severe storms, high wind, and lightning.	
	Antenna - Ice Rink	121 Plain Street	This facility is vulnerable to severe storms, high wind, and lightning.	
	Repeater - Police Department Attic	70 Hopedale Street	This facility was moved from Williams Street due to issues with loss of power at Williams Street. This facility is vulnerable to severe storms, high wind, and lightning.	Yes
Highway Department	Highway Department	7 Depot Street	The main barn at the Highway Department has 6 bays, and the mechanics garage has 5 bays. There are issues with flooding as the facility is close to the Mill River. The underground fuel tanks are also vulnerable to flooding. The main barn is very old, built around 1948, and is a brick and wood structure.	Yes, the Highway Department has a 25-year-old generator. This generator runs both of the Highway barns and Town fuel system.

	Salt Shed	4 Depot Street	The salt barn is vulnerable to flooding, over 30 years old, and is in rough shape. The side of the salt shed contains the Town Hall's old heating plant and used to store the boiler. This building is not functionable and has rusted metal.	
Emergency Shelters	Hopedale Junior/Senior High School	25 Adin Street		No
	Hopedale Memorial School	6 Prospect Street		Yes, Hopedale Memorial School has a generator. It only runs about 30% of the required items needed for a shelter (heat and some electricity). There are no food preparation areas.
	Senior Center/Community House	53 Hope Street	This facility could store people but there are no plans to certify as a Red Cross Shelter.	There are plans to install a generator.
	Hopedale Gymnasium	13 Dutcher Street	This facility has a large space and could be used for daytime summer hazard risks.	No
	Kingdom Hall	120 Plain Street	This facility could be used as a shelter for up to 12 hours. It is not a certified Red Cross Shelter.	No
	Unitarian Church	65 Hopedale Street	This facility could be used as a shelter for up to 12 hours. It is not a certified Red Cross Shelter.	No
	Sacred Heart Church	187 Hopedale Street	This facility could be used as a shelter for up to 12 hours. It is not a certified Red Cross Shelter.	No
	Union Evangelist	25 Dutcher Street	This facility could be used as a shelter for up to 12 hours. It is not a certified Red Cross Shelter.	No

Primary Evacuation Routes	Route 140	Route 140	The West Street Bridge along Route 140 is vulnerable to flooding. It is located in the 100-year flood zone and essentially functions as a culvert.	N/A
	Route 16	Route 16	The Mendon Street Bridge along Route 16 is vulnerable to flooding. Portions of the evacuation route fall within the flood zone.	N/A
Secondary Evacuation Routes	Hopedale Street	Hopedale Street	From Hopedale Street to Freedom Street/Route 16 is a secondary access point.	N/A
	Freedom Street	Freedom Street	The bridge along Freedom Street is located within the 100-year flood zone. The Mill River runs near Freedom Street, creating flooding issues. The culvert that runs from the Cemetery to the Mill River is collapsing.	N/A
	Green Street	Green Street	There are no noteworthy concerns along Green Street.	N/A
	Mill Street	Mill Street	Mill Street and the bridge are located within the 100-year flood zone, making this route vulnerable to flooding.	N/A
	Plain Street	Plain Street	There are no noteworthy concerns along Plain Street.	N/A
	Mellen Street	Mellen Street	Mellen Street has been closed for over 25 years. The street is impassible, and the Charles River flows under the bridge here.	N/A

3.3 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 Hopedale.

Type	Name	Address	Details	Has Emergency Generator?
Water Supply	Hopedale Water Treatment Facility	208 Hopedale Street	Well sites are vulnerable to flooding.	Yes
	Water Tower/Tank	11 Williams Street	This facility is vulnerable to severe storms.	No
	Mill Street Well Field and Pump Station	Mill Street near the Mill River	Well sites are vulnerable to flooding.	Not Sure
Sewer	Hopedale Wastewater Treatment Facility	154 Mendon Street	This facility is vulnerable to flooding. If it were to flood, waste would go into the Mill River.	Yes
	Milford Wastewater Treatment Facility	230 South Main Street	This facility is vulnerable to severe storms.	Yes
Town Facilities	Hopedale Town Hall	78 Hopedale Street	The Town Hall has some flooding at the street side basement level. The building was donated in the late 1800s, and has had some upgrades and improvements, but no overhaul of the building.	No
Utilities	National Grid Regional Facility	245 South Main Street	This is not a Town-owned or managed facility.	Not Sure
	Tennessee Gas Pipeline	Freedom Street Lapworth Circle Neckhill Road	This is not a Town-owned or managed facility.	Not Sure
	Grafton-Upton Railway	Freedom Street	This is not a Town-owned or managed facility. It runs through an area of high slope.	Not Sure
	CSX Railway	Mellen Street Howard Street	This is not a Town-owned or managed facility. It runs through the 100-year flood zone.	Not Sure

3.4 Category 3 – Dams

The third category is a listing of dams in Hopedale.

National ID	Dam Name	Owner	Regulatory Authority	Hazard Code	Notes
MA00624	Hopedale Pond Dam	Private	Office of Dam Safety	Significant Hazard	It is unclear if the responsibility of this dam falls to the Town. This dam was extensively repaired in 2010, and the Town paid for those repairs. This dam is located opposite of the Factory Pond Dam and these two

					systems should be repaired to function better.
MA00625	Mill Pond Dam	Private	Office of Dam Safety	Significant Hazard	This dam was not listed in the 2017 HMP.
MA00936	Spindleville Pond Dam	Town of Hopedale	Office of Dam Safety	Significant Hazard	This dam was rebuilt 10 years ago by the Commonwealth.
MA02790	Factory Pond Dam	Private	Non-Jurisdictional - Other	N/A	This dam is in the process of being repaired. It is located opposite of the Hopedale Pond Dam, and repairs should be made to help these two systems function better together. This dam was not listed in the 2017 HMP.

For additional information on dams and the dam failure hazard in Hopedale, also see Chapter 4.

3.5 Category 4 – Facilities/Populations to Protect

Type	Name	Address	Details
Special Needs Population/ Elderly Housing/ Assisted Living	Hopedale Housing Authority	Hopedale Street	This facility has emergency generators in half of their buildings. It is located near Route 16 and is in a low-lying area.
	Atria Draper Assisted Living	25 Hopedale Street	This facility has an emergency generator. Many residents at this facility would need assistance in the event of evacuation.
Public Buildings/Areas	Bancroft Memorial Library	50 Hopedale Street	The library roof was recently replaced. There is a historic statue at the library that is still at risk and is protected under a tent.

	Hopedale Senior Center/ Community House	43 Hope Street	The building seems to be in good condition, but the heating plant is old and makes a lot of noise. The building is also within 100 yards of a flood zone on Bellingham Street.
Schools/Daycares	Hopedale Junior/Senior High School	25 Adin Street	This facility does not contain a generator.
	Hopedale Memorial School	6 Prospect Street	This facility does contain a generator, though it only powers about 30% of the building.
	Just-A-Wee-Day-Care Center	138 Hartford Avenue	There are no noteworthy concerns regarding this facility.
	Luv-N Care of Hopedale	191 Dutcher Street	There are no noteworthy concerns regarding this facility.
	Young at Heart Learning Center	286 South Main Street	There are no noteworthy concerns regarding this facility.
	Steppingstones Children Center	391 South Main Street	There are no noteworthy concerns regarding this facility.
	Reddock, Pamela	11 Bancroft Park	There are no noteworthy concerns regarding this facility.
	Hagopian, Pamela	53 Mellen Street	There are no noteworthy concerns regarding this facility.
	Lescoe-Wilson, Vivien L.	180 South Main Street	There are no noteworthy concerns regarding this facility.
	Howley, Danielle T.	2 Steel Road	There are no noteworthy concerns regarding this facility.
	Suszanska, Dorothy	12 Moore Road	There are no noteworthy concerns regarding this facility.
	Hamel, Tina L.	9 Soward Street	There are no noteworthy concerns regarding this facility.
	Murphy, Dana	32 Westcott Road	There are no noteworthy concerns regarding this facility.
	Luchini, Diane P.	6 Spruce Street	There are no noteworthy concerns regarding this facility.
	Ozella, Deborah	319 South Main Street	There are no noteworthy concerns regarding this facility.

	Ingraham, Anne	20 Driftway Street	There are no noteworthy concerns regarding this facility.
Historic Buildings/Sites	According to the Massachusetts Cultural Resources Information System (MACRIS) online database accessed in January 2022, there are 13 Areas, 625 Buildings, 2 Burial Grounds, 8 Objects, and 14 Structures listed for Hopedale. The Bancroft Memorial Library Statue was noted as a vulnerable, significant historic structure in need of protection. The local planning team also noted that the Community Meeting House, a historic building, is up for sale. Most historic buildings, and several of the historic areas in Hopedale lie within regulated or locally identified flood areas.		

Employment Centers

Based on data obtained from the Massachusetts Executive Office of Labor and Workforce Development (EOLWD), the following table shows the largest employers in Hopedale:

Company name	Address	Number of Employees	NAICS Code
National Grid	S Main St	250-499	2211
Hopedale Public Schools	Adin St	100-249	6111
Jehovah's Witnesses	Plain St	100-249	8131
Memorial Elementary School	Prospect St	100-249	6111
Braun's Express Inc	Tandem Way	50-99	4842
Front Line	Mellen St	50-99	2361
Hopedale Junior Senior High	Adin St	50-99	6111

Ambro Adjustment	Business Way # A	20-49	5191
Automation Consulting Svc Inc	Jones Rd	20-49	5415
Bright Beginnings Ctr	Park St	20-49	6244
D C Bates Equipment Co Inc	Airport Rd	20-49	4238
Draper Place	Hopedale St	20-49	6233
East Care Ambulance	Charlesview Rd	20-49	6219
Expose Signs	Landing Ln	20-49	3399
Hopedale Fire Dept	Dutcher St	20-49	9221
Just A Wee Day Schools	Hartford Ave	20-49	6244
Kelley & Ryan Assoc	Airport Rd	20-49	5412
Ledges School	Adin St	20-49	6239
Lung Allergy & Sleep Specialists	Mendon St	20-49	6219
Phoenix Metallurgical Inc	Airport Rd	20-49	3322
REC Manufacturing Corp	Mellen St	20-49	3335
SE Shires Co	Spaceway Ln	20-49	3399
Sodexo	Rosenfeld Dr	20-49	4543
Year Up	Neck Hill Rd	20-49	6115

Environmental Justice and Vulnerable Populations

The Massachusetts Executive Office of Energy and Environmental Affairs (EEA) Environmental Justice policy sets the state's office definition for Environmental Justice areas. The policy states that EJ populations are those segments of the population that EEA has determined to be most at risk of being unaware of or unable to participate in environmental decision-making or to gain access to state environmental resources or are especially vulnerable. They are defined as neighborhoods (U.S. Census Bureau census block group data for minority criteria, and American Community Survey (ACS) data for state median income and English isolation criteria) that meet one or more of the following criteria:

- The annual median household income is not more than 65% of the statewide annual median household income;
- Minorities comprise 40 % or more of the population;
- 25 % or more of households lack English language proficiency; or
- Minorities comprise 25 % or more of the population and the annual median household income of the municipality in which the neighborhood is located does not exceed 150 % of the statewide annual median household income.

According to the EEA, there is not an Environmental Justice population in Hopedale. Though there are no Environmental Justice populations in Hopedale, it is still important for the Town to consider these and other vulnerable populations. In Hopedale, 24.8% of the population is under the age of 18 and 16.8% of the population is 65 years and over. About 5.1% of the population speaks a language other than English at home. Approximately 16.2% of the population has a disability, and of that, 9.9% are under the age of 65. Those without health insurance account for about 6.2% of Hopedale's population. And about 5.2% of the population is in poverty.

4.0 HAZARD PROFILES, RISK ASSESSMENT & VULNERABILITIES

The following section includes a summary of natural hazards that have affected or could affect Hopedale in the future. Natural hazards are weather, climate, or environmental threats to lives, property, or other valuable assets to human society. By examining historical data on natural hazard occurrences, and future projections of how climate change will interact with natural hazards, it is possible to approximate the future risk of natural hazards. Historical research, discussions with local officials and emergency management personnel, available hazard mapping and other weather-related databases were used to develop this list.

The most significant identified hazards are the following:

- Flooding
- Severe Snowstorms / Ice storms/ Nor'easters
- Hurricanes
- Severe Thunderstorms / Wind / Tornadoes
- Wildfires / Brushfires
- Earthquakes
- Dam failure
- Drought
- Extreme Temperatures
- Other hazards

4.1 STATE-WIDE OVERVIEW OF HAZARDS

4.1.1 MASSACHUSETTS STATE HAZARD MITIGATION AND CLIMATE ADAPTATION

The state of Massachusetts and Governor Baker's administration has instituted the State Hazard Mitigation and Climate Adaptation Plan (SHMCAP) through Executive Order 569. This plan outlines how the state of Massachusetts must prepare strategies to prevent, respond, and mitigate natural hazards.[1] The plan is the first of its kind to incorporate climate change adaptations into the mitigation plan. The plan also makes Massachusetts eligible for federal disaster recovery and hazard mitigation. The plan is effective under FEMA from September 19, 2018, to September 18, 2023. The Massachusetts SHMCAP is a useful model for incorporating climate change interactions into the natural hazard mitigation planning process.

4.1.2 CLIMATE CHANGE INTERACTIONS

The State Hazard Mitigation and Climate Adaptation Plan (SHMCAP) outlines four major climate change interactions that influence natural hazards in Massachusetts. These four interactions are described as follows on pg.3-4 of the Massachusetts SHMCAP:

1. Changes in precipitation: Changes in the amount, frequency, and timing of precipitation—including both rainfall and snowfall—are occurring across the globe as temperatures rise

[1] https://resilientma.org/shmcap-portal/index.html

and other climate patterns shift in response.

2. Sea level rise: Climate change will drive rising sea levels, and rising seas will have wide-ranging impacts on communities, natural resources, and infrastructure along the Commonwealth's 1,519 tidal shoreline miles.
3. Rising temperatures: Average global temperatures have risen steadily in the last 50 years, and scientists warn that the trend will continue unless greenhouse gas emissions are significantly reduced. The 9 warmest years on record all occurred in the last 20 years (2017, 2016, 2015, 2014, 2013, 2010, 2009, 2005, and 1998), according to the U.S. National Oceanographic and Atmospheric Administration (NOAA).
4. Extreme weather: Climate change is expected to increase extreme weather events across the globe, as well as right here in Massachusetts. There is strong evidence that storms—from heavy downpours and blizzards to tropical cyclones and hurricanes—are becoming more intense and damaging and can lead to devastating impacts for residents across the state.

4.2 Natural Hazard Identification and Analysis

This section examines the hazards in the Massachusetts SHMCAP which are identified as likely to affect Hopedale. The 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.

4.2.1 Hazard Description

The natural hazards identified for Hopedale are: Flooding, Severe snowstorms / Ice storms / Nor'easters, Hurricanes, Severe thunderstorms / Wind / Tornadoes, Wildfire / Brushfire, Earthquakes, Dam Failure, Drought, and Extreme Temperatures. Many of these hazards result in similar impacts to a community. For example, hurricanes, tornadoes and severe snowstorms may cause wind-related damage.

4.2.2 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:

Table 1: Percentage of Town Impacted by Natural Hazard

Land Area Affected by 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

4.2.3 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.

4.2.4 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, state-wide, or regional level.

4.2.5 Probability of Future Events

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

Table 2: 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

4.2.6 Impact

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

Table 3: 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 on quality of life. Temporary shutdown of facilities.

4.2.7 Potential Climate Change Effects

Each natural hazard is influenced by one or more of the climate change interactions listed in Section 4.1.2 Climate Change Interactions. Climate change interactions can modify the location, extent, and probability of future events depending on the hazard. The section of the hazard risk assessment lists climate change interactions as described by the 2018 State Hazard Mitigation and Climate Adaptation Plan (SHMCAP).

4.2.8 Vulnerability

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 – Highest risk

2 – High risk

3 – Medium risk

4 – Low risk

5 – Lowest risk

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

Type of Hazard	Location of Occurrence	Probability of Future Events	Impact	Potential Climate Change Effects	Hazard Risk Index Rating

Flooding	Small	Moderate	Minor	Increase extent; increase probability	3
Severe Snowstorms / Ice Storms/ Nor'easter	Large	Very High	Limited	Increase extent	2
Hurricanes	Large	Low	Limited	Increase extent; increase probability	3
Severe Thunderstorms/Wind	Small	Moderate	Minor	Unclear	2
Tornadoes	Small	Very Low	Limited	Unclear	4
Wildfire / Brushfire	Small	Moderate	Minor	Increase extent; increase probability	4
Earthquakes	Large	Very Low	Minor	None	5
Dam Failure	Small	Very Low	Limited	Indirect effects related to flooding	4
Drought	Large	Very Low	Minor	Increase extent; increase probability	4
Extreme Temperatures	Large	Moderate	Limited	Increase in average temperature; increase in probability of extreme heat	4

Source: based on Massachusetts State Hazard Mitigation Plan, 2013; modified to reflect conditions in Hopedale.

4.3 FLOODING

Flooding was one of the most prevalent natural hazards identified by local officials in Hopedale. Flooding is generally caused by hurricanes, nor'easters, severe rainstorms, and thunderstorms. Global climate change has the potential to exacerbate these issues over time with the potential for more severe and frequent storm and rainfall events. There are several different types of flood hazards – from stormwater inundation and poor drainage infrastructure to riverine flooding and storm surges to dam failures. Riverine and stormwater flooding both occur in Hopedale, though stormwater flooding is more common. Riverine flooding occurs when the surge of water comes from the top of streams, ponds, and rivers. Stormwater flooding occurs when the amount of precipitation in a storm is greater than the volume that the stormwater management system can handle.

LOCATION

Flooding and flood-prone areas in Hopedale are closely associated to the Hopedale Pond, Spindleville Pond, and the courses of the Mill River and Charles River. According to a GIS analysis performed by CMRPC, there are 8 parcels in Hopedale that are susceptible to 100-year floods, with 6 of them containing structures. Building footprints that overlap with these flood zones may be impacted by flooding of that magnitude, especially if homeowners have not taken action to mitigate their personal flood risk. Despite Hopedale having numerous flooding problems, most of Hopedale is upland and built away from rivers and ponds. Hopedale's affected area from this hazard, or, its location, is considered "small" (10% or less of the Town). Map 2 in Appendix A illustrates the FEMA FIRM 100-year flood zones in town, as well as locally identified flooding areas.

As of September 2022, the Town of Hopedale has no repetitive loss structures as defined by FEMA's NFIP. As defined by the National Flood Insurance Program (NFIP), a repetitive loss property is any property which the NFIP has paid two or more flood claims of $1,000 or more in any given 10-year period since 1978. For more information on repetitive losses see https://www.fema.gov/repetitive-flood-claims-grant-program-fact-sheet.

