



Southbridge Hazard Mitigation Plan Update

[Draft – April 2024]



Tornado Damage, Photo courtesy of Fire Chief Paul Normandin

Adopted by the Town Council on **DATE**

PLACEHOLDER FOR TOWN COUNCIL ADOPTION RESOLUTION

DRAFT

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1.0 INTRODUCTION

1.1 Hazard Mitigation Planning

The United States 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 for implementing DMA 2000 were published in the *Federal Register* in February 2002, and required that all communities have a hazard mitigation plan (HMP) in place to qualify for federal disaster mitigation grants following a presidential disaster declaration. The HMP must be updated and approved by the Federal Emergency Management Agency (FEMA) every 5 years. The HMP emphasizes measures to reduce or prevent future disaster damages caused by natural hazards. In the context of natural hazard planning, hazard mitigation refers to any action that permanently reduces or eliminates long-term risks to human life and property.

1.2 Plan Purpose

New England weather can be quick-changing and impactful in nature. Late summer hurricanes, major winter blizzards, and summer droughts are all part of climatic atmosphere in central Massachusetts. These natural events are familiar to Town of Southbridge, Massachusetts, residents. However, when routine natural events interact with the built environment, they can become natural disasters. Since many cities and towns historically developed along waterways for transportation and power, much development occurred in riverine floodplains. This historical development pattern in central Massachusetts increases the likelihood of devastating impacts from a natural disaster.

This plan identifies the natural hazards facing the Town of Southbridge; assesses the vulnerabilities of the area's critical facilities, infrastructure, residents, and businesses; and presents recommendations on how to mitigate the negative effects of typical natural hazards. This plan draws on the knowledge of local municipal officials and residents. The recommendations presented are intended to be realistic and effective steps for mitigating natural hazards. Implementing these actions will save lives and property, and better maintain access to essential services.

2.0 PLANNING PROCESS

2.1 Overview

The Southbridge HMP update process officially started in November 2023. Table 1 provides a timeline of the major planning tasks and milestones, including community and planning team meetings. Table 2 lists the planning team members. All planning team members were involved in the major components of the hazard mitigation planning process, including identifying hazards, conducting the risk assessment and mitigation capabilities assessment, and developing the mitigation strategy. The meeting agendas from the planning team meetings are included in Appendix A. The HMP update process was conducted for the planning area, defined as the Town of Southbridge. The public includes all residents of Southbridge.

Table 1 HMP Update Timeline

Date	Tasks/Topics	People Involved
November 2023 to Present	Regular planning team meetings	Community Planning Team, FEMA BRIC DTA Team
November 17, 2023	HMP update kickoff	Community Planning Team, FEMA BRIC DTA Team
January 17–18, 2024	In-person workshop to review hazard profiles, review community profile, review mitigation goals, and discuss and prioritize mitigation actions	Community Planning Team, FEMA BRIC DTA Team, MEMA
February 2024	Distributed online survey to the public asking for input on natural disasters and their impacts	Community Planning Team, public
January to March 2024	Meetings with other stakeholders (Section 2.2 and Appendix B provide more information)	Community Planning Team, FEMA BRIC DTA Team, invited partners

Table 2 Planning Team

Name	Title	Involvement
Paul Normandin	Fire Chief	Participated throughout process, contributing to relevant plan sections; BRIC DTA contact
Peg Dean	Economic Development and Planning Director	Participated throughout process, contributing to relevant plan sections
Ken Comia	Interim Town Planner and Conservation Agent	Participated throughout process, contributing to relevant plan sections

Name	Title	Involvement
Mat Fitton	Executive Assistant to the Town Manager	Participated throughout process, contributing to relevant plan sections
Michael Julian	Assistant Building Inspector	Participated throughout process, contributing to relevant plan sections
Richard Benoit	Director of Department of Public Works	Participated throughout process, contributing to relevant plan sections

The planning process consisted of two distinct but related phases: data collection and technical review, and public input and planning. The first phase focused on identifying the natural hazards impacting Southbridge, which was accomplished by reviewing available information from various sources including federal and state reports and datasets, and existing plans. The sources used are listed in Section 9, and primarily informed the assessment of risks and vulnerabilities presented in Section 4. For some hazards, assessment used geographic information systems (GISs) to identify the infrastructure (e.g., critical facilities, public buildings, roads, homes, businesses) at the highest risk of being damaged by hazards. Local knowledge, as imparted by town officials, staff, planning team members, and others, was a critical element of this phase.

The second phase focused on outreach, public participation and input, and planning, and is further described in Section 2.2. 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 the community.

The Southbridge Planning Board is the primary town agency responsible for regulating development in the town. Feedback from the planning board was solicited directly via presentations on January 17 and April 17, 2024, and was further ensured through participation of the Southbridge Department of Economic Development and Planning on the planning team.

The planning process was guided by FEMA Region 1 Building Resilient Infrastructure and Communities (BRIC) Direct Technical Assistance (DTA) (i.e., the FEMA BRIC DTA Team). Southbridge was selected to receive BRIC DTA nonfinancial technical assistance from October 2023 to October 2026.

2.2 Public Involvement, Stakeholder Engagement, and Opportunities for Public Participation

Public participation and stakeholder engagement was solicited through the following mechanisms:

1. The FEMA BRIC DTA Team presented at Southbridge Planning Board and Southbridge Conservation Commission meetings on January 17, 2024.

- a. The FEMA BRIC DTA Team provided an overview of the HMP update process.
 - b. These meetings are advertised via the town website and open to the public. The planning board meeting was streamed on local television.
2. The first public input opportunity was provided during the HMP update drafting stage.
 - a. An online survey was distributed to the public in February 2024, asking participants to share information on their experiences with natural disasters and the associated impacts.

The survey was distributed through social media, email, and local newspapers, in English and Spanish.
3. Meetings were held with community and regional stakeholders throughout February and March 2024 to collect focused feedback on the plan topics of most importance to those stakeholders. These meetings identified hazard mitigation concerns from these stakeholders, as well as potential opportunities for collaboration for future mitigation activities. The planning team met with:
 - a. Southbridge Recreation Department on February 23, 2024.
 - b. Chamber of Central Massachusetts South on March 1, 2024.
 - c. Southbridge Schools Department on March 15, 2024.
 - d. Opacum Land Trust on March 20, 2024.
4. The FEMA BRIC DTA Team presented at the planning board and conservation commission meetings on April 17, 2024.
 - a. The FEMA BRIC DTA Team provided a status update on the HMP update process and work completed since the previous presentations.
 - b. These meetings were advertised via the town website and were open to the public. The planning board meeting was streamed on local television.
5. The second public input opportunity was provided after the draft plan was completed.
 - a. An online survey in English and Spanish was distributed to the public in April 2024, asking participants to provide input on the plan’s goals, high-level findings, and mitigation strategy.
 - b. An executive summary and full draft of the plan were made available on the town’s CivilSpace website for public review and comment. The executive summary was also made available in Spanish.

Appendix B provides additional documentation of local stakeholder and public participation in the planning process.

3.0 REGIONAL AND COMMUNITY PROFILE

3.1 Regional Context

The Town of Southbridge is part of the Central Massachusetts Regional Planning Commission (CMPRC) region, which 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 as of 2020 (U.S. Census Bureau 2024). In 2020, 604,631 people lived in the CMRPC region, with 17,740 living in Southbridge (CMRPC 2023).

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 40-community region has been divided into six subregions for planning purposes, based on shared characteristics and roadway corridors. Southbridge is in the Southwest subregion, which includes seven Massachusetts towns within the Quinebaug and French (Shetucket) River valleys: Auburn, Charlton, Dudley, Oxford, Southbridge, Sturbridge, and Webster.

Massachusetts has a humid continental climate, with maritime influences increasing from northwest to southeast. The Worcester area, as represented by National Weather Service (NWS) data collected from 2000 through 2024, experiences monthly mean temperatures ranging from 25.4 degrees Fahrenheit (°F) in January to 71.4°F in July (NWS 2024a). Precipitation is relatively high, with an average of 51.43 inches of rainfall and 71.9 inches of snowfall annually. With a temperate climate and location about 40 miles from the Atlantic coast, Southbridge and the neighboring communities experience a variety of severe weather, including hurricanes, nor'easters, thunderstorms, and blizzards. These weather events are discussed further in Section 4.

3.2 Community Location and History

Southbridge is in south central Massachusetts along the state of Connecticut border on Route 169, 19 miles southwest of Worcester. Southbridge is surrounded by larger cities such as Hartford, Connecticut; Providence, Rhode Island; and Springfield, Boston, and Worcester, Massachusetts. Southbridge spans about 21 square miles of land that ranges from hilly to flat.

The Town of Southbridge was incorporated in 1816. The entire town lies within the Quinebaug River Basin and the Quinebaug River runs through the downtown. Southbridge is bordered by Sturbridge to the west, Dudley to the east, Connecticut to the south, and Charlton to the north.

The town's primary economic generators are healthcare and social assistance, retail trade, manufacturing, and its historic downtown. Southbridge is unofficially called the Eye of the Commonwealth from its history as a premier producer of optical products. In the early 1800s, the first textile mills were established in the downtown and a large dam was extended across the Quinebaug River. In 1863, a major fire destroyed most of the downtown buildings. Subsequently, the town erected new blocks of masonry structures. Manufacturing continued to expand as new mill complexes were built along the length of the Quinebaug River, bringing

diverse groups of immigrants and establishing the community's cultural diversity. In 1869, the American Optical Company arrived, building a new facility and workers' housing, and establishing itself as the city's largest employer.

3.3 Infrastructure

Infrastructure in the town is detailed in Section 5. Highlights are summarized here.

3.3.1 Transportation

The town's transportation network includes local, state, and federal roads. The primary arterial roads are State Highways 131, 169, and 198. Highway 131 carries the highest traffic volume and provides access to Sturbridge to the northwest. Interstate 84 is accessed from an interchange about 3 miles east of the downtown but requires a longer drive through downtown for most residents. Southbridge staff note that most local roads are two-lane and about 80 percent (%) are in varying levels of failing condition. The community has access to regional transit service for seniors and transit service to the City of Worcester. Many automobile, pedestrian, and bicycle accidents occur downtown.

3.3.2 Town Facilities

The primary town facilities include the town hall, fire station (a replacement station is planned), police station, Department of Public Works facility, community center, and public library. The town has an abundant water supply and owns its state-of-the-art waste water treatment plant and water filtration plant, both of which are operated by a contractor. The town owns and maintains five drinking water reservoirs within the town boundaries; the town is surrounded by over 2,000 acres of town-owned and -managed watershed protection area.

3.3.3 Natural Resources, Open Space, and Recreation

The town is proud of its rich natural heritage. Twenty-one percent of town land is in some form of protected open space. Southbridge's undeveloped land includes forested areas, steep slopes, and ridgelines. Approximately 2,000 acres of undeveloped farmland remain, down from 3,000 acres in 2019. Around 1,000 acres have been developed since 2019 for photovoltaic solar panel array projects. The town has over 1,200 acres of wetlands and important habitat areas documented in the Massachusetts Natural Heritage and Endangered Species Program.

Recreation areas in the town include:

- Nine town sites on about 97 acres, including active recreation facilities
- About 25 town parks

- Westville Recreation Area, which is an important regional facility partially located in Sturbridge that is managed by the U.S. Army Corps of Engineers (USACE)
- Other public and private land areas and trail systems

3.4 Population and Demographics

In 2022, Southbridge’s population was estimated at 17,669 (U.S. Census Bureau 2023). As shown in Table 3, the town’s population increased from 1980 to 1990, but then decreased from 1990 to 2010. The population increased 6.1% from 2010 to 2020. The *2050 Connections: 2024 Long-Range Transportation Plan for the Central Massachusetts Metropolitan Planning Organization* (CMRPC 2023) includes projections from the Massachusetts Department of Transportation (MassDOT) and CMRPC for population based on the best available data for each decade from 2020 to 2050. MassDOT projections show decreasing population every decade from 2020 and 2050. CMRPC projections show below-average population growth in Southbridge (less than 3% per decade) for 2020 to 2030 and 2030 to 2040, and average population growth (between 3% and 5% per decade) for 2040 to 2050 (CMRPC 2023).

Table 3 Southbridge Decennial Census Trends, 1980–2020

	1980	1990	2000	2010	2020
Southbridge Population	16,665	17,816	17,214	16,719	17,740

Sources: U.S. Department of Commerce 1981, 1992; U.S. Census Bureau 2002, 2022

Table 4 shows that the primary age demographics for Southbridge are similar to the state; however, the percentage of children under 18 years is somewhat higher than the state, and the percentage of seniors 65 years or over is somewhat lower than the state (U.S. Census Bureau 2022). The median age of town residents is 38.6 years, which is slightly younger than the state median age of 40.1 years. According to the Southbridge Master Plan (Town of Southbridge 2013), the town’s senior cohort is expected to nearly double between 2013 and 2030.

Table 4 Age Categories for Southbridge Compared with Massachusetts

Age Category	Southbridge	Massachusetts
Under 18 years	22.5%	19.2%
65 years and over	14.2%	18.1%
Median age	38.6%	40.1%

Source: U.S. Census Bureau 2022

The Southbridge median household income is \$50,414, significantly below the median incomes for Massachusetts (\$96,505) and Worcester County (\$88,524) (U.S. Census Bureau 2022).

3.4.1 Ethnic and Racial Diversity

Southbridge is an ethnically diverse community. White residents comprise the largest racial group at 69.6% of the population (U.S. Census Bureau 2022). The community’s older generation of immigrants includes Albanian, Polish, and French people. The community has a significant and growing Hispanic and Latino population, including Puerto Rican immigrants, as well as other minority populations. Individuals identifying as Hispanic or Latino (of any race) comprise 36.0% of the population, Black or African American residents comprise 4.9%, and individuals identifying as two or more races comprise 14.7%. U.S. natives make up 95.7% of the population (U.S. Census Bureau 2022). Much of the growing population of Spanish speakers is linguistically isolated. The town has several low-income areas with a high Spanish-speaking population.

3.4.2 Social Vulnerability

“Social vulnerability” describes the increased susceptibility of social groups or populations to the adverse impacts of stressors or shocks, such as public health threats or natural hazards. In the context of natural hazards, the FEMA National Risk Index (FEMA n.d.) describes social vulnerability as: “...the susceptibility of social groups to the adverse impacts that could lead to disproportionate death, injury, loss, or disruption of livelihood.”

There are different approaches that can be used to analyze social vulnerability. Table 5 summarizes U.S. Census data characteristics that may contribute to increased social vulnerability for populations in the Town of Southbridge, Worcester County (the broader region where Southbridge is located), and the State of Massachusetts.

Table 5 Comparison of 2022 Five-Year American Community Survey Population Statistics for the Town of Southbridge, Worcester County, and the State of Massachusetts

Jurisdiction	Population Under 18 Years	Population 65 Years and Over	Poverty Status: All Ages	Poverty Status: Population Under 18 Years	Population with a Disability	Population Speaking a Language Other than English at Home*
Town of Southbridge	22.5% (3,970)	14.2% (2,501)	17.9% (3,119)	24.0% (926)	18.0% (3,145)	33.9% (5,607)
Worcester County	20.3% (175,170)	17.2% (148,205)	10.6% (89,192)	11.7% (20,133)	13.8% (118,436)	21.9% (179,296)
State of Massachusetts	19.1% (1,335,988)	18.0% (1,260,100)	10.4% (700,156)	11.5% (151,751)	12.5% (868,570)	25.0% (1,660,772)

**Population 5 years and over.*

Source: U.S. Census Bureau 2022

Table 5 shows that when the Southbridge census data is compared with data for Worcester County and the state, there is a high level of social vulnerability for the town. The data characteristics are described as follows:

- **Age** – Populations under the age 18 years and 65 years and over may be more vulnerable than other age groups. Southbridge has a higher percentage of its population under 18 years than the county and state, and a lower percentage of its population 65 years and over than the county or state (although this cohort in the community is growing).
- **Poverty** – Poverty can contribute to increased social vulnerability; 17.9% of Southbridge residents are living in poverty, which is significantly higher than Worcester County (10.6%) and the state (10.4%). The poverty rate for Southbridge youth (under age 18) is 24.0%, significantly higher than the poverty rate for the overall town population.
- **Disability** – An individual that lives with a disability or chronic illness is more vulnerable because of limited mobility, diminished sensory awareness, and special equipment needs. Power outages resulting from natural disasters can cause inadequate heating or cooling, and potential loss of medical and life-support equipment; 18.0% of the Southbridge population reported a disability, which is significantly higher than the rates for Worcester County (13.8%) and the state (12.5%).
- **Speak a language other than English at home** – This characteristic is also correlated with increased vulnerability; 33.9% of Southbridge residents speak a language other than English at home, a significantly higher percentage than for the county or state.

3.4.3 Other Social Risk Factors

Other social risk factors that contribute to social vulnerability are described as follows:

- **Education** – In the past decade, Southbridge has seen education levels decline and poverty levels rise. The town’s schools were identified by the state as consistently low-performing and have been under receivership status since January 2016. There is currently no plan in place to end receivership and it is expected the schools will continue to be in receivership for the next few years. Additional data for youth education indicate:
 - Attendance rates are a concern, showing marginal improvement since receivership
 - Attendance continues to be an issue at the high school level
 - There has been some improvement for lower grade levels
 - Only 80.4% of the population over age 25 have obtained a high school diploma compared with 91.2% for the state

- **Serious health risks** – The Southbridge Master Plan (Town of Southbridge 2013) notes that Southbridge residents experience a high rate of serious health risks including asthma and childhood asthma, diabetes, substance abuse, obesity, binge drinking, and infant mortality.
- **Internet access** – A total of 13.1% of the population does not have broadband internet (U.S. Census Bureau 2022). This can pose a major challenge to education and risk awareness, and also impacts quality of life because of limiting access to employment, education, recreation, and other types of information and opportunities.
- **Vehicle access** – A total of 16.4% of the population does not have a vehicle, which is challenging because the community does not have transit service for the general population (U.S. Census Bureau 2022). Lack of access to a vehicle can make evacuation, travel to an emergency shelter, or access to basic resources more difficult.

3.5 Housing

In Southbridge, sheltering issues are a growing concern because of the increased strain on housing and social services. This is largely attributed to an influx of migrant populations; a trend that has been observed in several other Massachusetts towns. Southbridge staff have observed that as the cost of housing in the City of Worcester has increased, people are coming to Southbridge for more affordable options. Key characteristics of housing in Southbridge are as follows (U.S. Census Bureau 2022):

- Multi-family housing comprises 58.6% of housing units
- Detached or semi-detached single-family houses make up 41.3% of housing units
- The 7.8% vacancy rate is below the state (9.8%) and above Worcester County (6.9%)
- Most homes are older: 38.5% were built before 1939, compared to 31.5% for Massachusetts and 29.2% for Worcester County
- Housing costs are relatively low, with the median property value of an owner-occupied home at \$222,900, compared to \$424,700 for Massachusetts and \$314,900 for the county

The Southbridge Master Plan notes that the high number of affordable rental units has led to a high population turnover rate; as of 2013, 40% of households had moved to the community in the past 7 years (Town of Southbridge 2013).

3.6 Economy

For decades, Southbridge was the headquarters of American Optical, once the world's largest manufacturers of ophthalmic products. In 1979, the town's economy was devastated when American Optical, which employed over 5,000 people in Southbridge, ceased local operations because of foreign competition. The plant remained vacant for two decades until the town won a government grant to build the Southbridge Innovation Center, a state-of-the-art technological

conference facility, at the former American Optical campus. The U.S. Department of Defense signed a 20-year lease to use the facility as a training center. However, the closing of most of the mills left an employment gap that has not been filled since. Because of this trend, Southbridge is now largely a commuter community.

Despite these declines, the manufacturing sector is still the town’s largest single-block employment sector. There has been employment expansion in health services, social assistance, and accommodations and food services.

Table 6 lists the 12 largest employers in Southbridge.

Table 6 Twelve Largest Employers in Southbridge as of January 2024

Company	Location	Sector	Number of Employees
Dexter Russell	River Street	Manufacturing	250–499
Big Bunny Market, Inc.	Main Street	Supermarket	100–249
Big Y World Class Market	E Main Street	Supermarket	100–249
Center of Hope Foundation	Foster Street #3	Support Service for Disabled	100–249
Hyde Industrial Blade	54 Eastford Road	Manufacturing	100–249
Schott North America	122 Charlton Street	Manufacturing	100–249
Superior Cake Products	105 Ashland Avenue	Manufacturing	100–249
YMCA	43 Everett Street	Community Service	100–249
A&M Tool and Design	64 Mill Street	Manufacturing	50–99
Green Meadows	64 Mill Street	Marijuana Cultivation	50–99
Southbridge Hotel and Conference Center	14 Mechanic Street	Hospitality	50–99
United Lens Company	Worcester Street	Manufacturing	50–99

CMRPC (2023) includes employment projections by CMRPC and MassDOT based on the best available data and trends for each decade from 2020 to 2050. CMRPC projects average employment growth in Southbridge (between 1% and 3% per decade) for 2020 to 2030 and 2030 to 2040, and above-average employment growth (greater than 3% per decade) for 2040 to 2050. MassDOT projects average employment growth (1% to 3% per decade) for 2020 to 2050.

Southbridge has actively promoted economic development projects. One project that is generating economic development is the \$100 million Southbridge Innovation Center. This redevelopment of the American Optical campus includes a 150-acre campus of hotel, conference, commercial, industrial, and manufacturing spaces in 11 main buildings. A \$25 million

redevelopment project that converted a former school building into affordable senior housing was also completed with federal and state historic credits. The town also oversees an urban renewal area.

There are many built areas in the town's floodplain that are occupied by industrial uses. The town also includes farms that generate income from crops and livestock.

More recently, the community has worked to bolster its local economy by capitalizing on its natural resources and updating infrastructure to promote tourism. An area of focus has been the proposed 11-mile Quinebaug Valley Rail Trail, an ongoing rails-to-trails project along the discontinued Providence and Worcester rail spur from Webster to Southbridge. In 2022, Southbridge received a \$2.6 million grant from the U.S. Department of Commerce, Economic Development Administration. That grant was designed to support outdoor recreation and boost the local tourism industry, and will fund the ongoing construction of the Quinebaug Valley Rail Trail.

3.7 Community Planning

3.7.1 Land Use and Development

The Southbridge Master Plan (Town of Southbridge 2013) indicates that over three-quarters of Southbridge land is forest, agriculture, open land, water, or unforested wetlands, and much of this area is permanently protected. Of the remaining land area, more than 80% is zoned residential, 2.2% is zoned commercial, and 16.5% is zoned industrial. The zoning districts for two- and multi-family structures are concentrated along the Quinebaug River, creating a walkable downtown center. The town allows cluster or planned unit development by special permit.

In January 2024, Southbridge Planning Department staff noted that more permits have been requested in the past few months than in the past 5 years, mostly for reusing commercial buildings for residential and commercial purposes. This trend indicates the town's economic development and revitalization policies may be gaining momentum. This may result in an increased population working and residing in the downtown area, where riverine flood risk is higher than for other parts of the town. This indicates a need to implement mitigation actions in the downtown area to reduce flooding risk to future developments. There are still major structures that are vacant or underutilized, including area mill buildings and buildings on the American Optical campus. The town is completing an inventory of these buildings to guide future planning efforts.

3.7.2 National Flood Insurance Program and Floodplain Development

The town participates in FEMA's National Flood Insurance Program. Approximately 6% of town land area is in the 100- or 500-year floodplain, and there is extensive existing development in the floodplain. The Hazus analysis presented in Section 4 identified 197 buildings in the floodplain that would sustain damage during a 100-year flood event.

The town's zoning bylaws require that all development must comply with:

- 780 Code of Massachusetts Regulations (CMR) Massachusetts State building code regulations
- 310 CMR, Massachusetts Department of Environmental Protection (MA DEP) wetlands regulations
- MA DEP minimum requirements for subsurface disposal of sanitary sewage

3.7.3 Environmental Resources and Conservation

The town has an abundance of surface water resources that include lakes, ponds, reservoirs, wetlands, and a floodplain area. The Southbridge Master Plan (Town of Southbridge 2013) outlines that connecting the downtown to the Quinebaug River, increasing access to the river, and providing more recreational opportunities along the river's banks are key steps to reclaiming the town's assets. Westville Recreation Area (WRA) includes Westville Lake on the Quinebaug River. WRA is a popular recreation area managed by USACE that offers hiking trails, picnic shelters, recreation fields, and canoe/kayak launches.

Southbridge actively works to preserve its open spaces, environmental resources, and natural habitat. Approximately 21% (3,200 acres) of the community's land area is protected open space of some type. The town partners with Opacum Land Trust, a regional land conservation organization formed to protect natural and cultural resources in south central Massachusetts. The town also works with The Last Green Valley, an advocate for conservation and sustainable development in the region.

4.0 NATURAL HAZARD IDENTIFICATION AND ANALYSIS

This section includes summarizes the hazards and disasters that have affected or could affect the planning area (the area within the Southbridge town boundary). Historical research, discussions with local officials and emergency management personnel, and available hazard mapping and other weather-related databases were used to develop this list. The most significant identified hazards are:

- Dam failure
- Drought
- Earthquakes
- Extreme temperatures
- Flooding
- Hurricanes
- Severe snowstorms/ice storms/nor'easters
- Severe thunderstorms/tornadoes/wind
- Wildfire/brushfire
- Other hazards

4.1 Natural Hazard Analysis Approach

The analysis was organized by category (hazard description, location, extent, previous occurrences, probability of future events, extent of impact, vulnerability, and climate change). These categories are described further in this section.

