

# CITY OF NORTHAMPTON, MASSACHUSETTS

## HAZARD MITIGATION PLAN 2026 UPDATE



*1936 Flood – Pleasant Street*

*Credit: Forbes Library, Northampton and New England Public Media*

## **Acknowledgements**

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# CHAPTER 1: PLANNING PROCESS

## Introduction

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

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

Preparing a Natural Hazards Mitigation Plan before a disaster occurs can save the community money and will facilitate post-disaster funding. Costly repairs or replacement of buildings and infrastructure, as well as the high cost of providing emergency services and rescue/recovery operations, can be avoided or significantly lessened if a community implements the mitigation measures detailed in the Plan. FEMA requires that a community adopt a Hazard Mitigation Plan as a condition for mitigation funding, including the Hazard Mitigation Grant Program (HMGP) and the Flood Mitigation Assistance Program (FMA).

## Hazard Mitigation Plan Workgroup

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In 2025, the City of Northampton completed an update of their 2020 Hazard Mitigation Plan, in collaboration with the Pioneer Valley Planning Commission. All portions of the plan were reviewed and updated as necessary. Planning for hazard mitigation in Northampton involved a ten-member Steering Committee:

- Sarah LaValley – Assistant Director of Planning and Sustainability
- Matthew Lemberg – EMS Division Chief and Assistant Fire Chief
- Victor Caputo – Captain of Administration, Northampton Police
- Donna LaScaleia – Director of Public Works
- Doug McDonald – Stormwater Manager
- James Thompson – GIS Coordinator
- Katie Deppen – Director, Central Services
- Kelly Schuetze – Emergency Dispatch Director

- Kevin Ross – Building Commissioner
- Tony Kusnierz – Supervisor of School Maintenance

The Hazard Mitigation Plan update process for the City included the following tasks:

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

## **Hazard Mitigation Committee Meetings**

Meetings of the Hazard Mitigation Planning Committee, all of which took place remotely over Zoom, were held on the dates listed below.

- June 4, 2025, 1:00 pm., Zoom
- July 3, 2025, 1:00 p.m. Zoom
- July 31, 2025, 1:00 pm Zoom

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

## **Participation by Stakeholders**

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

### *Local and Regional Agencies*

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

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

- Developing Our Next Future: An Action Plan for Building A Smart, Sustainable and Resilient Pioneer Valley. “Our Next Future” was created to chart a course for a more vibrant, competitive, sustainable and equitable region. This is a regional plan, designed to achieve success through promoting collaboration of communities on a regional basis.
- Developing the Pioneer Valley Climate Action and Clean Energy Plan, which assesses the impact that climate change will have on the region and recommends strategies for mitigation that can be implemented by local municipalities and businesses.
- Facilitating the regional Clean Energy Climate Action quarterly workgroup, to advance regional sustainability and climate goals and to promote municipal collaboration.
- Collaborating with state agencies, such as the Department of Conservation and Recreation, to maintain inventories of critical infrastructure throughout the region.
- Collaborating with the City of Northampton on climate change mitigation, adaptation, and resilience measures through the Green Communities program and the Municipal Vulnerability Preparedness program. PVPC also assisted the City with incorporating climate mitigation goals into the Capital Improvement Planning process.

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

In addition, PVPC staff regularly present to their Executive Committee and Commission (representatives from the 43 cities and towns that comprise the Pioneer Valley), when new projects are launched and when funding opportunities are available. As result, all the communities in the region were informed of Northampton’s Hazard Mitigation Plan update process and encouraged to comment.