EXTENT

The average annual precipitation for the closest weather station to Hopedale has been 49 inches for the period from 2010 to 2021. Over the past five years, Hopedale has received an average of 6.7 days annually with precipitation over 1 inch. Water levels in Hopedale'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). Monthly precipitation levels are highly variable but for the period between 2010

FEMA Flood zones

FEMA creates and manages Flood Insurance Rate Maps (FIRMs) that identify local flood hazard areas. These Special Flood Hazard Areas (SFHA) are locations that will be inundated by a flood event with a 1% or greater chance of occurring in any year. These areas are also referred to as the base flood, or 100-year flood zone. These areas are considered at high risk of flooding and have around a 1 in 4 chance of flooding during a 30-year mortgage.

FEMA FIRMs also identify areas with a "moderate" flood risk, defined as locations between the 1% annual chance flood and a .2% annual chance flood. These areas are also known as the 500-year flood zone.

and 2021 Hopedale[1] received the most precipitation in the months of April, October, and December. At any time, heavy rainfall may create conditions that raise water levels in rivers and streams above bank full stage, which then overflow adjacent lands. Heavy rainfall may also cause excessive runoff that causes the sides of roads to give way, creating a public safety concern and maintenance problem for the town's Highway Department.

Previous Occurrences

In addition to the floodplains mapped by FEMA for the 1% and .2% annual chance floods, Hopedale periodically experiences minor flooding at isolated locations due to drainage problems, or problem culverts. Town staff have reported that flooding events are becoming more frequent in recent years. The following specific flooding locations (mapped in Appendix A) were identified by the Hopedale Hazard Mitigation Team:

- Green Street
- Rockridge Road
- Adin Street
- Cemetery Street
- Hope Street
- Airport and Industrial Park
- Dana Park area
- Centennial Street
- Fitzgerald Drive
- Cutler Street
- Mellen Street
- Downtown Hopedale
- Cook Street
- Dutcher Street
- Mendon Street
- Route 16

Most of the flood hazard areas listed here were identified due to known past occurrences in the respective area. There are other areas with no record of previous flood incidents that could be affected in the future by heavy rain and runoff. Additionally, some areas have experienced erosion and stormwater drainage failures.

At the MVP Workshop, it was reported that major floods occurred in 1927, 1938, and 1955. The 1955 flood prompted major reconstruction of the Mill St. dam. In the past 10 years, there have been a number of flooding events that have occurred in and around the Hopedale community. Major events are listed below:

- 6/18/13 – Flash Flood: A cold front moved across southern New England, igniting

showers and thunderstorms. Some of these storms became severe. Heavy rain resulted in flash flooding across parts of the region.

- 9/1/13 – Flood and Flash Flood: An upper-level disturbance moved over southern New England bringing showers and thunderstorms to the region… bringing torrential rainfall and flash flooding.
- 5/31/15 – Flood: A cold front moving across southern New England combined with high precipitable waters and weak flow aloft to initiate showers and thunderstorms that produced flooding and pockets of flash flooding.
- 8/15/2015 – Flood: A weak cold front moving through southern New England brought showers and thunderstorms to the region. These storms produced hail and damaging winds as well as some poor drainage street flooding.
- 9/30/2015 – Flood: A cold front moved across southern New England bringing heavy rain, strong winds, and periods of coastal flooding along the south coast.
- 10/30/17 – Flood: The remnants of Tropical Storm Phillipe merged with a mid-latitude system approaching the U.S. East Coast. Tropical moisture flowing north ahead of the cold front contributed to heavy downpours with one to five inches of rain reported.
- 11/3/2018 – Flood: Heavy rain occurred in the early morning hours, with generally 1.50 to 2.50 inches in eastern sections of southern New England and up to 3.66 inches in the slopes of the Berkshires.
- 7/6/19 – Flood: A cold front advanced into a very moist, almost tropical air mass in place across southern New England. This produced a line of thunderstorms, some with torrential downpours that caused flooding.
- 7/9/21 – Flood: Tropical Storm Elsa made landfall in Rhode Island on Friday morning before moving into the Gulf of Maine. It interacted with a stalled frontal boundary and brought widespread heavy rainfall of 2 to 3.5 inches.
- 11/12/21 – Flood: Strong southerly wind flow out ahead of an advancing cold front produced strong to damaging wind gusts and some heavy rain that caused some street and basement flooding.

Probability of Future Events

Based upon previous data, there is a "moderate" probability of localized flooding occurring in Hopedale in the next year.

Impact

The Town faces a minor impact, with less than 10% of the total Town area likely to be affected by a 1% annual chance flooding event. Based on the HAZUS analysis described below, a flood in Hopedale is unlikely to completely destroy any buildings, but a .2% annual chance flood event could displace residents and come with a significant economic cost.

Utilizing the GIS analysis noted in Location, above, the total building value of the 6 parcels with structures that are susceptible to a 1% annual chance flood is approximately. The total building value of the 6 parcels with structures that are susceptible to a .2% annual chance flood is

approximately $1,317,300. This approximates the property value at risk of flooding, rather than the estimated financial impact of a major flood event.

HAZUS- MH (multiple-hazards) is a computer program developed by FEMA to estimate losses due to a variety of natural hazards. The HAZUS software was used to model potential damages to the community from a .2% annual chance flood event, assuming a 1 square mile data resolution.

	.2% annual chance flood event
Building Characteristics	
Estimated total number of buildings in Hopedale	2,212
Estimated total building replacement value (2014 $)	$ 871,000,000
Building Damages	
# of buildings sustaining minor damage (1-10%)	0
# of buildings sustaining moderate damage (11-40%)	1
# of buildings sustaining severe damage (41-50%)	0
# of buildings destroyed	0
Population Needs	
# of households displaced	20
# of people seeking public shelter	15
Value of Damages	
Total property damage (buildings and content)	$ 940,000
Total losses due to business interruption	$ 720,000
Total Economic loss	**$1,660,000**

Though there are no recorded instances of a flood event of this size in Hopedale, this model was included in order to present a reasonable "worst case scenario" that would help planners and emergency personnel evaluate the impacts of flooding that might be more likely in the future, as we enter into a period of more intense and frequent storms. For more information on the HAZUS-MH software, go to http://www.fema.gov/hazus-software.

EXPOSURE

Certain features within Hopedale's community infrastructure, society, and environment may face more exposure to flooding, or be disproportionately impacted by it, relative to the rest of the community. Some of these features may be documented in the list of critical facilities and vulnerable populations in Section 3. These features include:

- Low-lying areas, including but not limited to the FEMA 1% and .2% annual chance flood zones.
- Specific locations with undersized or outdated storm water infrastructure that cannot handle

sudden surges in precipitation.

- Residents who may have trouble evacuating from their residence due to age, health concerns, or lack of a vehicle.
- Flood-prone municipal buildings and critical infrastructure.
- that are subject to flooding and potential contamination from flood waters.
- Septic systems, especially in flood prone areas or locations with high water tables.
- Aquatic ecosystems, which may suffer from erosion, eutrophication, or sedimentation due to stormwater.
- The municipal financial burden of infrastructure maintenance and upgrades meant to address flooding.
- Highway department staff, who sometimes must unclog storm drains during extreme weather events. Due to limited staffing, highway department employees often have to go out alone, making safety a concern.
- Sides of roadways, which may be erode due to excessive rainfall. Lack of funding to make road repairs may compound this issue.

Potential Climate Change Effects

According to the 2018 State Hazard Mitigation and Climate Adaptation Plan, there are three major ways that inland flooding can be influenced by climate change:

- Changes in precipitation may lead to more intense and more frequent downpours. Intense downpours that generate a high volume of precipitation in a short period of time may overwhelm stormwater infrastructure, saturate soils, and make them unable to absorb additional moisture, and cause river or stream flows to rise.
- Climate change may result in more frequent severe storms, which would increase the frequency of flooding, and make it more likely for multiple storms in a short duration to cause cumulative damage.
- "Vegetated ground cover" can slow down runoff water, making it more likely to absorb into the ground rather than flow into streams and rivers. Climate change could create more frequent drought conditions, and drought can stress or kill plants, limiting their ability to mitigate runoff from heavy rainfall.

In summary, climate change is likely to increase the extent and probability of future flood events in Hopedale.

Vulnerability

Based on this analysis and the assessment of the Hopedale Core Team, Hopedale faces a hazard index rating of "3 - medium risk" from flooding.

4.4 Severe Snowstorms / Ice Storms / Nor'easters

Severe winter storms can pose a significant risk to property and human life. Severe snowstorms and ice storms can involve rain, freezing rain, ice, snow, cold temperatures, and wind. Heavy snowfall and extreme cold can immobilize an entire region. Even areas that normally experience mild winters can be hit with a major snowstorm or extreme cold. Winter storms can result in flooding, storm surge, closed highways, blocked roads, downed power lines and hypothermia. A northeast coastal storm, known as a nor'easter, is typically a large counterclockwise wind circulation around a low-pressure center often resulting in heavy snow, high winds, and rain.

Location

The entire town of Hopedale is susceptible to severe snowstorms, which means the location of occurrence is "large." Because these storms occur regionally, they would impact the entire town is equally vulnerable.

Extent

The Northeast Snowfall Impact Scale (NESIS) 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.

Table 4: Northeast Snowfall Impact Scale Categories[2]

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

[2] National Centers for Environmental Information. (n.d.). Regional Snowfall Index (RSI). National Oceanic and Atmospheric Association. Retrieved January 27, 2022, from https://www.ncdc.noaa.gov/snow-and-ice/rsi/nesis

Previous Occurrences

Based on data available from the National Oceanic and Atmospheric Administration, there are 66 high-impact snowstorms since 1958 that have affected the Northeast Corridor. Of these, approximately 34 storms resulted in snow falls in Hopedale of at least 10 inches. These storms are listed in the table below:

Start Date	NESIS Value	NESIS Category	NESIS Classification
12/14/2020	3.21	2	Significant
3/11/2018	3.16	2	Significant
1/3/2018	2.27	1	Notable
3/12/2017	5.03	3	Major
2/8/2015	1.32	1	Notable
1/29/2015	5.42	3	Major
1/25/2015	2.62	2	Significant
3/4/2013	3.05	2	Significant
2/7/2013	4.35	3	Major
1/26/2011	2.17	1	Notable
1/9/2011	5.31	3	Major
12/24/2010	4.92	3	Major
2/23/2010	5.46	3	Major
12/18/2009	3.99	2	Significant
3/15/2007	2.54	2	Significant
2/12/2006	4.10	3	Major
1/21/2005	6.80	4	Crippling
2/15/2003	7.50	4	Crippling
3/31/1997	2.29	1	Notable
2/8/1994	5.39	3	Major
3/12/1993	13.2	5	Extreme
2/10/1983	6.25	4	Crippling
4/6/1982	3.35	2	Significant
2/5/1978	5.78	3	Major
1/19/1978	6.53	4	Crippling
2/18/1972	4.77	3	Major
2/22/1969	4.29	3	Major
2/8/1969	3.51	2	Significant
2/5/1967	3.50	2	Significant
2/2/1961	7.06	4	Crippling
1/18/1961	4.04	3	Major
12/11/1960	4.53	3	Major
3/2/1960	8.77	4	Crippling
2/14/1958	6.25	4	Crippling

Probability of Future Events

Based upon the availability of records for Worcester County, the likelihood that a severe snowstorm will affect Hopedale is "very high" (greater than 70 percent in any given year).

Research on climate change indicates that there is great potential for stronger, more frequent storms as the global temperature increases.

Impact

Hopedale faces a "limited" impact or less than 10 percent of total property damaged, from snowstorms. The weight from multiple snowfall events can test the load ratings of building roofs and potentially cause significant damage. Multiple freeze-thaw cycles can also create large amounts of ice and make for even heavier roof loads.

Other impacts from snowstorms and ice storms include:

- Tree damage and fallen branches that cause utility line damage and roadway blockages
- 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.
- Damage to telecommunications structures
- Reduced ability of emergency officials to respond promptly to medical emergencies or fires

The local planning team noted icing concerns along Green Street, Rockridge Road, Adin Street, Cemetery Street, and Hope Street. Snow drift was also identified as a concern along Fitzgerald Drive, Hopedale Street, and Freedom Street.

Exposure

Certain features within Hopedale's community infrastructure, society, and environment may face more exposure to winter storms, or be disproportionately impacted by them, relative to the rest of the community. Some of these features may be documented in the list of critical facilities and vulnerable populations in *Section 3*. These features include:

- Elderly residents, who may have more difficulty clearing snow and walking on icy or snow-covered sidewalks. Elderly residents may also be more vulnerable to extremely low temperatures.
- Households with low or fixed incomes who may be less able to afford sufficient heating or home improvements to improve energy efficiency and insulation.
- Renters, who may have less control over their living situation and indoor environment than homeowners.
- Public safety, utility, and highway department workers, who are tasked with responding to emergency calls, keeping the heat and power on, and keeping the streets clear during winter storms.

Potential Climate Change Effects

According to the 2018 State Hazard Mitigation and Climate Adaptation Plan, there are three major ways that severe winter storms (including ice storms and nor'easters) can be influenced by climate change:

- Warming surface waters in the ocean will cause air moving over the water to retain more moisture, and as a result certain winter storms will be capable of dropping more snow than is typical for Massachusetts.
- Rising ocean temperatures may lead to changing atmospheric circulation patterns that make the formation of winter storms along the US East Coast more likely.
- Nor'easters may increase in frequency and intensity and may become more concentrated in the coldest winter months.

In summary, climate change is likely to increase the extent of winter storms in Hopedale.

VULNERABILITY

Based on the above assessment, Hopedale has a hazard index rating of "2 — high risk" from snowstorms and ice storms.

4.5 HURRICANES

Hurricanes begin as tropical storms that form over warm ocean waters in the Atlantic Ocean, Pacific Ocean, or off the west coast of Africa. The heated, moist air is drawn up into the atmosphere and begins circulating clockwise or counterclockwise depending on which hemisphere they are in. Tropical storms become hurricanes when their sustained winds exceed 74 miles per hour, or greater. The primary damaging forces associated with these storms are high-level sustained winds and heavy precipitation. Hurricanes winds can reach speeds of up to 200 miles per hour and can grow to 500 miles in diameter. In New England, hurricanes generally occur between August, September, and the first half of October, and can result in flooding and wind damage to structures and above-ground utilities.[3]

LOCATION

Because of the hazard's regional nature, all of Hopedale is at risk from hurricanes, meaning the location of occurrence is "large." Ridgetops 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.

Table 5: Saffir-Simpson Scale[4]

Category	Maximum Sustained Wind Speed
1	74–95 mph: very dangerous winds will produce some damage
2	96–110 mph: extremely dangerous winds will cause extensive damage
3	111–129 mph: devastating damage will occur
4	130–156 mph: catastrophic damage will occur
5	157 + mph: catastrophic damage will occur

PREVIOUS OCCURRENCES

Hurricanes that have affected the region in which Hopedale is located are shown in the following table:

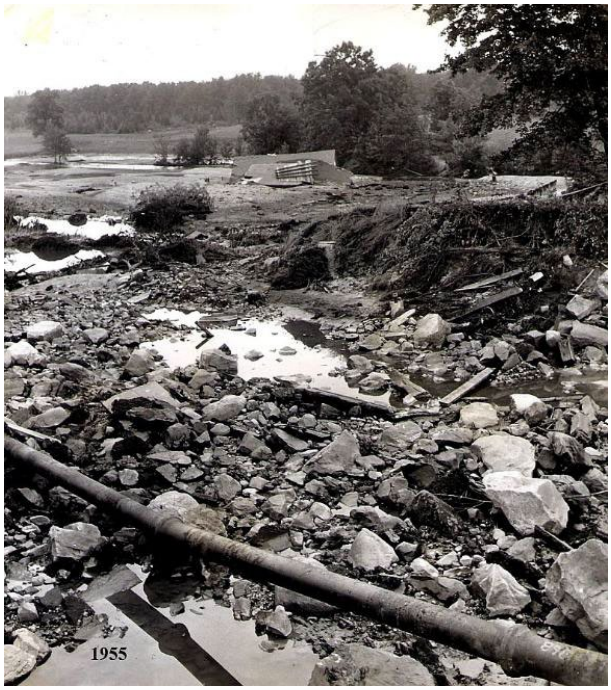
Storm Name	Year	Saffir/Simpson Category (when reached MA)
Belle	1976	Tropical Storm
Gloria	1985	1

[3] 2018 Massachusetts State Hazard Mitigation and Climate Adaptation Plan.

[4] National Hurricane Center and Central Pacific Hurricane Center. (n.d.). Saffir-Simpson Hurricane Wind Scale. National Oceanic and Atmospheric Association. Retrieved January 31, 2022, from https://www.nhc.noaa.gov/aboutsshws.php

Henri	1985	Tropical Storm
Chris	1988	Minor Storm
Bob	1991	2
Beryl	1994	Tropical Storm
Bertha	1996	Tropical Storm
Floyd	1999	Tropical Storm
Gordon	2000	Minor Storm
Hermine	2004	Tropical Storm
Barry	2007	Minor Storm
Hanna	2008	Minor Storm
Irene	2011	Tropical Storm
Sandy	2012	"Super Storm"
Andrea	2013	Minor Storm
Elsa	2021	Tropical Storm
Fred	2021	Extratropical Storm
Henri	2021	Tropical Storm/Depression

Hopedale, and the whole Blackstone area, have been hit hard by hurricanes and tropical storms in the past, resulting in widespread flooding. In 1955, Hurricane Connie and Tropical Storm Diane resulted in major flooding, especially in the Spindleville area. Historic photos below show the aftermath:



Probability of Future Events

Hopedale's location in central Massachusetts approximately 45 miles inland reduces the risk of extremely high winds that are associated with hurricanes, although it can still experience some high wind events. Based upon past occurrences, it is reasonable to say that there is a "low" probability (1 percent to 10 percent in any given year) of hurricanes in Hopedale. Climate change is projected to result in more severe weather, including increased occurrence of hurricanes and tropical storms. Because of this, the occurrence of hurricanes will increase in the future.

Impact

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

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+

HAZUS- MH (multiple-hazards) is a computer program developed by FEMA to estimate losses due to a variety of natural hazards. The HAZUS software was used to model potential damages to the community from a 100-year and 500-year hurricane event; storms that are 1% and .0.2% likely to happen in a given year, and roughly equivalent to a Category 1 and Category 2 hurricane. The damages caused by these hypothetical storms were modeled as if the storm track passed directly through the Town, bringing the strongest winds and greatest damage potential.

	100-Year storm (89 mph winds)	500-Year storm (102-105 mph winds)
Building Characteristics		

Estimated total number of buildings	2,212	
Estimated total building replacement value (2014 $)	$871,000,000	
Building Damages		
# of buildings sustaining minor damage	79	393
# of buildings sustaining moderate damage	4	59
# of buildings sustaining severe damage	0	4
# of buildings destroyed	0	2
Population Needs		
# of households displaced	2	16
# of people seeking public shelter	1	8
Debris		
Building debris generated (tons)	2,296	5,766
Tree debris generated (tons)	1,237	2,783
# of truckloads to clear building debris	10	46
Value of Damages (thousands of dollars)		
Total property damage (buildings and content)	$ 7,175,000	$23,458,650
Total losses due to business interruption	$ 165,000	$992,120

Though there are no recorded instances of a hurricane equivalent to a 500-year storm passing through Massachusetts, this model was included in order to present a reasonable "worst case scenario" that would help planners and emergency personnel evaluate the impacts of storms that might be more likely in the future, as we enter into a period of more intense and frequent storms. For more information on the HAZUS-MH software, go to http://www.fema.gov/hazus-software.