4.1.1 Hazard Description

The hazard description provides a summary of each hazard and any technical definitions used to characterize the hazard. The description includes an overview of the mechanisms that create the hazard, as well as any typical impacts that the hazard has on people and infrastructure.

4.1.2 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, according to the scale that follows.

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

4.1.3 Extent and Impact

Extent describes the strength or magnitude of a hazard. Extent is typically described using a hazard-specific scientific scale or measurement system and can include metrics such as water depth, wind speed, and duration. Impact refers to the effect that a hazard may have on people and property in the community, based on the assessment of extent. Impacts are classified according to the scale that follows.

Impacts and the Magnitude of Multiple Impacts for a 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; 25% to 50% of property in affected area damaged or destroyed; complete shutdown of facilities for more than 1 week
Limited	Minor injuries only; 10% to 25% 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

4.1.4 Previous Occurrences

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

4.1.5 Probability of Future Events

The likelihood of a future event for each natural hazard was classified according to the scale that follows.

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

4.1.6 Vulnerability

Based on each hazard’s location of occurrence, previous occurrences, probability of future events, extent and impact, 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 actions currently in place and many of those proposed for implementation can be applied to the expected natural hazards regardless of their unpredictability.

For earthquake, flooding, and hurricanes hazards, vulnerability was quantified using Hazus. Hazus is a software developed by FEMA to estimate losses from a variety of natural hazards. More information on Hazus is available at FEMA’s website at <https://www.fema.gov/flood-maps/products-tools/hazus>. Additional information on how Hazus was used for this HMP is provided in Appendix C.

4.1.7 Climate Change

This section describes the effects of future conditions because of climate change. Each hazard section may evaluate long-term weather patterns, average temperature changes, storm frequency, and other indicators to understand the effects on the type, location, and range of anticipated intensities identified in each hazard profile.

4.1.8 Natural Hazard Analysis Summary

Table 7 provides an overview of the natural hazards analyzed for Southbridge.

Table 7 Hazard Identification and Analysis for the Town of Southbridge

Type of Hazard	Location of Occurrence	Probability of Future Events	Impact	Hazard Risk Index Rating
Dam failure	Small	Very Low	Limited	4
Drought	Large	Low	Minor	4
Earthquakes	Large	Very Low	Minor	5
Extreme temperatures	Large	Very High	Critical	2
Flooding	Medium	Low	Critical	2
Hurricanes	Large	Low	Critical	3
Severe snowstorms/ice storms/nor'easters	Large	Very High	Limited	2
Severe thunderstorms/tornadoes/wind	Small	Moderate	Minor	2
Wildfire/brushfire	Large	Low	Minor	4

4.2 Dam Failure and Overtopping

Hazard Description

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. Most dam failures occur when extreme floodwaters overtop dams, causing rapid deterioration through erosion of upper dam surfaces. Often dam breaches lead to catastrophic consequences as the water rushes in a torrent downstream, flooding an area called an inundation area. Overtopping is when water spills over the top of a dam and can also be a precursor for dam failure. According to data from the Association of State Dam Safety Officials, the primary dam failure incident mechanism in the U.S. from 2010 to 2019 was overtopping, and the primary dam failure incident driver was hydrologic (flooding) (Association of Dam Safety Officials 2024).

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

The Massachusetts Department of Conservation and Recreation (DCR) Office of Dam Safety (ODS) 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). Jurisdictional determination of dams, whether or not they must be regulated by the state, is based on factors such as height, type of structure, volume of the impoundment, extent of downstream development, and other factors deemed appropriate by the state. Dams that exceed 6 feet in height and have more than 15 acre-feet of storage capacity are generally determined jurisdictional. Dams that are 6 feet or less in height (regardless of storage capacity) or have 15 acre-feet or less of storage capacity (regardless of height) are typically non-jurisdictional. 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. Federally owned dams and dams that are regulated by the Federal Energy Regulatory Commission (FERC) are excluded from the provisions of the state regulations. All other dams are subject to DCR Office of Dam Safety regulation unless exempted in writing by DCR.

Location

According to the Massachusetts Office of Dam Safety, there are 17 dams in Southbridge, of which 3 are High Hazard level and 6 are Significant Hazard level. Table 8 lists the names and hazard levels of dam structures within Southbridge and Figure 1 shows the locations of these dams. Dams with an “N/A” hazard potential do not have a hazard code. Nonjurisdictional dams do not have hazard codes except when owned and regulated by the federal government. Further detail on hazard potential classifications is included in the extent description for the dam failure hazard. Southbridge does not own any dams outside of the planning area.

Table 8 Southbridge Dams

National ID	Dam Name	Owner Type	Storage Capacity (acre-feet)	Normal Storage (acre-feet)	Hazard Potential	Emergency Action Plan Status
MA00694	Cohasse Brook Reservoir Dam	Town of Southbridge	1,300	830	High Hazard	Last revised 1/1/2013
MA00997	Lensdale Pond Dam	Private	311	74.4	High Hazard	Prepared

National ID	Dam Name	Owner Type	Storage Capacity (acre-feet)	Normal Storage (acre-feet)	Hazard Potential	Emergency Action Plan Status
MA00972	Westville Lake Dam	USACE	24,000	100	High Hazard	Last revised 8/31/2020
MA00688	Diversion Dam	Private	91	26	Significant Hazard	Not required
MA01983	Edget's Pond Dam	Private	15.8	10.5	Significant Hazard	Not required
MA00689	Russell Harrington Mill Pond Dam	Private	280	50	Significant Hazard	Not required
MA00691	Southbridge Reservoir #3 Dam	Town of Southbridge	350	261	Significant Hazard	Not required
MA00692	Southbridge Reservoir #4 Dam	Town of Southbridge	905	660	Significant Hazard	Not required
MA00693	Southbridge Reservoir #5 Dam	Town of Southbridge	610	491	Significant Hazard	Not required
MA00690	Cohasse Country Club Dam	Private	N/A	N/A	Low Hazard	N/A
MA03372	Morse Pond Dam	Private	204	136	Low Hazard	Not required
MA02378	Carpenter Pond Dam	Town of Southbridge	N/A	N/A	N/A	N/A
MA01985	McKinstry Co. Pond Dam	Private	N/A	N/A	N/A	N/A
MA01986	Private Pond Dam	Private	N/A	N/A	N/A	N/A
MA01984	Sandersdale Pond Dam	Private	N/A	N/A	N/A	N/A
MA02377	Southbridge Reservoir #2 Dam	Town of Southbridge	N/A	N/A	N/A	N/A
MA02376	Town Swimming Pool Dam	Town of Southbridge	N/A	N/A	N/A	

Note: This list only includes dams within the town boundary.

Source: USACE 2024a

The East Brimfield Dam is a high hazard potential dam approximately 6 miles upstream of the Westville Lake Dam on the Quinebaug River. Although this dam is outside the planning area, it could still present a potential risk to Southbridge if it were to fail and inundate downstream areas.

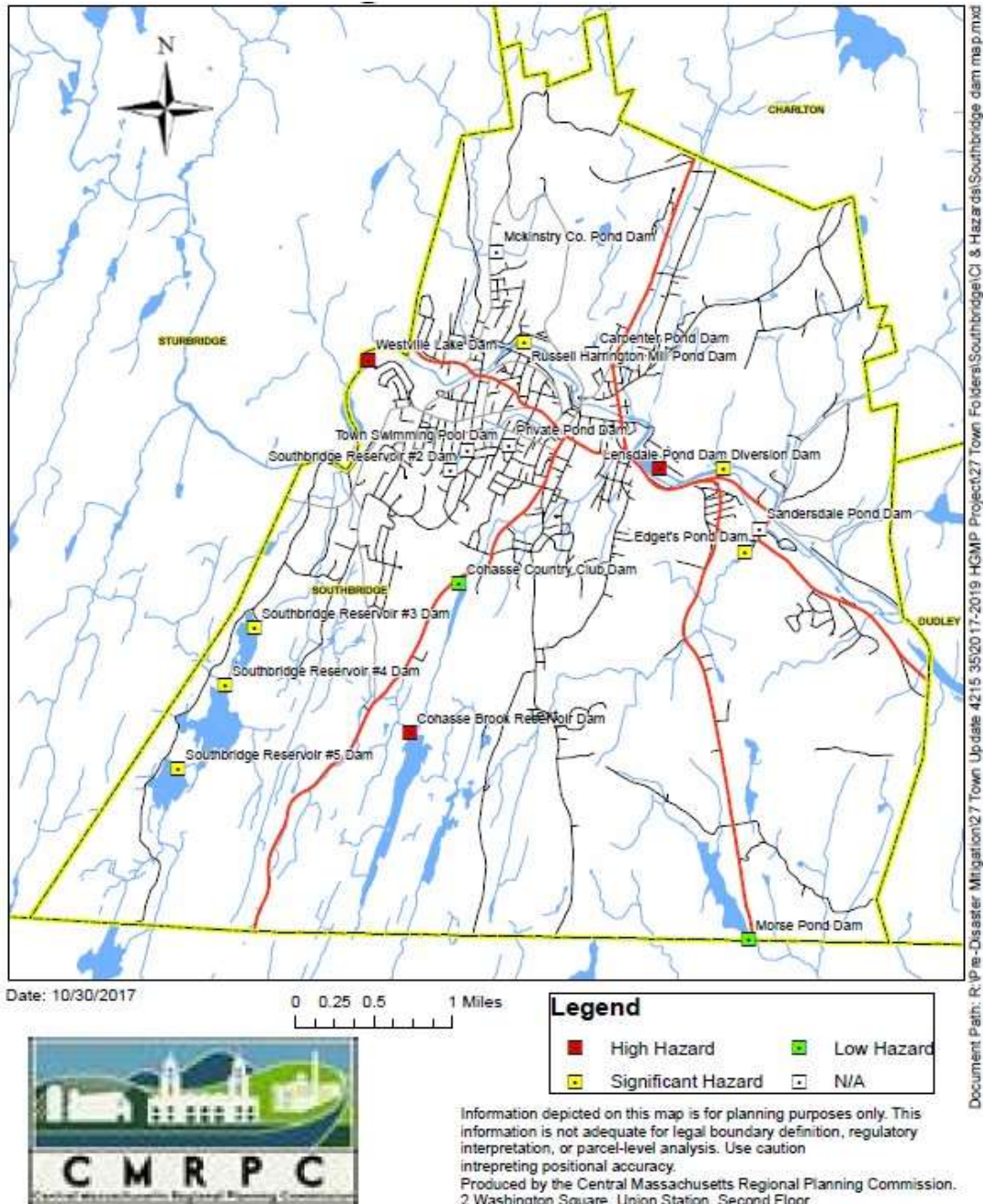


Figure 1 Southbridge Dam Locations

Because inundation maps are only publicly available for Westville Lake Dam, it is not possible to precisely determine what percentage of the town's area would be inundated by each dam in the event of a failure. Depending on the location and size of the dam that fails, inundation areas would be expected to range from "small" to "medium".

Extent and Impact

Often dam or levee breaches lead to catastrophic consequences as the water floods the downstream inundation area. The number of casualties and the amount of property damage will depend on 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 potential 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. A qualified engineer must inspect the dam and report results every 2 years.
- *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. A qualified engineer must inspect the dam and report results every 5 years.
- *Low Hazard:* Dams located where failure or improper operation may cause minimal property damage to others. Loss of life is not expected. A qualified engineer must inspect the dam and report results every 10 years.

Hazard potential classifications do not indicate anything about the conditions of the dams. The State of Massachusetts requires owners of High Hazard and Significant Hazard dams to develop emergency action plans (EAPs); however, as shown in Table 8, none of the significant hazard dams in Southbridge are federally required to develop EAPs. EAPs must include information such as inundation maps depicting areas that would be flooded in the event of a dam failure. The EAP requirement became effective on February 10, 2017 when the DCR ODS promulgated regulatory changes mandated by amended General Laws Part 1-Title II, Chapter 21, Section 65 (b)-Emergency Action Plans for high and significant hazard dams. The dam breach inundation areas mapped within the EAPs can be made available to help raise awareness.

Depending on the location and size of the dam that fails, the town faces a "limited" to "critical" impact from failure of dams, with up to 25% to 50% of the affected area likely to experience

damage. Dam failure can result in injury and loss of life, damage to infrastructure, utilities, property, land, and freshwater ecosystems. The *2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan* indicates the Greater Connecticut River Valley and Central regions, where Southbridge is located, would experience the highest adverse economic impacts from dam failure and overtopping (State of Massachusetts 2023). Table 26 lists the location of Southbridge’s emergency response facilities and services, some of which are downstream of Southbridge’s 3 high hazard potential dams and could be at risk of inundation in the event of a dam failure. None of the listed infrastructure is located downstream of the Lensdale Pond Dam. The emergency operations center and the police station are located downstream of Cohasse Brook Dam, and all the facilities listed are located downstream of Westville Lake Dam.

Southbridge has 3 high hazard dams with EAPs on file. Cohasse Brook Reservoir Dam, Lensdale Pond Dam, and Westville Lake Dam are all classified as having high hazard potential. The coordination between the town and dam owners and the availability of information on each dam varies. The Cohasse Brook Reservoir Dam is owned by the town and managed by the Department of Public Works (DPW); as a result, there is a high degree of coordination. The Lensdale Pond Dam is privately owned, and the town has had some difficulty coordinating with the dam owner to obtain information. They recently requested the maintenance plan and schedule and are working to improve communication using mechanisms such as development permit approvals. The Westville Lake Dam is owned by USACE and USACE regularly shares information with the town; as a result, there is a high degree of coordination. Detailed information about the Westville Lake Dam is also available on USACE’s National Inventory of Dams database.

USACE’s National Inventory of Dams provides information on economic losses and lives at risk from potential dam breach scenarios for dams owned by USACE. Consequence estimates for dam breach scenarios for the Westville Dam are listed in Table 9. The normal pool is the level the dam maintains throughout the year when not in a flood operation with minimal outflow releases. The maximum high pool is the level near the top of the dam resulting from water flowing into the reservoir from heavy rainfall, snowmelt, or other significant high-water events. These scenarios were selected because they illustrate the incremental impacts of dam failure when the town is not already experiencing flooding.

Table 9 Westville Dam Consequence Estimates

Scenario	Pool Elevation	Daytime People at Risk	Nighttime People at Risk	Buildings at Risk	Economic Cost
Normal Pool Breach	527.2	328	72	42	\$3,090

Maximum High Pool Breach	581.3	5,679	4,820	1,437	\$1,303,848,597
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Source: USACE 2024b

Figure 2 shows the inundation area associated with a normal pool breach scenario and Figure 3 shows the inundation area associated with a maximum high pool breach scenario. Losses from failure of an individual dam could be significant but would be geographically limited to portions of the dam’s inundation area.

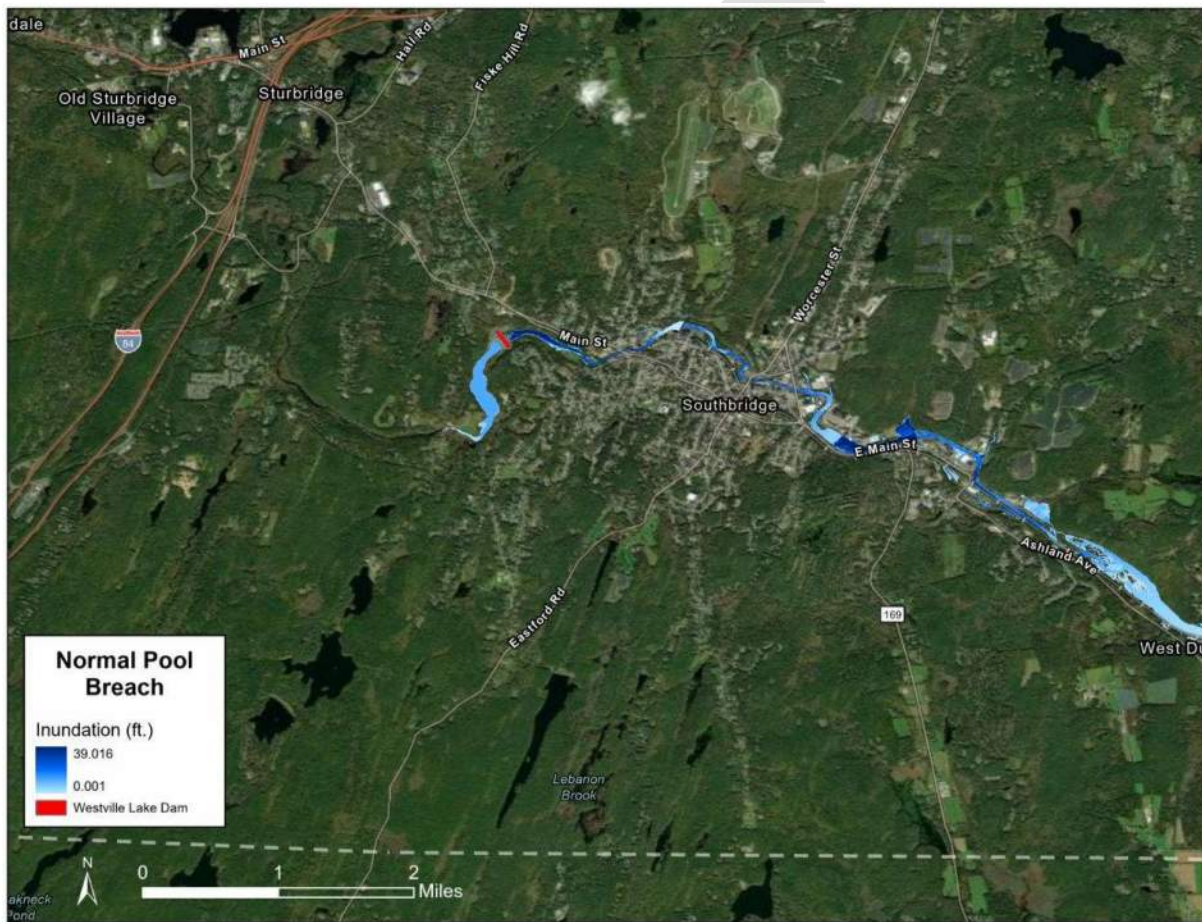


Figure 2 Normal Pool Breach Inundation Area for Westville Lake Dam

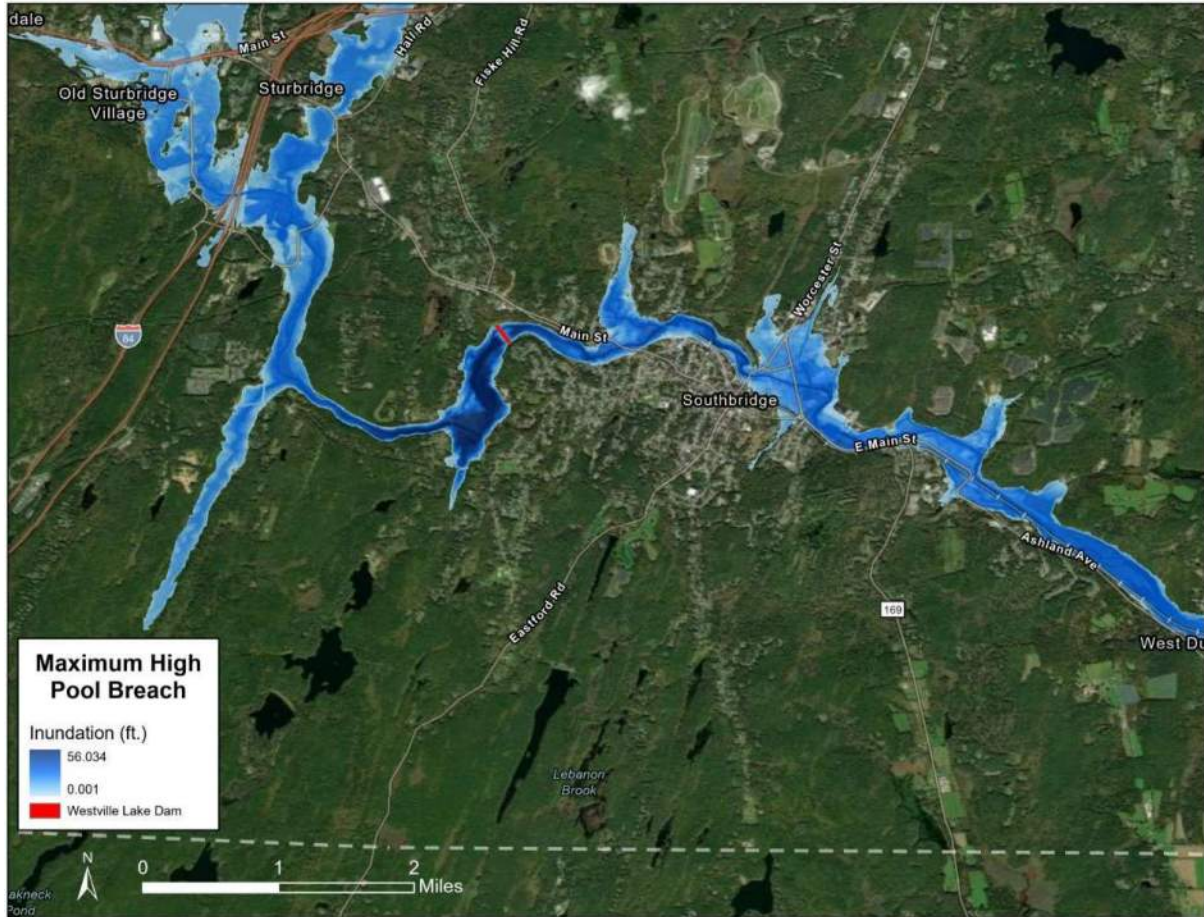


Figure 3 Maximum High Pool Breach Inundation Area for Westville Lake Dam

Previous Occurrences

To date, there have been no catastrophic dam failures in Southbridge. However, extreme weather led dams in neighboring towns to breach in the past. Nearly every dam along the French River was destroyed in 1955, which led to flooding in the Webster Square area of the City of Worcester. Southbridge had no dam failures, but was adversely affected by the upstream dam breach in Charlton.

Probability of Future Events

While Southbridge has nine High Hazard and Significant Hazard dams, there are no reported previous dam failure events in the 150-plus years that dams have been present. Probability for future failure events is therefore “very low,” with less than 1% chance of a dam failing in any given year.

Vulnerability

Based on a mostly qualitative assessment and considering the low probability of occurrence but significant impact of this hazard, Southbridge has a hazard index rating of 4 (low risk) from dam failure.

Climate Change

Total precipitation in the Quinebaug Basin is projected to increase from a baseline of 46.58 inches of rain per year by 2.70 to 2.79 inches (6%) by 2030 and by 3.24 to 3.72 inches (7% to 8%) by 2050 (Massachusetts Executive Office of Energy and Environmental Affairs 2023). The basin is expected to experience an annual increase in the number of days with precipitation greater than 1 inch from a baseline of 5.95 days by 0.82 days by 2030 and by 1.04 to 1.27 days by 2050 (Massachusetts Executive Office of Energy and Environmental Affairs 2023). Although precipitation will remain variable from year to year, annual precipitation is expected to continue increasing, as is the frequency of extreme precipitation events (Runkle et al. 2022). Dams are increasingly vulnerable to extreme rainfall events, especially if they are already at a high-water level (Lin et al. 2021). The projected increase in total precipitation (7% to 8% by 2050) may also result in larger increases in increases in surface runoff into streams and rivers and associated discharge levels because of changes in the water cycle (NWS 2024b), thereby increasing the risk of overtopping or dam failure, resulting in downstream flooding. More extreme precipitation events can result in changes to dam operations, such as increased need for strategic flooding or slow releases.

4.3 Drought

Hazard Description

Drought is a normal, recurrent feature of climate. It occurs almost everywhere, although its features vary from region to region. Drought can be defined as a deficiency of moisture over an extended period resulting in a water shortage for some activity, group, or environmental sector. Direct impacts of drought include 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.

The National Integrated Drought Information System defines five types of drought (National Drought Mitigation Center [NDMC] et al. 2024a):

- Meteorological – dry weather patterns dominate an area
- Hydrological – low water supply becomes evident in the water system
- Agricultural – crops become affected by drought
- Socioeconomic – supply and demand of various commodities is affected
- Ecological – natural ecosystems are affected

The *Massachusetts Drought Management Plan* identifies six drought indices including precipitation, streamflow, groundwater, lakes and impoundments, fire danger, and evapotranspiration (Massachusetts Energy and Environmental Affairs [MA EEA] and MEMA 2023).

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% of the town area.

Extent and Impacts

The impacts of droughts in Massachusetts as categorized by the U.S. Drought Monitor are summarized in the table that follows.

Classification	Category	Impacts
D0	Abnormally Dry	<ul style="list-style-type: none"> • 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	Moderate Drought	<ul style="list-style-type: none"> • 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	Severe Drought	<ul style="list-style-type: none"> • 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 • Trees are brittle and susceptible to insects • 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	Extreme Drought	<ul style="list-style-type: none"> • Crop loss is widespread; Christmas tree farms are stressed; dairy farmers are struggling financially • Well drillers and bulk water haulers experience 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

D4	Exceptional Drought	<ul style="list-style-type: none"> Massachusetts has experienced little or no exceptional (D4) drought since the inception of the U.S. Drought Monitor, so no D4-level drought impacts are recorded in the Drought Impact Reporter
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Source: NDMC et al. 2024d

According to the *Massachusetts Drought Management Plan*, other impacts may include adverse effects to aquatic life and habitat, increased fire danger, and decline in health of forests and other vegetation during drought conditions (MA EEA and MEMA 2023).

Most of Southbridge is served by the Southbridge Water Department. Impacts in Southbridge may vary among customers of the Water Department 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 parts of the town that are not located within the town’s water service area. Southbridge does not anticipate a need for additional drinking water sources in the near term.

Agricultural impacts because of drought are generally not substantial in the area, and agriculture is a relatively insignificant industry in Southbridge. On a countywide scale, the extreme drought of 2016 caused crop failures on roughly 0.4% of all harvested cropland based on U.S. Department of Agriculture (USDA) loss claims and the Massachusetts Agricultural Census.

Previous Occurrences

In Massachusetts, seven major droughts have occurred statewide between 1930 and the recently notable 2016 event (MA EEA and MEMA 2023), though the Southbridge area has been spared the most severe impacts in each case. These historical major droughts ranged in severity and in length, lasting from 1 to 9 years. In many of these droughts, water supply systems around the state were found to be inadequate. The 9-year drought of record occurred from 1961 to 1969 and forced communities to use emergency water supplies and implement pumping restrictions (MA EEA and MEMA 2023). Table 10 displays peak drought severity in Worcester County since 2000, from the U.S. Drought Monitor. Worcester County has experienced extreme drought twice since 2019.

Table 10 Annual Drought Status in Worcester County, Massachusetts

Year	Maximum Severity
2000	No drought
2001	D2 conditions in 7% of the county
2002	D2 conditions in 100% of the county

Year	Maximum Severity
2003	No drought
2004	D0 conditions in 96% of the county
2005	D0 conditions in 100% of the county
2006	D0 conditions in 100% of the county
2007	D1 conditions in 87% of the county
2008	D0 conditions in 98% of the county
2009	D0 conditions in 76% of the county
2010	D1 conditions in 43% of the county
2011	No drought
2012	D2 conditions in 70% of the county
2013	D1 conditions in 91% of the county
2014	D1 conditions in 79% of the county
2015	D1 conditions in 100% of the county
2016	D3 conditions in 57% of the county
2017	D3 conditions in 48% of the county
2018	D1 conditions in 33% of the county
2019	D0 conditions in 100% of the county
2020	D3 conditions in 14% of the county
2021	D1 conditions in 51% of the county
2022	D3 conditions in 53% of the county
2023	D0 conditions in 74% of the county

Source: NDMC et al. 2024c

Impacts from drought on Southbridge’s water supply have been minimal. Although the town complied with the state-mandated water restrictions during the statewide 2016 drought event, Southbridge’s reservoirs have never dropped below 75% of capacity during any of the past droughts.

Probability of Future Events

In Southbridge, as in the rest of the state, extreme and exceptional droughts occur at a low probability (1% to 10% in the next year). This probability rating combines the probability of future meteorological and hydrological droughts in Southbridge. Because of their robust water supply, Southbridge is at very low risk of experiencing a hydrological drought; however, Southbridge has a moderate probability of experiencing a meteorological drought where dry weather patterns dominate the area. Many factors, such as water supply sources, population, economic factors (e.g., agriculture-based economy), and infrastructure, may affect the severity and length of a drought event.

As with all communities in normally precipitation-rich Massachusetts, Southbridge is unlikely to be adversely affected by conditions other than a major, extended drought. While such a drought would require water saving measures to be implemented, foreseeable damage to structures or loss of life resulting from the hazard would likely be very limited, with modest increased risk of damaging forest or brush fires.

Climate Change

Climate change is expected to increase the frequency, duration, and severity of droughts. Two methods for quantifying these increases include the number of consecutive dry day events (number of multiple dry-day events per year) and the number of days in a year without rain. Consecutive dry-day events in the Quinebaug Basin are projected to increase from a baseline of 31.6 days by 0.15 days by 2030, and up to 0.35 to 0.48 days in 2050 (Massachusetts Executive Office of Energy and Environmental Affairs 2023). The 2022 Massachusetts Climate Change Assessment indicates the annual number of days without rain in the Greater Connecticut River Valley is expected to increase from a baseline of 171 days to 172 days in 2030 and 175 days in 2050. Impacts of increased drought can include degraded freshwater ecosystems, increased wildfire risk (Section 4.10), and loss of urban tree cover. Although Southbridge currently is at low risk of drought, the town may face an increased risk of meteorological drought in the future as a result of climate change.

Vulnerability

Based on the above assessment, Southbridge has a hazard index rating of 4 (low risk) from drought. Although minimal or no loss of property, or damage to people or property is expected because of this hazard, the risk of drought to the community may increase as a result of higher temperature extremes and more consecutive dry days associated with climate change. The large volume of water available to Southbridge also reduces their vulnerability to hydrological drought. Vulnerability is higher in areas outside the municipal water service area, which extends outside the planning area.

4.4 Earthquakes

Hazard Description

An earthquake is a sudden, rapid shaking of the ground that is caused by the breaking and shifting of rock beneath the earth's surface resulting in a sudden slip on a fault. Faults are caused by tectonic plates scraping against each other as they move. 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. Unreinforced 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. In addition, any displaced persons must be sheltered and fed, and medical aid must be provided to anyone injured in the event. There will also be a need to remove and dispose of resulting rubble before infrastructure and housing can be rebuilt.

Location

There are thousands of old geologic faults throughout the entire Northeast (Figure 4). However, there has not been adequate data collection to determine which faults are active today. Because of the regional nature of the hazard, the entire town of Southbridge is susceptible to earthquakes. This makes the location of occurrence large (over 50% of the total study area).

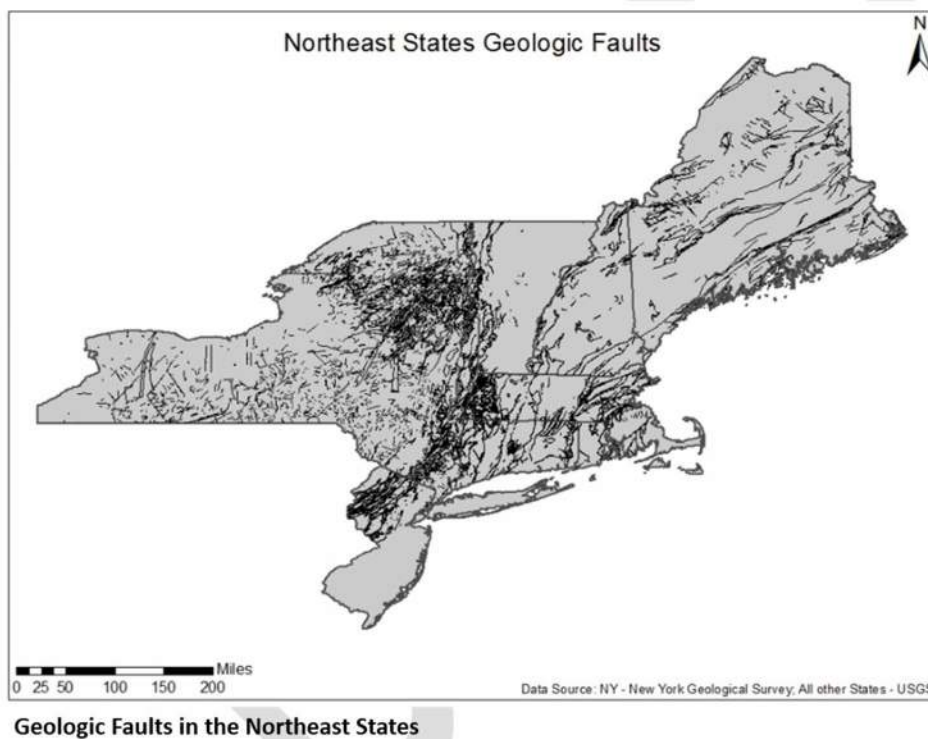


Figure 4 Northeast States Geologic Faults

Extent and Impacts

The amount of energy earthquakes release can be measured using the Richter Scale (Table 11) which is expressed as a magnitude and is measured directly from seismographs. On this scale, one step up in magnitude (from 5.0 to 6.0, for example) increases the energy more than 30 times. The intensity of earthquakes is measured by the Modified Mercalli Intensity (Table 12) scale. Intensity is the amount of shaking at any given location, as felt by humans.

Table 11 Richter Scale Magnitudes and Effects

Magnitude	Effects
Less than 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 greater	Great earthquake. Can cause serious damage in areas several hundred kilometers across.

The intensity of an earthquake is measured using the Modified Mercalli Scale. This scale quantifies the effects of an earthquake on the earth’s surface, humans, objects of nature, and humanmade 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 12 Modified Mercalli Intensity Scale and Effects

Scale	Intensity	Effects	Corresponding Richter Scale Magnitude
I	Instrumental	Detected only on seismographs.	
II	Feeble	Some people feel it.	Less than 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.	Less than 4.8
VI	Strong	Trees sway; suspended objects swing, objects fall off shelves.	Less than 5.4
VII	Very Strong	Mild alarm; walls crack; plaster falls.	Less than 6.1
VIII	Destructive	Moving cars uncontrollable; masonry fractures, poorly constructed buildings damaged.	
IX	Ruinous	Some houses collapse; ground cracks; pipes break open.	Less than 6.9

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

Source: USGS, n.d.

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 81.6% of Southbridge’s 7,466 occupied housing units were constructed in 1979 or earlier (American Communities Survey 2015). The seismic standards were upgraded with the 1997 revision of the Massachusetts State Building Code. Despite its older housing stock, Southbridge faces a minor impact from earthquakes, with little damage likely to occur because of the extreme rarity of damaging events.

Previous Occurrences

Although New England has not experienced an earthquake above a 7.0 on the Richter Scale since 1929 (NESEC 2024), seismologists state that a 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. Earthquakes occur without warning and may be followed by aftershocks. Most older buildings and infrastructure were constructed without specific earthquake-resistant design features.

Earthquakes in the northeastern part of North America that registered above 5.0 on the Richter Scale in the last 100 years include:

- March 1, 1925 – Magnitude 6.2 centered in Charlevoix, Quebec
- September 5, 1944 – Magnitude 5.9 centered in Massena, New York
- January 9, 1982 – Magnitude 5.8 centered in New Brunswick Territory
- January 11, 1982 – Magnitude 5.5 centered in New Brunswick Territory
- November 25, 1988 – Magnitude 5.9 centered in Quebec City

- August 23, 2011 – Magnitude 5.8 centered in Mineral, Virginia

These earthquakes were felt in Massachusetts, but no damage was reported in any of the events. In the last 60 years, Massachusetts has not had an earthquake centered within the state with a magnitude greater than 4.0.

Historic incidences of earthquakes for the eight northeastern states are shown in Table 13.

Table 13 Northeastern States Record of Historic Earthquakes

State	Years of Record	Number of Earthquakes	Years with Damaging Earthquakes
Connecticut	1678–2016	115	1791
Maine	1766–2016	454	1904, 1973
Massachusetts	1668–2016	408	1727, 1755
New Hampshire	1638–2016	320	1638, 1940
New Jersey	1738–2016	98	1884
New York	1737–2016	551	1737, 1929, 1944, 1983, 2002
Rhode Island	1766–2016	34	
Vermont	1843–2016	50	
Total Number of Earthquakes within the Northeast states between 1638 and 2016: 2,030.			

Source: Northeast States Emergency Consortium website, <http://nesec.org/massachusetts373737-earthquakes/>

Probability of Future Events

The U.S. Geological Survey (USGS) does not provide earthquake predictions because it is not possible to forecast the exact time, location, and magnitude of seismic events. Instead, they provide a dataset showing the frequency of damaging earthquake shaking around the U.S., as shown in Figure 5. This map shows the expected number of damaging earthquakes in 10,000 years. It is providing a recurrence interval for events that surpass the Modified Mercalli Intensity for level VI or higher. This is not a precise indicator for future events, but it provides a reasonable estimate for earthquake risk around the country. As shown, central Massachusetts expects to see 4 to 10 damage-causing earthquakes in the next 10,000 years. These could happen at any time and there could be many more than 10, but it shows the probability of Southbridge experiencing earthquake damage is very low.



Frequency of Damaging Earthquake Shaking Around the U.S.

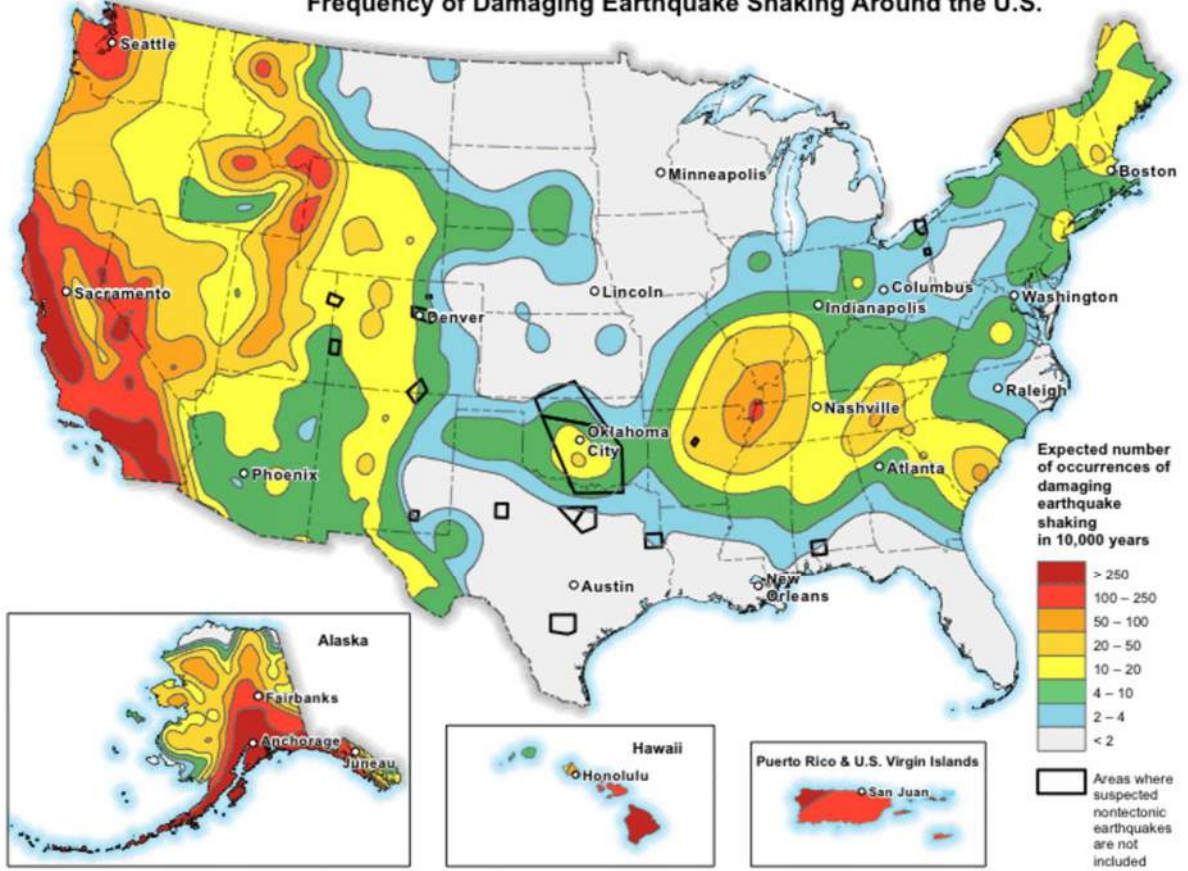


Figure 5 Frequency of Damaging Earthquake Shaking Around the U.S.
<https://www.usgs.gov/media/images/frequency-damaging-earthquake-shaking-around-us>

In addition to the USGS dataset, as shown in Table 12, the Northeast States Emergency Consortium developed information with USGS data in 1993, which provides an estimate for return times for earthquakes of different magnitudes. This aligns with the USGS dataset to show that Southbridge does not face a significant threat from earthquake activity.

Table 14 Estimated Mean Repeat Times for Earthquakes in the Northeast

Magnitude	5.0	5.5	6.0	6.5	7.0
Return Time (years)	30–47	82–156	224–518	709–1,687	2,250–5,500
Most Recent Event	Plattsburgh, NY 2002	Ossipee, NH 1940	Cape Ann, MA 1755	Central, NH 1638	No Record

Vulnerability

The FEMA National Risk Index scores Worcester County as relatively low for earthquake hazards. It also states that the expected community resilience to earthquakes is very high.

In addition, a HAZUS analysis was completed to quantify potential damages. Based on the HAZUS analysis summarized in Table 15, Southbridge has a Hazard Index Rating of 5 (lowest risk) from earthquakes. Although data point out relatively low risk, the planning team noted that the town hall, the fire station, school buildings, and the public library may be vulnerable to a substantial earthquake because of the age of the structures because the structures may not have been kept up to date with building code changes.

Table 15 Estimated Damages from an Earthquake

Magnitude 5.0	
Building Characteristics	
Estimated total number of buildings	4508
Estimated total building replacement value (2010 \$)	\$ 2,679,717,000
Building Damages	
Number of buildings sustaining slight damage	1343
Number of buildings sustaining moderate damage	716
Number of buildings sustaining extensive damage	177
Number of buildings completely damaged	43
Population Needs	
Number of households displaced	167
Number of people seeking public shelter	98
Debris	
Building debris generated (tons)	63,000
Number of truckloads to clear debris (at 25 tons per truck)	25,20
Value of Damages (dollars)	
Total property damage	\$3372,569,000
Total losses because of business interruption	\$9,178,000

More information on the HAZUS-MH software is provided at FEMA's website at www.fema.gov/hazus-software.

The HAZUS analysis shows the vulnerability to earthquakes is the lowest risk—most of the damage caused by an earthquake will result in slight to moderate damage and it will displace a very small portion of the population. In addition to the general impacts identified by HAZUS, the planning team noted that the town hall, the fire station, school buildings, and the public library may be vulnerable to a substantial earthquake.

Climate Change

There is no statistically significant data that shows climate change will cause an increase in earthquakes. USGS states that very large low-pressure changes (e.g., hurricanes) can trigger fault slips (i.e., slow earthquakes) in the earth’s crust, but the numbers of these occurrences are small (USGS, n.d.).

4.5 Extreme Temperatures

Hazard Description

Extreme temperatures events include both extreme cold and extreme heat events. These are described further in the subsections.

Extreme Cold

Per the Massachusetts HMP, extreme cold is a dangerous situation that can result in health emergencies for susceptible people such as those without shelter, who are stranded, or living in homes that are poorly insulated or not heated. Prolonged exposure to extreme cold can cause frostbite or hypothermia and can be life threatening. Poorly insulated pipes can freeze and burst, and the extreme cold can impair communications facilities. The elderly and infants are most susceptible to extreme cold.

Extreme Heat

Extreme heat is the leading weather-related killer in the U.S., according to the NWS “Excessive Heat Conditions” web page. Combined high heat and humidity can lead to heat-related illnesses such as heat cramps, heat exhaustion, and heat stroke. These illnesses occur when the body cannot properly cool itself or when there is a lack of hydration and electrolytes because of sweating. Heat-related illnesses increase as the temperature and relative humidity increase. The elderly; small children; people with chronic illness; and people with weight, alcohol, or drug issues are particularly vulnerable to heat-related illnesses.

While there is no universal definition for extreme temperatures because the term is relative to local weather conditions, the NWS has provided general guidelines for providing warnings for extreme temperature events. A common guideline for a Wind Chill Warning is when the wind

chill index is less than -25°F for at least 3 hours using only sustained winds. A common guideline for excessive heat alerts is when the Daytime Heat Index is greater than 105°F for 2 consecutive hours.

Location

Extreme temperatures can be expected to be fairly uniform across Southbridge during a given weather event, because of the town's lack of extreme elevations and coastal areas. Therefore, this hazard is of large geographic coverage. However, extreme heat impacts may be concentrated in the urban core of the town because of the urban heat island effect.

Extent and Impacts

As per the Massachusetts HMP, the extent (severity or magnitude) of extreme cold temperatures are generally measured through the Wind Chill Temperature Index. The NWS introduced the Wind Chill Temperature Index in 2001. This index calculates the dangers from winter winds and freezing temperature. 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. Figure 6 shows three shaded areas of frostbite danger. Each shaded area shows how long a person can be exposed before frostbite develops. In Massachusetts, a wind chill warning is issued by the NWS Taunton Forecast Office when the Wind Chill Temperature Index, based on sustained wind, is -25°F or lower for at least three hours. Although the data show the extent in Southbridge is limited, there are other factors that may increase the impact. Several factors discussed in Sections 3 and 5, including an unhoused population, lack of affordable housing, and substandard housing for low-income communities, contribute to increased exposure to extreme temperatures events. For this reason, the extent of impact in Southbridge for this hazard is critical.

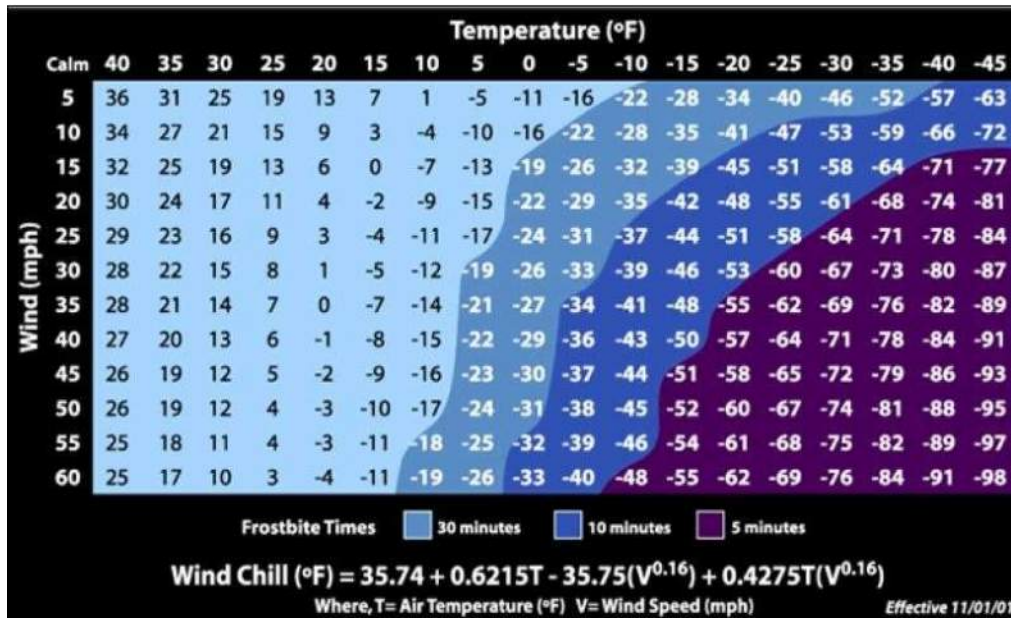


Figure 6 Wind Chill Determination

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 a Heat Advisory when the Heat Index is forecast to reach 100 to 104°F for 2 or more hours. The NWS issues an Excessive Heat Warning if the Heat Index is forecast to reach 105+°F for 2 or more hours. Figure 7 shows the relationship between heat index and relative humidity.

Relative Humidity (%)		80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110	
	40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136	
	45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137		
	50	81	83	85	88	91	95	99	103	108	113	118	124	131	137			
	55	81	84	86	89	93	97	101	106	112	117	124	130	137				
	60	82	84	88	91	95	100	105	110	116	123	129	137					
	65	82	85	89	93	98	103	108	114	121	128	136						
	70	83	86	90	95	100	105	112	119	126	134							
	75	84	88	92	97	103	109	116	124	132								
	80	84	89	94	100	106	113	121	129									
	85	85	90	96	102	110	117	126	135									
	90	86	91	98	105	113	122	131										
95	86	93	100	108	117	127												
100	87	95	103	112	121	132												
Category		Heat Index					Health Hazards											
Extreme Danger		130 °F – Higher					Heat Stroke or Sunstroke is likely with continued exposure.											
Danger		105 °F – 129 °F					Sunstroke, muscle cramps, and/or heat exhaustion possible with prolonged exposure and/or physical activity.											
Extreme Caution		90 °F – 105 °F					Sunstroke, muscle cramps, and/or heat exhaustions possible with prolonged exposure and/or physical activity.											
Caution		80 °F – 90 °F					Fatigue possible with prolonged exposure and/or physical activity.											

Figure 7 Heat Index Determination

Previous Occurrences

The following are the average low temperatures recorded at the Worcester weather station for the period from 1895 to present (NWS 2024a.). Southbridge’s annual average temperature range is 56°F for the high and 39.6°F for the low. Southbridge’s temperature range is essentially the same as in Worcester, located some 15 miles away and at a similar elevation.