The Town faces a "limited" impact from hurricanes, with 10 percent or less of Hopedale affected.

EXPOSURE

Certain features within Hopedale's community infrastructure, society, and environment may face more exposure to hurricanes, or be disproportionately impacted by them, relative to the rest of the community. Some of these features may be documented in the list of critical facilities and vulnerable populations in Section 3. Vulnerable community features include:

- The electrical grid is vulnerable to outages from trees falling across power lines. National Grid proactively trims trees in their right of way, but outages are still common. Though concerns regarding street trees are a Town-wide issue, the local planning team identified

Adin Street, Dutcher Street, Mill Street, and Freedom Street as particularly vulnerable. During Hurricane Irene in 2011, some neighborhoods in Hopedale were without power for 3 to 4 days.

- Municipal buildings have been impacted by high winds in the past. Damage to these buildings could impact critical town functions and be a distraction from other essential emergency response and recovery activities.
- Public safety, utility, and highway department workers, who are tasked with responding to emergency calls and keeping the streets clear during hurricanes.

In addition to high winds, hurricanes can also bring heavy precipitation and cause flooding. The vulnerable features identified in the Flooding section above also apply to hurricanes.

Potential Climate Change Effects

According to the 2018 State Hazard Mitigation and Climate Adaptation Plan, there are two major ways that hurricanes and tropical storms can be influenced by climate change:

- Warming oceans will provide more energy for hurricanes and tropical storms, which could lead to more intense or potentially damaging storms in the future, and larger storms could result in more storms that are likely to impact Massachusetts.
- Warmer air can hold more water vapor and will enable greater precipitation rates during future storms.

In summary, climate change is likely to increase the frequency and extent of hurricanes in Hopedale.

Vulnerability

Based on the above analysis, Hopedale has a hazard index rating of "3 – medium risk" from hurricanes.

4.6 Severe Thunderstorms / Wind / Tornado

A thunderstorm is a storm with lightning and thunder produced by a cumulonimbus cloud, usually producing gusty winds, heavy rain, and sometimes generating 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.

Every thunderstorm has an updraft (rising air) and a downdraft (sinking air). Sometimes strong downdrafts known as downbursts can cause tremendous wind damage that is similar to that of a tornado. A small (less than 2.5 mile path) downburst is known as a "microburst" and a larger downburst is called a "macro-burst." An organized, fast-moving line of microbursts traveling across large areas is known as a "derecho." These occasionally occur in Massachusetts. The strongest downburst recorded was a downburst in North Carolina of 175 mph. Winds exceeding 100 mph have been measured from downbursts in Massachusetts.[5]

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

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 the Connecticut River Valley and in western Worcester County, with Hopedale some 40 miles east of the zone of most frequent past occurrence. 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.

Location

As per the Massachusetts Hazard Mitigation Plan, the entire Town is at risk of high winds, severe thunderstorms, and tornadoes. The plan identifies Hopedale and its surrounding communities as having a moderate frequency of tornado occurrence within the Massachusetts context. However, the actual area affected by thunderstorms, wind, or tornadoes is "small," with less than 10 percent of the Town generally affected.

Extent

An average thunderstorm is 15 miles across and lasts 30 minutes; severe thunderstorms can be much

[5] 2018 Massachusetts State Hazard Mitigation and Climate Adaptation Plan.

larger and longer. Southern New England typically experiences 10 to 15 days per year with severe thunderstorms. Thunderstorms can cause hail, wind, lightning damage, and flooding.

High wind can be linked to a number of different hazards, including hurricanes and winter storms, in addition to thunderstorms and tornadoes. High winds can cause damage to structures, trees, as well as increase the risk of wildfire.

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

Table 6: Enhanced Fujita Scale Levels and Descriptions of Damage[6]

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.

[6] National Oceanic and Atmospheric Administration. (n.d.). The Enhanced Fujita Scale (EF Scale). National Weather Service; NOAA's National Weather Service. Retrieved January 31, 2022, from https://www.weather.gov/oun/efscale

Table 7: Extent Scale for Hail[7]

HAIL SIZE (in.)	OBJECT ANALOG REPORTED
.50	Marble, moth ball
.75	Penny
.88	Nickel
1.00	Quarter
1.25	Half Dollar
1.50	Walnut, ping pong
1.75	Golf ball
2.0	Hen egg
2.5	Tennis ball
2.75	Baseball
3.00	Tea cup
4.00	Grapefruit
4.50	Softball

Previous Occurrences

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

In Worcester County, there have been several F1 tornadoes over the years. However, a data search for tornadoes rating 3 or above, or resulting in death/injury, or significant property damage, identifies the following events:

- In 1953, an F4 tornado struck Worcester. The event resulted in at least 90 fatalities, and more than 1,200 injured. There was extensive property damage. On the same date, an F3 tornado began in the Town of Sutton.
- In 1981 an F3 tornado struck Westminster, resulting in just 3 injuries and very little reported property damage.
- In June 2011, an F3 tornado struck Massachusetts. Few deaths were reported, all in Hampden County. No deaths were reported in Worcester County.

Within the last 5 years, there has only been one small tornado that has affected communities near Hopedale:

- 2018 Tornado (East Douglas, Uxbridge, Upton)

[7] National Oceanic and Atmospheric Administration. (n.d.). Hail Size as Related to Objects. Storm Prediction Center. Retrieved January 31, 2022, from https://www.spc.noaa.gov/misc/tables/hailsize.htm

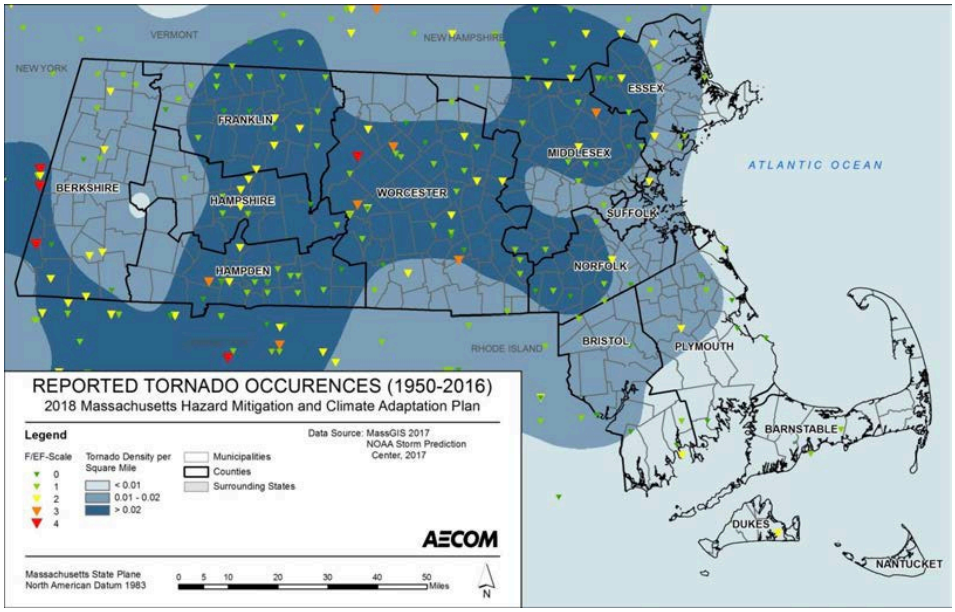


Image 1: Density of Reported Tornados per Square Mile (1950-2016). Source: Massachusetts State Hazard Mitigation and Climate Adaptation Plan, 2018.

Image 2: Above: NASA released this image of part of the 39-mile-long tornado track through south-central Mass. The image was captured on June 5, 2011 by Landsat 5 satellite.

Probability of Future Events

According to the 2018 State Hazard Mitigation and Climate Adaptation Plan, Massachusetts experienced 171 tornados between 1950 and 2017, or an average of 2.6 tornado events per year. The report goes on to state that "Massachusetts ranks 35th among the states for the frequency of tornadoes, 14th for the frequency of tornadoes per square mile, 21st for injuries, and 12th for cost of damage." Tornado activity may become more variable due to climate change, so it is difficult to predict the likelihood of future events in Hopedale.

Based upon the available historical record, as well as Hopedale's location in a moderate-density cluster of tornado activity for Massachusetts, there is a "very low" probability (less than 1 percent chance in any given year) of a tornado affecting the town, and a moderate (10 percent to 40 percent chance in any given year) probability of a severe thunderstorm and/or high winds.

Impact

Overall, Hopedale faces a "minor" impact from severe thunderstorms, and a "limited" impact from severe winds, or tornados, with 10 percent or less of the Town likely to be affected.

The Enhanced Fujita Scale Levels for tornados describes the likely impacts of tornados on the physical environment:

As indicated as part of the Enhanced Fujita Scale Levels for tornados, the following impacts can result from a tornado:

- EF0 - Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages to sign boards.
- EF1 - 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 - Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.
- EF3 - Roof and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted.
- EF4 - Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.

The potential for locally catastrophic damage is a factor in any tornado, severe thunderstorm, or wind event. In Hopedale, a tornado that hit residential areas would leave much more damage than a tornado with a travel path that ran along the town's uplands, where less settlement has occurred. Most buildings in the town have not been built to Zone 1, Design Wind Speed Codes. The first edition of the Massachusetts State Building Code went into effect on January 1, 1975, and 27.4% percent of the town's 1,340 occupied housing units was constructed in 1979 or earlier (American Communities Survey, 2020 5-year estimate). Beyond private homes, some important Town facilities are vulnerable to strong winds and tornados. The Fire Station on Dutcher Street is vulnerable, having been built in 1912, and having an eighty (80) foot tall Town structure attached to it. All three of the Town's antennas are also considered vulnerable because they are perched on top of structures, one of which is quite tall (Water Tank/Tower, Williams St).

Utilizing the Town's median home value of $354,600 (American Communities Survey, 2020 5-year

estimate), combined with the total value of all property, $829,687,588 (Massachusetts Dept. of Revenue, 2021), and an estimated 10 percent of damage to 5 percent of all structures, the estimated amount of damage from a tornado is $4,148,438. The cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included in this estimate.

EXPOSURE

Certain features within Hopedale's community infrastructure, society, and environment may face more exposure to severe thunderstorms/wind/tornadoes, or be disproportionately impacted by them, relative to the rest of the community. Some of these features may be documented in the list of critical facilities and vulnerable populations in *Section 3*. Vulnerable features to severe thunderstorms/wind/tornadoes overlap with features vulnerable to hurricanes and flooding.

POTENTIAL CLIMATE CHANGE EFFECTS

The 2018 Massachusetts State Hazard Mitigation and Climate Adaptation Plan (SHMCAP) notes that it is not currently possible to predict how tornados will be impacted by climate change. Tornados are too small to be simulated with accuracy by climate models. Also, they are measured based on their impact rather than inherent physical characteristics, so it's difficult to state whether tornados will increase in frequency and intensity because that depends in part on how many people live in the areas where tornados occur. These challenges make specific predictions about the changes to tornadoes from impossible. However, the SHMCAP report goes on to note that "the conditions that are conducive to tornadoes (which are also conducive to other weather phenomena, such as hurricanes and tropical storms) are expected to become more severe under global warming" (pg. 4-246).

The SHMCAP report also does not draw clear conclusions about the impact of climate change on thunderstorms. It notes that while a warming climate will increase the capacity of the atmosphere to hold water vapor, precipitation rates are dependent on other factors that complicate predictions at local scales. It is likely that annual precipitation will increase, and some studies seem to indicate that precipitation rates will increase the temperatures when peak participation rates are likely to occur (pg. 4-465).

VULNERABILITY

Based on the above assessment, Hopedale has a hazard index rating of "2- high risk" from severe thunderstorms and winds, and a "4 – low risk" from tornadoes.

4.7 Wildfires / Bush Fires

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. Typical causes of brushfires and wildfires are lightning strikes, human carelessness, and arson. Relative humidity and wind and two weather-related factors that influence fire danger. Relative humidity refers to "the ratio of the amount of moisture in the air to the amount of moisture necessary to saturate the air at the same temperature and pressure."[8] When relative moisture drops, light fuels like grasses become drier and burn more easily.[9]

FEMA has classifications for 3 different classes of wildfires:

- Surface fires are the most common type of wildfire, with the surface burning 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.

Potential vulnerabilities to wildfires include damage to structures and other improvements and impacts on natural resources. Smoke and air pollution from wildfires can be a health hazard, especially for sensitive populations including children, the elderly, and those with respiratory and cardiovascular diseases.

Location

Approximately 62% of total land area in Southern Worcester County is forested land.[10] Much of this region of Massachusetts, including the Hopedale area, have a high risk of wildfire. In Hopedale, an estimated 63.99% of the land is forested.[11] Hopedale is developed in a moderate to high-density suburban pattern, with few uninterrupted tracts of forest present. Although the substantial tree cover does present some risk for wildfires and brushfires, the total amount of town that could be affected by a wildfire is categorized as "small," or less than 10 percent of the total area.

The public water supply in Hopedale covers roughly 90% of the Town. The majority of water is supplied by a tubular well field on Mill Street located within the Hopedale golf course. There are also five separate wells located on the water treatment plant property that provide additional water. The Hopedale Fire Department manages a cistern off Francis Road and has the ability to pull water from Spindleville Pond for firefighting purposes.

[8] U.S. National Park Service. (2021, January 21). Understanding Fire Danger. National Park Service. https://www.nps.gov/articles/understanding-fire-danger.htm
[9] U.S. National Park Service (2021).
[10] Mass GIS. (2016). Land Cover/Land Use [Map]. https://www.mass.gov/info-details/massgis-data-2016-land-coverland-use
[11] Mass GIS (2016).

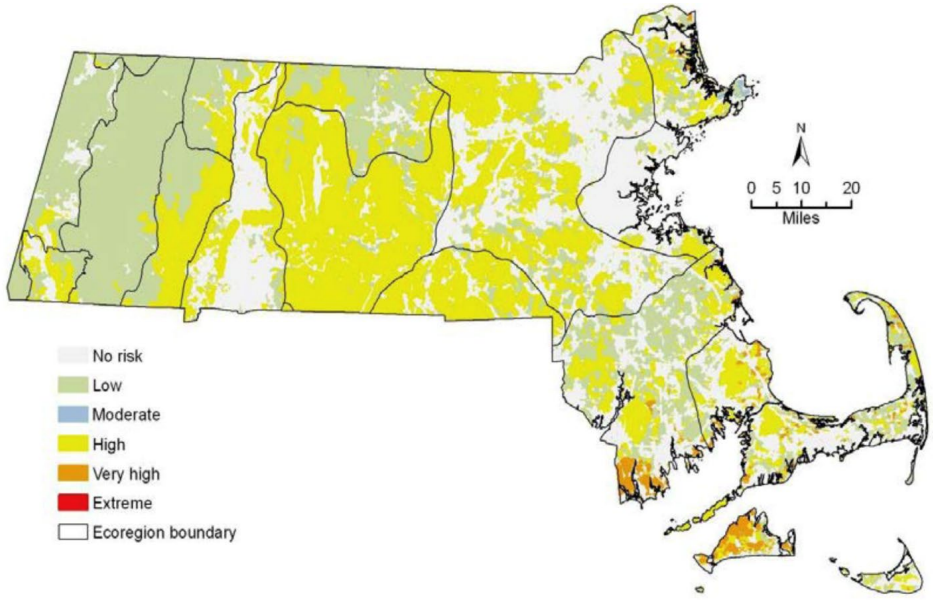


Figure 1: Wildfire Risk Areas for the Commonwealth of Massachusetts. Source: 2018 SHMCAP.

EXTENT

Wildfires can cause widespread damage. They can spread very rapidly, depending on local wind speeds and can be very difficult to get under control. Fires can last for several hours up to several days.

In Hopedale, approximately 63.99 percent of the town's total land area is deciduous forest, evergreen forest, or forested wetland, and an additional 16.17% of the town consists of grassland or shrub. These areas are at risk of fire and are spread evenly throughout the community, with developed areas, rivers, and major transportation corridors (Route 140 and the Grafton-Upton Railroad) breaking up the forest. In drought conditions, a brushfire or wildfire would be a matter of concern.

The National Fire Danger Rating system illustrates the potential extent of wildfires should they occur under the described fire danger conditions:

Rating	Basic Description	Detailed Description

CLASS 1: Low Danger (L) Color Code: Green	Fires not easily started	Fire starts are unlikely. Weather and fuel conditions will lead to slow fire spread, low intensity, and relatively easy control with light mop up. Controlled burns can usually be executed with reasonable safety.
CLASS 2: Moderate Danger (M) Color Code: Blue	Fires start easily and spread at a moderate rate	Some wildfires may be expected. Expect moderate flame length and rate of spread. Control is usually not difficult and light to moderate mop up can be expected. Although controlled burning can be done without creating a hazard, routine caution should be taken.
CLASS 3: High Danger (H) Color Code: Yellow	Fires start easily and spread at a rapid rate	Wildfires are likely. Fires in heavy, continuous fuel, such as mature grassland, weed fields, and forest litter, will be difficult to control under windy conditions. Control through direct attack may be difficult but possible, and mop up will be required. Outdoor burning should be restricted to early morning and late evening hours.
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 may spread faster than suppression resources can travel. Flame lengths will be long with high intensity, making control very difficult. Both suppression and mop up will require an extended and very thorough effort. Outdoor burning is not recommended.
CLASS 5: Extreme (E) Color Code: Red	Fire situation is explosive and can result in extensive property damage	Fires will start and spread rapidly. Every fire start has the potential to become large. Expect extreme, erratic fire behavior. NO OUTDOOR BURNING SHOULD TAKE PLACE IN AREAS WITH EXTREME FIRE DANGER.

Previous Occurrences

Hopedale has a full-time Fire Department providing 24/7 coverage. In addition, Hopedale is part of the South Middlesex County Fire Department (Mutual Aid District 14), with 23 other Towns. Hopedale has experienced four brushfires between 2001-2020, however, each of these fires were quite small; the largest was only two acres in size, and altogether they consumed only three acres of brush/wildland (Massachusetts Fire Incident Reporting System). In 1995, one brushfire off of Greene Street consumed 50 acres of brush/wildland. This fire was of particular significance not only because of its size, but also because of the residential development contained in that area. Thankfully, no residential property was affected by this fire. The local planning team identified concerns regarding brush fires that are caused by sparking of the Grafton-Upton Railway, however, this railway was not the cause of the sizable fire in 1995, a permit fire was. In addition, the local planning team identified the Parklands as vulnerable to wildfires because of its large tracts of uninterrupted forested land.

Probability of Future Events

In accordance with the 2018 State Hazard Mitigation and Climate Adaptation Plan, the Hopedale Hazard Mitigation Team found it difficult to predict the likelihood of wildfires in a probabilistic manner because of the number of variables involved - fuel availability, weather and climate conditions, and human activity all factor into wildfire occurrences. However, based on regular previous occurrences of minor brush fires, the planning team determined the probability of future damaging wildfire events to be "moderate" (10 percent to 40 percent probability in the next year).