- November: 32.5°F
- December: 23.4°F
- January: 17.1°F
- February: 18.9°F

The following the average high temperatures recorded for the period from 1895 to present (NOAA):

- June: 74.5°F
- July: 79.8°F
- August: 78.1°F
- September: 70.7°F

Probability of Future Events

The Climate.gov Climate Explorer predicts that the average annual temperature in Southbridge will increase 2.93 to 3.72 degrees F from its current baseline of 46.86 degrees F by 2050. The annual number of days exceeding 90 degrees F is projected to increase from 3.28 days per year to 11.46 days per year in 2030 and to 22.19 days per year by 2050. The minimum winter temperature in Southbridge is projected to increase from 15.29 degrees F to 21.39 degrees F by 2050. The Climate Explorer uses the RCP8.5 scenario to determine the upper bounds of the future predictions. There are four Representation Concentration Pathways, or RCPs, that are used in climate modeling. These pathways represent different climate change scenarios through 2100. RCP8.5 is the worst-case scenario climate scenario.

Extreme temperature days have a very high chance of occurrence. Southbridge currently averages about 3 days per year over 90°F, and this is expected to continue to rise. This means that this will be an ever present hazard in Southbridge.

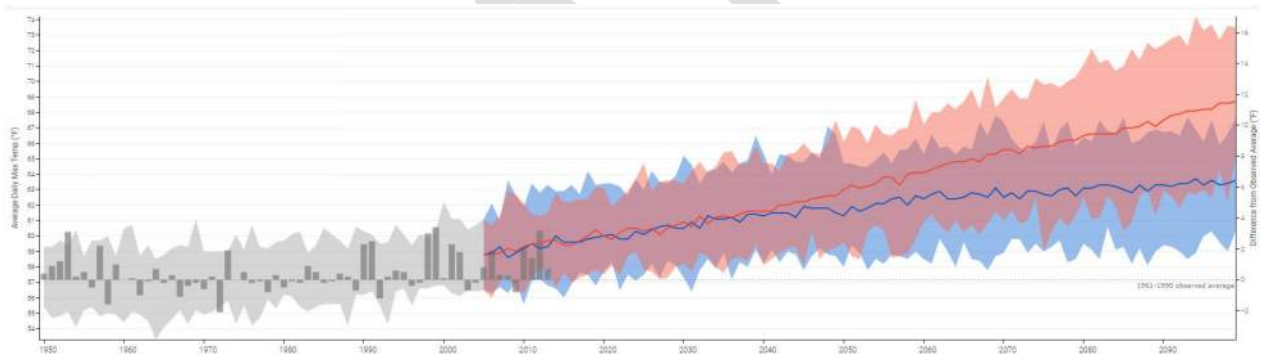


Figure 8 Southbridge, Massachusetts Average Daily Maximum Temperature (Observed and Projected)

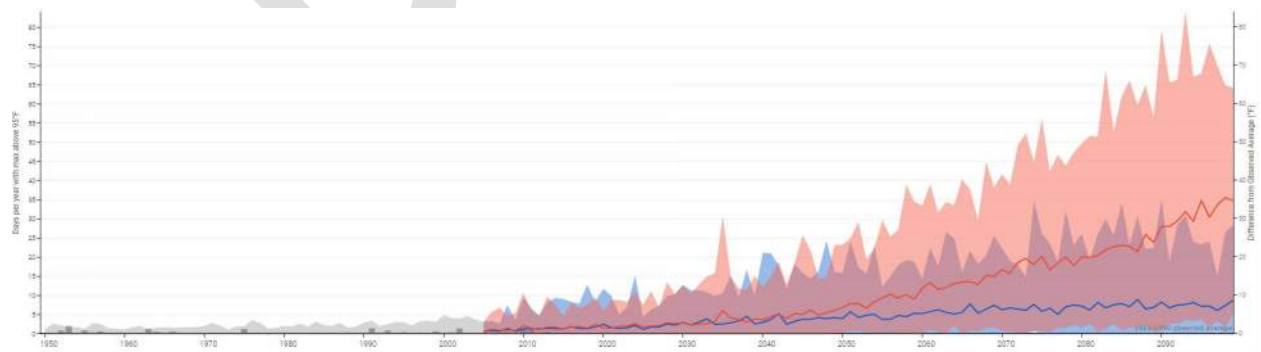


Figure 9 Southbridge, Massachusetts Days Over 95°F (Observed and Projected)

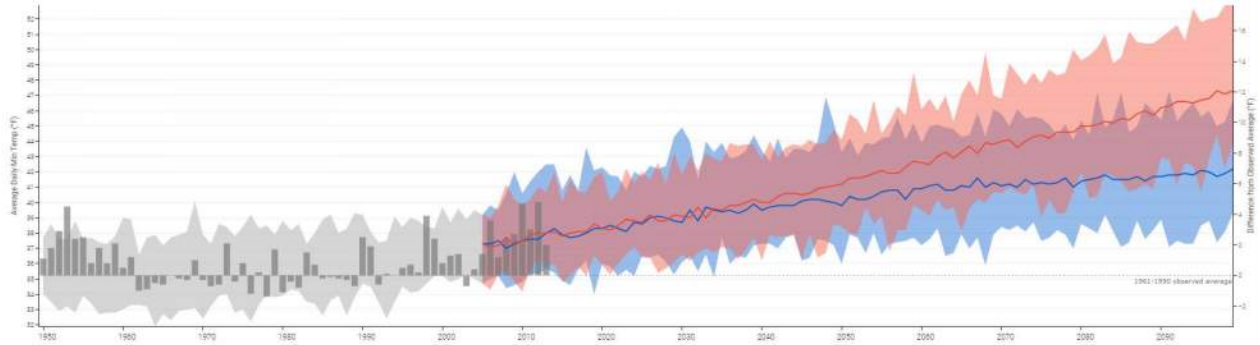


Figure 10 Southbridge, Massachusetts Average Daily Minimum Temperature (Observed and Projected)

Vulnerability

Southbridge’s vulnerability to extreme heat and cold is considered to be, 2 (high risk).

Climate Change

The Municipal Vulnerability Report (Town of Southbridge 2022) states that as weather patterns are predicted to continue changing which will lead to an increase in extreme heat. This may result in an increase of the occurrence of heat-related illnesses, especially in downtown areas where high percentages of impervious surfaces create a heat island effect. As seen in the Probability of Future Events section, climate change will have a significant impact on the amount of extreme weather days in Southbridge. Extreme heat days are expected to increase and this will strain town resources moving forward.

4.6 Flooding

Hazard Description

Flooding was the most prevalent natural hazard identified by local officials in Southbridge. Flooding is generally caused by hurricanes, nor’easters, severe rainstorms, and thunderstorms. However, the most frequent flood threat is because of riverine and stormwater flooding. Global climate change has the potential to exacerbate these issues over time with the potential for more severe and frequent storm and rainfall events. In the Northeast, there has been an increase in total precipitation of 60% on the heaviest 1% of days (Marvel et al, 2023.). There are several different types of flood hazards – from stormwater inundation and poor drainage infrastructure to riverine flooding and storm surges to dam failures. The most extensive damage would result from dam failure. Flooding because of hurricanes, nor’easters, and dam failure is covered in the corresponding sections. This section covers riverine flooding and stormwater inundation.

Location

Flooding and flood-prone areas in Southbridge are closely associated with the course of the Quinebaug River and its tributary water bodies and waterways. According to a GIS analysis performed by CDM Smith, there are 476 parcels in Southbridge that are susceptible flooding during a 100-year or base flood events, with 364 of these parcels containing structures. Much of Southbridge is upland, away from rivers and ponds and as a result, the location of this hazard is medium. Map 2 in Appendix D illustrates the FEMA Flood Insurance Rate Maps (FIRM) 100-year flood zones in the town. Despite much of the town being upland, the suburban environment and extensive network of imperviousness combined with inadequate drainage systems and steep slopes often leads to localized flooding because of excessive surface water runoff. Therefore, the location of occurrence for flooding is “medium”.

Extent and Impacts

Water levels in Southbridge’s rivers, streams, and wetlands rise and fall seasonally and during high rainfall events. High-water levels are typical in spring, because of snowmelt and ground thaw combined with rainfall. This is a period when flood hazards are normally expected. Low water levels occur in summer because of high evaporation and transpiration. At any time, heavy rainfall may create conditions that raise water levels in rivers and streams above bank full stage, which then overflow to adjacent land. Riverine flooding extent in Southbridge is shown in Figure 11.

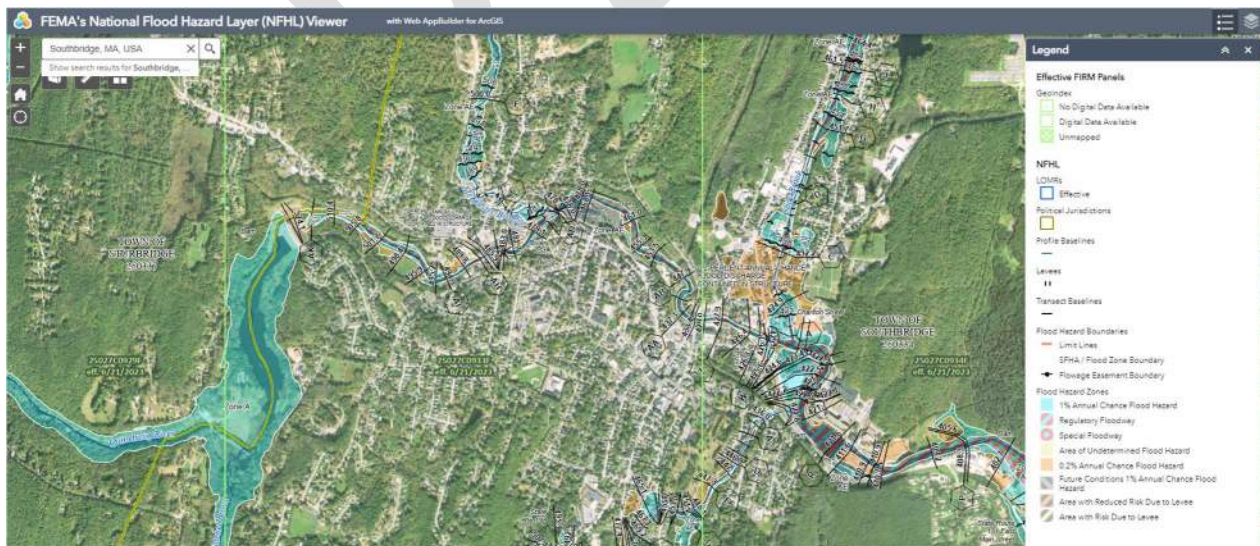


Figure 11 Floodplain Extent in Downtown Southbridge

Undersized and outdated stormwater infrastructure has led to a significant amount of localized flooding, even during smaller precipitation events. Flooding caused by these stormwater systems

has begun to erode bridges and other structures that are not subject to regular fluvial flooding. Precipitation events also contribute to increased I&I within the sanitary sewer system, challenging the wastewater treatment plant and risking a sanitary sewer overflow. Additionally, precipitation events increase the risk of erosion in areas where solar panel arrays and other greenfield development is occurring. Therefore, the town faces an increased risk of infrastructure damage because of pluvial flooding.

Based on past records and the knowledge and experience of members of the Southbridge Hazard Mitigation Team and residents, the extent of the impact of localized flooding would be considered critical.

Previous Occurrences

In addition to the floodplains mapped by FEMA for the 100-year and 500-year flood, there have been a few notable flooding instances in Southbridge. In the 1950s there was a historic flood across Main Street going past West Street and Mill Street. There was also a flood in 2005 that caused some damage at Accurate Metal Sales.

Southbridge often experiences minor but persistent flooding at isolated locations because of drainage issues, including undersized culverts. Undersized culverts and the stormwater drainage system are a problem town wide. The following specific flooding locations were identified by the Southbridge Hazard Mitigation Team based on knowledge of past flood events, but town staff noted that additional locations may exist that are not known to town staff given the limited capacity of staff and lack of data collection:

- Wall Street at Langlois Brook, undersized inlet coupled with the natural flow of the stream causes flooding during rain events
- Mechanic Street has a blockage and causes water to back up and cause localized flooding
- There is a tree blockage at Cady Brook
- Lebanon Street area floods because of undersized inlets
- Elderly housing complex at Maria Avenue floods during rain events because of undersized culverts
- There are flooding issues behind the Big Y Plaza. This is where the wastewater treatment plant is located, so it is of high concern.

According to community members, additional locations of potential localized flooding issues include:

- Charlton Street
- Worcester Street
- South Street

- The intersection of Eastford Road and Dennison Drive
- Ellis Road
- Central Street
- Meadowbrook Road, at the bottom of the hill where the road curves

Because of a lack of proper maintenance, the sanitary sewer system is in generally poor condition and experiences significant inflow and infiltration (I&I) during heavy precipitation events. The wastewater treatment plant reaches its maximum treatment capacity multiple times a year and requires careful management from the operating staff to avoid a sewer overflow.

Since the previous HMP, a major development trend in Southbridge has been the installation of several large photovoltaic solar panel arrays to comply with state requirements for renewable energy production. During workshops for the 2022 Municipal Vulnerability Preparedness (MVP) summary, community members and Town staff noted an increased risk of erosion during high-precipitation events in the areas around these solar panel arrays. Several of these arrays were constructed on hill slopes in town, required the removal of existing forest, and did not include adequate restoration efforts to prevent erosion.

Based on these impacts, the probability of future events for both riverine and localized flooding is high.

Vulnerability

Using the GIS analysis noted above, the total value of the structures, as of February 2017, on the 476 parcels that are susceptible to a 100-year flood is approximately \$143,000,000.

The Hazus software was used to model potential damage to the community from a 100-year flood event, assuming a 1 square mile data resolution.

Table 16 Estimated Damages from Flood

	100 Year flood event
Building Characteristics	
Estimated total number of buildings	4508
Estimated total building replacement value (2010 \$)	\$ 2,679,717,000
Building Damages	
Number of buildings sustaining minor damage (1-10%)	113
Number of buildings sustaining moderate damage (11-40%)	83
Number of buildings sustaining severe damage (41-50%)	1
Number of buildings destroyed	0

Population Needs	
Number of households displaced	3687
Number of people seeking public shelter	681
Value of Damages	
Total property damage (buildings and content)	\$ 272,487,000
Total losses because of business interruption	\$348,388,000

Historically there are a limited number of recorded instances of flood events of this size. This model was included to help planners and emergency personnel quantify the impact scale of a plausible and increasingly likely flood event as we observe increasing frequency of severe weather events because of climate change.¹

Based on the Hazus analysis and the historical impacts of localized pluvial flooding, Southbridge faces a hazard index rating of 2 (high risk) from flooding.

Climate Change

To understand the potential impact of climate change on flooding risk, the HMP team conducted an analysis to understand how projected changes in precipitation may affect modeled damages from a 100-year event in 2050. The 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan projects that in Southbridge precipitation depths for extreme storms, such as the 100-year event, may increase by 22% in 2050, compared to the historical precipitation depths published in Atlas 14 (Le Noir et al. 2023, MA EEA 2024). A study modeling the impact of extreme precipitation on runoff showed that across the country, a 1% increase in extreme precipitation can result in approximately a 1.9% increase in runoff and river discharge (Maimone and Adams 2023). This ratio was used to estimate that runoff and river discharge will increase by 40% in 2050 compared to modeled flows in current FIS reports. The HMP team analyzed FEMA flow and recurrence-interval relationships around the downtown area of Southbridge and found that a 40% increase in flow means that a 100-year event in 2050 is approximately equal to a 275-year event today. By interpolating between the modeled damages for a 100-year event and 500-year event from HAZUS, the team found that total property damage increased by 26% to \$342,000,000 and that losses from business interruption increase by 14% to \$396,000,000.

¹For more information on the HAZUS-MH software, go to <http://www.fema.gov/hazus-software>.

4.7 Hurricanes

Hazard Description

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

Location

Because of the hazard's regional nature, the entire town of Southbridge is at risk from hurricanes, meaning the location of occurrence is large. Ridgetops are more susceptible to wind damage while low-lying areas susceptible to flooding are likely to be affected by heavy rainfall.

Extent and Impacts

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 by category on a scale of 1 to 5, with 5 being the most intense.

A description of the damages that could occur because of a hurricane is described by the Saffir-Simpson scale, as shown in Table 17 below:

Table 17 Hurricane Damage Classifications

Storm Category	Damage Level	Description of Damages	Wind Speed (mph)
1	MINIMAL		74–95

Storm Category	Damage Level	Description of Damages	Wind Speed (mph)
	Very dangerous winds will produce some damage	Well-constructed frame homes could have damage to roof, shingles, vinyl siding and gutters. Large branches of trees will snap and shallowly rooted trees may be toppled. Extensive damage to power lines and poles likely will result in power outages that could last a few to several days. An example of a Category 1 hurricane is Hurricane Dolly (2008).	
2	MODERATE	Well-constructed frame homes could sustain major roof and siding damage. Many shallowly rooted trees will be snapped or uprooted and block numerous roads. Near-total power loss is expected with outages that could last from several days to weeks. An example of a Category 2 hurricane is Hurricane Francis (2004).	96–110
	Extremely dangerous winds will cause extensive damage		
3	EXTENSIVE	Well-built frame homes may incur major damage or removal of roof decking and gable ends. Many trees will be snapped or uprooted, blocking numerous roads. Electricity and water will be unavailable for several days to weeks after the storm passes. An example of a Category 3 hurricane is Hurricane Ivan (2004).	111–129
	Devastating damage will occur		
4	EXTREME	Well-built framed homes can sustain serious damage with loss of most of the roof structure and/or some exterior walls. Most trees will be snapped or uprooted and power poles downed. Fallen trees and power poles will isolate residential areas. Power outages will last weeks to possibly months. Most of the area will be uninhabitable for weeks or months. An example of a Category 4 hurricane is Hurricane Charley (2004).	130–156
	Catastrophic damage will occur		
5	CATASTROPHIC	A high percentage of framed homes will be destroyed, with total roof failure and wall collapse. Fallen trees and power poles will isolate residential areas. Power outages will last for weeks to possibly months. Most of the area will be uninhabitable for weeks or months. An example of a Category 5 hurricane is Hurricane Andrew (1992).	157+
	Catastrophic damage will occur		

mph – miles per hour

Source: NOAA 2024a

The town faces a critical impact from hurricanes with multiple injuries possible 25% to 50% of property in affected area damaged or destroyed.

Previous Occurrences

Table 18 list hurricanes that passed within 60 nautical miles of Southbridge through 2023.

Table 18 Major Hurricanes and Tropical Storms within 60 nautical miles of Southbridge since 1952

Hurricane/Storm Name	Year	Saffir-Simpson Category (when reached MA)
Able	1952	Tropical Storm
Carol	1954	3
Cindy	1959	Tropical Storm
Brenda	1960	Tropical Storm
Donna	1960	1
Doria	1971	Tropical Storm
Belle	1976	Minor Storm
Gloria	1985	1
Henri	1985	Tropical Storm
Bob	1991	2
Bertha	1996	Tropical Storm
Floyd	1999	Tropical Storm
Hermine	2004	Tropical Storm
Hanna	2008	Tropical Storm
Irene	2011	Tropical Storm
Elsa	2021	Tropical Storm
Henri	2021	Tropical Storm

Source: NOAA 2024b

Probability of Future Events

Southbridge's location, approximately 55 miles inland in central Massachusetts, reduces the risk of extremely high winds that are associated with hurricanes because hurricanes and tropical storms lose strength as they move inland., Although the town can still experience some high wind events, based upon past occurrences, there is a low probability (1% to 10% in any given year) of hurricanes in Southbridge. However, climate change is projected to result in more severe weather, including increased occurrence and intensity of hurricanes and tropical storms. Southbridge will likely experience increased risk from hurricanes in the future.

Vulnerability

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 .02% likely to happen in a given year, and roughly equivalent to a Category 2 and Category 4 hurricane, respectively. 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. The results are summarized in Table 19.

Table 19 Estimated Damages from Hurricanes

	100 Year	500 Year
Building Characteristics		
Estimated total number of buildings	4508	
Estimated total building replacement value (2014 \$)	\$ 2,679,717,000	
Building Damages		
Number of buildings sustaining minor damage	231	765
Number of buildings sustaining moderate damage	31	177
Number of buildings sustaining severe damage	1	17
Number of buildings destroyed	0	12
Population Needs		
Number of households displaced	5	57
Number of people seeking public shelter	5	51
Debris		
Building debris generated (tons)	1543	5821
Tree debris generated (tons)	11,257	21,982
Number of truckloads to clear building debris	512	1,112
Value of Damages (thousands of dollars)		
Total property damage (buildings and content)	\$18,201,000	\$68,394,000
Total losses because of business interruption	\$ 1,660,000	\$8,457,000

Though there are no recorded instances of a hurricane equivalent to a 500-year storm passing through Massachusetts, this model was included to present a reasonable worst-case scenario that will help planners and emergency personnel evaluate the impacts of storms that may be more likely in the future.

Based on the above analysis, Southbridge has a hazard index rating of 3 (medium risk) from hurricanes. Although Southbridge is not a coastal community and therefore not as likely to be impacted directly by a hurricane, communities in western Massachusetts have recently been more at risk from the heavy rainfall and high winds associated with hurricanes (State of Massachusetts 2023).

Climate Change

Warming ocean and air temperatures are expected to result in increased frequency and intensity of hurricanes and tropical storms. Although hurricanes lose strength as they move inland, Southbridge is still at risk from associated heavy precipitation and winds and climate change may increase the town's vulnerability to hurricanes in the future. The 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan notes that climate change may result in increased frequency of Atlantic tropical cyclones.

4.8 Severe Snowstorms/Ice Storms/Nor'easters

Hazard Description

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 Southbridge is susceptible to severe snowstorms, which means the location of occurrence is large. Because these storms occur regionally, they would impact the entire town. Southbridge Regional Airport is especially vulnerable to severe snow storms because of its high elevation.

Extent and Impacts

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

NESIS scores are a function of the area affected by the snowstorm, the amount of snow, and the number of people living in the path of the storm. The aerial distribution of snowfall and population information are combined in an equation that calculates a NESIS score which varies from around one for smaller storms to over 10 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 20 Northeast Snowfall Impact Scale Categories

Category	NESIS Value	Description
1	1–2.499	Notable
2	2.5–3.99	Significant
3	4–5.99	Major
4	6–9.99	Crippling
5	10.0+	Extreme

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

The town faces a limited impact or less than 10% 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 and lead to ice dams and both interior and exterior structural damage.

Other impacts from snowstorms and ice storms include:

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

Previous Occurrences

The 2011 Halloween Nor’easter was a memorable event that produced unusually early snowfall on trees that were often still in leaf, adding extra weight, with the ground in some areas still soft

from a preceding warm, rainy period that increased the possibility trees could be uprooted. While this event did not rank high on the Northeast Snowfall Impact Scale (NESIS) scale, its occurrence has added awareness to the town’s vulnerability of a low scoring NESIS event that occurs earlier in the season.

Based on data available from NOAA and using the NESIS scale, there have been 62 high-impact snowstorms since 1958 that affected the Northeast corridor. Of these, 33 storms resulted in snowfalls in Southbridge of at least 10 inches. These storms are listed Table 21 below:

Table 21 Winter Storms Producing Over 10 Inches of Snow in Southbridge, 1958–2024

Date	NESIS Value	NESIS Category	NESIS Classification
12/21/2022	2.66	2	Significant
12/13/2022	8.52	4	Crippling
1/28/2022	1.73	1	Notable
1/04/2022	1.60	1	Notable
1/01/2022	1.06	1	Notable
1/30/2021	4.93	3	Major
12/14/2020	3.21	2	Significant
3/03/2019	1.29	1	Notable
1/11/2019	2.03	1	Notable
3/20/2018	1.63	1	Notable
3/11/2018	3.16	2	Significant
3/05/2018	3.45	2	Significant
1/03/2018	1.71	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
2/12/2006	4.1	3	Major
2/21/2005	6.8	4	Crippling
2/15/2003	7.5	4	Crippling

Date	NESIS Value	NESIS Category	NESIS Classification
3/31/1997	2.29	1	Notable
2/2/1995	1.43	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
12/25/1969	6.29	4	Crippling
2/22/1969	4.29	3	Major
2/8/1969	3.51	2	Significant
2/5/1967	3.5	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

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

Probability of Future Events

Based upon the availability of records for Worcester County, the likelihood that a severe snow storm will affect Southbridge is very high (greater than 70% in any given year).

Research on climate change indicates that there is great potential for stronger, more frequent storms as the global temperature increases. The 2022 Massachusetts State Climate Change Assessment says that predicted changes in the amount, frequency, and timing of precipitation, and the shift toward more precipitation because of the increased capacity of warmer air to hold moisture, that winters could have significant implications. By the end of the century, under the high-emissions scenario, annual precipitation is expected to increase by up to 6% annually, and a 24% increase in the winter. The report expresses confidence in the increase in winter precipitation but acknowledges the uncertainty of predicting summer precipitation increases.

Vulnerability

Based on the above assessment, Southbridge has a hazard index rating of 2 (high risk) from snowstorms and ice storms.

Using the town's total value of all property, \$1,682,581,286 (Massachusetts Department of Revenue, 2024), and an estimated 5% of damage to 10% of residential structures, approximately \$8,412,906 worth of damage could occur from a severe snowstorm. This is a rough estimate and likely reflects a worst-case scenario. The cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included in this estimate.

Climate Change

Winter precipitation is predicted to increase by 24% to 42% according to the 2022 State of Massachusetts Climate Assessment. This is because of the increased capacity of air to hold moisture as the mean temperature rises. It is possible that this leads to less snow and rainier and icier winter storms. However, it is difficult to predict exactly how climate change will affect winter storms.

4.9 Severe Thunderstorms/Wind/Tornado

Hazard Description

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, NWS modified the hail size criterion to classify a thunderstorm as severe when it produces damaging wind gusts over 58 mph (50 knots), hail that is 1 inch in diameter or larger (quarter size), or a tornado (NWS 2024c).

Wind is air in motion relative to surface of the earth. For nontropical events over land, 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 of 40 mph or more or any gusts of 58 mph or more). For nontropical events over water, NWS issues a small craft advisory (sustained winds of 25 to 33 knots), a gale warning (sustained winds of 34 to 47 knots), a storm warning (sustained winds of 48 to 63 knots), or a hurricane-force wind warning (sustained winds of 64 knots or more). For tropical systems, 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, and more. High winds can cause scattered power outages and present 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 and with little or no advance warning, a tornado can attain rotational wind speeds in excess of 250 mph and can cause severe devastation along a path that ranges from a few dozen yards to over a mile wide. 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 Southbridge some 10 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

The 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan identifies Worcester, Middlesex, Hampden, and part of Essex counties as having the greatest risk for tornado touchdowns with the state. However, the actual area that would be affected by these events when they happen would be small, with less than 10% of the town generally affected.

Extent and Impacts

Overall, Southbridge faces a minor impact from severe thunderstorms and a limited impact from severe winds or tornadoes, with a 10% or less chance of the town likely to be affected.

Severe thunderstorms are defined as storms with wind gusts over 58 mph or that are capable of producing a tornado or hail that is an inch or larger in diameter (NWS 2024c). Massachusetts typically experiences 10 to 15 days per year with severe thunderstorms. Approximately 20% of severe, long-lived thunderstorms, known as supercells, produce tornadoes (State of Massachusetts 2023).

Tornadoes are measured using the Enhanced Fujita (EF) Scale, shown in Table 22, with corresponding wind speed estimates as determined by damage assessment. The EF Scale relies on 28 damage indicators (e.g., residential buildings, flagpoles) to determine wind speeds. Within those damage indicators, several degrees of damage are identified, ranging from the start of visible damage to the destruction of the damage indicator (Texas Tech University 2006).

Table 22 EF Scale Levels

EF Scale Number	Description	3-Second Gust (mph)
EF0	Gale	65–85
EF1	Moderate	86–110
EF2	Significant	111–135
EF3	Severe	136–165
EF4	Devastating	166–200

EF Scale Number	Description	3-Second Gust (mph)
EF5	Incredible	>200

Source: NWS 2024d

Table 23 describes the traditional object-to-size conversion for hail.

Table 23 Extent Scale for Hail

Hail Size (inches)	Object Analog Reported
0.50	Marble, mothball
0.75	Penny
0.88	Nickel
1.00	Quarter
1.25	Half dollar
1.50	Walnut, ping pong ball
1.75	Golf ball
2.00	Hen egg
2.50	Tennis ball
2.75	Baseball
3.00	Tea cup
4.00	Grapefruit
4.50	Softball

Source: NOAA 2024c

According to the EF Scale for tornadoes, the following impacts can result to one- and two-family residences (Texas Tech University 2006):

- EF0 (65 to 85 mph) – 65 mph is the threshold of visible damage. At 79 mph, damage includes loss of roof covering material (less than 20%), gutters and/or awning; loss of vinyl or metal siding.
- EF1 (86 to 110 mph) – At 97 mph, damage includes broken glass in doors and windows, uplift of roof deck and loss of significant roof covering material (greater than 20%); collapse of chimney; garage doors collapse inward or outward; failure of porch or carport.
- EF2 (111 to 135 mph) – At 122 mph, entire houses may shift off their foundations. Large sections of roof structure are removed; most walls remain standing. At 132 mph, exterior walls collapse.
- EF3 (136 to 165 mph) – At 152 mph, most walls are collapsed in the bottom floor, except small interior rooms.
- EF4 (166 to 200 mph) – At 170 mph, all walls are collapsed.

- EF5 (over 200 mph) – At 200 mph, damage includes destruction of engineered and/or well-constructed residence; slabs are swept clean.

Previous Occurrences

Because thunderstorms and wind affect the town regularly on an annual basis, there are no significant records available for these events. Per the 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan, there are approximately 10 to 15 days of severe thunderstorm activity in the state each year (State of Massachusetts 2023).

In Worcester County, a number of F1 tornadoes have occurred sporadically over the years. A search of NOAA’s Storm Events Database for tornadoes with a rating of F3 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, South of Worcester.
- In 1970, an F3 tornado struck Worcester County. No deaths or injuries were reported.
- In 1981 an F3 tornado struck, resulting in just three injuries and very little reported property damage.
- In June 2011, an EF3 tornado struck Massachusetts and passed directly through Southbridge (Figure 13). Few deaths were reported, all in Hampden County. No deaths were reported in Worcester County; however, several aircraft at Southbridge Municipal Airport sustained damage and more than 20 buildings in the Brookside Road, Charlton Street, and Harrington Road neighborhoods were rendered uninhabitable (Town of Southbridge 2022).



Figure 12 Tornado Damage (MEMA 2011)

Figure 13 shows the path of the 2011 Tornado near Southbridge. Figure 14 illustrates the tracks of tornadoes that occurred near Southbridge from 1950 to 2022.



Figure 13 Path of the 2011 Tornado

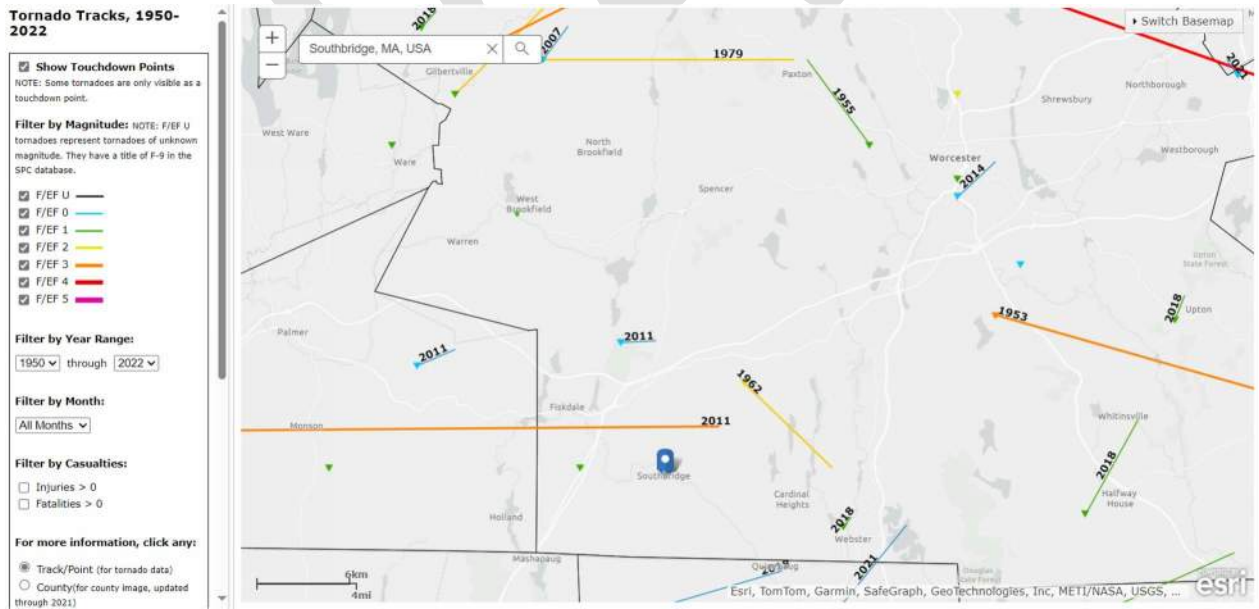


Figure 14 Tornado Tracks, 1950–2022 near Southbridge (Midwestern Regional Climate Center 2024)

Probability of Future Events

One measure of tornado activity is the Tornado Index value. Activity is calculated based on historical tornado events data using USA.com algorithms. The index is an indicator of the relative tornado activity level in a region. A higher Tornado Index value means a higher chance of tornado events. Index values for Worcester and its surroundings are shown in Table 24.

Table 24 Tornado Index Value

Location	Tornado Index Value
Town of Southbridge	106.08
Worcester County	120.35
Massachusetts	87.60
United States	136.45

Source: World Media Group, LLC 2024

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

Vulnerability

Based on the above assessment, Southbridge has a hazard index rating of 2 (medium risk) from severe thunderstorms and winds, and a 4 (low risk) from tornadoes. Although Southbridge would be affected by frequent heavy precipitation and high winds associated with a severe thunderstorm, the likelihood of future occurrence is relatively low, and the impact would be minor.

The potential for locally catastrophic damage is a factor in any tornado, severe thunderstorm, or wind event. In Southbridge, 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 74.2% of the town's 7,030 occupied housing units were constructed in 1979 or earlier (U.S. Census Bureau 2022). Private homes and town facilities are vulnerable to strong winds and tornadoes. Utility lines throughout the town are also vulnerable, particularly where trees have not been trimmed recently.

Using the town's total value of all property, \$1,682,581,286,915,440,195 (Massachusetts Department of Revenue 2024), and an estimated 10% of damage to 5% of all structures, the estimated amount of damage from a tornado in 2024 is \$8,412,906. The cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included in this estimate.

Climate Change

Climate predictions indicate an increase in severe thunderstorms, which can produce tornadoes; however, there is no clear indicator that tornado frequency will increase with climate change (State of Massachusetts 2023).

4.10 Wildfires/Brush Fires

Hazard Description

Wildfires are typically fires triggered by fuel sources such as lightning or human-caused accidents, involving full-sized trees as well as meadows and scrublands. Brushfires are uncontrolled fires occurring in meadows and scrublands but do not involve full-sized trees. Fire conditions typically arise from some combination of hot weather, an increase in young vegetation, and low moisture content in both the air and the fuel. The main area of concern is the wildland-urban interface, the point at which land use transitions from forested to urban. This zone is most susceptible to damage from wildfire, resulting in major loss of property and structure. Wildfires can also cause negative impacts to human health from decreased air quality.

FEMA has classifications for three different types 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 lightning
- Crown fires move quickly by jumping along the tops of trees and may spread rapidly, especially under windy conditions

Location

Worcester County has approximately 645,000 acres of forested land, which accounts for 64% of total land area (Massachusetts Office of GIS 2007). In Southbridge, an estimated 64% of the land is forested. Southbridge is developed in a somewhat dense suburban pattern and few uninterrupted tracts of forest are present, the tree coverage does present some risk for wildfires and brush fires. The total amount of the town that could be affected by a wildfire is categorized as large (more than 50% of the total area). The town has a full-time fire department and municipal water is available throughout the town.

Extent and Impacts

While a large wildfire could in theory damage much of the landmass of Southbridge, most forested areas are sparsely developed, meaning that wildfire affected areas are not likely to cause damage to personal property. For this reason, the town faces a minor impact from wildfires, with little damage likely to occur. However, wildfires and brush fires can consume homes, other buildings, and agricultural resources. The impacts of wildfires and brush fires for the town follow:

- 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, because of damage to property and income from land following a wildfire
- Impact through the destruction of people and property

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 Southbridge, approximately 64% of the town's total land area is forested and is therefore at risk of fire. This forested area is generally scattered throughout the community, with developed areas, rivers, and major transportation corridors (Route 131 and Route 169) breaking up the forest. In drought conditions, a brushfire or wildfire would be a matter of concern. However, Southbridge has an excess of water storage and drought conditions are not considered a concern for the town, as noted in the drought hazard profile. However, the town may still be affected by a more localized meteorological drought with low precipitation and/or high temperatures, which could increase wildfire risk. As noted in the section that follows describing previous occurrences of wildfire, there have not been any major wildfires recorded in Southbridge in recent decades.

USDA and USFS created a nationwide dataset to determine wildfire risk for communities that shows the wildfire risk in the town of Southbridge to be very Class 1 (low danger). This same program also shows there have been no significant wildfires in the town of Southbridge for the last four decades.

The USDA and USFS wildfire rating table ranks wildfire danger based on the ease of ignition and rate of spread. As fuels increase in dryness it becomes easier to start fires and they spread more quickly. The rating system was created using a nationwide wildfire dataset to determine a generalized wildfire risk rating. Wildfire ratings are described in Table 25.

Table 25 Wildfire Ratings

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

Previous Occurrences

Southbridge has a full-time staff with firefighters, emergency medical technicians, and paramedics. There are seven members per shift and it is staffed 24 hours per day, 7 days per week. There have not been any notable wildfires in Southbridge.



Figure 15 Wildfire Hazard Potential by the United States Forest Service

Source: https://apps.fs.usda.gov/arcx/rest/services/RDW_Wildfire/RMRS_WildfireHazardPotential_2023/MapServer

Probability of Future Events

USDA and the United States Forest Service (USFS) created a nationwide dataset to determine wildfire risk for communities that shows the wildfire risk in the town of Southbridge to be Class 1: low risk. As shown in Figure 15, Southbridge has large areas of very low risk, low risk, moderate risk. However, there are also numerous natural fire breaks and unburnable areas within the town boundary.

Climate scenarios project summer temperature increases between 2 and 5°C and precipitation decreases of up to 15%. Such conditions would exacerbate summer drought and further promote high-elevation wildfires, releasing stores of carbon and further contributing to the buildup of greenhouse gases. Forest response to increased atmospheric carbon dioxide—the so-called

fertilization effect—could also contribute to more tree growth and thus more fuel for fires, but the effects of carbon dioxide on mature forests are still largely unknown.

Based on the available information Southbridge has a low risk of future events causing wildfire damage. Given the lack of risk based on USDA and USFS predictions and the lack of previous occurrences causing damage, the planning team determined there to be less than a 10% chance of occurrence of damaging wildfire events.

Vulnerability

Based on this assessment, Southbridge has a Hazard Risk Index of 4 (low risk) from wildfires.

There are several areas considered vulnerable in the town, Southbridge Municipal Airport and the water department land in the southwestern part of town. Using the town's total value of all property, \$1,682,581,286 (Massachusetts Department of Revenue 2024), and an estimated 5% of damage to 10% of all structures, the estimated amount of damage from a wildfire is \$8,412,906. The cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included in this estimate.

Climate Change

There are too many factors to accurately predict wildfire increases. Climate change is likely to increase the fire season by increasing temperatures and causing precipitation events to be more intense but more sporadic. Increased drought conditions and temperatures will lead to an increase in fire conditions. 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. While the town has an excess supply of drinking water, a meteorological drought that leaves fuel excessively dry could increase the wildfire potential in the area. However, with the amount of fire breaks in the town, widespread fire is unlikely to occur even in extreme conditions.

4.11 Hazards Not Evaluated

In addition to the hazards identified in previous sections, the planning team reviewed the other hazards listed in the Massachusetts HMP: changes in groundwater, coastal flooding, coastal erosion, invasive species, landslides/mudflows, and tsunamis. It was determined that these hazards are either irrelevant to Southbridge because of the town's location, or insufficient data were available to evaluate Southbridge's vulnerability to the hazard.

Invasive Species

The gypsy moth, *Lymantria dispar*, is one of North America's most devastating forest pests. The species originally evolved in Europe and Asia and has existed there for thousands of years. In either 1868 or 1869, the gypsy moth was accidentally introduced near Boston by E. Leopold Trouvelot. About 10 years after this introduction, the first outbreaks of the moth began in Trouvelot's neighborhood, and in 1890, the state and federal government began their attempts to eradicate the gypsy moth. These attempts ultimately failed, and since that time, the range of gypsy moth has continued to spread. Every year, isolated populations are discovered beyond the contiguous range of the gypsy moth, but these populations have been naturally eradicated or they disappear without intervention. Yet it is inevitable that the gypsy moth will continue to expand its range in the future.

The gypsy moth is known to feed on the foliage of hundreds of species of plants in North America. Its most common hosts are oaks and aspen. Gypsy moth hosts occur through most of the coterminous U.S., but the highest concentrations of its host trees are in the southern Appalachian Mountains, Ozark Mountains, and northern lake states.

Gypsy moth populations are typically eruptive in North America; in any forest stand densities may fluctuate from near 1 egg mass per hectare to over 1,000 per hectare. When densities reach very high levels, trees may become completely defoliated. Several successive years of defoliation, along with contributions by other biotic and abiotic stress factors, may ultimately result in tree mortality.

Other invasive species noted in the Massachusetts State HMP include the emerald ash borer and the Asian long-horned beetle. The primary impact of these invasive species in Southbridge is destruction of trees and forest, which leads to more dead wood on the forest floor, increasing Southbridge's wildfire risk.

Beaver Dams

Beavers are common and abundant throughout most of Massachusetts, and they are becoming increasingly more common and plentiful. Beavers play an important role in controlling downstream flooding by storing and slowly releasing floodwater. They also improve water quality by removing or transforming excess nutrients, trapping silt, binding and removing toxic chemicals, and filtering out sediment. However, many towns, including Southbridge, have concerns with the growing number of beavers and the potential hazard of the beaver dams. Beavers may pose threats to public water supply and the animals carry a couple pathogens, which can contaminate drinking water. Also, the beavers dam flowing water, potentially creating water quality and quantity issues.

MA DEP can determine whether the presence of beavers is a threat to the health and safety of residents.

Another risk is abandonment of the dam for various reasons and subsequent failure of the dam. Failures result in rapid entrenchment downstream of the dam, some evacuation of pond sediments, and rapid colonization of exposed sediments by vegetation. Furthermore, abandoned beaver dams were often found to transform from a pond to a meadow in less than a decade as they filled up with sediment and the sediments were colonized by plants. This abandonment could dramatically reshape parts of Southbridge in a relatively short period; the shift in wetlands would likely have impacts beyond the localized beaver pond. A major storm or rapid snow melt in the region could significantly impact the stability of beaver dams. Although the dams are generally solidly built, the risk of multiple breaches at once should be considered. Cascade failure of the dams is also a concern—if one dam collapses, others downstream may not be able to handle the sudden increase in the surge of water. Catastrophic flooding would occur and sediment of likely unknown quality would be washed downstream. Municipal officials should be aware of the risk and monitor the beaver population when possible. Cooperation with the Massachusetts Board of Health and MA DEP to trap beavers should occur when appropriate. Also, educating the community at large would ensure community members are aware of the risk and encourage the monitoring of the various beavers in the town.

Landslides

An additional hazard that can affect Southbridge 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 Southbridge. The town is relatively flat so risk of landslides is minimal. Most of the town's rivers are slow moving

and frequently dammed, which can minimize landslide risk. Roadways are not generally built close to river channels, reducing undercutting risk from stormwater-induced bank erosion. High-slope terrain (defined as 15% to 25% grade) cover 1,843 acres, or 13.81% of the town; very high slopes (higher than 25% grade) cover 146.7 acres, or slightly more than 1% of the town's area. Development is present in these areas and, should a landslide occur in the future in Southbridge, 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, although the data reviewers for this plan and the local Planning Team noted no specific concerns. Injuries and casualties, while possible, would be unlikely given the low extent and impact of landslides in Southbridge.

Southbridge, like nearly all communities in the region, is categorized in the Massachusetts Natural HMP as a low incidence/low susceptibility area for landslide hazards based on review of past occurrences. 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 VULNERABILITY ASSESSMENT

This section provides a summary of community assets in the town of Southbridge that are vulnerable to natural hazards. Community assets include:

- People, including underserved communities and socially vulnerable populations
- Structures, including existing and future buildings
- Community lifelines, critical facilities, and systems (including networks and capabilities)
- Natural, historic, and cultural resources
- Economy and other activities that have value to the community

5.1 People Including Underserved Communities and Socially Vulnerable Populations

For this assessment of people at risk, the town identified people at risk from natural hazards in three categories:

- Town residents
- Employees that travel to the community for work

Underserved Communities Executive Order 13985 was enacted in January 2021 to promote equity by addressing disparities in laws and public policies that have denied equal opportunity to individuals and communities. The order states: “The term ‘underserved communities’ refers to populations sharing a particular characteristic, as well as geographic communities, that have been systematically denied a full opportunity to participate in aspects of economic, social, and civic life . . .” The order notes underserved communities include Black, Latino, and Indigenous and Native American persons, Asian American and Pacific Islanders, and other persons of color; members of religious minorities; LGBTQ+ persons; persons with disabilities; persons who live in rural areas; and persons otherwise adversely affected by persistent poverty or inequality.

- Visitors that come to the town to enjoy historic, cultural, recreational, or other benefits

People may be vulnerable to widespread hazards that could occur at any location such as severe storms or extreme cold, or to locational hazards such as flooding, where the area of hazard risk can be mapped. Section 4 includes analysis of vulnerability for each natural hazard that could impact Southbridge. The widespread hazards with the highest probability and for which people would be most vulnerable are severe storms and extreme heat and cold. For extreme temperatures, the very young and old populations are of the greatest concern. For locational hazards, flooding is the hazard of greatest concern for people. Other hazards, such as dam failure or earthquakes, could have catastrophic impacts to people, but probability for those events is very low.

As noted in Section 3, the town of Southbridge is experiencing minimal population growth. However, in January 2024, town staff noted a recent increase in permits for reuse of commercial buildings, primarily mill structures. For this reason, there are likely to be population increases in areas where the town is promoting revitalization, such as the downtown, Globe Village, and the American Optical mill building redevelopment areas. This will increase the population exposed to hazards with the highest risk in these areas, including dam failure, flooding, and extreme temperatures. Therefore, mitigation actions for these hazards in these areas are needed to protect future growth.

5.1.1 Town Residents

In Southbridge, people reside in high-density residential areas in the downtown area, along the Quinebaug River, and along State Route 169. Additional areas with medium- and low-density residential concentrations are to the north and south of the downtown area. There is also a concentration of density to the east and west of downtown along State Route 131. This expansive downtown and high-density area is vulnerable to the locational hazards of flooding and severe thunderstorms because of the proximity of the Quinebaug River and its tributaries and the condition of drainage infrastructure in these areas. This area are also vulnerable to the widespread hazard of extreme temperatures, given the concentration of people in this area and the quality of existing housing.