Climate scenarios project that by mid-century, the mean summer temperatures in the Blackstone River basin will increase by 1.08° F to 4.53° F.[12] Combined with increasingly variable precipitation, rising temperatures could exacerbate summer drought and further promote high-elevation wildfires, releasing stores of carbon and further contributing to the buildup of greenhouse gases.

Climate change is also predicted to bring increased wind damage from major storms, as well as new types of pests to the region. Both increased wind and the introduction of new pests could potentially create more debris in wooded areas and result in a larger risk of fires.

IMPACT

While a large wildfire could in theory damage much of the landmass of Hopedale, most forested areas are sparsely developed, meaning that wildfire affected areas are not likely to cause damage to property. For this reason, the town faces a "minor" impact from wildfires, with little damage likely to occur.

Both wildfires and brush fires can consume homes, other buildings and/or agricultural resources. The impact of wildfires and brush fires are as follows:

- Impact to benefits that people receive from the environment, such as food/water and the regulation of floods and drought
- Impact on local heritage, through the destruction of natural features
- Impact to the economy, due to damage to property and income from land following a wildfire
- Impact through the destruction of people and property

Utilizing the total value of all property, $829,687,588 and an estimated 5 percent of damage to 1 percent of all structures, the estimated amount of damage from a wildfire is $414,848. The cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included in this estimate.

EXPOSURE

Certain features within Hopedale's community infrastructure, society, and environment may face more exposure to wildfires/brushfires, or be disproportionately impacted by them, relative to the rest of the community. Some of these features may be documented in the list of critical facilities and vulnerable populations in Section 3. Vulnerable community features include:

- People who are sensitive to smoke, including children, the elderly, and individuals with other health conditions. Wildfires outside of Hopedale may also impact the town residents. Air pollution from wildfires can be a severe public health concern. Smoke can exacerbate

[12] Northeast Climate Adaptation Science Center. (n.d.). Datagrapher. ResilientMA. https://resilientma.org/datagrapher

respiratory conditions like asthma and carry toxic chemicals and particulate matter. In 2021, wildfire smoke from western states and Canada extended across the continental US forced the Massachusetts Department of Environmental Protection to issue an air quality alert.[13]

- First responders, especially the town's firefighters.

Potential Climate Change Effects

According to the 2018 State Hazard Mitigation and Climate Adaptation Plan, there are two major ways that wildfires/brushfires can be influenced by climate change:

- Seasonal drought risk is projected to increase and summer temperatures are expected to rise. Rising temperatures and changes in precipitation could cause vegetation to dry out and become more flammable.
- Rising temperatures may cause the frequency of lightning strikes to increase, which could spark more wildfires.

Seasonal drought may also make it more difficult to ensure a reliable water source for firefighting. In summary, climate change is likely to increase the frequency and extent of wildfires in Hopedale.

Vulnerability

Based on the above assessment, Hopedale has a hazard risk index of "4 – low risk" from wildfires. However, this risk assessment is highly dependent on short term weather patterns like wind, lightning, and rainfall, which are impossible for the town to predict with certainty.

[13] McAlpine, K. J. (2021, July 27). Wildfire Smoke in New England Is "Pretty Severe from Public Health Perspective." The Brink. https://www.bu.edu/articles/2021/wildfire-smoke-in-new-england/

4.8 EARTHQUAKES

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. Ground shaking from earthquakes can rupture gas mains and disrupt other utility service, damage buildings, bridges and roads, and trigger other hazardous events such as avalanches, flash floods (dam failure) and fires. Un-reinforced masonry buildings, buildings with foundations that rest on filled land or unconsolidated, unstable soil, and mobile homes not tied to their foundations are at risk during an earthquake.

LOCATION

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

EXTENT

The magnitude of an earthquake is sometimes 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. Earthquakes are also commonly measured using the moment magnitude scale, which provides similar measurements to the Richter scale but more accurately measures earthquakes with magnitudes greater than 8.[14]

Table 8: 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.

[14] Michigan Tech. (n.d.). How Do We Measure Earthquake Magnitude? Michigan Technological University. Retrieved February 3, 2022, from https://www.mtu.edu/geo/community/seismology/learn/earthquake-measure/

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.

Table 9: Modified Mercalli Intensity Scale for and Effects[15]

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

[15] U.S. Geological Survey. (n.d.). The Modified Mercalli Intensity Scale. UGGS. Retrieved February 3, 2022, from https://www.usgs.gov/programs/earthquake-hazards/modified-mercalli-intensity-scale?qt-science_center_objects=0#qt-science_center_objects

Previous Occurrences

The last earthquake to cause major damage in New England occurred in 1755,[16] though seismologists state that another serious earthquake occurrence is possible. There are five seismological faults in Massachusetts, but there is no discernible pattern of previous earthquakes along these fault lines. Additionally, earthquakes that are based in more seismologically active regions like parts of Canada may also impact Massachusetts.[17] Earthquakes occur without warning and may be followed by aftershocks. Image 4 below shows the locations of earthquakes that have occurred across the New England region and beyond over the last 45 years.

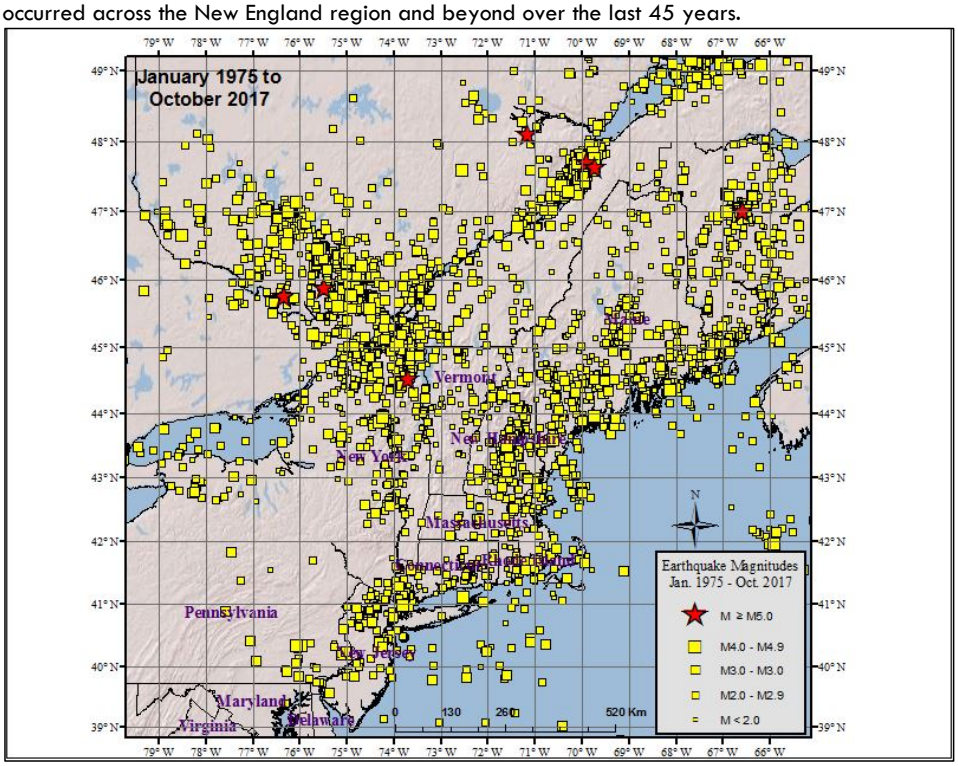


Image 3: Map of Earthquakes of the Northeastern US and Southeastern Canada 1975 to 2017. Source: The Northeast States Emergency Consortium website.

The local Hazard Mitigation Team reports that no earthquakes have been felt in Hopedale. To determine whether earthquakes have occurred recently near Hopedale, events listed by Weston Observatory in Boston College were reviewed for all towns in Massachusetts for a five-year lookback. Listed earthquakes above magnitude 2.0 include:

- 12/21/18 – 3 km WSW of Gardner, 2.1/2.1 [Mn*/Mc**]

[16] Northeast States Emergency Consortium. (n.d.). Massachusetts Earthquakes. Retrieved February 3, 2022, from http://nesec.org/massachusetts-earthquakes/

[17] 2018 Massachusetts State Hazard Mitigation and Climate Adaptation Plan.

- 8/21/19 – 2 km SSE of Wareham, 1.7/2.4
- 12/3/19 – 4 km SSE of Plymouth, 1.6/2.2
- 11/8/20 – 11 km SW of New Bedford, 3.8/3.4
- 11/22/20 – 12 km WSW of New Bedford, 1.7/2.6
  *Mn is the Nuttli Magnitude (see below)
  **Mc is the Coda Duration Magnitude (see below)

Each of these earthquakes are minor. Additionally, earthquakes with a magnitude of about 2.0 or less are usually called "microearthquakes" and are generally only recorded locally.

The Weston Observatory utilizes two scales to track the magnitude of earthquakes. These include the Nuttli magnitude (Mn) for North America east of the Rocky Mountains. Weston Observatory also utilizes the Coda Duration magnitude (Mc), which is based on the duration of shaking at a particular station. The Coda Duration magnitude can quickly estimate the magnitude before the exact location of the earthquake is known.

On August 23, 2011, an earthquake measuring 5.8 on the Richter scale centered in Virginia was felt in much of the northeast, but was not felt in Hopedale according to the local planning team.[18]

Commented [SC1]: Including hopedale?

Probability of Future Events

The 2018 Massachusetts State Hazard Mitigation and Climate Adaptation Plan (SHMCAP) notes that "Earthquakes cannot be predicted and may occur at any time." Additionally, the report notes that a strong earthquake could occur anywhere within the New England Region, rather than in specific hotspots. Therefore, it is difficult to estimate the probability of a future damaging earthquake in Hopedale.

Based upon existing records, there is a "very low" frequency (less than 1 percent probability in any given year) of a damaging earthquake in Hopedale.

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. The first edition of the Massachusetts State Building Code went into effect on January 1, 1975, and 67.3% percent of the town's 1,340 housing units was constructed in 1979 or earlier.[19] The seismic standards were upgraded with the 1997 revision of the State Building Code. Despite its fairly old average housing stock, Hopedale faces a "minor" impact from earthquakes, with little damage likely to occur due to the extreme rarity of damaging events.

HAZUS-MH (multiple-hazards) is a computer program developed by FEMA to estimate losses due to a variety of natural hazards. The HAZUS earthquake module allows users to define an earthquake magnitude and model the potential damages caused by that earthquake as if its epicenter had been at the geographic center of the study area. For the purposes of this plan, a

[18] Weston Observatory Boston College
[19] US Census Bureau, 2020 American Community Survey 5-year estimates, DP04.

magnitude 5.0 earthquake was selected for analysis. Historically, major earthquakes are rare in New England, although a magnitude 5 event occurred in 1963.

	Magnitude 5.0
Building Characteristics	
Estimated total number of buildings	2,212
Estimated total building replacement value (2010 $)	$ 871,000,000
Building Damages	
# of buildings sustaining slight damage	655
# of buildings sustaining moderate damage	347
# of buildings sustaining extensive damage	93
# of buildings completely damaged	23
Population Needs	
# of households displaced	79
# of people seeking public shelter	41
Debris	
Building debris generated (tons)	18,000
# of truckloads to clear debris (@ 25 tons/truck)	720
Value of Damages (dollars)	
Total property damage	$110,540,000
Total losses due to business interruption	$14,771,000

For more information on the HAZUS-MH software, go to www.fema.gov/hazus-software.

EXPOSURE

Certain features within Hopedale's community infrastructure, society, and environment may face more exposure to earthquakes, or be disproportionately impacted by them, relative to the rest of the community. Some of these features may be documented in the list of critical facilities and vulnerable populations in *Section* ***Error! Reference source not found.***. Vulnerable community features include:

- Older buildings constructed prior to the first edition of the Massachusetts State Building Code.

POTENTIAL CLIMATE CHANGE EFFECTS

According to the 2018 Massachusetts State Hazard Mitigation and Climate Adaptation Plan (SHMCAP), earthquakes in Massachusetts are not influenced by climate change.

VULNERABILITY

Based on the above analysis, Hopedale has a hazard index rating of "5- lowest risk" from earthquakes.

4.9 Dam Failure

Dams and their associated impoundments provide many benefits to a community, such as water supply, recreation, hydroelectric power generation, and flood control. However, they also pose a potential risk to lives and property. Dam failure is not a common occurrence, but dams do represent a potentially disastrous hazard.

When a dam fails, the potential energy of the stored water behind the dam is released rapidly. Some dam failures occur when floodwaters above overtop and erode the material components of the dam. Other failures are caused by foundation defects, inadequate maintenance, internal erosion caused by seepage, and many other specific causes.[20] Dam failure may be influenced by storm floodwaters but most are caused by structural, mechanical, or hydraulic failures.[21] Dam breeches can lead to catastrophic consequences as the water rushes in a torrent downstream flooding an area engineers refer to as an "inundation area." The number of casualties and the amount of property damage will depend upon the timing of the warning provided to downstream residents, the number of people living or working in the inundation area, and the number of structures in the inundation area.

Many dams in Massachusetts were built 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 Office of Dam Safety is the agency responsible for regulating dams in the state (M.G.L. Chapter 253, Section 44 and the implementing regulations 302 CMR 10.00). To be regulated, these dams are in excess of 6 feet in height (regardless of storage capacity) and have more than 15 acre-feet of storage capacity (regardless of height). Dam safety regulations enacted in 2005 transferred significant responsibilities for dams from the Commonwealth of Massachusetts to dam owners, including the responsibility to conduct dam inspections.

Location

According to the Massachusetts Office of Dam Safety, there are 4 dams in Hopedale: Hopedale Pond Dam, Mill Pond Dam, Spindleville Pond Dam, and Factory Pond Dam. Of these, three are ranked as a Significant Hazard. In addition to the 4 dams in Town, the Fiske Mill Pond Dam (Low Hazard, MA0062, privately owned) in neighboring Upton, lies roughly 0.8 miles upgradient from Mill Pond and the West Street Bridge, which straddles Primary Evacuation Route 140. The local planning team also identified concerns with dams upstream in Hopkinton that control water flowing into Hopedale Pond, and the Milford Dam which is owned by 3 different Towns. The names and hazard levels of dam structures within Hopedale are:

[20] Association of State Dam Safety Officials. (n.d.). Dam Failures and Incidents. Association of State Dam Safety Officials. Retrieved December 29, 2021, from https://damsafety.org/dam-failures

[21] FEMA. (2013). Living with Dams: Know Your Risks (FEMA P-956; p. 9). Federal Emergency Management Agency. https://www.fema.gov/sites/default/files/2020-08/fema_living-with-dams_p-956.pdf

National ID	Dam Name	Owner	Regulatory Authority	Hazard Code	Notes
MA00624	Hopedale Pond Dam	Private	Office of Dam Safety	Significant Hazard	It is unclear if the responsibility of this dam falls to the Town. This dam was extensively repaired in 2010, and the Town paid for those repairs. This dam is located opposite of the Factory Pond Dam and these two systems should be repaired to function better. There are structural and mechanical issues that should be addressed with this dam.
MA00625	Mill Pond Dam	Private	Office of Dam Safety	Significant Hazard	This dam was not listed in the 2017 HMP.
MA00936	Spindleville Pond Dam	Town of Hopedale	Office of Dam Safety	Significant Hazard	This dam was rebuilt 10 years ago by the Commonwealth. Maintenance is needed due to storm debris accumulation.
MA02790	Factory Pond Dam	Private	Non-Jurisdictional - Other	N/A	This dam is in the process of being repaired. It is located opposite of the Hopedale Pond Dam, and repairs should be made to help these two systems function better together. This dam was not listed in the 2017 HMP.

EXTENT

Often dam or levee 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. The state has three hazard classifications for dams:

- High Hazard: Dams located where failure or improper operation will likely cause loss of life and serious damage to homes, industrial or commercial facilities, important public utilities, main highways, or railroads.
- Significant Hazard: Dams located where failure or improper operation may cause loss of life and damage to homes, industrial or commercial facilities, secondary highways or railroads or cause interruption of use or service of relatively important facilities.
- Low Hazard: Dams located where failure or improper operation may cause minimal property damage to others. Loss of life is not expected.

Some dams do not have a hazard rating.

Previous Occurrences

To date, there have been no catastrophic dam failures in Hopedale.

Probability of Future Events

Probability for future failure events is "very low" with less than 1 percent chance of a dam bursting in any given year.

Impact

The Town faces a "limited impact" from failure of dams with, with 10 to 25 percent of the Town likely to see damage.

It is not possible to estimate the property loss impacts of dam failure quantitatively given the large number of variables involved in failure events. Qualitatively, losses from failure of an individual dam could be significant but would be geographically limited to portions of the dam's inundation zone.

Potential Climate Change Effects

Dam failure through overtopping can be caused by floodwaters flowing into a dammed body of water, exceeding the spillway capacity of the dam, and causing water to flow over dam the top of the dam (overtopping). If the water flowing over the dam erodes the dam itself, then a dam failure can occur. Therefore, the risk of dam failure may be indirectly impacted by climate change through its impacts on flooding.

Vulnerability

Based on a mostly qualitative assessment, Hopedale has a hazard index rating of "4 – low risk" from dam failure.

4.10 DROUGHT

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. Of course, these impacts can have far-reaching effects throughout the region and even the country.

LOCATION

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

EXTENT

The severity of a drought would determine the scale of the event. The National Drought Mitigation Center also records information on historical drought occurrence. Unfortunately, data are only available at the state level. The National Drought Mitigation Center categorizes drought on a D0-D4 scale as shown below.

Table 10: U.S. Drought Monitor[22]

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

[22] National Drought Mitigation Center. (n.d.). Drought Classification. U.S. Drought Monitor. Retrieved February 3, 2022, from https://droughtmonitor.unl.edu/About/AbouttheData/DroughtClassification.aspx

Previous Occurrences

In Massachusetts, nine extreme droughts have occurred statewide since 1930, though the Hopedale area has been spared the most severe impacts in each case according to USGS Water Supply Paper for Massachusetts #2375. These historic major droughts range in severity and in length, lasting from three to eight years. In many of these droughts, water-supply systems around the state 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 displays peak drought severity since 2000, from the National Drought Mitigation Center:

Table 11: Annual Drought Status[23]

Year	Maximum Severity
2000	No drought
2001	D2 conditions in 21% of the state
2002	D2 conditions in 100% of the state
2003	No drought
2004	D0 conditions in 48% of the state
2005	D1 conditions in 7% of the state
2006	D0 conditions in 98% of the state
2007	D1 conditions in 71% of the state
2008	D0 conditions in 69% of the state
2009	D0 conditions in 45% of the state
2010	D1 conditions in 27% of the state
2011	D0 conditions in 0.01% of the state
2012	D2 conditions in 51% of the state
2013	D1 conditions in 60% of the state
2014	D1 conditions in 54% of the state
2015	D1 conditions in 58% of the state
2016	D3 conditions in 52% of the state
2017	D3 conditions in 9% of the state
2018	D1 conditions in 36% of the state
2019	D0 conditions in 85% of the state
2020	D3 conditions in 36% of the state
2021	D2 conditions in 1% of the state
2022 (to September)	D3 conditions in 39% of the state

In Hopedale, there has not been a drought event with substantial impacts for many decades. Hopedale has a Drought Management Plan to issue water bans on odd/even days, meaning that

[23] National Drought Mitigation Center. (2016, 2022). Statistics by Threshold. U.S. Drought Monitor. https://droughtmonitor.unl.edu/DmData/DataDownload/StatisticsbyThreshold.aspx

Town water users with odd-numbered addresses are restricted to watering on odd-numbered days, and vice versa. Over the past few years, the local planning team noted that the Town has issued water bans every summer. More recently, the Town has been issuing water bans even when there is a substantial amount of rainfall. And in spring of 2022, the Town enacted a strict water ban, prohibiting outside watering during indicated periods. This stricter policy was to mitigate the inactivation of one of the Town's water wells due to high concentrations of polyfluoroalkyl substances (PFAS).