Underserved communities and socially vulnerable populations have even greater risk to natural hazards. According to the Massachusetts 2020 Environmental Justice (EJ) population classifications, as shown in Figure 16, the entire downtown area and the northern half of the town meet Massachusetts' criteria for low-income and/or minority populations. Massachusetts defines EJ populations as:

- Minority population – Minorities comprise 40% or more of the population
- Median household income – Not more than 65% of the statewide annual income

- 25% or more of the population lack English language proficiency
- Minorities comprise 25% or more of the population and the annual median household income of the municipality does not exceed 150% of the statewide annual median income

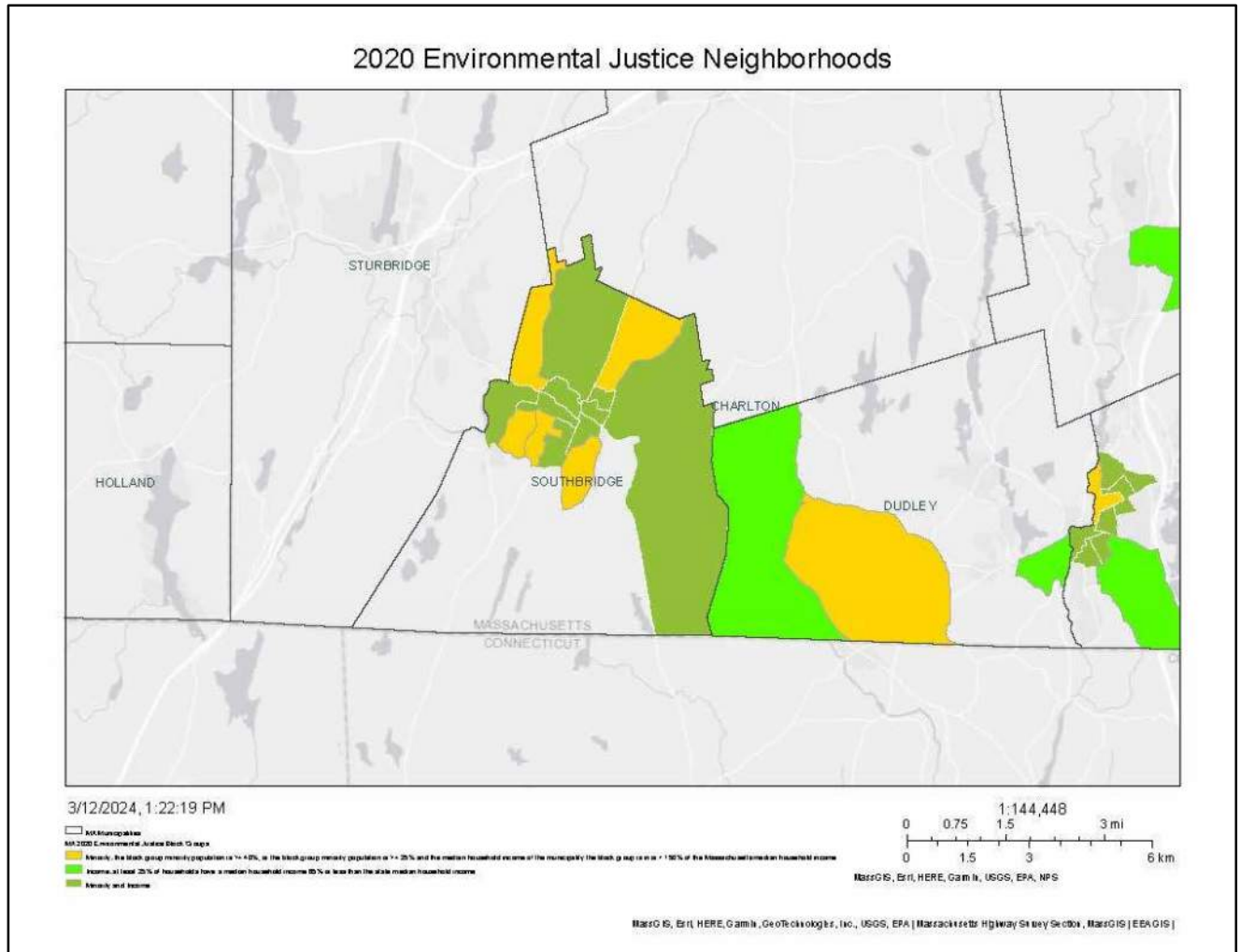


Figure 16 2020 Massachusetts EJ Populations in Southbridge

Source: Based on U.S. Census Bureau data released October 2021 and March 2022 and updated on November 12, 2022. <https://www.mass.gov/info-details/massgis-data-2020-environmental-justice-populations>

Other areas with high levels of social vulnerability in Southbridge include:

- Entire downtown, which is a designated EJ area per the 2020 EJ Populations Map and is also a low-lying area prone to flooding

- 600 Block on Main Street, whose census tract has a high percentage of low-income/minority residents
- 300 Block and Edwards Block on Main Street, which are low-income areas with a high Spanish-speaking population
- Communities near the airport, where there are EJ concerns because of high percentages of low-income/minority residents
- 301 housing units owned or administered by the Southbridge Housing Authority for individuals and families that qualify for subsidized housing

Within the context of natural hazards and vulnerable populations, potential EJ concerns may arise from income-related factors, discrimination (overt or institutional), cultural isolation and barriers, language isolation, lack of transportation access, and disability (especially among the elderly). Social vulnerabilities contributing to increased hazard vulnerability in Southbridge include:

- **Low-income households** – These households may have fewer resources to plan for, evacuate from, or recover from a disaster event. In addition, these populations typically occupy housing in the lower affordability levels that is substandard and without proper insulation or cooling/heating systems, which adds to the vulnerability for these populations.
- **Speak a language other than English** – Individuals with limited English proficiency have less ability to communicate or understand relevant emergency response, preparedness, or health and safety information, which puts this population at greater risk of life-threatening circumstances during a hazard event. Spanish is the predominant non-English language spoken. Town staff note that most departments strive to issue communications in both English and Spanish, including evacuation and public health information.
- **Senior citizens** – The elderly experience more health and cognitive issues, which make them more vulnerable than the general population. This includes residents that live independently or in senior housing, in assisted living, or in skilled nursing facilities. It may be difficult for this community to evacuate during a disaster, and they may be more vulnerable to the impacts of hazards such as extreme heat and cold. Senior housing facilities in Southbridge include:
 - Elderly housing complex on Maria Avenue
 - Residences at Wells School at 82 Marcy Street
 - Quinebaug Plaza Elderly Housing at 60 Charlton Street
 - Dresser Park Elderly Housing at 150 Main Street
- **Food and housing insecurity** – Although food insecurity is difficult to measure, town staff have noted that local convenience stores are a critical source of food access for some residents, indicating that food insecurity may be high in some parts of town. Town staff

have also noted that substandard housing and an increasing unhoused population increases the exposure of vulnerable communities to all natural hazards.

- **High health risks** – The community’s residents experience a high rate of serious health risks, most notably asthma and childhood asthma (Massachusetts Department of Public Health 2022). Southbridge is one of 10 cities/towns in the state with the highest 3-year average annual age-adjusted rate of asthma-related hospitalization. Asthma is a condition involving chronic inflammation of the airways, which makes these residents more vulnerable to hazards such as extreme temperatures and wildfire.

Facilities and organizations that serve or accommodate people must also be considered. This includes the health and social services facilities, including schools, daycare facilities, and human service agencies listed in Sections 5.3.2 and 5.3.3. Faith-based organizations can provide a valuable supporting role during emergencies and natural disasters by providing refuge and shelter, food, referrals to other resources, and other supports. To these support organizations, it is important to ensure their facilities and organizations continue to maintain accessibility, power, and communications.

5.1.2 Employees

The town includes numerous commercial, mixed-use, industrial, and other employment centers in locations where employees could be vulnerable to hazard risk. The highest concentration of employees at risk is in the downtown and other concentrations of mill buildings (e.g., former American Optical campus). These locations are further discussed in Sections 5.2 and 5.5. Based on the locations of these buildings, the primary hazards affecting employees specifically are flooding and dam failure. Other hazards that may affect them include those hazards that would make traveling to work difficult, such as severe snowstorms and thunderstorms.

5.1.3 Visitors

The town has historic, cultural, and recreational amenities that draw people to the community. Expanding tourism to the community is a key economic development strategy for the town. Visitors or tourists may not be familiar with the community’s hazard risks and may be less prepared to respond if an event occurs. The community assets that generate visitors are summarized in Section 5.4 and Section 5.5.

5.2 Structures and Development

This section addresses structures and their vulnerability to hazard risk. All structures are vulnerable to some level of hazard risk; however, certain buildings may be more vulnerable to risk because of their age, construction type, condition, or use. For this category, the community must consider existing structures and potential new structures. For mitigation planning, it is

helpful to identify concentrations of structures at risk. For detailed information on the types, numbers, and values of structures at risk to locational hazards (specifically earthquakes, flooding, and hurricanes), refer to Sections 4.4, 4.6, and 4.7.

5.2.1 Existing Structures and Development

This section describes existing structures vulnerabilities to natural hazards.

5.2.1.1 Residential Structures

Residential structures in Southbridge face increased vulnerability to hazard risk because of the following factors:

- Over half of the town's housing units are in multi-family structures. Developers have leveraged grant investments to increase production of new multi-family housing units.
- Nearly half of the community's housing units were constructed before 1939.
- Generally, home size is smaller than average; 53% of homes have five or fewer rooms.
- Mill buildings converted to residential use face a high flood risk because of their location in or near the floodway.
- Town staff describe the quality of much of the community's housing as substandard. Because of building age, many homes are not properly insulated and most do not have air-conditioning. In January 2024, town staff noted a trend for revitalization of substandard units, which can help reduce these vulnerabilities.
- The fire department responds to frequent calls to assist property owners with flooded basements.

5.2.1.2 Commercial, Mixed Use, and Industrial

Commercial and mixed-use structures face increased vulnerability to hazard risk because of the following factors:

- Commercial and employment uses in the downtown are primarily in mill buildings and other older structures along waterways, including some structures in the 100-year floodplain.
- Newer commercial redevelopments include the American Optical campus, which has sustained past flooding.
- Town staff note there are vacant mill buildings in the community that are vulnerable. These buildings may not be well-maintained, and if they collapsed, they could impact neighboring structures. Examples are structures at 18 and 30 Mill Street.

Industrial structures face increased vulnerability to natural hazards because of the following factors:

- The town’s zoning map identifies areas for manufacturing and office research uses in the downtown, to the east of the town, at the American Optical conference facility campus, and along Route 131, and north of the City to the east of Highway 169. A number of existing industrial uses are built in floodplain areas.
- There are public and private solar facilities in the community may be vulnerable to flooding and erosion if not properly sited or designed. One such facility sustained erosion damage that also impacted adjacent properties.

5.2.2 Future Structures and Development

Overall, Southbridge has not experienced significant new development in the past 5 years; however, economic development and revitalization is a priority for this community and this trend has recently shifted. In January 2024, town staff noted they have been issuing a much higher number of permits in the last few months for residential and commercial reuse of commercial buildings. Town staff continue to issue a limited number of permits for infill development of new single-family homes.

Southbridge’s Land Use Concept Plan (Town of Southbridge 2013) identifies the future land uses that are envisioned for areas of the community. This map shows the town has designated large tracts of land in the northern and eastern areas of the town for future industrial, manufacturing, or mixed-use development. The town has adopted two overlay zones to promote redevelopment of these areas at the American Optical campus and the Globe Village. The intent of both of these overlay zones is to repurpose former industrial buildings and related properties and encourage a mix of residential, commercial, and industrial uses within each of these areas. The town also has a floodplain overlay district, which can similarly help guide development to avoid new development within the floodplain. There has been substantial redevelopment within the American Optical campus, including the Southbridge Hotel and Conference Center and several commercial and residential buildings. Additional redevelopment within this campus is planned.

5.3 Community Lifelines, Critical Facilities, and Systems

This section identifies the critical facilities and community lifelines in Southbridge. These include the physical structures and infrastructure for these facilities, as well as the systems, networks, and capabilities that these facilities provide to the community. The term “community lifelines” broadly describes the facilities and services that are the most vital services in the community and are fundamental to community operation; when these services function, all other aspects of society can function. Community lifelines include the facilities, systems, and services that are needed to support disaster response planning and operations, as well as public health,

safety, and economic viability. The systems and networks that support community lifelines could be disrupted by a natural disaster and could impact community response to the disaster and impact safety of the town.

A critical facility is a building, structure, or location that is:

- Vital to the emergency response and hazard mitigation efforts
- Maintains an existing level of protection from hazards for the community
- Would create a secondary disaster if a hazard were to impact it

The information in this section was developed for the 2024 HMP based on the information from Southbridge’s 2019 HMP, along meetings with town staff, public meetings, and supporting plans and documents such as the Southbridge Master Plan.

5.3.1 Safety and Security

A community’s safety and security lifeline includes facilities and services such as law enforcement, municipal government service, community safe, emergency response, and fire service. For Southbridge, this includes the critical infrastructure listed in Table 26. The town hall does not currently have a backup power system; however, all other major town facilities have backup generators. The police station is currently in the 100-year floodplain; there have been no significant or damaging flooding events at this location in recent years.

Table 26 Southbridge Emergency Response Facilities and Services

Function	Building/Facility	Address
Emergency operations center	Casaubon Community Center	153 Chestnut Street
Police station	Southbridge Police Department	One Mechanic Street
Fire station (will be replaced by a new fire station)	Fire headquarters	24 Elm Street (existing station) 122 Worcester Street (new replacement station)
DPW yards/offices	DPW headquarters	185 Guelphwood Road
UMass Memorial Health Harrington Hospital	Health care, urgent care, and emergency services	100 South Street

5.3.2 Food, Water, Shelter

The public and private facilities that provide food, water, and shelter must be stabilized to support community needs. The Southbridge Fire Department works with local grocery stores and corporations to develop memorandums of understanding that would give the department priority access for essential goods, including food and water, if residents are not able to access those

resources because of a disaster event. In addition, the community has approximately two dozen religious organizations in the community that provide various community support services. Table 27 summarizes the key groceries and food markets in the community.

Table 27 Southbridge Groceries and Food Markets

Name	Location
Big Bunny Market	942 W Main Street
Southbridge Xtra Mart	464 E Main Street
Big Y World Class Market	505 E Main Street

The town maintains a Watershed Protection Area (WPA) in the southwest corner of the community to protect the town drinking water reservoirs. As shown on the town’s zoning map, the area is subject to a Watershed Protection District zoning overlay. The WPA includes five reservoirs that provide a total of one billion gallons of water storage within 3,000 acres of drainage area. Town officials are considering adding a sixth reservoir, which would provide 2 years of storage capacity. Unless there is a large new industrial user, the town’s current water resources are expected to meet the community’s needs. The Town of Charlton purchases water from Southbridge. During the 2016 drought, Charlton’s water resources did not fall below the 75% capacity requirement that would have triggered water restrictions.

The town hosts a range of institutions that serve people of all ages, including the public school system, private schools, daycare and preschool facilities, and group homes. These facilities are summarized in Table 28. These facilities and their staff also provide a safety/security function for the populations they serve. The senior center and armory serve as community shelters to offer cooling and heating; however, they do not meet Americans with Disability Act requirements. An animal rescue team provides support to shelter animals.

Table 28 Southbridge Schools, Daycare Facilities, Social Service Facilities, and Community Shelters

Name	Location	Function
Southbridge Public Schools Central Services Office	25 Cole Avenue	School administration
Eastford Road School	120 Eastford Road	Public school
Charlton Street School	220 Charlton Street	Public school
West Street School	156 West Street	Public school
Mary E. Wells Junior High School	82 Marcy Street	Shelter/mass care shelter
Southbridge Middle/High School	132 Torry Road	Shelter/mass care shelter
Southbridge Community Center	153 Chestnut Street	Shelter/mass care shelter
Southbridge Senior Center	153 Chestnut Street	Eldercare, community shelter
Trinity Catholic Academy	11 Pine Street	Private school
WCAC Head Start Program	25 Cole Avenue	Daycare

Name	Location	Function
Montessori Children’s House	370 Worcester Street	Daycare
Tri-Community YMCA Day Care	115 Marcy Street	Daycare
Tri-Community YMCA Preschool	43 Everett Street	Preschool
YMCA After School Daycare	43 Everett Street	Daycare
Center of Hope Foundation	100 Foster Street	Support services for disabled individuals
Massachusetts Department of Transitional Assistance	One North Street, Suite B	Social services
Chapter 689 Special Needs Housing	45 and 51 Cross Street	Group home
U.S. National Guard Armory	153 Chestnut Street	Community shelter for cooling, heating

A major vulnerability for Southbridge is the quality of the public school buildings. Almost all of the buildings are outdated and need substantial upgrades or replacement. Most of the buildings do not have air-conditioning, which creates hazardous conditions during warmer months. As the number of hot days each year increases, this has increasing impacts on public school workers, students, and infrastructure. Southbridge Middle/High School is the school in best condition and is supposed to be the town’s backup shelter; however, it is missing several components to make it suitable as a shelter, including the capacity to run water in the building when the power is out.

Southbridge Community Center is currently the primary shelter used by the town. It has been used for disaster sheltering as well as heating and cooling during extreme temperature events. There are some deficiencies at this building, however, that should be addressed to improve its sheltering capacity, including replacing the heating, ventilation, and cooling (HVAC) system at the community center and addressing drainage issues in the parking lot to improve building access.

5.3.3 Health and Medical

The Southbridge community health and medical system includes a hospital, a long-term care facility, a rehabilitation facility, and mortuary services. UMass Memorial Health Harrington Hospital in Southbridge is part of the UMass Memorial Health system and provides medical and surgical inpatient care, 24-hour emergency services, intensive care, and outpatient care. Southbridge health and medical assets are listed in Table 29.

Table 29 Southbridge Health and Medical Assets

Name	Location	Facility Type
UMass Memorial Health Harrington Hospital	100 South Street	Hospital/emergency facility

Name	Location	Facility Type
CVS Pharmacy	455 Main Street	Drug store/medical care
South Central Respite/7 Hills Foundation	150 Main Street	Long-term care facility
Southbridge Rehabilitation and Healthcare	84 Chapin Street	Rehabilitation hospital
Belanger/Bullard Funeral Home	51 Marcy Street	Mortuary
Morril Funeral Home	130 Hamilton Street	Mortuary
Sansoucy Funeral Home	40 Marcy Street	Mortuary
Southbridge Veterinary Hospital	100 Central Street	veterinary hospital
Veterinary Surgery Center	175 Charlton Road	Veterinary Hospital

5.3.4 *Energy (Power and Fuel)*

National Grid provides the community’s gas and electric service. The electric system includes aboveground wires that are vulnerable to hazards. Some members of the community may be using delivered fuel (heating oil or propane) for heating, but the exact portion of the community using delivered fuel is not known.

5.3.5 *Communications*

There are five communications towers throughout the town. The town maintains the following communications services:

- Town municipal communications computer network (in development over the next year)
- Everbridge voluntary citizen message alert system
- Code Red system – Approximately one-third of residents are enrolled; the town uses this sparingly to provide messaging for incidents such as road closures, fires, floods, and parking bans

5.3.6 *Transportation*

Southbridge residents rely on State Routes 131, 169, and 198 as the primary evacuation routes. These routes lead to adjacent communities, and residents of those communities also use these routes for evacuation to Southbridge. In the event of a larger, regional-scale disaster event, these facilities may be overwhelmed. These routes also serve as the hazardous materials transportation routes. In addition to these roads, there are four bridges that serve a critical function to the community. These bridges are:

- Dresser Hill Road at Quinebaug River
- Quinebaug River at Central Street
- Quinebaug River/Route 131 at Hamilton Street

- Sandersdale Road/Route 169

There are other transportation facilities and services that support the community and would help resume regular, daily functions in the event of a significant natural hazard:

- Southbridge Municipal Airport (One Airport Road and Clemence Hill Road) provides freight service and supports warehousing needs
- Alternate transportation services are provided by Harrington Memorial Hospital, Dresser Park Elderly Housing, Quinebaug Plaza Elderly Housing, and Southbridge Rehabilitation
- AA Transportation (185 Guelphwood Road) is a private bus company that provides transportation services

5.3.7 *Hazardous Materials*

The town has identified 30 locations that use or store hazardous materials, including 26 facilities and 4 fuel transfer stations. These hazardous materials locations are inventoried and monitored by the Southbridge Fire Department.

There is a liquid natural gas processing facility on Route 169 in Charlton. Although this facility is not within Southbridge town boundaries, it is close to Southbridge and Charlton may be first responders in the case of an emergency at this facility.

5.3.8 *Water Systems*

The town maintains an extensive stormwater drainage system that includes aging infrastructure in need of replacement. There are many undersized pipes and culverts across the town. In addition, there are ongoing issues with maintenance of vegetation and debris on private property to ensure proper function of stormwater drainage flow. DPW maintains the stormwater drainage system. DPW oversees a drainage maintenance plan, which has been effective, but the department is under-staffed and has limited capacity to for preventative maintenance. In addition to surface drainage systems and below ground infrastructure, the DPW maintains infrastructure for several underground streams.

The town has identified both public and privately owned dams as critical infrastructure. A list of dams in Southbridge is included in Section 4. Town staff cited that their greatest concern related to dams is the condition and maintenance of private local dams and levees. Staff also noted there are dams of concern outside of town boundaries in East Brimfield and Sturbridge, Massachusetts, and in Thompson, Connecticut.

Southbridge's wastewater treatment plant is in a floodplain, and there have been past instances of overcharging in heavy storm events. DPW staff believe that the historical overcharging events are the result of I&I into the sanitary sewer collection system because of the aging infrastructure.

5.4 Natural, Historic, and Cultural Resources

5.4.1 *Natural Resources*

Southbridge has an extremely diverse natural environment with an abundance of surface water resources including rivers, lakes, ponds, reservoirs, and wetlands, as well as upland areas with steep slopes and ridgelines. As of 2013, 21% of the community (3,200 acres) was in some form of protected open space. Some primary resources are the Quinebaug River, which flows through the core of the community and downtown; WRA in the west, which includes a campsite and facilities for day use and is managed by USACE; and over 2,000 acres of WPA in the southwest corner of the community. The town areas with hillsides and ridgelines are in the eastern portion of the community north of State Highway 131 and in the south-central part of the community south of State Highway 131. The town has 2,000 acres of remaining prime farmland that is on the tops of these hilly areas that is vulnerable to erosion. As of 2013, the town had over 8,500 acres of woodlands that consist of mixed hardwood and pine forest; these areas and provide significant functions natural functions such as supporting habitat biodiversity, reducing runoff and flooding, and moderating extreme climate conditions (Town of Southbridge 2013). Some of this woodland area may be vulnerable to development and subsequent natural hazard impacts such as erosion and localized flooding.

These natural resources provide significant value as habitat, community amenities and recreational resources, and water resources. As discussed previously, there are also numerous areas where water, soil, and flooding conditions overlap with public facilities and private development, posing hazard risk to these assets.

5.4.2 *Historic and Cultural Resources*

Southbridge includes a wealth of historic and cultural sites, resources, and programs. The Massachusetts Cultural Resources Information System (MACRIS) online database provides information on historic properties on file with the Massachusetts Historical Commission, which includes the Inventory of Historic Assets of the Commonwealth, National Register of Historic Places (NRHP) nominations, State Register of Historic Places listings, and local historic district study reports. Authorized by the National Historic Preservation Act of 1966, the National Park Service's NRHP is part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect America's historic and archaeological resources. The NRHP is the official list of America's historic places worthy of preservation. This official list includes districts, sites, buildings, structures, and objects that have cultural value both nationally and within the state in which they are located.

As of February 13, 2024, MACRIS indicates Southbridge has 416 historic properties listed in or eligible for listing in the NRHP that are classified as areas (local areas of cultural interest, usually

with more than one historic resource with the boundary), buildings (e.g., residential dwellings, commercial buildings), burial grounds (cemeteries), objects (usually archaeological resources), and structures (usually infrastructure [e.g., bridges, rail lines]). However, MACRIS records are not current and therefore do not reflect the total number of resources on the NRHP or no longer extant. Additionally, this statistic does not include known archaeological sites.

The designation “area” in MACRIS is a mapping classification for locations that have several historic properties in them and may include historic districts. Southbridge has 14 established historic districts in residential, commercial, and formerly industrial areas. The largest historic districts are the American Optical Company Historic District; Centre Village Historic District; and Hamilton Woolen Company Historic District.

As of April 5, 2024, 85 town properties are listed on the NRHP. Of those properties, 12 are historic districts that include multiple properties within the district boundaries. The remaining 73 properties identified are individually listed. Most of the 85 NRHP properties are in the downtown and central areas of the community, creating a historic town core. Approximately 12 of the properties are in the immediate outlying areas of the community.

It is a great honor for a property to be listed on the NRHP. This status can be very useful in helping to save historic buildings and sites because these properties are typically held in high regard. Understanding the history and cultural value of a property can help prevent insensitive alteration and demolition because the site has been determined to be worthy of preservation by the nation and the community. This information is also valuable if a property must be restored following damage from natural hazards. Building restoration or alteration efforts may need to follow certain procedures to honor the property’s historic preservation status.

For parts of the town with increased extreme temperatures and flood risk, the historic status of affected properties is important to determine what potential mitigation actions are feasible given the constraints applied to historic properties.

Key town facilities that support historic preservation and cultural arts are:

- Optical Heritage Museum, 12 Crane Street – This museum is dedicated to the preservation, education, and research of the optical industry from the nineteenth century to the present.
- Gateway Players Theater, Elm Street Congregational Church, 61 Elm Street – This volunteer community theater, in its forty-ninth season, provides live theater and workshops throughout the year.
- Ruth Wells Center for the Arts, 111 Main Street – The center is a notable cultural institution that houses the Quinebaug Valley Council for the Arts and Humanities. The center is housed in a historic home (constructed about 1828) with accompanying

landscape and serves 19 Massachusetts and six Connecticut communities. Services include a gallery, special art and music events, arts classes and workshops, and a store for local artist-made items. The center includes indoor and outdoor spaces for special events rentals. The center also supports programming for the Southbridge Historical Society.

The community has five cemeteries designated as historic burial grounds. These are Notre Dame Cemetery, Oak Ridge Cemetery, Street George Cemetery, Street Hedwig's Cemetery, and Street Mary's Cemetery.

5.5 Economy and Other Community-Valued Activities

5.5.1 Economic Development

Southbridge has proactively worked to diversify its economic base and bolster its economy through tourism. There are several initiatives currently underway that the town has supported by developing new zoning tools and making investments in infrastructure:

- Globe Village created a flexible overlay zoning district to redevelop mill buildings; one building is currently under development
- Continuing downtown revitalization activity through roadway, water system, and signalization improvements, with the objective of connecting with the rail trail
- Supporting ongoing activity to promote mill building redevelopment at the American Optical campus including implementing a flexible overlay zoning district

Southbridge Municipal Airport is also a component of the community's economic development strategy. Airport facilities have been improved to support warehouse shipping.

Additional background on the community's economic development and employment is provided in Section 3.6.

5.5.2 Other Facilities and Activities of Importance to the Community

Southbridge has significant recreational facilities that add to the quality of life for residents, support tourism, and are integrated with natural areas that provide broad environmental benefits. The Quinebaug River Rail Trail is a significant community infrastructure project and trail construction is expected to be underway soon. The trail will be a significant amenity for residents and is a key component of the community's economic development strategy to attract tourism and promote revitalization. Most recently, the town received \$4.1 million in grant funds (\$2.6 million federal, \$1.5 million MassDOT) to continue the trail.