Probability of Future Events

In Hopedale, as in the rest of the state, extreme and exceptional droughts occur at a "very low" probability (1 to 10 percent in the next year). Based on past events and current criteria outlined in the Massachusetts Drought Management Plan, it appears that Central Massachusetts may be slightly more vulnerable than parts of 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.

In the long-term, the risk of drought may increase in Hopedale due to climate change influences, which will result in annual increases of consecutive dry days.

Impact

The specific impacts of drought in Massachusetts are categorized by the National Drought Mitigation Center in Table 23 below:

Table 12: Historic Impacts of Drought in Massachusetts[24]

Category	Historically observed impacts
D0	Crop growth is stunted; planting is delayed
	Fire danger is elevated; spring fire season starts early
	Lawns brown early; gardens begin to wilt
	Surface water levels decline
D1	Irrigation use increases; hay and grain yields are lower than normal
	Honey production declines
	Wildfires and ground fires increase
	Trees and landscaping are stressed; fish are stressed
	Voluntary water conservation is requested; reservoir and lake levels are below normal capacity
D2	Specialty crops are impacted in both yield and fruit size
	Producers begin feeding cattle; hay prices are high
	Warnings are issued on outdoor burns; air quality is poor
	Golf courses conserve water
	Trees are brittle and susceptible to insects

[24] National Drought Mitigation Center. (n.d.). State Impacts. U.S. Drought Monitor. Retrieved February 3, 2022, from https://droughtmonitor.unl.edu/DmData/StateImpacts.aspx

	Fish kills occur; wildlife move to farms for food
	Water quality is poor; groundwater is declining; irrigation ponds are dry; outdoor water restrictions are implemented
D3	Crop loss is widespread; Christmas tree farms are stressed; dairy farmers are struggling financially
	Well drillers and bulk water haulers see increased business
	Water recreation and hunting are modified; wildlife disease outbreak is observed
	Extremely reduced flow to ceased flow of water is observed; river temperatures are warm; wells are running dry; people are digging more and deeper wells

The 2018 Massachusetts State Hazard Mitigation and Climate Adaptation plan notes that while drought is a naturally occurring climate phenomenon, its impacts can be exacerbated by human behavior. The volume and rate of groundwater withdrawn from underground aquifers can impact the amount of water that flows through surface water bodies, negatively impacting aquatic ecosystems. Additionally, more impervious surface coverage, and some forms of stormwater infrastructure, can prevent natural infiltration of precipitation into groundwater.[25]

Specific impacts in Hopedale may vary among customers of the water system and private well users. So, while the impact of a drought can be assessed as "minor" overall, with very little damage to people or property likely to occur, impacts may be higher in the parts of Town that are not located within the Town's water service area.

EXPOSURE

Certain features within Hopedale's community infrastructure, society, and environment may face more exposure to drought, or be disproportionately impacted by them, relative to the rest of the community. Some of these features may be documented in the list of critical facilities and vulnerable populations in *Section* 3. Vulnerable community features include:

- Residences or businesses with shallow wells.
- Wild plants and animals, including trees.
- Vegetation, which may become more vulnerable to wildfire due to prolonged drought.

Higher water bills or the cost of re-drilling private wells due to drought impacts, could also negatively affect local residents. Other factors like PFAS contamination of water sources could compound drought-related water supply challenges. Hopedale has already experienced this, having to inactive one of its wells due to PFAS contamination.

POTENTIAL CLIMATE CHANGE EFFECTS

According to the 2018 State Hazard Mitigation and Climate Adaptation Plan, there are two major ways that drought can be influenced by climate change:

- The frequency and extent of droughts are projected to increase in summer and fall as higher temperatures result in more evaporation, snow melts earlier in the year, and precipitation becomes less constant and more extreme.
- Rising temperatures and changes in precipitation will reduce the snowpack and hasten

[25] 2018 Massachusetts State Hazard Mitigation and Climate Adaptation Plan.

snowmelt. This could result in less snowmelt recharge of groundwater, less snowmelt feeding stream flows, and less snowmelt as a water source for agriculture.

In summary, climate change is likely to increase the frequency and extent of drought in Massachusetts.

VULNERABILITY

Based on the above assessment, Hopedale has a hazard index rating of "4 – low risk" from drought. Minimal or no loss of property, or damage to people or property is expected due to this hazard.

4.11 Extreme Temperatures

As per the 2018 Massachusetts State Hazard Mitigation and Climate Adaptation Plan, there is no universal definition for extreme temperatures, with the term relative to local weather conditions. Extreme heat in Massachusetts is typically defined as a period of 3 or more consecutive days with temperatures above 90 °F.[26] Extreme heat may also refer to any prolonged period of especially hot weather (a heat wave), which may also be accompanied by high humidity. Extreme cold is a dangerous situation that can result in health emergencies for susceptible people, such as those without shelter or who are stranded or who live in homes that are poorly insulated or without heat.

For Massachusetts, extreme temperatures can be defined as those that are far outside the normal ranges. Normal temperatures for the Hopedale area are:

	July (Hottest Month)	January (Coldest Month)
Average High (°F)	84.0°	37.8°
Average Low (°F)	63.3°	18.8°

Specific criteria used by the National Weather Service for issuing extreme heat and extreme cold watches, warnings, and advisories, are described in Extent, below.

Location

Extreme temperatures can be expected to be uniform across Hopedale during a given weather event, due to the town's lack of extreme elevations, urban areas, and coastal areas. Therefore, this hazard has a "large" geographic coverage.

Extent

2018 Massachusetts State Hazard Mitigation and Climate Adaptation Plan notes that the extent (severity or magnitude) of extreme cold temperatures are generally measured through the Wind Chill Temperature Index. Wind Chill Temperature is the temperature that people and animals feel when outside and it is based on the rate of heat loss from exposed skin by the effects of wind and cold. In Massachusetts, a wind chill warning is issued by the National Weather Service (NWS) Norton Forecast Office when the Wind Chill Temperature Index, based on sustained wind, is –25°F or lower for at least three hours. NWS Windchill Chart (shows three shaded areas of frostbite danger. Each shaded area shows how long a person can be exposed before frostbite develops.

[26] 2018 Massachusetts State Hazard Mitigation and Climate Adaptation Plan.

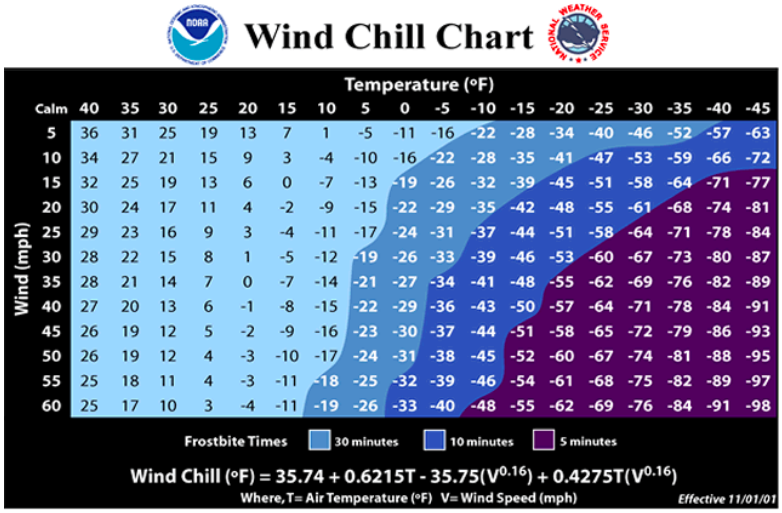


Figure 2: NWS Wind Chill Temperature (WCT) index. Source: https://www.weather.gov/safety/cold-wind-chill-chart

For extremely hot temperatures, the heat index scale is used, which combines relative humidity with actual air temperature to determine the risk to humans. The NWS issues an Excessive Heat Warning when the daytime heat index is forecasted to reach 105 degrees F for 2 or more hours. The NWS issues an Excessive Heat Advisory if the heat index is forecast to reach 95°F-99°F for 2 or more hours over 2 consecutive days, or 100°F-104°F for 2 or more hours over 1 day. The NWS defines a heat wave as 3 or more days of ≥ 90°F temperatures. The following chart indicates the relationship between heat index and relative humidity:

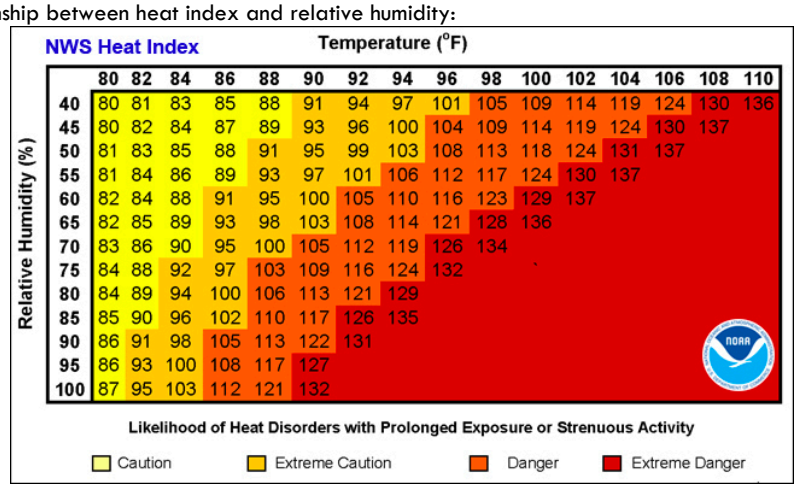


Figure 3: Heat Index. Source: https://www.weather.gov/safety/cold-wind-chill-chart

Extreme heat causes more fatalities in the United States that all other weather-related natural hazards combined.[27] Extreme heat can be the underlying cause of death or can worsen other medical conditions like heart disease, hypertension, alcohol poisoning and drug overdoses.[28] The heat-related mortality rate is higher among males and people aged 65 years and older.[29]

Table 13: Heat Effects on Body lists the effects of the body at different levels of the heat index. It is important to note that while temperatures exceeding 100°F are unusual for Central Massachusetts, high humidity is very common during the summer and can drive the heat index to dangerous levels.

Table 13: Heat Effects on Body[30]

Classification	Heat Index	Effect on Body
Caution	80°-90°F	Fatigue possible with prolonged exposure and/or physical activity.
Extreme Caution	90°-103°F	Heat stroke, heat cramps, or heat exhaustion possible with prolonged exposure and/or physical activity
Danger	103°-124°F	Heat cramps or heat exhaustion likely, and heat stroke possible with prolonged exposure and/or physical activity
Extreme Danger	125°F+	Heat strokes highly likely.

Other impacts of high temperatures include drought, wildfire, and the formation of ground-level ozone.[31] Prolonged heat can cause power use to spike and overload the electrical grid, causing outages.[32] Cold temperatures are often combined with winter storms. Individuals may have to deal with the loss of heat and power due to storm damage, which could further subject them to the cold.[33] Carbon monoxide poisoning is another risk during cold weather, especially when households lack adequate power or heat.[34] Extreme heat and cold can both negatively impact transportation infrastructure. Railroad tracks are a particular concern because the metal rails can kink in high temperatures.[35]

Previous Occurrences

There is not a comprehensive data source listing instances when the National Weather Service has issued extreme heat or cold warnings or advisories in Worcester County. Across Massachusetts as a whole, there were 33 cold weather events between 1994 and 2018. The NOAA storm Events database lists the following Extreme Cold/ Wind Chill Events as having occurred in Southern Worcester County since the last Hopedale HMP was developed in 2017:

[27] 2018 Massachusetts State Hazard Mitigation and Climate Adaptation Plan.
[28] Vaidyanathan, A. (2020). Heat-Related Deaths—United States, 2004–2018. MMWR. Morbidity and Mortality Weekly Report, 69. https://doi.org/10.15585/mmwr.mm6924a1
[29] Vaidyanathan, A. (2020).
[30] National Weather Service. (n.d.). What is the heat index? National Weather Service; NOAA's National Weather Service. Retrieved February 4, 2022, from https://www.weather.gov/ama/heatindex
[31] 2018 Massachusetts State Hazard Mitigation and Climate Adaptation Plan.
[32] 2018 Massachusetts State Hazard Mitigation and Climate Adaptation Plan.
[33] 2018 Massachusetts State Hazard Mitigation and Climate Adaptation Plan.
[34] 2018 Massachusetts State Hazard Mitigation and Climate Adaptation Plan.
[35] 2018 Massachusetts State Hazard Mitigation and Climate Adaptation Plan.

- 01/06/2018: Strong west winds trailed the January 4 winter storm. These winds drew bitterly cold arctic air over Massachusetts. The combination of strong wind and low temperatures created a dangerous wind chill, with readings reaching 25 degrees below zero or colder in a couple of locations during the early mornings of January 6 and 7.
- 01/21/2019: Strong west to northwest winds trailing the January 20th storm drew cold air across Southern New England on January 21st and caused wind chill values of 25 below zero or colder in Central and Western Massachusetts. The wind diminished during the afternoon and evening of of January 21st allowing wind chill values to become less extreme, in the teens below zero.

According to the SHMCAP43 warm weather events have occurred across Massachusetts between 1995 and 2018. The NOAA Storm Events database does not have Record Warmth/Heat or Excessive Heat events listed in the last decade for Southern Worcester County. However, it should be noted that, in 2012, Massachusetts temperatures broke 27 heat records. Most of these records were broken between June 20 and June 22, 2012, during the first major heat wave of the summer to hit Massachusetts and the East Coast. In July 2013, a long period of hot and humid weather occurred throughout New England. One fatality occurred on July 6, when a postal worker collapsed as the Heat Index reached 100°F. [36]

Inland portions of Massachusetts are more subject to extreme temperatures because they lack the moderating effect of the Atlantic Ocean, and densely developed cities are more likely to be impacted by heat waves than smaller towns like Hopedale.

Probability of Future Events

The probability of future extreme heat or extreme cold is considered to be "moderate," or between 10 and 40 percent in the next year.

Impact

The impact of extreme heat or cold in Hopedale is considered to be "limited," with no property damage and a limited effect on humans.

EXPOSURE

Certain features within Hopedale's community infrastructure, society, and environment may face more exposure to extreme temperatures, or be disproportionately impacted by them, relative to the rest of the community. Some of these features may be documented in the list of critical facilities and vulnerable populations in *Section* 3. Vulnerable community features include:

- Children and elderly residents, who may find it difficult to regulate their body temperatures in extremely hot or cold conditions.
- Low-income residents unable to afford adequate cooling or heating.
- Renters who may have few options for mitigating extreme heat and cold through home improvements.
- People who work outdoors such as construction or farm workers.

[36] NOAA Storm Events Database

- The utility grid, which could be vulnerable to outages due to surges in power during extreme temperatures. Power outages during extremely hot or cold days could cause further problems to those who rely on air conditioners or electric heaters.
- Certain forms of agriculture may be negatively affected by extreme temperatures, especially extreme heat.

Potential Climate Change Effects

According to the 2018 State Hazard Mitigation and Climate Adaptation Plan, there are two major ways that temperature in Massachusetts be influenced by climate change:

- High temperatures overall will result in higher extreme temperatures in the summer months. By 2100, extreme heat could occur between 13 and 65 days during the summer.
- By 2100, annual average temperatures are expected in increase by 3.8 to 10.8 degrees compared to the 1971-2000 baseline.

In summary, climate change is likely to increase the frequency of extreme heat in Massachusetts. Changes to average annual temperatures will also impact Hopedale. Seasonal temperatures may shift, with spring and summer temperatures extending through more of the year.[37] Winters may also be more mild than historical norms.[38] Changes to average temperatures could impact the agricultural industry and the natural environment. Farmers may need to shift their practices to account for new climate conditions, and certain specific of plants and animals may need to migrate to new ranges to find suitable habitat.[39]

Vulnerability

Hopedale's vulnerability from extreme heat and cold is considered to be, "4 - Low Risk."

[37] 2018 Massachusetts State Hazard Mitigation and Climate Adaptation Plan.
[38] 2018 Massachusetts State Hazard Mitigation and Climate Adaptation Plan.
[39] 2018 Massachusetts State Hazard Mitigation and Climate Adaptation Plan.

4.12 Other Hazards

In addition to the hazards identified in previous sections, the Hazard Mitigation Team reviewed the other hazards listed in the Massachusetts Hazard Mitigation Plan: coastal hazards, atmospheric hazards, ice jams, coastal erosion, sea level rise, and tsunamis. It was determined that these hazards are irrelevant to Hopedale due to the town's location.

Landslides

One other hazard that can affect Hopedale is landslides. Landslides occur in all U.S. states and territories. In a landslide, masses of rock, earth, or debris move down a slope. Landslides may be small or large, slow or rapid. They are generally activated by:

- storms
- earthquakes
- volcanic eruptions
- fires
- alternate freezing or thawing
- steepening of slopes by natural erosion or by human modification

Debris and mud flows are rivers of rock, earth, and other debris saturated with water. They develop when water rapidly accumulates in the ground, during heavy rainfall or rapid snowmelt, changing the earth into a flowing river of mud or "slurry." They can flow rapidly, striking with little or no warning at avalanche speeds. They also can travel several miles from their source, growing in size as they pick up trees, boulders, cars, and other materials.

There are no documented previous occurrences of significant landslides in Hopedale. The town is relatively flat and its primary water body and river are dammed, slowing movement and minimizing landslide risk. The only roadways built close to Spindleville Pond are Freedom Street, Dutcher Street, and a few smaller side streets. The Mill River crosses over Route 16 and Mill Street, and comes up against a small residential development near Laurelwood Drive. The Town has reduced undercutting risk from stormwater-induced bank erosion to the extent that is has mostly avoided building close to its water features. High slope terrain (defined as 15 to 25% grade) covers 117 acres, or only 3.4% of the town; very high slopes (higher than 25% grade) cover 11 acres, or less than 1% of the town's area. Little development is present in these areas; however, a sizable portion of Hopedale's high slope terrain borders Spindleville Pond to its west. If a landslide were to happen, causing land to enter the pond, water displacement could cause spillage or a dam failure near Freedom Street. Nearby residencies and Town buildings could be affected. Overall, should a landslide occur in the future in Hopedale, the type and degree of impacts would be highly localized. Vulnerabilities could include damage to structures, damage to transportation and other infrastructure, and localized road closures, though our data review and the local planning team noted no specific concerns. Flooding from water displacement injuries and casualties, while possible, would be unlikely given the low extent and impact of landslides in Hopedale.