The town has 25 parks and other recreational facilities, and has made substantial investments in these facilities. The town is planning a park master planning process to guide investments and

hazard mitigation could potentially be incorporated as part of that process. The town recently invested \$700,000 in the McCann/Henry Street Fields, which included a new skate park, handball court, accessible path connecting the McCann Fields to Joe Capillo Park, lighting, security, and playground upgrades. The town is considering development of a new waterfront park behind Hook Street on the Quinebag River. In the past, some public facilities were not appropriately designed for existing soil and drainage conditions, which has caused serious problems (e.g., the Morris Street Fields have drainage issues, the tennis courts at West Street School are experiencing erosion and subsidence). Future recreational resources, especially those created in areas close to flooding sources, may be vulnerable to similar hazards.

6.0 EXISTING PROTECTION

Southbridge 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 federal programs such as StormReady certification and the Community Rating System (CRS), but it does plan to research the utility of more public awareness and education programs as a result of this HMP planning process.

Southbridge has most of the no- 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, stormwater management, and tree maintenance. Southbridge also has appropriate staff dedicated to hazard mitigation-related work for a community of its size, including a town manager, an emergency management director, a professionally run DPW, and a tree warden. Southbridge has several relevant plans in place, including a comprehensive emergency management plan, and has several plan updates planned in the coming years. Not only does Southbridge have these capabilities in place, but they are also deployed for hazard mitigation, as appropriate. The town 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 Regional Emergency Planning Committee, and has opted into fire protection mutual aid agreements through MEMA.

Southbridge is an active CMRPC community member and can take advantage of no-cost local technical assistance, as needed, provided by the professional planning staff at CMRPC.

Table 30 describes existing mitigation protections in Southbridge. It includes a brief description of each activity, a subjective evaluation of the activity's effectiveness, and the need for any modifications to the activity.

Table 30 Existing Protection Matrix

Existing Measure	Description	Effectiveness and Recommendations
Participation in National Flood Insurance Program (NFIP)	<p>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.</p> <p>Southbridge stays compliant by enforcing all floodplain regulations (Section 9, Special Districts) in the town bylaws. The town has and will continue to maintain the town’s floodplain maps and review any FIRM changes and provided comments on changes, as needed, to provide residents with correspondence and maps to residences impacted by the mapping changes and provide builders with appropriate building requirements.</p>	<p>Effective – There is one repetitive loss property in Southbridge and there are no severe repetitive loss properties. Southbridge is evaluating ways to further limit development in the 100-year flood zones. Southbridge may consider joining the CRS under the NFIP to enable its residents to obtain lower flood insurance rates. The CRS is an opportunity to complement the existing floodplain ordinance and overlay district as the town experiences an increase in building permit requests.</p>
FEMA FIRM	<p>Official map of a community on which FEMA has delineated the Special Flood Hazard Areas, the base flood elevations, and the risk premium zones applicable to the community.</p> <p>The FIRM became effective in June 2023. There are no preliminary map revisions in process for Southbridge.</p>	<p>Effective – Southbridge should keep up to date on any proposed map revisions in the town. This may mean limiting development in the 100-year floodplain.</p>
Floodplain Zoning District Bylaw in place	<p>Requires all development to be in compliance with state building code requirements for construction in floodplains.</p> <p>Southbridge has a floodplain district in its zoning bylaws (Section 9, Special Districts).</p>	<p>Very effective – no changes recommended.</p>

Existing Measure	Description	Effectiveness and Recommendations
Zoning bylaw	<p>Zoning bylaws include the purpose of and authority for zoning, establishes districts and a zoning map, and defines uses and dimensional regulations. It includes special regulations and districts.</p> <p>Includes a Floodplain Overlay District and Watershed Protection District.</p>	Effective – The bylaws are actively reviewed and updated by the Southbridge Planning Board to capture emergent issues and changes in the town’s priorities for land use and development.
Stormwater management policy and regulations in place	Planning boards or conservation commissions review projects for consistency with MA DEP standards. This helps ensure adequate on-site retention and recharge. Southbridge does have a stormwater management bylaw (7.2.5) however, zoning, subdivision and wetlands regulations have different requirements for stormwater management.	Effective – Adopted November 2018. Consider revisiting enforcement responsibilities between zoning regulations and DPW to make enforcement more effective.
Local open space and recreation plan	<p>Local plan identifying significant natural resources and identifying mechanisms to ensure their protection. Following Massachusetts Department of Conservation and Recreation guidance for development of open space and recreation plans, this document does not focus on specific hazards.</p> <p>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. Southbridge’s Open Space and Recreation Plan was issued in 2017. An update to this plan is scheduled for 2024.</p>	Effective – Southbridge should incorporate Hazard Mitigation into any updates of its Open Space and Recreation Plan where appropriate.

Existing Measure	Description	Effectiveness and Recommendations
Local wetlands protection bylaw and regulations in place (Massachusetts Association of Conservation Commissions, 2006 data)	Local bylaws building upon the state’s Wetlands Protection Act and Regulations. These 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. Southbridge does not have a Wetlands Protection Bylaw. Southbridge follows the Wetlands Protection Act, Massachusetts General Law c. 131, § 40.	Effective – Southbridge should seek the adoption of a wetland bylaw.
Drainage system maintenance and repair program	<p>Plan to keep municipal drainage facilities (e.g. storm drains, culverts) in good order.</p> <p>Southbridge performs catch basin cleaning from every year, problem locations more frequently.</p> <p>Much of the drainage system is undersized. As construction is completed throughout town, the drainage system is evaluated and replaced with appropriately-sized infrastructure.</p>	Effective – Southbridge should examine a public education program for residents on storm drain clearance and other best practices. Continue to replace undersized drainage system infrastructure as opportunities arise.
Tree trimming	<p>Plan to ensure routine maintenance of trees to reduce likelihood of vegetative debris in response to storm events.</p> <p>Southbridge conducts roadside mowing from April to November to remove juvenile trees. Tree trimming (take-downs and clearing dead branches) takes place as needed.</p>	Effective – Southbridge should work with its electrical utility to coordinate a more systematic tree trimming program.
Street sweeping	<p>Sweep streets to increase stormwater management capacity; capture and dispose of debris appropriately.</p> <p>All streets are swept twice a year.</p>	Very Effective – No changes recommended.

Existing Measure	Description	Effectiveness and Recommendations
Culvert maintenance and replacement	<p>Maintain existing culverts through regular maintenance and beaver controls (in some cases); replace/expand culverts where needed to allow for adequate stormwater flow.</p> <p>The town has historically maintained and replaced problem culverts when needed and as funding allows.</p>	Somewhat effective –Current efforts are piecemeal and are limited by lack of resources and systematic approach. Southbridge should develop a policy to prepare for expected climate-change-related precipitation increase by upsizing culverts, especially in known problematic areas. The town should also seek external financial support. Planning must comply with 2014 Massachusetts Wetlands Protection Act update; culverts may not be replaced in-kind.
Community Outreach and Communications		
Emergency alert system	<p>Emergency warning system that sends voicemail/text/email alerts to residents (text/email alerts are optional).</p> <p>The Everbridge system enables the town to provide residents with critical information quickly in a variety of situations, such as severe weather, unexpected road closures, missing persons and evacuation of buildings or neighborhoods.</p>	Very effective – Promote Everbridge so all residents are familiar with the program.
Town, library, schools, Southbridge Civil Space, and other websites	<p>The town has a website and also can also post updates on other sites. Southbridge Civil Space is used by Town staff to facilitate online engagements and communicate information about Town projects.</p> <p>Southbridge Civil Space is used to provide a consolidated location for municipal project information. It also has a feature that translates communications material into Spanish, improving the reach of engagement materials.</p>	Effective – This tool was key for a recent engagement effort to support a town planning effort.
Grants and Financial Capabilities (Relevant Recent Grants)		

Existing Measure	Description	Effectiveness and Recommendations
Community development block grants	The town received CDBG grant funding from the FY2020 (\$825,000), FY2021 (\$825,000), FY2022 (\$1.65M for FY2022 and FY2023), and FY2023 grant years of the program. Funding goes toward different efforts every year depending on town priorities.	Effective
Emergency Rural Health Care Grants Program (2022)	\$86,000 Rural Development Investment grant provided funding to support the purchase of an ambulance to service the town and all mutual aid response throughout the south central region of Massachusetts. This will ensure all residents have access to rescue services and advance medical care provided through the fire department.	Effective
Economic Development Administration (EDA) Grant	This \$2.6M EDA grant will be matched with \$1.5M in funds provided by MassDOT. Funds will go toward development of the Quinebaug Valley Rail Trail with a goal to support recreation and boost local tourism. The project is estimated will create 45 jobs, retain 325 jobs, and generate \$3.3M in private investment.	Effective
Mass Trails Grant Program (2022)	A \$400,000 grant was awarded to municipalities, nonprofit organizations, and other public entities for the design, construction, and maintenance of a variety of public trails throughout the state.	Effective
FEMA BRIC DTA Grant	<p>Non-monetary technical assistance grant to support communities in applying for BRIC funding.</p> <p>Through the BRIC DTA grant, Southbridge has received support in developing this HMP update. Southbridge will receive further support for the remainder of the grant through 2026 with developing subapplications for BRIC funding.</p>	Effective

Existing Measure	Description	Effectiveness and Recommendations
Community Compact Information Technology Grant (2023)	Southbridge was awarded \$31,000 in funding for a municipal fiber assessment.	Effective. Pursue additional funding through the Municipal Fiber Grant to construct the municipal fiber network based on the assessment. The network will connect the Fire Department communication tower, library, Town Hall, and DPW.

DRAFT

7.0 MITIGATION STRATEGY

7.1 Mitigation Goals

The 2019 HMP identified one overall goal: Facilitate activity within the Town of Southbridge that reduces the loss, and risk of loss, to persons and property. There are no changes in this overall priority for the town, but the mitigation goals were revisited and refined in the 2024 HMP update process to provide a more robust measure of success:

1. Build and enhance local mitigation capabilities to ensure the safety and resilience of all community members.
2. Reduce damage to public buildings and ensure the continuity of emergency services.
3. Create and maintain communication methods with the community to build engagement and educate the community about natural hazard risk.
4. Protect and maintain existing community resources, assets, and infrastructure (including natural infrastructure) while pursuing new development and infrastructure projects.
5. Prepare for and respond to climate-change-induced natural hazards and extreme weather events.

7.2 Evaluating and Prioritizing Mitigation Actions

The planning team developed a list of mitigation strategies (both new and previously identified by local officials) and prioritized them using the criteria described below.

7.2.1 *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 equal 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

7.2.2 *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 (e.g., engineering design, permitting), and where appropriate town staff time (valued at approximately \$25 per hour for grant applications, administration). 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 and \$100,000
- High – Over \$100,000

7.2.3 *Priority*

Following the ranking of each strategy for its mitigation impact and consideration of the cost associated with each mitigation action, 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, local administrative burden, and whether the mitigation action was continuing efforts already in progress.

Costs and cost effectiveness – 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 because of 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 that have demonstrated political and/or public support through positive involvement by the public or prioritization in previous regional and local plans and initiatives that were locally initiated or adopted are given higher priority.

Administrative burden – Strategies that are realistically within the administrative capacity of the town and its available support network (e.g., CMRPC, Tri-EPIC Regional Emergency Planning Committee) are prioritized. Considerations include grant application requirements, grant administrative requirements (including audit requirements), procurement, and staff time to oversee projects.

In Progress Activities – Mitigation actions that are continuing efforts already in progress are higher priority to capitalize on existing progress and momentum.

All of the mitigation actions are categorized as follows:

- **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

7.3 Mitigation Action Plan

Table 31 identifies mitigation strategies for the Town of Southbridge. Some have been carried forward from the 2019 HMP, several have been carried forward from the 2022 MVP workshops held by the town, and others were generated by this planning process. The mitigation action plan includes the following information for each individual action:

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- to 2-year timeframe, 3- to 5-year timeframe, 5-year-plus timeframe, and ongoing items.

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 and mortar” infrastructure and building improvements 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.
- **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 Planning and Regulatory Actions** – 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, and other planning. 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.
- **Natural Systems Protection** – Design or implement projects that protect, enhance, and restore natural systems, which in turn provide mitigation benefits to the community. In addition to describing the action items in each of these categories, for each strategy, the hazard(s) it is intended to address is identified, as described in Chapter 4 of this plan. Each strategy further identifies the lead organization serving as the primary point of contact for coordinating the efforts associated with that item, and the potential funding sources for implementation. Chapter 8 provides more information on potential funding.

Table 31 Mitigation Actions

Item	Description	Hazards Addressed	Responsible Agency	Potential Funding Sources	Estimated Cost*	Priority	Mitigation Impact	Project Timeline (Years)	Completeness	Mitigation Action Source	Status of Mitigation Actions Identified in 2019 Hazard Mitigation Plan
1	Continually Improve enrollment in Everbridge warning systems and continue to notify to vulnerable populations through Social Medias, Public Access channel and Town Website	All	EMD	Local	Low	High	High	Continuous	Ongoing	2019 HMP	This is ongoing. The Town continues to use this system and promote it to residents.
2	Continually develop a means for sharing information on a regional basis about successful disaster mitigation planning and programs. Create a feedback loop to improve pre-disaster planning by establishing a formal post-disaster assessment process. Continue to utilize TriEpic CERT team.	All	EMD	Local, State, Federal	Low	Medium	Medium	2	Ongoing	2019 HMP	The Town continues to participate in the REPC, TriEPIC. There is typically a formal follow-up after an official drill. Post-disaster assessments have historically been more informal and hosted by the affected Town with some support from TriEPIC.
3	Continually develop and distribute educational and outreach tools to reach typically marginalized populations, particularly in designated environmental justice areas.	All	EMD to lead, supported by DPW, Fire Department, and Police department as needed	Local, State, Federal	Low	Medium	Medium	2	Ongoing	2019 HMP	This is ongoing as applicable.
4	Investigate expanding shelter space to accommodate the <u>elderly and senior citizens</u> .	All	Town	Local, State, Federal	Low	High	High	Continuous	Ongoing	2022 MVP	
5	Continue to promote use of full range of federal and state resources related to disaster mitigation such as educational materials, training, and National Weather Service forecasts.	All	EMD	Local, State, Federal	Low	High	High	Continuous	Ongoing	2019 HMP	This is ongoing. The Town Emergency Manager receives regular updates from National Grid for coordination and information sharing.
6	Continue to educate the community in order to combat complacency and foster individual responsibility for mitigating hazard impacts.	All	EMD	Local	Low	High	High	Continuous	Ongoing	2019 HMP	This is ongoing as applicable.
7	Maintain Unified Incident Command program training officials when appropriate. Continue the regular meetings of the Crises Team.	All	EMD	Local	Low	High	High	Continuous	Ongoing	2019 HMP	This is ongoing as applicable.

Item	Description	Hazards Addressed	Responsible Agency	Potential Funding Sources	Estimated Cost*	Priority	Mitigation Impact	Project Timeline (Years)	Completeness	Mitigation Action Source	Status of Mitigation Actions Identified in 2019 Hazard Mitigation Plan
8	Ensure that municipal staff from various disciplines participates in NFIP training	All	EMD	Local, State, Federal	Low	Medium	Medium	2	Ongoing	2019 HMP	This is ongoing as applicable.
9	Work with private landowners on outreach/education regarding non-chemical <u>pest</u> management opportunities	OT	Town to lead. Involvement from private land owners is necessary for success	Local, State	Low	Medium	Low	1	Not Started	2022 MVP	
10	Integrate hazard mitigation concerns into subdivision, site plan review, 40B reviews, other zoning reviews, and Town bylaws. In particular, evaluate bylaw changes to address issues such as large-scale land clearing impacts (such as those associated with ground-mounted solar) and associated runoff and erosion. Additional topics include incentivizing urban tree planting, siting solar in existing cleared areas, and improving the Town's old housing stock.	All	Town	Local	Low	High	High	Continuous	Ongoing	2019 HMP and 2022 HMP	These topics are considered by the Conservation Commission and Planning Board as they complete their responsibilities, but have not been officially codified in the town bylaws. The description for this mitigation action was updated from 2019 to reflect topics of concern for the community that might be addressed through future bylaw changes.
11	Continually inventory shelter/emergency resources. Identify what services are available at the different shelters (e.g. food preparation, potable water, back-up electrical power, heat, showers, etc.) and whether the location of different shelters will be impacted by different hazards (i.e. whether flooding will make the shelter inaccessible to some residents). This would help ensure that suitable shelters are available for different types of natural hazards. Review Shelter Plan once a year.	All	EMD	Local	Low	High	High	Continuous	Ongoing	2019 HMP	Shelter and emergency resource inventorying is done on an annual basis. This has identified needed updates at the community center to improve its sheltering functions, several of which have been completed or are planned. The Emergency Management team is working on developing MOUs with local grocery stores and corporations for food and water priority during an emergency.

Item	Description	Hazards Addressed	Responsible Agency	Potential Funding Sources	Estimated Cost*	Priority	Mitigation Impact	Project Timeline (Years)	Completeness	Mitigation Action Source	Status of Mitigation Actions Identified in 2019 Hazard Mitigation Plan
12	Continue to incorporate flood protection measures when critical structures located in floodplains are re-built or renovated.	All	Town	Local	Low	High	High	Continuous	Ongoing	2019 HMP	This mitigation action was generalized from the 2019 HMP to include all redevelopment of critical structures in the floodplain.
13	Continually integrate disaster mitigation concerns into transportation projects (e.g. drainage improvements, underground utilities, etc.). Continue to encourage underground utilities in new development.	All	DPW	Local, State, Federal	Low	High	High	Continuous	Ongoing	2019 HMP	This is ongoing. Whenever transportation projects are planned, the Town evaluates the adjacent stormwater drainage infrastructure to determine if upgrades are needed. Utilities are also undergrounded if it is feasible to do so. The upcoming Safe Streets for All planning project (funded by US DOT) will consider street trees and stormwater drainage as well as transportation concerns.
14	Continue communication/coordination between federal, state, regional, county, municipal, private, and non-profit agencies in the area of hazard mitigation	All	EMD	Local	Low	High	High	Continuous	Ongoing	2019 HMP	This is ongoing. Southbridge Fire and Police Departments have upgraded their radio system for improved communication.
15	Collaborate with others (conservation or env. groups that support wetlands protection, river corridor acquisition, or reducing runoff may assist.) to undertake initiatives and achieve success in mitigating hazards.	All	EMD to lead, supported by Business Owners, Neighboring Communities, OLT, other Town departments	Local	Low	High	Medium	Continuous	Ongoing	2019 HMP	Southbridge is actively working with the Opacum Land Trust on the Tree Planting Initiative to increase urban tree canopy. This work is funded by a USFS grant for tree planting and maintenance.
16	Evaluate acquisition of <u>farmland and soils</u> and additional protection for privately-owned farms to address erosion issues	OT	Town to lead, supported by	Local, Private	Low	High	Low	1	Not Started	2022 MVP	

Item	Description	Hazards Addressed	Responsible Agency	Potential Funding Sources	Estimated Cost*	Priority	Mitigation Impact	Project Timeline (Years)	Completeness	Mitigation Action Source	Status of Mitigation Actions Identified in 2019 Hazard Mitigation Plan
			private landowners								
17	Continue to pursue funding that builds local capacity and supports grant-writing for mitigation actions identified in the HMP	All	Town	Local	High	Medium	Medium	1	Ongoing	2019 HMP	Achieved FEMA BRIC DTA grant for BRIC subapplication development support through October 2026.
18	Continue to incorporate disaster mitigation actions into appropriate local and regional plans – Master Plans, land use, transportation, open space, and capital plan.	All	Town	Local	Low	High	High	Continuous	Ongoing	2019 HMP	There have not been any major planning updates since the previous HMP. There are two plan updates scheduled for 2024 (Open Space and Recreation Plan and Housing Production Plan). Findings from the HMP update will be incorporated into those documents.
19	Expand the use and role of annual Capital Improvement Program, develop a longrange plan, incorporating hazard mitigation into projects.	All	Town	Local	Low	Medium	High	Continuous	Not Applicable	2019 HMP	The Town's capital improvement planning process has changed since the previous HMP and this mitigation action is no longer applicable.
20	Continue coordination with dam owners for information sharing regarding dam condition, maintenance, and planning. Continue regular inspections and maintenance at Town-owned dams.	FL, ST, HU	EMD to lead coordination with dam owners. State is responsible for inspections.	State	Medium	High	Medium	Continuous	Ongoing	2019 HMP	Coordination with dam owners is ongoing, including maintenance of Town-owned dams. This mitigation action has been updated to reflect the different roles the Town has with respect to dams.
21	Continue to actively enforce and comply with State Building Code Requirements.	All	Town	Local	Low	High	High	Continuous	Ongoing	2019 HMP	This is ongoing as applicable.

Item	Description	Hazards Addressed	Responsible Agency	Potential Funding Sources	Estimated Cost*	Priority	Mitigation Impact	Project Timeline (Years)	Completeness	Mitigation Action Source	Status of Mitigation Actions Identified in 2019 Hazard Mitigation Plan
22	Continue building relationships with the utility companies to improve mitigation of threats, and improve communication during events; ensure satellite spaces for temporary emergency headquarters	All	EMD	Local	Low	High	High	Continuous	Ongoing	2019 HMP	This is ongoing. The Emergency Manager meets with National Grid regularly for coordination and information sharing purposes.
23	Evaluate recent significant erosion issues resulting from lost vegetation due to development. Evaluation activities could include a postmortem on projects with significant erosion issues, including solar development, or evaluation of the rainfall modelling used in the stormwater bylaw. Consider erosion control or stormwater bylaw updates to address any identified issues.	OT	Town	Local	Low	High	Medium	1	Not Started	2022 MVP	
24	Incorporate disaster mitigation concerns into the MEPA review process.	All	Conservation Commission	Local, State	Low	High	High	Continuous	Ongoing	2019 HMP	MEPA reviews are rare for the Town, so this action has rarely been applicable.
25	Investigate opportunities for cooling stations to reduce impact of the <u>heat island effect</u> .	XT	EMD to lead, supported by Town and DPW	Local, Federal	Low	Medium	High	1	Not Started	2022 MVP	
26	Find funding to review and update the hazard mitigation plan on a five-year cycle	All	EMD to lead, supported by Town	Local, State, Federal	Low	High	High	2	Complete	2019 HMP	This was completed by receiving the FEMA BRIC DTA grant to support the HMP update.
27	Continue to enforce seismic standards in the State's Building Code	All	Town	Local	Low	High	High	Continuous	Not Applicable	2019 HMP	This is removed as it is redundant with the previous mitigation action I-16.
28	Continue efforts to increase tree canopy, including enhancing communication and participation regarding the <u>Thousand Tree Initiative</u> . Encourage tree planting/maintaining canopy to reduce impact of the heat island effect. Continue collaboration with Opacum Land Trust.	XT	Town	Local, Private	Low	High	Low	1	Ongoing	2022 MVP	
29	Evaluate updates to regulations such as zoning to incorporate incentives and credits for infiltration and water reuse to reduce flow through <u>underground streams and culverts</u>	FL	Town	Local	Low	High	Medium	1	Not Started	2022 MVP	

Item	Description	Hazards Addressed	Responsible Agency	Potential Funding Sources	Estimated Cost*	Priority	Mitigation Impact	Project Timeline (Years)	Completeness	Mitigation Action Source	Status of Mitigation Actions Identified in 2019 Hazard Mitigation Plan
30	Evaluate opportunities for <u>wetland</u> creation/restoration to provide additional flood control	FL	Town to lead, supported by DPW for implementation once areas are identified	Local, State	Low	High	Medium	5	Not Started	2022 MVP	
31	Incorporate additional shade trees, bioretention areas, and other low-impact development features into existing parks and <u>recreation areas</u> . Continue to assess active recreation areas and potential for incorporating natural ecosystems into those spaces.	XT	Town to lead, supported by OLT and DPW for implementation	Local, Private, State	Low	Medium	Low	Continuous	Ongoing	2022 MVP	
32	Work with private <u>dam</u> owners on evaluation of the dam conditions and removal where beneficial at locations such as MV Motors, Lebanon Brook, Brookside Terrace, and Ashland Ave	FL	Town to lead. Involvement from businesses is required for success	Local, State, Federal	Low	High	Medium	Continuous	Planned	2022 MVP	
33	Acquire additional private land in the <u>drinking water supply watershed</u> for preservation	DR	Town	Local, State	Low	High	Low	1	Not Started	2022 MVP	
34	Evaluate creation of Town food forest to educate people on food supply and protect <u>farmland and soils</u>	OT	Town	Local, Private	Low	High	Low	1	Not Started	2022 MVP	
35	Consider joining the Central Mass. Mosquito Control Project	FL, ST, HU, SS	Town Department of Health	Local	Medium	Medium	Medium	1	Complete	2019 HMP	Mosquito control is ongoing, so this action is no longer needed.
36	Pursue funding to purchase and install a generator at the Town Hall. Town Hall houses the Town wide email server and needs backup power to keep Town wide email server running	All	Town	Local, State, Federal	Low	High	High	1	Planned	2019 HMP	Funding has been allocated, but the purchase is pending. A location to install the generator needs to be identified.
37	Investigate pursuing a 6th drinking water reservoir to protect <u>watershed and water supply</u> .	All	DPW to lead, supported by other Town departments	Local, State	High	High	Medium	1	Not Started	2022 MVP	
38	Explore additional treatment capacity for <u>water supply</u> .	All	DPW to lead, supported by other Town departments	Local, State, Federal	Low	High	Low	1	Not Started	2022 MVP	

Item	Description	Hazards Addressed	Responsible Agency	Potential Funding Sources	Estimated Cost*	Priority	Mitigation Impact	Project Timeline (Years)	Completeness	Mitigation Action Source	Status of Mitigation Actions Identified in 2019 Hazard Mitigation Plan
39	Continually improve debris Management Plan. Continue to clear debris from stormwater drainage infrastructure. Continue to clear debris from fire roads on an as needed basis to maintain 10 foot area on both sides of road	All	DPW and Fire Department	Local	Low	Low	Medium	Continuous	Ongoing	2019 HMP	The Town's debris management program has generally been effective at keeping roads open and facilitating stormwater drainage.
40	Continue bridge updates near the <u>fire station</u> .	All	Fire Department	Local, State, Federal	Medium	High	Medium	Continuous	Ongoing	2022 MVP	
41	Continue partnership with the <u>hospital</u> to evaluate vulnerabilities to hazards as well as potential improvements	All	Hospital	Local	Low	High	High	2	Ongoing	2022 MVP	
42	Maintain and expand on vegetative debris management programs to reduce debris and thereby mitigate risk of stormwater flooding, riverine flooding, winter storm damage, etc, such as through the Central Massachusetts Mosquito Control Project	FL, OT	DPW	Local	Low	High	High	Continuous	Not Applicable	2019 HMP	This is removed as it is redundant with mitigation action 39.
43	Continue to replace/prioritize multiple inadequate old brick catch basins throughout town in order to decrease the flood risk throughout town.	FL, ST, HU	DPW	Local, State, Federal	Medium	High	High	Continuous	Ongoing	2019 HMP	Drainage infrastructure improvements are completed as applicable and feasible based on other public infrastructure projects. A Town-wide study has not yet been completed.
44	Undertake beaver management activities such as beaver deceiver/trapping, etc. to mitigate flooding in the vicinity of River Street.	FL	Town	Local	Low	Low	Medium	Continuous	Not Started	2022 MVP	
45	Monitor for and evaluate erosion of the landfill with the contractor.	OT	DPW	Local, Private	Medium	Low	Medium	Continuous	Not Started	2022 MVP	
46	Evaluate town-owned housing for the <u>elderly and senior citizens</u> and its vulnerability to extreme heat and cold, and communicate opportunities for private <u>nursing home</u> owners to improve resilience through programs such as MassSave	XT	Town	Local	Low	Medium	High	1	Not Started	2022 MVP	
47	Continue to perform annual review of operations plan to ensure its continuity.	All	Town	Local	Low	Low	High	Continuous	Ongoing	2022 MVP	

Item	Description	Hazards Addressed	Responsible Agency	Potential Funding Sources	Estimated Cost*	Priority	Mitigation Impact	Project Timeline (Years)	Completeness	Mitigation Action Source	Status of Mitigation Actions Identified in 2019 Hazard Mitigation Plan
48	Improve <u>Town Hall</u> communication infrastructure (including fiber optics) and flood-proof certain critical components such as servers/computers.	All	Town	Local, State, Federal	Medium	High	High	1	Not Started	2022 MVP	
49	Investigate, repair, or purchase air conditioner so <u>Community Center</u> can continue to function as a cooling station.	XT	Town	Local, Federal	Low	High	High	1	Not Started	2022 MVP	
50	Evaluate whether or not the Middle/High School can function as a back-up shelter/cooling station to the <u>Community Center</u> . Make necessary upgrades to the Middle/High School so that it can function as a back-up shelter/cooling station, including alternate access routes, a new generator and improved communication capabilities.	XT	Schools	Local, State, Federal	Low	High	Medium	1	Not Started	2022 MVP	
51	Evaluate capacity and condition of <u>underground streams and culverts</u> and prioritize replacements or upgrades	FL	DPW	Local, State, Federal	Low	High	Medium	Continuous	Ongoing	2022 MVP	
52	Evaluate capacity and condition of <u>bridges</u> and drainage infrastructure at <u>roadways</u> and prioritize replacements or upgrades	FL	DPW	Local	Low	High	Medium	Continuous	Ongoing	2022 MVP	
53	Investigate measures for odor abatement/control at the <u>wastewater treatment plant</u> .	FL	DPW	Local	Low	High	Low	Continuous	Ongoing	2022 MVP	
54	Feasibility study to repair, replace or upgrade Ashland Ave. Bridge abutments. Abutments are currently being washed out.	FL, ST, HU, SS	DPW to lead, supported by MassDOT	Local, State, Federal	Medium	High	High	1	Planned	2019 HMP	The project to replace this bridge is in progress. The Town received a grant from MassDOT for this work, which is currently in the final design phase.
55	Fund <u>wastewater treatment plant</u> upgrades, including flood resiliency opportunities.	FL	DPW	Local, State, Federal	High	High	Medium	Continuous	Ongoing	2022 MVP	
56	Evaluate opportunities for improving public transportation and ride sharing to address <u>limited transportation availability</u> .	All	DPW	Local, State, Federal	Low	High	Medium	1	Not Started	2022 MVP	
57	Continue to pursue funding to purchase road side ditch equipment for town wide road side drainage improvements	All	DPW	Local, State, Federal	Medium	Medium	Medium	2	Ongoing	2019 HMP	This is ongoing but there has been little progress since 2019. Improvements to the ditches and other drainage infrastructure are made as road projects are completed, but DPW doesn't currently have capacity for a full-scale solution.

Item	Description	Hazards Addressed	Responsible Agency	Potential Funding Sources	Estimated Cost*	Priority	Mitigation Impact	Project Timeline (Years)	Completeness	Mitigation Action Source	Status of Mitigation Actions Identified in 2019 Hazard Mitigation Plan
58	Investigate existing conditions and undertake repairs of <u>underground electric lines</u> .	All	DPW	Local, State, Federal	High	Medium	High	1	Not Started	2022 MVP	
59	Perform assessment of <u>underground streams</u> , particularly Nuisance Brook and undertake corrective actions to prevent flooding.	FL	DPW	Local, State, Federal	Low	Low	High	1	Ongoing	2022 MVP	
60	Continually improve debris Management Plan. Continue working with MassDot on town wide drainage improvements.	All	DPW	State, Local	Low	Medium	High	Continuous	Not Applicable	2019 HMP	This is removed as it is redundant with mitigation action 39.
61	Repair failing portion of <u>River Street</u> .	OT	DPW	Local, State, Federal	Medium	High	Medium	1	Not Started	2022 MVP	
62	Perform H&H study to understand flood risk and stormwater drainage issues throughout the Town.	FL	DPW	Local, State, Federal	Medium	High	High	1	Not Started	2022 MVP	
63	Review existing flood insurance plans and mapping, including quality of the housing, relative to the Town's <u>old housing stock and senior housing</u> .	FL	Town	Local	Low	Medium	Medium	1	Not Started	2022 MVP	
64	Conduct Globe Area comprehensive study to assess feasibility in upgrades to manage undersized stormwater system	FL, ST, HU	DPW	Local, State, Federal	Low	High	High	1	Not Started	2019 HMP	This project has not been completed, but could be addressed during upcoming transportation improvement projects in this area.
65	Continue to find funding to replace Cohasse Street culvert at the Oak Ridge Cemetery.	FL, ST, HU	DPW	Local, State, Federal	Medium	High	Medium	2	Not Started	2019 HMP	This project is not high priority for the Town at this time due to the location of this issue away from residential properties and roadways, but this could be addressed in a future project.
66	Continue to follow MS4 Sweep streets at least twice per year to increase stormwater management capacity.	FL, ST, HU, SS	DPW	Local	Low	High	High	Continuous	Ongoing	2019 HMP	MS4-required street sweeping continues at least twice per year.
67	Replacement of DePaul Street culvert at Nuisance Brook. Currently the culvert is undersized and below grade.	FL, ST, HU, SS	DPW	Local, State, Federal	Medium	High	High	1	Not Started	2019 HMP	This has not been completed.

Item	Description	Hazards Addressed	Responsible Agency	Potential Funding Sources	Estimated Cost*	Priority	Mitigation Impact	Project Timeline (Years)	Completeness	Mitigation Action Source	Status of Mitigation Actions Identified in 2019 Hazard Mitigation Plan
68	Continue to work with MassDot to replace the Mill Street Bridge	FL, ST, HU, SS	DPW to lead, supported by MassDOT	Local, State, Federal	High	High	High	2	Planned	2019 HMP	MassDOT TIP funds will be used to replace both Mill Street bridges in 2025.
69	Evaluate the feasibility of installing green roofs on municipal buildings <u>downtown</u>	FL, XT, OT	Town	Local, Private	Low	Medium	Low	Continuous	Not Started	2022 MVP	
70	Conduct evaluation of <u>police station</u> relative to its vulnerability to flooding and identify potential flood protection improvements	FL	EMD	Local, State, Federal	Low	Low	High	1	Not Started	2022 MVP	
71	Evaluate drainage improvements for Dresser Street nursing home	FL	Town to lead, supported by business owners in the area	Local, Private	Medium	Low	High	1	Ongoing	2022 MVP	
72	Continue to inventory and install lightning rods on all public buildings	ST, HU	EMD	Local	Low	Low	Low	3	Not started	2019 HMP	There has not been any major progress on this item since the previous HMP.
73	Undertake a study to review sensitive areas surrounding the <u>hotel and innovation center</u> .	All	Town	Local	Low	High	Medium	1	Not Started	2022 MVP	
74	Increase <u>municipal airport</u> hangar capacity for storage/surplus space during emergencies.	All	Airport	Local, Private	Medium	Medium	High	5	Not Started	2022 MVP	
75	Construct a helipad for helicopter access at the <u>municipal airport</u> .	All	Airport	Local, Private	High	Medium	High	5	Not Started	2022 MVP	
76	Evaluate capacity of snow storage areas to accommodate increased storm events for the <u>downtown</u>	XT, OT	DPW	Local	Low	Low	Medium	1	Not Started	2022 MVP	
77	Identify hazard trees for removal and investigate damage to <u>existing overhead utilities</u> from pests (Asian longhorn beetle & ash borer)	OT	DPW, supported by Town and EMD	Local, Private	Low	Low	Low	2	Not Started	2022 MVP	
78	Perform study of inflow and infiltration (I&I) in the sanitary sewer collection system to identify potential solutions and implement the identified solution(s)	FL, ST, HU, SS	DPW	Local, State, Federal	High	High	High	3	Not Started	2024 HMP	
79	Complete needed upgrades at the community center, including installation of a new HVAC system and addressing parking lot drainage issues.	All	EMD, supported by DPW	Local, State, Federal	Medium	High	High	3	Not Started	2024 HMP	

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8.0 PLAN ADOPTION, IMPLEMENTATION, AND MAINTENANCE

8.1 Plan Adoption

This section will be updated after the plan has been adopted by the Southbridge Town Council.

8.2 Plan Implementation

The implementation of this plan began upon its formal adoption by the Southbridge Town Council 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 Sections 5 and 6, will be notified of their responsibilities immediately following approval. The Hazard Mitigation Planning Team will oversee the implementation of the plan.

8.2.1 *Incorporation with Other Planning Documents*

The Town of Southbridge has taken steps to implement findings from the 2019 HMP into the following policy, programmatic areas, and plans: Housing Production Plan, 2013 Master Plan, 2016 Southbridge Economic Development Plan, 2017 Open Space and Recreation Plan, Tier 1 Complete Streets Program, and LaRoche Way and Hook Street Conceptual Plan (as part of the Central Massachusetts Metropolitan Planning Organization Transportation Improvement Project supported project completed in FY2023).

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

- **Southbridge 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.
- **Southbridge Open Space and Recreation Plan (2017)** – This plan was used to identify the natural context within which mitigation planning would take place. This proved useful in identifying water bodies, rivers, streams, and 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.
- **Southbridge Zoning Bylaw** – Zoning was used to gather and 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.

- **Southbridge Master Plan (2013)** – The town completed its master plan in 2013. The Master Plan Committee is encouraged to include the recommendations provided by the planning team in future plans be incorporated into the next Southbridge Master Plan.
- **Massachusetts Statewide Hazard Mitigation and Climate Adaptation Plan (2023)** – This plan was used to ensure the town’s HMP was consistent with the state’s HMP.

8.2.2 Plan Integration Process

After the Southbridge HMP 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 HMP implementation process, the planning team will review whether any of these plans are in the process of being updated. If so, the planning team will remind people working on the components (e.g., plans, policies) of the HMP, and urge them to incorporate the HMP into their efforts. The Hazard Mitigation Team will also review current town programs and policies to ensure they are consistent with the mitigation strategies described in this plan. The HMP will be incorporated into updates of the Southbridge Comprehensive Emergency Management Plan. Updates of the Southbridge Open Space and Recreation Plan, including a facility study, and Housing Production Plan are scheduled for 2024. Findings from this HMP will be incorporated into those studies.

8.3 Plan Maintenance

8.3.1 Monitoring

A representative(s) of the planning team will report annually, at a minimum, to the Southbridge Conservation Commission and Planning Board on plan progress and implementation. The representative will generally be the Town Planner, and have support from other members of the planning team (such as the Emergency Manager or Director of Public Works), as necessary, depending on the nature of the updates. These presentations will serve as an opportunity to solicit public input on plan implementation and ensure that other town activities are aligned with the goals of the plan. The Southbridge Conservation Commission and Planning Board meetings are open to the public and advertised on the town’s website.

8.3.2 Evaluation

Prior to these presentations, the Town Planner will call a meeting of all responsible parties to review plan progress. Additional meetings may be called by members of the Hazard Mitigation Planning Team, as needed based, on occurrence of hazard events or plan implementation needs. Meetings will involve evaluating the plan for its effectiveness in achieving the plan’s goals and stated purpose. The following questions will serve as the evaluation criteria:

Plan Mission and Goal

- Is the plan's stated goal and mission still accurate and up to date, reflecting any changes to local hazard mitigation activities?
- Are there any changes or improvements that can be made to the goal and mission?

Hazard Identification and Risk Assessment

- Have there been any new occurrences of hazard events since the plan was last reviewed? If so, these hazards should be incorporated into the hazard identification and risk assessment.
- Have any new occurrences of hazards varied from previous occurrences in terms of their extent or impact? If so, the stated impact, extent, probability of future occurrence, or overall assessment of risk and vulnerability should be edited to reflect these changes.
- Is there any new data available from local, state, or federal sources about the impact of previous hazard events, or any new data for the probability of future occurrences? If so, this information should be incorporated into the plan.

Existing Mitigation Strategies

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

Monitoring and Tracking 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?
- Do the high-priority mitigation actions have clear consensus from all involved parties on priority, methods, and schedule for implementation?
- Is the planning team tracking any upcoming potential funding opportunities (either through grant programs or otherwise) that could be used to fund mitigation strategies included in the plan?

Review of the Plan and Integration with Other Planning Efforts

- Is the current process for reviewing the HMP effective? Could it be improved?
- Are there any town plans in the process of being updated that should have the content of this HMP incorporated into them?
- How can the current HMP 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?
- Have opportunities for ongoing community input and involvement been provided? Has community feedback been incorporated into the plan?

8.3.3 *Updating*

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 HMP every 5 years. Two years before expiration, the Emergency Manager will engage the planning team and Town Manager to identify potential funding sources for the plan update, and apply for grant funding as appropriate. The update planning process will begin 18 months before the current HMP expires. The Emergency Manager will assemble the HMP planning team for a kickoff meeting to begin the process. The public will be notified of any changes to the plan via the Southbridge Civil Space website and an updated version of the plan will be posted to the website. Additional public communication methods, including development of a fact sheet summarizing plan success, may be used as needed.

8.4 Potential Federal and State Funding Sources

8.4.1 *Federal Funding Sources*

The FEMA web page at <https://www.fema.gov/grants> identifies a number of funding opportunities. Some programs are described briefly in the sections and subsections that follow.

8.4.1.1 *Hazard Mitigation Assistance*

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 because of natural hazards. Brief descriptions of the HMA grant programs can be found below. Program links are provided for more information on the individual programs or information related to a specific fiscal year (FY).

8.4.1.2 Hazard Mitigation Grant Program

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.

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, changing the elevation of a home to reduce the risk of flood damages as opposed to buying sandbags and pumps to fight a 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 the following:

- 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

8.4.1.3 Building Resilient Infrastructure and Communities

The BRIC program provides funds on an annual basis for mitigation projects and activities to reduce or eliminate risk of several hazards to people and infrastructure. Eligible activities are similar in breadth and variety to those eligible under HMGP. BRIC projects generally fall into one of three categories: capability and capacity building activities, hazard mitigation projects, and building code adoption and enforcement.

8.4.1.4 Flood Mitigation Assistance

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 NFIP.

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

- **Planning grants** are used to prepare flood mitigation plans. Only NFIP-participating communities with approved flood mitigation plans can apply for FMA project grants.
- **Project grants** are used 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 two or more losses, each with a claim of at least \$1,000 within any 10-year period since 1978.

8.4.1.5 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 our Individuals and Households Program, most disaster assistance from the federal government is in the form of loans administered by the Small Business Administration.

In the event of a Declaration of Disaster, assistance from FEMA is grouped in three categories: housing needs, other than housing needs, and additional services. These are discussed in more detail in the subsections.

Housing Needs

The following definitions apply to housing needs under FEMA:

- **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.

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

Additional Services

- Crisis counseling
- Disaster unemployment assistance
- Legal services
- Special tax considerations

8.4.1.6 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 component that funds public outreach programs and prevention activities, which can emphasize wildfire mitigation. More information is available at the FEMA AFG website at <https://www.fema.gov/welcome-assistance-firefighters-grant-program>.

8.4.1.7 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 SBA can provide three types of disaster loans to qualified homeowners and businesses:

- Home disaster loans to homeowners and renters to repair or replace disaster-related damages to home or personal property
- Business physical disaster loans to business owners to repair or replace disaster-damaged property, including inventory and supplies
- Economic injury disaster loans, which provide capital to small businesses and to small agricultural cooperatives to assist them throughout the disaster recovery period

8.4.1.8 Disaster Assistance from Other Organizations and Entities

The website <https://www.disasterassistance.gov/> is a secure, user-friendly federal government web portal that consolidates disaster assistance information in one place. If individuals or entities 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 federal government agencies contribute to the portal. The website speeds the application process by feeding common data to multiple online applications. Application information is shared only with those agencies the applicant identifies and is protected by the highest levels of security. Through the website, there is ability to:

- Determine the number and forms of assistance an applicant may be eligible to receive by answering a brief series of questions or start the individual assistance registration process immediately
- Apply for FEMA assistance and be referred to the SBA for loans through online applications
- Choose to have Social Security benefits directed to a new address
- Access federal student loan account information
- Receive referral information on forms of assistance that do not yet have online applications
- Access a call center in the event applicants do not have internet access to ensure they can still register for assistance
- Check the progress and status of applications online
- Identify resources and services for individuals, families and businesses needing disaster assistance during all phases of an emergency situation
- Identify resources to help locate family members and pets
- Access assistance from the U.S. Department of State if an individual is affected by a disaster while traveling abroad
- Find information on disaster preparedness and response

8.4.1.9 Federal Funding Summary Table

Table 32 summarizes the programs that are the primary sources for federal funding of hazard mitigation projects and activities in Massachusetts.

Table 32 Federal Funding Sources Summary

Program	Type of Assistance	Availability	Managing Agency	Funding Source
NFIP	Pre-disaster insurance	Anytime (pre- and post-disaster)	DCR Flood Hazard Management Program	Property owner, FEMA
CRS (part of the NFIP)	Flood insurance discounts	Anytime (pre- and post-disaster)	DCR Flood Hazard Management Program	Property owner
FMA	Cost share grants for pre-disaster planning and projects	Annually, pre-disaster program	MEMA	75% FEMA/ 25% nonfederal
HMGP	Post-disaster cost-share grants	Post-disaster program	MEMA	75% FEMA/ 25% nonfederal
BRIC	National, competitive grant program for projects and planning	Annually, pre-disaster mitigation program	MEMA	75% FEMA/ 25% nonfederal
Severe Repetitive Loss	For SRL structures insured under the NFIP	Annually	MEMA	Authorized up to \$40 million for each FY2005 through FY2009
AFG	Training and equipment for wildfire-related hazards	Annually	FEMA	FEMA
SBA Mitigation Loans	Pre- and post-disaster loans to qualified applicants	Ongoing	MEMA	SBA
Public Assistance	Post-disaster aid to state and local governments	Post-disaster	MEMA	FEMA plus a nonfederal share

8.4.2 State Funding Sources

The Commonwealth of Massachusetts provides matching FEMA assistance. This means that following presidential disaster declarations, the state may contribute a portion of the 25% nonfederal share for federal infrastructure support funds. Since 1991, the state has contributed nearly \$20 million to match FEMA's funding following declared presidential disasters. Other state funding sources include those listed below.

8.4.2.1 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 1991, Massachusetts has issued 20 major disaster declarations. Additionally, individual legislators may seek specific project funding for projects through the legislative budgeting and appropriations process.

8.4.2.2 State Revolving Fund

This statewide loan program through the Executive Office of Environmental Affairs assists communities in funding local stormwater management projects that help to minimize and/or eliminate flooding in poor drainage areas.

8.4.2.3 Chapter 90 Funds

This statewide program reimburses communities for roadway projects, such as resurfacing and related work (e.g., 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 other purposes as the department may specifically authorize. Maintaining and upgrading critical infrastructure and evacuation routes is an important component of hazard mitigation.

8.4.2.4 Municipal Vulnerability Preparedness Program

Launched in 2017, the Municipal Vulnerability Preparedness (MVP) program provides support for cities and towns to begin or to supplement the process of planning for resiliency. The state awards communities with funding to complete vulnerability assessments and to develop action-oriented resiliency plans with a special emphasis on the impacts of climate change. Communities will be able to define extreme weather and natural and climate-related hazards, identify existing and future vulnerabilities and strengths, develop and prioritize actions for the community, and identify opportunities to take action to reduce risk and build resilience. MVP activities can easily be integrated with updates to the local HMP. More information is available

online here: www.mass.gov/eea/air-water-climate-change/climate-change/massachusetts-global-warming-solutions-act/municipal-vulnerability-preparedness-program.html

8.4.2.5 Community Development Block Grant Program

Community Development Block Grant (CDBG) program 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. While primarily a housing and community development program administered through the Massachusetts Executive Office of Housing and Community Development, the program can also fund the rehabilitation of municipal buildings such as town halls, which often also serve as emergency operations centers for their communities.

8.4.2.6 State Land Acquisition and Conservation Program

Through the Massachusetts Executive Office of Energy and Environmental Affairs, this annual program purchases private property for open space, wetland protection, and floodplain preservation purposes. For instance, in 1998, the state set an ambitious goal of protecting 200,000 acres of open space in the Commonwealth of Massachusetts by 2010. In August 2001, less than 3 years later, the state announced that the commonwealth and its land protection partners had reached the halfway mark in achieving that goal—protecting 100,000 acres. Updated information may be found at <https://www.mass.gov/orgs/executive-office-of-energy-and-environmental-affairs>.

8.4.2.7 Dams and Levees Program

EEA funds projects for the repair and removal of dams, levees, seawalls, and other forms of inland and coastal flood control. A minimum financial match of 25% of total funds requested is required. Additional information is available at [Dam and Seawall Repair or Removal Program Grants and Funds | Mass.gov](#)

8.4.2.8 Major Flood Control Projects

The state provides half of the nonfederal share of the costs of major flood control projects developed in conjunction with USACE. This program is managed by DCR.

8.4.2.9 Flood Control Dams

The Natural Resource Conservation Service (NRCS) manages the Flood Control Dams Program, (PL566), which funds states in the operation and maintenance of the 25 PL566 flood control dams located on state property. This program also includes technical assistance and other smaller services from NRCS and partners.

8.4.2.10 Flood Hazard Management Program Staff Funding

The state provides the 25% nonfederal share for FEMA’s funding under the Community Assistance Program’s State Support Services Element (CAP-SSSE). CAP-SSSE funding (and the state match) supports the Flood Hazard Management Program (FHMP) within the Department of Conservation and Recreation. The FHMP works with FEMA to coordinate the NFIP throughout Massachusetts, providing technical assistance to participating communities and professionals.

8.4.2.11 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 MassDOT and the Executive Office for Administration and Finance. The program’s website at

<http://www.mass.gov/hed/economic/eohed/pro/infrastructure/massworks/> provides additional information.

8.4.2.12 Weatherization Assistance Program

The Weatherization Assistance Program is funded each year by the U.S. Department of Energy’s Office of Energy Efficiency and Renewable. The extent of services to be provided depends on available funding. The program is intended to help low-income homeowners and renters lower their energy cost and reduce the potential impact from severe weather events. Weatherization service agencies throughout Massachusetts run the Weatherization Assistance Program. The program’s website at <http://energy.gov/eere/wipo/weatherization-assistance-program> provides additional information.

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10.0 APPENDICES

Appendix A Planning Team Meeting Agendas

Appendix B Public Engagement Documentation

Appendix C Hazus Analysis Procedure

Appendix D Flood Maps

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