Hopedale, like nearly all communities in the CMRPC region, has few areas with susceptibility for landscapes according to figure 4-16 in the 2018 State Hazard Mitigation and Climate Adaptation. Landslides are therefore considered low frequency events that may occur once in 50 to 100 years (a 1% to 2% chance of occurring per year).

5.0 EXISTING PROTECTION

The Town of Hopedale currently makes use of most available locally-controlled tools to mitigate the consequences of natural hazards: zoning regulations, planning, and physical improvements. The Town does not participate in any federal programs such as StormReady certification or Firewise community certification, but it does use utilize CodeRed and Reverse 911 for emergency notifications. Hopedale plans to research the utility of public awareness and education programs as a result of this planning process.

Hopedale has most of the no-cost or low-cost hazard mitigation capabilities in place. 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, tree maintenance, etc. Hopedale also has appropriate staff dedicated to hazard mitigation-related work for a community of its size, including a Town Administrator, an Emergency Management Director, a Highway Superintendent, Water & Sewer Manager, and a Tree Warden. Hopedale has several relevant plans in place, including a Comprehensive Emergency Management Plan (2006), and a Master Plan which is in the process of being updated. Not only does Hopedale 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, Commissions and Committees and in other volunteer positions. The Town collaborates closely with surrounding communities through its South Middlesex County Fire Department (Mutual Aid District 14, and has opted-in to fire protection and DPW mutual aid agreements through MEMA. Hopedale is also an active member community of the Central Massachusetts Regional Planning Commission (CMRPC) and can take advantage of no cost local technical assistance as needed provided by the professional planning staff at CMRPC.

The table below describes existing mitigation protections in Hopedale. It includes a brief description of each activity as well as a subjective evaluation of its effectiveness and of any need for modifications.

5.1 Existing Protection Matrix

Existing Measure	Description	Action	Effectiveness & Recommendations
Participation in National Flood Insurance Program (NFIP)	Provides flood insurance for structures located in flood-prone areas. Also, communities participating in the NFIP have adopted and enforce ordinances, bylaws and regulations that meet or exceed FEMA requirements to reduce the risk of flooding.	Hopedale monitors building activity within the flood plain to ensure compliance with provisions of state building code.	Effective; There are no repetitive loss properties in Hopedale. Hopedale should seek to further limit development in the 100-year flood zones. The Town of Hopedale should look at joining the Community Rating System (CRS) under the NFIP to allow the resident earn discount on their flood insurance rate.. Hopedale should educate its residents about NFIP.
Flood Plain District zoning bylaw in place	Requires all development to be in compliance with state building code requirements for construction in floodplains	Hopedale has a Flood Plain District (Section 14) in its Zoning Bylaw.	Very effective; No changes recommended
Local Open Space and Recreation Plan	Local plan identifying significant natural resources and identifying mechanisms to ensure their protection. Following Mass. Department of Conservation and Recreation guidance for development of OSRPs, this document does not focus on specific hazards. Open Space Plans can provide many tools. Towns must commit to making the land acquisitions and regulatory changes, giving increased attention to preserving undeveloped flood-prone areas and associated lands	Hopedale's Open Space and Recreation Plan was first issued in 1990. The Town is in the process of updating its OSRP.	Somewhat effective; Where allowable, Hopedale should use the update to integrate hazard mitigation activities and recommendations.

Comprehensive Stormwater Management Program	Hopedale completed a Comprehensive Stormwater Management Plan, which outlines tasks to improve stormwater management, and presented it at a public meeting.	Hopedale is in the process of seeking funding and carrying out action items in this plan.	Very effective; Hopedale should inquire with CMRPC for assistance identifying applicable grants.
Drainage system maintenance and repair program	Plan to keep municipal drainage facilities (storm drains, catch basins etc.) in good order	Hopedale performs street sweeping and catch basin cleaning yearly.	Effective; Hopedale should examine a public education program for residents on storm drain clearance and other best practices.
Tree Trimming	Plan to ensure routine maintenance of trees to reduce likelihood of vegetative debris in response to storm events	Hopedale conducts roadside mowing yearly to remove juvenile trees. Tree trimming (take-downs and clearing dead branches) takes place as needed.	Effective; Hopedale should work with its electrical utility to coordinate a more systematic tree trimming program. Hopedale should also seek out additional grants to aid with tree management.
Culvert Maintenance and Replacement	Maintain existing culverts through regular maintenance and (in some cases) beaver controls; replace/expand culverts/catch basins where needed to allow for adequate stormwater flow.	The Town has historically maintained and replaced problem culverts when needed and as funding allows.	Somewhat effective; Current efforts are piecemeal and are limited by lack of resources and systematic approach. Hopedale should develop a prioritized inventory of problem culverts for use in seeking external financial support.

6.0 Status of Mitigation Measures From 2017 Plan

Town staff provided updates on the status of mitigation measures from Hopedale's 2017 Hazard Mitigation Plan. Certain measures were incomplete as of 2022 and deemed "still relevant". These actions were reviewed by the Core Team. Some actions were re-incorporated in the 2022 Hazard Mitigation Plan action strategy based on whether they could be completed in the next 5 years, and their perceived effectiveness.

2017 Task	2022 Status	2022 Notes	Include in 2022 Plan?
Structure & Infrastructure Strategies			
Tree trimming and tree wire installation needed across Town to protect utility wires, especially in south end of Town where flooding is frequent and sump pumps are required. Focus on high-growth areas. Repeat every four years.	Completed	Tree trimming around wires was completed by National Grid and is maintained by them as well.	NO
Identify / resolve issues causing flooding in the Dana Park/Harmony Estates area including catch basin cleaning	In progress	Catch basin cleanings have been completed and surveyed, along with outfalls, outfall sampling, and outfall condition; Dana Park is still an issue - cleaned out drainage but it didn't help. The town has lacked resources and staffing to finish attending to this issue.	YES
Identify / resolve issues causing flooding near Centennial Street and the Community House	In progress	Issues still here, culvert from Centennial that runs from community house through highway and old stone culvert can't hold volume of water. This leads to floods during heavy rainstorms. This might need a larger diameter pipe. Without mitigation, it will continue to cause flooding on Dutcher St and Hopedale St. The town has lacked resources and staffing to finish attending to this issue.	YES
Identify / resolve issues causing flooding near Fitzgerald Drive	In progress	The private road is currently shut down and will need to be fixed when re-opened. This intersects with the Mill River, so any flooding from river will flood the road. The town has lacked resources and staffing to finish attending to this issue.	YES

Identify / resolve issues causing flooding near Cutler Street	Completed	No longer a problem area.	NO
Identify / resolve issues causing flooding near Mellen Street, including monitoring and clearing beaver dams	Completed (beavers no longer in this location)	For now, there are no longer beavers in this location. When there were beavers, this area was flooding out to the Charles River at one point. The bridge on Mellen Street is closed right now, and it would need to be replaced before the Town can open it back up. Fixing this bridge should help with flooding issues. The closest beaver dam is on Hopedale/Bellingham border on Charles River, though beavers could migrate back to Hopedale.	NO
Structural upgrades to old Fire Department building and attached tower	No movement on this action yet	The Fire Department building needs a new roof, new tower, and new bricks. No funding was available to move on this project yet.	YES
Replace emergency generator and associated wiring at former school (4 Maple Road) to provide power to building and food storage and preparation areas for use as shelter	No movement on this action yet	The Town is waiting for a generator for the High School, which is designated as a shelter and currently has no generator. In the meantime, if there is a regional shelter open, the Town can send people there. Northbridge is typically where the Town sends its residents to. It is highly recommended that the High School installs a generator. Memorial School doesn't have central air so it cannot be a cooling center. Lack of funding and debate on what location to designate as emergency shelter has held up this project. Memorial School is designated as a shelter right now. The High School only has one functioning boiler, and Memorial School doesn't have A/C. The Town wants to prioritize updates at one shelter location.	YES (but at High School or Memorial School)
Preparedness, Coordination & Response Action Strategies			

Coordinate with Towns of Hopkinton and Milford regarding water release from Lake Maspenock, Fiske Mill Pond, and Mill Pond, which have the potential to cause significant flooding in Hopedale.	In progress	The Town is taking steps to complete this task during the Freedom Street Dam reconstruction. The Town Administrator is seeking funding to daylight the Mill River. This should be incorporated in the as-builts/O&M in the contacts list and chain of command. The Town wants to communicate regionally between groups and wants to start a Mill River Watershed Association. The town also wants to coordinate with private entities that own dams along this waterway. Coordination should include communities downstream.	YES
Continue to participate in National Flood Insurance Program (NFIP) (or other) training offered by the State and/or FEMA that addresses flood hazard planning and management	Ongoing	The Town continues to participate in this program. There are no repetitive loss properties in Hopedale. The Town should seek to further limit development in the 100-year flood zones. The Town of Hopedale should look at joining the Community Rating System (CRS) under the NFIP to allow the resident earn discount on their flood insurance rate.The Town should also seek to educate its residents about NFIP. Hopedale also has a Flood Plain District in its Zoning Bylaw which requires all development to be in compliance with state building code requirements for construction in floodplains.	YES
Investigate Community Rating System (CRS) benefits and requirements and decide whether to participate	No movement on this action yet	Lack of funding and staff time has prevented this project from being completed.	YES
Road information coordination and planning for snow removal	Completed	Snow Removal Coordination is in place and works well. If there are major emergencies, the Town sends out alerts on CodeRED.	NO
Evacuation Plan updates	Completed	Evacuation plans have been updated in the community plan.	NO

Improve vegetation and debris management along Grafton-Upton Railway and CSX railway rights-of-way; recurrent brush fires reported near tracks	Completed	Vegetation and debris management has been occurring. The railroad has different stages that they manage every year. And they have tracks marked for limited spray zones and no spray zones. The action plan is reviewable every year. There have been no major brushfires in Hopedale.	NO
Education & Awareness Strategies			
Provide information to residents and businesses on severe snowstorms, ice storms, nor'easters, severe thunderstorms, high winds, tornadoes, lightning, and flooding, hurricanes tropical storms, and microbursts. Incorporate into school programs for students to bring home information to parents.	In progress	Lack of funding and staff time has prevented the completion of this project. Discussion on these topics occurred during the Municipal Vulnerability Preparedness planning process. Recommendations from the MVP plan suggest providing more climate resilience and natural hazard preparedness outreach and education materials. During the school year, the Safe Student Fire Awareness Education program is provided. The Town wants to acquire a siren to alert residents of severe weather.	YES
Provide information to residents and businesses, possibly through town-wide mailings, about proper brush and tree clearance, and other firefighting measures.	No movement on this action yet	Lack of funding and staff time has prevented the completion of this project. The local planning team suggests providing this information through a Town mailing (ex. Tax or Water/Sewer bill).	YES
Provide information to residents and businesses on droughts, and water conservation through low-impact landscaping and other measures (to conserve water for firefighting). Integrate lessons from Mass Audubon. Incorporate into school programs for students to bring home information to parents.	No movement on this action yet	Lack of funding and staff time has prevented the completion of this project. The local planning team suggests providing this information through a Town mailing (ex. Tax or Water/Sewer bill). The Town does alert residents of drought conditions during water bans. And this topic was discussed further during the Municipal Vulnerability Preparedness planning process.	YES
Local Plan & Regulation Strategies			

Pursue local Stormwater Management Policy and Bylaw to ensure adequate on-site retention and recharge	Completed	This was adopted at Town Meeting. The Water Department is looking further at the bylaw and is considering stormwater fines and fees to keep management program going.	NO
Use MA Drought Management Plan as a template for Town's own drought plan, and integrate State's recommendations and actions according to Town's needs.	Completed	This is in WMA permit (Water Dept) and DEP is currently drafting drought regulations that will be mandatory for all water suppliers to follow based on drought severity. There is interest in trying to incorporate private wells into regulations.	YES
Establish a Local wetlands protection bylaw to further build upon the State's Wetlands Protection Act and Regulations, which add regulatory oversight provisions for development within the jurisdictional buffer zone, adding increased attention to alteration of wetlands and the opportunity to preserve capacity and quality.	In progress	The Town has begun developing a Wetlands Bylaw, though it is in early stages. The town has lacked resources and staff time to finish development.	YES
Review and update local plans and development review processes (planning, zoning, stormwater management, conservation, etc.) to ensure new construction will not be affected by hazards	In progress	The Stormwater Bylaw has been reviewed and updated. The Town is working on the permitting process between different Town Departments. Lack of resources and staffing has held up this process.	YES
Monitor implementation of Hazard Mitigation Plan	Ongoing	The Town has been managing several action plans from various planning efforts and is trying to coordinate progress between all of them.	YES

7.0 MITIGATION STRATEGY

The Hopedale Hazard Mitigation Planning team developed a list of mitigation strategies (both new and previously identified by local officials) and prioritized them using the criteria described below. This list of factors is broadly derived from FEMA's STAPLE+E feasibility criteria.

7.1 OBJECTIVE

Objectives are based on background information on natural hazards in Hopedale, the list of critical infrastructure and facilities, and knowledge and experience from the Core Team, to generate a list of objectives for Hopedale's natural hazard mitigation strategy. Each objective includes one or more mitigation actions. General objectives for Hopedale include:

- Address current stormwater drainage issues and proactively incorporate resilience to extreme precipitation
- Address roadway erosion and maintenance issues and proactively incorporate resilience to extreme precipitation
- Ensure availability of water for fire suppression
- Maintain readiness and response capacities of Hopedale's emergency services
- Support community quality of life
- Protect the natural environment and ecosystem services
- Protect water quality and public health
- Complete other actions that build community resilience

7.2 PRIORITY

Following the ranking of each strategy for its mitigation impact, real world considerations were brought back into the analysis to inform the priority ranking process. Factors considered in this step include costs and cost effectiveness (including eligibility and suitability for outside funding), timing, political and public support, and local administrative burden.

- High Priority – strategies that have obvious mitigation impacts that clearly justify their costs and to a large degree can be funded, can be completed in a timely fashion, can be administered effectively, and are locally supported
- Medium Priority – strategies that have some clear mitigation impacts that generally justify their costs and generally can be funded, can be completed in a timely fashion, can be administered effectively, and are locally supported
- Low Priority – strategies that have relatively low mitigation impacts that do not necessarily justify their costs and that may have difficulty being funded, completed in a timely fashion, administered effectively, and locally supported

Costs and 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 clear and viable potential funding streams, such as FEMA's Hazard Mitigation Grant Program (HMGP), are also given higher priority.

Time required for completion - Projects that are faster to implement, either due to short work

duration, current or near-term availability of funds, and/or ease of permitting or other regulatory procedures, are given higher priority.

Political and public support - Strategies are given higher priority if they have demonstrated political and/or public support through positive involvement by the public, prioritization in previous regional and local plans, initiatives that were locally initiated or adopted are given higher priority, or prioritization in the Community Resilience Building workshop process.

Administrative burden – Strategies that are realistically within the administrative capacity of the town and its available support network (CMRPC, Blackstone River Valley National Heritage Corridor, Blackstone Watershed Collaborative, etc.) are prioritized. Considerations include grant application requirements, grant administrative requirements (including audit requirements), procurement, and staff time to oversee projects.

Impact - The team's consideration of each strategy included an analysis of the mitigation impact each can provide, regardless of cost, political support, funding availability, and other constraints. The intent of this step is to separately evaluate the theoretical potential benefit of each strategy to answer the question: if cost were no object, what strategies have the most benefit? Factors considered in this analysis include the number of hazards each strategy helps mitigate (more hazards equals higher impact), the estimated benefit of the strategy in reducing loss of life and property (more benefit equals higher impact) based on the relevant hazard(s) as assessed in Chapter 4, and the geographic extent of each strategy's benefits (other factors being equal, a larger area equals higher impact).

- High Impact – actions that help mitigate several hazards, substantially reduce loss of life and property (including critical facilities and infrastructure), and/or aid a relatively large portion of the community
- Medium Impact – actions that help mitigate multiple hazards, somewhat reduce loss of life and property (including critical facilities and infrastructure), and/or aid a sizeable portion of the community
- Low Impact – actions that help mitigate a single hazard, lead to little or no reduction in loss of life and property (including critical facilities and infrastructure), and/or aid a highly localized area

7.3 Estimated Cost

Each implementation strategy is provided with a rough cost estimate based on available third party or internal estimates and past experience with similar projects. Each includes hard costs (construction and materials), soft costs (engineering design, permitting, etc.), and where appropriate Town staff time (valued at appx. $25/hour for grant applications, administration, etc.). Projects that already have secured funding are noted. Detailed and current estimates were not generally available, so costs are summarized within the following ranges:

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

7.4 Timeline

Each strategy is provided with an estimated length of time it will take for implementation. Where funding has been secured for a project, a specific future date is provided for when completion is expected. However, most 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. Strategies are grouped by 1-2 year timeframe, 3-5 year timeframe, 5+ year timeframe, and ongoing items.

7.5 Strategy Types

Mitigation strategies were broken into four broad categories to facilitate local implementation discussions, especially regarding budget considerations and roles/responsibilities:

Structure and Infrastructure Projects - Construct "bricks & mortar" infrastructure and building improvements in order to eliminate or reduce hazard threats, or to mitigate the impacts of hazards. Examples include drainage system improvement, dam repair, and generator installation. Structure and infrastructure improvements tend to have the greatest level of support at the local level, but are highly constrained by funding limits.

Preparedness, Coordination and Response Actions - Ensure that a framework exists to facilitate and coordinate the administration, enforcement and collaboration activities described in this plan. Integrate disaster prevention/mitigation and preparedness into every relevant aspect of town operations, including Police, Fire, EMD, EMS, DPW, Planning Board, Conservation Commission and Select Board; coordinate with neighboring communities where appropriate. Recommendations in this category tend toward standardizing and memorializing generally-practiced activities.

Education and Awareness Programs - Integrate education and outreach into the community to raise awareness of overall or hazard-specific risk and generate support for individual or community-wide efforts to reduce risk. Awareness and education seek to affect broad patterns of behavior, essentially altering a culture. Awareness-building activity tends to have a fairly slow effect, although in the end it can provide extraordinary benefits with relatively little cash outlay.

Local Plans and Regulations - Review and propose updates to local bylaws, ordinances and regulations to protect vulnerable resources and prevent further risk to those resources. Formally adopt these updates into the local regulatory framework. Review the effectiveness of past mitigation projects, programs procedures and policies. Incorporate mitigation planning into master plans, open space plans, capital improvement plans, facility plans, etc.

Planning and regulatory activity tends to provide extraordinary benefits with relatively little cash outlay. However, in smaller communities where planning activities are largely the purview of volunteers, outside assistance from the state or regional levels may be required to maximize its benefits. Political support may be difficult to achieve for some planning and regulatory measures, especially those that place new constraints on land use.

In addition to describing action items in each of these categories, for each strategy we also identify what hazard(s) it is intended to address. Each strategy also identifies the lead organization who serves as the primary point of contact for coordinating efforts associated with that item and identifies potential funding sources for implementation.

7.6 Town of Hopedale 2023 Hazard Mitigation Strategies

OVERALL GOAL: Facilitate activity within the Town of Hopedale that reduces the loss, and risk of loss, to persons, property, and environment. Please view section 8.4, Potential Federal and State Funding sources, for more information on the funding sources listed below.

Actions	Hazards Addressed	Objective	Agencies Involved	Potential Funding Sources	Priority	Impact	Estimated Cost	Timeline
Structure & Infrastructure Strategies								
Add PFAS removal treatment to existing water treatment plant.	FL, DR	Protect Water Quality and Public Health	EPA, DEP, Water and Sewer Department	Staff Time, MVP Action Grant, Drinking Water Supply Grant, Town General Fund/ Town Capital Budget	High	High	High	3-5 Years
Adding three additional gravel packed satellite wells to our current Green Street well location and pump test BRW1 to increase water supply. This would include engineering, construction, and DEP approval process.	FL, DR, WF	Protect Water Quality and Public Health	EPA, DEP, Highway Department, Water and Sewer Department	Staff Time, MVP Action Grant, Drinking Water Supply Grant, Town General Fund/ Town Capital Budget	High	High	High	3-5 Years

Reconstruct the Freedom Street Dam.	FL, DF	Address Current Stormwater Drainage Issues	Army Corp of Engineers, DEP, Select Board, Conservation Commission, Highway Department	BRIC Grant, Dam and Seawall Repair and Removal Grant, Army Corp of Engineers Planning Assistance, Town General Fund/ Town Capital Budget	High	High	High	3-5 Years
Remove the beaver dam by the rustic bridge.	FL, DF	Address Current Stormwater Drainage Issues	Conservation Commission, DEP, Highway Department	MVP Action Grant, Staff Time, ARPA Grant, DER Ecological Restoration Grant, Town General Fund	High	High	Low	1-2 Years
Restore Hopedale Pond and remove sedimentation.	FL, DR, XT	Protect the Natural Environment and Ecosystem Services	Conservation Commission, EPA, DEP, Highway Department	MVP Action Grant, DER Ecological Restoration Grant, Private Funding, Town General Fund/ Town Capital Budget	Medium	Medium	High	3-5 Years
Daylight the Mill River by strengthening and deepening the river in certain segments. Remove sediment from Spindleville Pond and upstream.	FL, HU, DF	Protect the Natural Environment and Ecosystem Services	Conservation Commission, EPA, DEP, Highway Department	MVP Action Grant, DER Ecological Restoration Grant, Private Funding, Town General Fund/	Medium	High	High	5+ Years

				Town Capital Budget				
Conduct a Town-wide culvert inventory and assessment.	FL, HU	Address Current Stormwater Drainage Issues	Conservation Commission, EPA, DEP, Highway Department	MVP Action Grant, Culvert Replacement Municipal Assistance Grant, Staff Time, CMRPC (DLTA/LPA), Town General Fund/ Town Capital Budget	High	High	Medium	1-2 Years
Identify / resolve issues causing flooding in the Dana Park/Harmony Estates area including catch basin cleaning.	FL, SS, ST, HU	Address Roadway Erosion and Maintenance Issues	Highway Department, Water and Sewer Department, Conservation Commission Board of Health	MassWorks, Chapter 90, Staff Time, Town General Fund/ Town Capital Budget	Medium	Medium	Medium	1-2 Years
Identify / resolve issues causing flooding near Centennial Street and the Community House.	FL, SS, ST, HU	Address Roadway Erosion and Maintenance Issues	Highway Department, Water and Sewer Department, Conservation Commission, Board of Health	MassWorks, Chapter 90, Staff Time, Town General Fund/ Town Capital Budget	Medium	Medium	Medium	1-2 Years

Identify / resolve issues causing flooding near Fitzgerald Drive.	FL, SS, ST, HU	Address Roadway Erosion and Maintenance Issues	Highway Department, Water and Sewer Department, Conservation, Board of Health	MassWorks, Chapter 90, Staff Time, Town General Fund/ Town Capital Budget	Medium	Medium	Medium	1-2 Years
Upgrade the Fire Department building (new roof and new bricks) and attached tower. Investigate building an Emergency Operations Center with Police Department and Fire Department in an alternative location.	FL, SS, ST, HU	Maintain Readiness and Response Capacities of Emergency Services	Highway Department, Water and Sewer Department, Conservation, Board of Health	USDA Community Facilities Direct Loan & Grant Program, Assistance to Firefighter Grants, Staff Time, Town General Fund/ Town Capital Budget	Medium	Medium	Low	1-2 Years
Install generator at the High School and upgrade other amenities to improve facility as the emergency shelter location.	FL, SS, ST, HU	Maintain Readiness and Response Capacities of Emergency Services	Highway Department, Water and Sewer Department, Conservation, Board of Health	BRIC Grant, HMGP Grant, Private Funding, Town General Fund/ Town Capital Budget	Medium	Medium	Low	1-2 Years
Install solar panels to the High School and Elementary School.	FL, SS, ST, HU	Maintain Readiness and Response Capacities of Emergency Services	Highway Department, Water and Sewer Department, Conservation, Board of Health	BRIC Grant, HMGP Grant, Private Funding, Town General Fund/ Town Capital Budget	Medium	Medium	Low	2-4 Years

Upgrade Highway Department building by constructing a wash bay and upgrading storage for salt and sand.	FL, SS, ST, HU	Maintain Readiness and Response Capacities of Emergency Services	Highway Department, Select Board	USDA Community Facilities Direct Loan & Grant Program, Private Funding, Town General Fund/ Town Capital Budget	High	Medium	High	5+ years
Develop a Retention and Detention Pond clearing plan for the 14-15 ponds and implement.	DR, WF, XT	Ensure Availability of Water for Fire Suppression	Conservation Commission, EPA, DEP, Highway Department, Fire Department	MVP Action Grant, CDBG, HMGP	High	High	High	3-5 Years
Preparedness, Coordination & Response Action Strategies								
Perform a Vulnerability Assessment of all the dams in Town.	FL	Address Current Stormwater Drainage Issues	Army Corp of Engineers, DEP, EPA, Conservation Commission, Highway Department	MVP Action Grant, Dam and Seawall Repair and Removal Grant, Private Funding, Town General Fund/ Town Capital Budget	Medium	High	Low	3-5 Years
Investigate constructing additional fire cisterns in certain areas to address lack of access to water for firefighters. Review and update cistern regulations.	DR, WF, XT	Ensure Availability of Water for Fire Suppression	Conservation Commission, EPA, DEP, Highway Department, Fire Department	USDA Community Facilities Direct Loan & Grant Program, Assistance to Firefighters Grants, MVP Action Grant, BRIC Grant	Medium	High	Low	1-2 Years

Coordinate with Towns of Hopkinton and Milford regarding water release from Lake Maspenock, Fiske Mill Pond, and Mill Pond, which have the potential to cause significant flooding in Hopedale. Create Mill River Watershed Association.	FL, SS, ST, HU	Protect the Natural Environment and Ecosystem Services	Conservation Commission, Planning Board, Highway Department	MVP Action Grant, Staff Time, Town General Fund/ Town Capital Budget, Water Quality Management Planning Grant	High	Medium	Low	1-2 Years
Continue to participate in National Flood Insurance Program (NFIP) (or other) training offered by the State and/or FEMA that addresses flood hazard planning and management.	FL, SS, ST, HU	Support Community Quality of Life	DPW, Local Emergency Management, Planning	Staff Time	High	High	Low	1-2 Years
Investigate Community Rating System (CRS) benefits and requirements and decide whether to participate.	FL, SS, ST, HU	Support Community Quality of Life	DPW, Local Emergency Management, Planning	Staff Time	Low	Low	Low	1-2 Years
Install siren(s) to alert residents of severe weather.	SS, WF, HU, ST	Maintain Readiness and Response Capacities of Emergency Services	DPW, Local Emergency Management, Planning	USDA Community Facilities Direct Loan & Grant Program, Assistance to Firefighters Grants, MVP Action Grant, BRIC Grant	Medium	High	Low	3-5 Years
Education & Awareness Strategies								
Host a one-day workshop for the public covering severe storms, emergency preparedness, individual climate resilience. Record presentations and post on Town website.	DF, EQ, HU, SS, WF, DR, FL, ST, XT	Support Community Quality of Life	Local Emergency Management	MVP Action Grant, Staff Time, Town General Fund, CMRPC (DLTA/LPA)	Medium	High	Low	1-2 Years

Provide information to residents and businesses on severe snowstorms, ice storms, nor'easters, severe thunderstorms, high winds, tornadoes, lightning, and flooding, hurricanes tropical storms, and microbursts. Incorporate into school programs for students to bring home information to parents.	SS, ST, HU, FL	Support Community Quality of Life	Local Emergency Management	MVP Action Grant, Staff Time, Town General Fund, CMRPC (DLTA/LPA)	High	Medium	Low	1-2 Years
Provide information to residents and businesses, possibly through town-wide mailings, about proper brush and tree clearance, and other firefighting measures.	DR, WF	Support Community Quality of Life	Local Emergency Management	MVP Action Grant, Staff Time, Town General Fund, CMRPC (DLTA/LPA)	High	Medium	Low	1-2 Years
Provide information to residents and businesses on droughts, and water conservation through low-impact landscaping and other measures (to conserve water for firefighting). Integrate lessons from Mass Audubon. Incorporate into school programs for students to bring home information to parents.	DR, WF	Protect Water Quality and Public Health	Water & Sewer Department, Conservation Commission	MVP Action Grant, Staff Time, Town General Fund, CMRPC (DLTA/LPA)	High	Medium	Low	1-2 Years
Local Plan & Regulation Strategies								
Complete the development of and adopt Wetland Protection Bylaws. Review and update as needed.	FL, DR, XT, ST, HU	Protect the Natural Environment and Ecosystem Services	Conservation Commission, Select Board	Staff Time, Town General Fund/ Town Capital Budget, CMRPC Assistance (DLTA/LPA)	High	High	Low	1-2 Years
Use MA Drought Management Plan as a template for Town's own drought plan and integrate State's recommendations and actions according to Town's needs.	DR, WF, XT	Protect Water Quality and Public Health	Highway Department, Water Department,	Staff Time, Town General Fund, CMRPC Assistance (DLTA/LPA)	Medium	Low	Low	1-2 Years

			Conservation Commission					
Review and update local plans and development review processes (planning, zoning, stormwater management, conservation, etc.) to ensure new construction will not be affected by hazards.	DF, EQ, HU, SS, WF, DR, FL, ST, XT	Maintain Readiness and Response Capacities of Emergency Services	All Town Departments	Staff Time, Town General Fund, CMRPC Assistance (DLTA/LPA)	Medium	High	Low	1-2 Years
Monitor implementation of Hazard Mitigation Plan.	DF, EQ, HU, SS, WF, DR, FL, ST, XT	Maintain Readiness and Response Capacities of Emergency Services	All Town Departments	Staff Time, Town General Fund	High	High	Low	1-2 Years
Coordinate with Upton, Grafton, Milford regarding relative hazards along the Grafton-Upton Railroad.	FL, HU, DF, DR	Maintain Readiness and Response Capacities of Emergency Services	Select Board, Fire Department, Local Emergency Management	Staff Time, Town General Fund, CMRPC Assistance (DLTA/LPA)	High	High	Low	1-2 Years
Investigate the water rights all along the Mill River.	FL, HU, DF, DR	Protect the Natural Environment and Ecosystem Services	Conservation Commission, Planning Board, Select Board	Staff Time, Town General Fund/ Town Capital Budget, CMRPC Assistance (DLTA/LPA)	High	High	Low	1-2 Years

'Hazards Addressed' abbreviations:

DF	Dam Failure	DR	Drought
EQ	Earthquake	FL	Flooding
HU	Hurricane	OT	Other
SS	Severe Snowstorm/Ice storm/Nor'easter	ST	Severe Thunderstorm/Wind/Tornado
WF	Wildfire/Brushfire	XT	Extreme Temperatures

8.0 PLAN ADOPTION, IMPLEMENTATION, AND MAINTENANCE

8.1 PLAN ADOPTION

Update paragraph after plan finalization

A public meeting was held on MONTH ##, YEAR as part of the Select Board's meeting in order detail the planning process to date and to solicit comments and feedback from the public on the draft Hopedale Hazard Mitigation Plan then being developed. The draft plan was provided to the Town for distribution and posted on CMRPC's website from DATE for public review and input. The Plan was then submitted to the Massachusetts Emergency Management Agency (MEMA) and the Federal Emergency Management Agency (FEMA) for their review. Upon receiving conditional approval of the plan by FEMA, the final plan was adopted by vote of the Hopedale Select Board and certified on [Insert Date].

8.2 PLAN IMPLEMENTATION

The Town of Hopedale has taken steps to implement findings from the 2017 Hazard Mitigation Plan into the following policy, programmatic areas and plans: the 2021 Municipal Vulnerability Preparedness Plan, , and 2022 Master Plan, and the upcoming Open Space and Recreation Plan.

The implementation of the 2023 plan update began upon its formal adoption by the Select Board and approval by MEMA and FEMA. Those Town departments and boards responsible for ensuring the development of policies, ordinance revisions, and programs as described in Section 6 and Section 7 of this plan will be notified of their responsibilities immediately following approval. The Hazard Mitigation Team 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:

- ***Hopedale Comprehensive Emergency Management Plan*** (particularly the Critical Infrastructure Section) – the Critical Infrastructure section was used to help identify infrastructure components in Town that have been identified as crucial to the function of the Town; this resource was also used to identify potentially vulnerable populations and potential emergency response shortcomings.
- ***Regional Evacuation Plan*** – Funded by Homeland Security via the Commonwealth of Massachusetts and the Central Regional Homeland Security Advisory Council, the regional evacuation plan prepared by CMRPC was used to identify evacuation routes and shelters.
- ***Hopedale Open Space and Recreation Plan*** – This Plan was used to identify the natural context within which mitigation planning would take place. This proved useful insofar as it identified water bodies, rivers, streams, infrastructure components (i.e., water and sewer, or the lack thereof), as well as population trends. This was incorporated to ensure that the Town's mitigation efforts would be sensitive to the surrounding environment. It should be noted that this plan has expired and is in the process of being updated..
- ***Hopedale Zoning Bylaw*** –Zoning was used to gather identify those actions that the town is already taking that are reducing the potential impacts of a natural hazard (i.e., floodplain regulations) to avoid duplicating existing successful efforts.
- ***Hopedale Master Plan*** – The Town is in the process of updating its Master Plan. We encourage the Master Plan committee to include the recommendations provided by the

Hopedale Local Hazard Mitigation Team in this Plan to be incorporated into the final Hopedale Master Plan.

- ***Massachusetts State Hazard Mitigation Plan*** - This plan was used to ensure that the town's HMP was consistent with the State's Plan.

After this plan has been approved by both FEMA and the local government, links to the plan will be emailed to all Town staff, boards, and committees, with a reminder to review the plan periodically and work to incorporate its contents, especially the action plan, into other planning processes and documents. In addition, during annual monitoring meetings for the Hazard Mitigation Plan implementation process, the Hazard Mitigation Team will review whether any of these plans are in the process of being updated. If so, the Hazard Mitigation Team will remind people working on these plans, policies, etc., of the Hazard Mitigation plan, and urge them to incorporate the Hazard Mitigation plan into their efforts. The Hazard Mitigation Team will also review current Town programs and policies to ensure that they are consistent with the mitigation strategies described in this plan. The Hazard Mitigation Plan will also be incorporated into updates of the Town's Comprehensive Emergency Management Plan.

8.3 Plan Monitoring and Evaluation

The Town's Emergency Management Director will call meetings of all responsible parties to review plan progress 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 are 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 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 planning team 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 team will review and update the Hazard Mitigation Plan every five years.

Public participation will be a critical component of the Hazard Mitigation Plan maintenance process. The Hazard Mitigation Team will hold all meetings in accordance with Massachusetts open meeting laws and the public is invited to attend. 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.

8.4 POTENTIAL FEDERAL AND STATE FUNDING SOURCES

8.4.1 FEDERAL FUNDING SOURCES

The following is a summary of the programs which are the primary source for federal funding of hazard mitigation projects and activities in Massachusetts:

Table 14: Federal Hazard Mitigation Funding

Program	Type of Assistance	Availability	Managing Agency	Funding Source

National Flood Insurance Program (NFIP)	Pre-disaster insurance	Any time (pre & post disaster)	DCR Flood Hazard Management Program	Property Owner, FEMA
Community Rating System (CRS) (Part of the NFIP)	Flood insurance discounts	Any time (pre & post disaster)	DCR Flood Hazard Management Program	Property Owner
Flood Mitigation Assistance (FMA) Program	Cost share grants for pre- disaster planning & projects	Annual pre-disaster grant program	MEMA	75% FEMA/ 25% non- federal
Hazard Mitigation Grant Program (HMGP)	Post-disaster cost-share grants	Post disaster program	MEMA	75% FEMA/ 25% non- federal
Building Resilient Infrastructure and Communities (BRIC)	National, competitive grant program for projects & planning	Annual, pre-disaster mitigation program	MEMA	75% FEMA/ 25% non- federal
Assistance to Firefighters Grants (AFG)	Training & equipment for wildfire-related hazards	Annual	FEMA	FEMA
Army Corp of Engineers Planning Assistance	Water supply, conservation, wetlands, & dam safety	Any time (pre & post disaster)	U.S. Army Corps of Engineers	50% Federal/ 50% non-federal
USDA Community Facilities Direct Loan & Grant Program	Improve essential community facilities	Annual	USDA	Varies
Small Business Administration (SBA) Mitigation Loans	Pre- & Post- disaster loans to qualified applicants	Ongoing	MEMA	Small Business Administration
Public Assistance	Post-disaster aid to state & local governments	Post Disaster	MEMA	FEMA/ plus a non-federal share

The FEMA web pages identify several funding opportunities. Please refer to https://www.fema.gov/grants. Some programs are described in more detail below:

HAZARD MITIGATION ASSISTANCE

The HMA grant programs provide funding opportunities for pre- and post-disaster mitigation. While the statutory origins of the programs differ, all share the common goal of reducing the risk of loss of life and property due to Natural Hazards. Brief descriptions of the HMA grant programs can be found below. For more information on the individual programs, or to see information related to a specific Fiscal Year, please click on one of the program links.

Hazard Mitigation Grant Program (HMGP)

HMGP assists in implementing long-term hazard mitigation measures following Presidential disaster declarations. Funding is available to implement projects in accordance with State, Tribal, and local priorities. Please refer to http://www.fema.gov/hazard-mitigation-grant-program for additional information.

HMGP funds may be used to fund projects that will reduce or eliminate the losses from future disasters. Projects must provide a long-term solution to a problem, for example, elevation of a home to reduce the risk of flood damages as opposed to buying sandbags and pumps to fight the flood. In addition, a project's potential savings must be more than the cost of implementing the project. Funds may be used to protect either public or private property or to purchase property that has been subjected to, or is in danger of, repetitive damage. Examples of projects include, but are not limited to:

- Acquisition of real property for willing sellers and demolition or relocation of buildings to convert the property to open space use
- Retrofitting structures and facilities to minimize damages from high winds, earthquake, flood, wildfire, or other natural hazards
- Elevation of flood prone structures
- Development and initial implementation of vegetative management programs
- Minor flood control projects that do not duplicate the flood prevention activities of other Federal agencies
- Localized flood control projects, such as certain ring levees and floodwall systems, that are designed specifically to protect critical facilities
- Post-disaster building code related activities that support building code officials during the reconstruction process

Building Resilient Infrastructure and Communities (BRIC)

The Building Resilient Infrastructure and Communities program aims to categorically shift the federal focus away from reactive disaster spending and toward research-supported, proactive investment in community resilience. Examples of BRIC projects are ones that demonstrate innovative approaches to partnerships, such as shared funding mechanisms, and/or project design. For example, an innovative project may bring multiple funding sources or in-kind resources from a range of private and public sector partners. Or an innovative project may offer multiple benefits to a community in addition to the benefit of risk reduction. The BRIC program is replacing the Pre-Disaster Mitigation grant program. More information on the BRIC program can be found here: https://www.fema.gov/grants/mitigation/building-resilient-infrastructure-communities.

The Massachusetts Emergency Management Agency (MEMA) coordinates BRIC applications for municipalities within the Commonwealth. Links to MEMA resources and BRIC application materials can be found here: https://www.mass.gov/service-details/building-resilient-infrastructure-and-communities-bric-flood-mitigation-assistance-fma-grant-programs.

FLOOD MITIGATION ASSISTANCE (FMA)

Flood Mitigation Assistance (FMA) provides funds on an annual basis so that measures can be taken to reduce or eliminate risk of flood damage to buildings insured under the National Flood Insurance Program. Please refer to the FMA website: http://www.fema.gov/flood-mitigation-assistance-grant-program.

Three types of FMA grants are available to States and communities:

- **Project Scoping Grants** are designed to develop mitigation strategies and obtain data to prioritize, select, and develop complete applications in a timely manner that result in either an improvement in the capability to identify appropriate mitigation projects or in the development of an application-ready mitigation project for FMA or another.
- **Planning Grants** to prepare Flood Mitigation Plans. Only NFIP-participating communities with approved Flood Mitigation Plans can apply for FMA Project grants.
- **Technical Assistance Grants** are awards of up to $50,000 federal cost share for Recipients to which FEMA obligated at least $1 million federal share the previous FMA cycle.
- **Project Grants** to implement measures to reduce flood losses, such as elevation, acquisition, or relocation of NFIP-insured structures. States are encouraged to prioritize FMA funds for applications that include repetitive loss properties; these include structures with 2 or more losses each with a claim of at least $1,000 within any ten-year period since 1978.

MEMA coordinates FMA applications for municipalities within the Commonwealth. Links to MEMA resources and FMA application materials can be found here: https://www.mass.gov/service-details/building-resilient-infrastructure-and-communities-bric-flood-mitigation-assistance-fma-grant-programs.

DISASTER ASSISTANCE

Disaster assistance is money or direct assistance to individuals, families and businesses in an area whose property has been damaged or destroyed and whose losses are not covered by insurance. It is meant to help with critical expenses that cannot be covered in other ways. This assistance is not intended to restore damaged property to its condition before the disaster. While some housing assistance funds are available through FEMA's Individuals and Households Program, most disaster assistance from the Federal government is in the form of loans administered by the Small Business Administration.

Disaster Assistance Available from FEMA

In the event of a Declaration of Disaster, assistance from FEMA is grouped in 3 categories:

A. Housing Needs

- **Temporary Housing** (a place to live for a limited period of time): Money is available to rent a different place to live, or a government provided housing unit when rental properties are not available.
- **Repair**: Money is available to homeowners to repair damage from the disaster to their primary residence that is not covered by insurance. The goal is to make the damaged home safe, sanitary, and functional.
- **Replacement**: Money is available to homeowners to replace their home destroyed in the disaster that is not covered by insurance. The goal is to help the homeowner with the cost of replacing their destroyed home.
- **Permanent Housing Construction**: Direct assistance or money for the construction of a home. This type of help occurs only in insular areas or remote locations specified by FEMA, where no other type of housing assistance is possible.

B. Other than Housing Needs

- Money is available for necessary expenses and serious needs caused by the disaster,

including:

- Disaster-related medical and dental costs.
- Disaster-related funeral and burial cost.
- Clothing; household items (room furnishings, appliances); tools (specialized or protective clothing and equipment) required for your job; necessary educational materials (computers, school books, supplies)
- Fuels for primary heat source (heating oil, gas).
- Clean-up items (wet/dry vacuum, dehumidifier).
- Disaster damaged vehicle.
- Moving and storage expenses related to the disaster (moving and storing property to avoid additional disaster damage while disaster-related repairs are being made to the home).
- Other necessary expenses or serious needs as determined by FEMA.
- Other expenses that are authorized by law.

C. Additional Services

- Crisis Counseling
- Disaster Unemployment Assistance
- Legal Services
- Special Tax Considerations

ASSISTANCE TO FIREFIGHTERS GRANTS

The FEMA Assistance to Firefighters Grants (AFG) program provides funds to equip and train emergency personnel to recognized standards, enhance operations efficiencies, foster interoperability, and support community resilience. Under AFG, funds may be available for equipment, vehicles and/or training that can be used to mitigate and/or respond to wildfire-related hazards. AFG also has a Fire Prevention and Safety (FPS) component which funds public outreach programs and prevention activities, which can emphasize wildfire mitigation. Please refer to: https://www.fema.gov/welcome-assistance-firefighters-grant-program.

ARMY CORP OF ENGINEER PLANNING ASSISTANCE

Under the authority provided by Section 22 of the Water Resources Development Act of 1974 (PL 93-251), as amended, the U.S. Army Corps of Engineers can provide states, local governments, other non-Federal entities, and eligible Native American Indian tribes assistance in the preparation of comprehensive plans for the development, utilization, and conservation of water and related land resources. Typical studies are only planning level of detail; they do not include detailed design for project construction. The program can encompass many types of studies dealing with water resources issues. Types of studies conducted in recent years under the program include the following: water supply/demand, water conservation, water quality, environmental/conservation, wetlands evaluation/restoration, dam safety/failure, flood damage reduction, coastal zone protection, and harbor planning. Please refer to:
https://www.nae.usace.army.mil/missions/public-services/planning-assistance-to-states/

USDA COMMUNITY FACILITIES DIRECT LOAN & GRANT PROGRAM

The UDSA Community Facilities Direct Loan & Grant program provides affordable funding to develop essential community facilities in rural areas. An essential community facility is defined as a facility that provides an essential service to the local community for the orderly development of the community in a primarily rural area, and does not include private, commercial or business undertakings. Rural areas including cities, villages, townships and towns including Federally Recognized Tribal Lands with no more than 20,000 residents according to the latest U.S. Census Data are eligible for this program. Funds can be used to purchase, construct, and / or improve essential community facilities, purchase equipment and pay related project expenses. For more information, please refer to:
https://www.rd.usda.gov/programs-services/community-facilities/community-facilities-direct-loan-grant-program

DISASTER LOANS AVAILABLE FROM THE SMALL BUSINESS ADMINISTRATION

The U.S. Small Business Administration (SBA) can make federally subsidized loans to repair or replace homes, personal property or businesses that sustained damages not covered by insurance. The Small Business Administration can provide three types of disaster loans to qualified homeowners and businesses:

- Physical damage loans: Loans to cover repairs and replacement of physical assets damaged in a declared disaster.
- Mitigation assistance: Funding to cover small business operating expenses after a declared disaster.
- Economic injury disaster loans: This loan provides economic relief to small businesses and nonprofit organizations that have suffered damage to their home or personal property.
- Military reservist loans: SBA provides loans to help eligible small businesses with operating expenses to make up for employees on active-duty leave.

For many individuals the SBA disaster loan program is the primary form of disaster assistance. Please find more information about this loan program here: https://www.sba.gov/funding-programs/disaster-assistance.

DISASTER ASSISTANCE FROM OTHER ORGANIZATIONS AND ENTITIES

DisasterAssistance.gov is a secure, user-friendly U.S. Government web portal that consolidates disaster assistance information in one place. If individuals need assistance following a presidentially declared disaster— which has been designated for individual assistance— they can now go to DisasterAssistance.gov to register online. Local resource information to help keep citizens safe during an emergency is also available. Currently, 17 U.S. Government agencies, which sponsor almost 70 forms of assistance, contribute to the portal.

DisasterAssistance.gov speeds up the application process by feeding common data to multiple online applications. Application information is shared only with those agencies individuals identify and is protected by the highest levels of security. DisasterAssistance.gov will continue to expand to include forms of assistance available at the federal, state, tribal, regional, and local levels.

8.4.2 STATE FUNDING SOURCES

The following is a summary of state funding opportunities for hazard mitigation projects and activities in Massachusetts:

Table 15: State Hazard Mitigation Funding

Program	Type of Assistance	Availability	Managing Agency	Funding Source
604b	Grants focused on nonpoint source pollution assessment and watershed planning	Annual	Mass DEP	State funding
Chapter 90	Reimbursable grants	On-going	Mass DOT	State funding
Community Development Block Grants (CDBG)	Competitive community development grants	Annual grant program	HCD	US Department of Housing and Urban Development
Community Preservation Act (CPA)	Grants for local projects that preserve local open space or historic sites, create affordable housing, or develop outdoor recreational facilities	Annual program	Department of Revenue (DOR)	Statewide Community Preservation Trust Fund / local Community Preservation Fund
Culvert Replacement Municipal Assistance Grant Program	Competitive grants for replacing an undersized, perched, and/or degraded culvert located in an area of high ecological value	Annual program	DER	State funding
Dam and Seawall Repair or Removal Program	Competitive grants for dam and seawall repair and removal, as well as construction loans	Annual program	EEA	State funding
District Local Technical Assistance (DLTA)	Funding to support planning and technical assistance for housing, economic growth, and regional projects	Varies, generally annually	Massachusetts General Legislature, CMRPC	State funding
Division of Ecological Restoration Priority Project	Competitive grants for wetland and river restoration projects	Annual Program	DER	State funding
Drinking Water Supply Grant	Competitive grants for protection of drinking water supplies	Annual Program	EEA, DCS	State funding

Land and Recreation Grants and Loans	Varies, though primarily grant funding	Varies, generally annually	EEA Division of Conservation Services	Varies
Local Planning Assistance (LPA)	Planning and technical assistance	Annual program	CMRPC	Planning assistance hours
Mass Works	Competitive infrastructure grants	Annual	EOHED	State funding
Municipal Small Bridge Program	Competitive grants for small bridge replacement, preservation, and rehabilitation projects	Annual	Mass DOT	State funding
Municipal Vulnerability Preparedness Action Grants	Competitive climate adaptation grants	Annual grant program	EEA	75% EEA/ 25% non-state match
Planning Assistance Grants	Competitive grants that support efforts to plan, regulate (zone), and act to conserve and develop land consistent with the Massachusetts' Sustainable Development Principles	Annual grant program	EEA	75% EEA / 25% non-state match
Section 319 Nonpoint Source Competitive Grants Program	Competitive grant program funding projects that address the prevention, control, and abatement of nonpoint source (NPS) pollution	Annual grant program	Mass DEP	State funding
Special appropriations and legislative earmarks	Varies	Infrequent, after natural disasters or legislature vote	State Legislature	State funding
State Revolving Fund	Low-interest loans	Annual program	Mass DEP	Municipal funding with state loan
Water Quality Management Planning Grant	Competitive grant for water quality assessment and management planning	Annual program	EEA, DCS	State funding

The Community Grant Funder web page includes the municipal grant programs listed above, as

well as other funding opportunities: https://www.mass.gov/lists/community-grant-finder. Some programs in Table 15 are described in more detail on the following pages.

CHAPTER 90 FUNDS

This statewide program reimburses communities for roadway projects, such as resurfacing and related work and other work incidental to the above such as preliminary engineering including State Aid/Consultant Design Agreements, right-of-way acquisition, shoulders, side road approaches, landscaping and tree planting, roadside drainage, structures (including bridges), sidewalks, traffic control and service facilities, street lighting (excluding operating costs), and for such other purposes as the Department may specifically authorize. Maintaining and upgrading critical infrastructure and evacuation routes is an important component of hazard mitigation. Chapter 90 funds could be used for roadway improvements.

COMMUNITY DEVELOPMENT BLOCK GRANT (CDBG)

CDBG remains the principal source of revenue for communities to use in identifying solutions to address physical, economic, and social deterioration in lower-income neighborhoods and communities. CDBG is primarily a housing and community development program administered through the Executive Office of Housing and Community Development (HCD). The program can fund certain critical infrastructure projects, and necessary housing improvements that benefit populations that may be more vulnerable to certain natural hazards. The program can also fund the rehabilitation of municipal buildings such as town halls, which in many cases, also serve as Emergency Operations Centers for their communities.

COMMUNITY PRESERVATION ACT (CPA)

The Community Preservation Act (CPA) is a smart growth tool that helps communities preserve open space and historic sites, create affordable housing, and develop outdoor recreational facilities. CPA also helps strengthen the state and local economies by expanding housing opportunities and construction jobs for the commonwealth's workforce, and by supporting the tourism industry through preservation of the commonwealth's historic and natural resources. All communities in Massachusetts pay into statewide Community Preservation Trust fund through a real estate excise tax. However, communities must set up a local Community Preservation Fund and governing committee to utilize the trust fund. CPA projects can build local resilience by protecting open spaces, and by creating affordable housing, which benefits residents who may be most vulnerable to natural hazards. More information on the CPA program can be found here: https://www.communitypreservation.org/about.

DAM AND SEAWALL REPAIR OR REMOVAL PROGRAM

The EEA funds projects for the repair and removal of dams, levees, seawalls, and other forms of inland and coastal flood control. For additional information, please refer to https://www.mass.gov/service-details/dam-and-seawall-repair-or-removal-program-grants-and-funds.

DER PRIORITY PROJECTS

The Division of Ecological Restoration selects wetland and river restoration projects through a state-wide, competitive process. DER chooses high-priority projects that bring significant ecological and community benefits to the commonwealth. DER's most recent call for applications solicited projects located in Massachusetts that focus on cranberry bog wetland restoration, dam removal and river restoration, coastal wetland restoration projects, or a combination of

these topics. More information on the Priority Projects program can be found here: https://www.mass.gov/how-to/become-a-der-priority-project. This program can be used to remove significant or high hazards dams that communities no longer want to maintain, which may improve the health and resilience of aquatic systems.

DISTRICT LOCAL TECHNICAL ASSISTANCE

District Local Technical Assistance (DLTA) is funding allocated by the Massachusetts General Assembly (Legislature) to the Central Massachusetts Regional Planning Commission (CMRPC) to provide technical assistance to member communities on eligible projects. DLTA planning dollars help cities and towns take on necessary projects that they don't have the staff capacity to address on their own, and to partner with neighboring communities to tackle shared projects with reduced administrative burden.

According to the most recent guidelines of the Commonwealth's DLTA program, a proposed project must fall into one of the following four (4) general priority categories to be considered eligible for technical assistance:

1. Planning Ahead for Housing;
2. Planning Ahead for Growth;
3. Technical Assistance to support Community Compact Cabinet Activities including Regionalization; and
4. Supporting the Housing Choice Initiative

The goal of the DLTA Fund is to direct these funds to projects and activities that result in change in the municipality(ies) receiving these DLTA Fund services, whether in law, regulation, program management, or practice, that serve to further these objectives. Community Compact Cabinet (CCC) best practices should include both those that the Commonwealth of Massachusetts is seeking to fund as part of the CCC program as a first priority and also best practices that explicitly align with CCC best practices but are not best practices identified in a signed CCC agreement. COVID-19 relief/recovery activities that fall under the above priority categories are eligible.

DRINKING WATER SUPPLY GRANT

The DWSP grant program provides financial assistance to public water systems and municipal water departments for the purchase of land or interests in land for the following purposes: 1) protection of existing DEP-approved public drinking water supplies; 2) protection of planned future public drinking water supplies; or 3) groundwater recharge. It is a reimbursement program.

LAND AND RECREATION GRANTS AND LOANS

The Division of Conservation Services (DCS) manages several grant or loan programs that enable land preservation, natural resources conservation, and public recreation. Municipalities with an active Open Space and Recreation Plan are generally eligible to apply for these programs. Preserving natural open space can buffer natural systems from development impacts, protect open spaces from future development, and maintain ecosystem services like natural flood mitigation. The full list of DCS grant programs can be found here: https://www.mass.gov/land-and-recreation-grants-loans/need-to-know.

LOCAL PLANNING ASSISTANCE

The Local Technical Assistance (LTA) program was initiated to improve the direct services of this agency to its member communities. Under the LTA program each community annually receives a set number of hours of technical assistance to be used in any reasonable planning project authorized by the community's commissioner.

MASSWORKS INFRASTRUCTURE PROGRAM

The MassWorks Infrastructure Program provides a one-stop shop for municipalities and other eligible public entities seeking public infrastructure funding to support economic development and job creation. Although not specific to natural hazards per se, these infrastructure enhancements under MassWorks could also address identified needs for hazard mitigation. The MassWorks Infrastructure Program is administered by the Executive Office of Housing and Economic Development, in cooperation with the Department of Transportation and Executive Office for Administration & Finance. Please refer to http://www.mass.gov/hed/economic/eohed/pro/infrastructure/massworks/ for additional information.

MUNICIPAL VULNERABILITY PREPAREDNESS ACTION GRANT PROGRAM

The MVP Action Grant offers financial resources to municipalities that are seeking to advance priority climate adaptation actions to address climate change impacts resulting from extreme weather, sea level rise, inland and coastal flooding, severe heat, and other climate impacts. Towns are eligible for this competitive grant program after successfully completing an MVP planning grant. A variety of project types are eligible for funding, but projects must address local vulnerabilities to climate change and incorporate MVP Core Principles. Grant application information can be found here: https://www.mass.gov/service-details/mvp-action-grant. MVP Core Principles can be found here: https://www.mass.gov/doc/mvp-core-principles/download.

SPECIAL APPROPRIATIONS AND LEGISLATIVE EARMARKS

Although there is no separate state disaster relief fund in Massachusetts, the state legislature may enact special appropriations for those communities sustaining damages following a natural disaster that are not large enough for a Presidential disaster declaration. Since 2011, Massachusetts has issued 12 state of emergency declarations. Additionally, individual legislators may seek specific project funding for projects through the legislative budgeting and appropriations process.

STATE REVOLVING FUND

This statewide loan program through the Massachusetts Department of Environmental Protection assists communities in funding local drinking water, wastewater, and storm water infrastructure improvements.

WATER QUALITY MANAGEMENT PLANNING GRANT

This grant program is authorized under the federal Clean Water Act Section 604(b) for water quality assessment and management planning. Eligible entities include: regional planning agencies, councils of governments, conservation districts, counties, cities and towns, and other substate public planning agencies and interstate agencies. No local match is required.