#### *Agencies that have the authority to regulate development*

Several City staff who participated in the Northampton Hazard Mitigation Committee have direct connections to various municipal commissions, boards, and committees within Northampton that have the authority to regulate development. These commissions and the Hazard Mitigation Committee members involved in each are as follows:

- Transportation and Parking Commission, Energy and Sustainability Commission, Planning Board – Sarah LaValley, Planning and Sustainability
- Department of Public Works – Donna LaScaleia, Director and Doug McDonald, Stormwater Coordinator
- Conservation Commission, Historical Commission, Community Preservation Committee - Sarah LaValley, Planning and Sustainability
- Local Emergency Planning Committee – Matthew Lemberg, Fire Department and Emergency Management Coordinator

Feedback from the stakeholder agencies listed above was ensured through the participation of the Hazard Mitigation Committee members, who were able to attend the Hazard Mitigation Committee meetings representing their respective groups.

In addition, the Pioneer Valley Planning Commission, as a regional planning authority, works with all agencies that regulate development in Northampton, including the municipal entities listed above and state agencies, such as the Department of Conservation and Recreation and MassDOT. This regular involvement ensured that during the development of the Northampton Hazard Mitigation Plan, the operational policies and any mitigation strategies or identified hazards from these entities were incorporated into the Hazard Mitigation Plan.

### **Participation by the Public, Businesses, and Neighboring Communities**

Two public meetings were held as part of the development of the Northampton HMP Update – on August 5, 2025 at the Northampton Senior Center and on February 3, 2026, over Zoom. The first public meeting was held midway through the planning process, after the Hazard Mitigation Committee had provided input on hazards and mitigation strategies relevant to the community. The second public meeting was held after the draft plan had been completed and was available to the public for review. Notice of both public meetings was posted on the City of Northampton website and its Planning and Sustainability webpage calendars and at Northampton City Hall in compliance with the Commonwealth of Massachusetts’ Open Meeting Law. Public meeting agendas and notices can be found in the Appendix.

#### *August 5, 2025 Public Meeting*

The first public meeting was held at the Northampton Senior Center on August 5, 2025 at 6 pm. Eight members of the public attended the public meeting, as well as two members of the committee. Mimi Kaplan from PVPC delivered a PowerPoint presentation that included an overview of natural hazards and climate change impacts on Northampton, and the hazard mitigation planning process. This was followed by a discussion period that included a number of questions and comments from attendees. Topics discussed included green infrastructure mitigation strategies for flooding, impacts of invasive species, and the importance of education, outreach, and engagement around flood mitigation and green infrastructure in particular. This input was incorporated into the plan update, including into the Action Plan.

#### **Second Public meeting - Add**

On July 25, 2025, PVPC sent a press release to all area media outlets to inform the public that a public meeting would be held on August 5, 2025 at the Northampton Senior Center. A flyer was posted on the City website and on the City Facebook page, as well as individual department websites and Facebook pages. Emails with the flyer were sent to relevant departments and committees. Hard copies were posted at the Senior Center and the libraries.

#### **Add information on publicity for second public meeting.**

The press releases were sent to local media outlets, which are listed in the appendix.

### *Neighboring Communities*

Emails were also sent to all neighboring communities before the public meetings, inviting them to attend and to provide input on the plan. This included the communities of Easthampton, Westhampton, Hadley, Williamsburg, and Hatfield. The press releases also encouraged citizens and municipal officials from nearby communities to review the draft plan and to attend the public meetings. The Pioneer Valley Planning Commission's regional scope ensured that residents and government officials throughout the Pioneer Valley saw the press releases and request for comments.

### *Representatives of businesses, academia, and other private organizations*

The Northampton Public Schools were represented in the HMP planning process by the involvement of the Supervisor of School Maintenance on the HMP committee. Emails were sent to the Smith Vocational and Agricultural High School and the Northampton Chamber of Commerce to invite them to the public meetings and to provide them with an opportunity to review the draft plan.

### *Representatives of nonprofit organizations*

Representatives of the Climate Action Now, Northampton Survival Center, Grow Food Northampton, and Pioneer Valley Habitat for Humanity were invited to attend the public meetings and to provide comments on the draft plan.

### *Outreach to underserved and vulnerable populations*

The Northampton Housing Authority posted flyers about both public meetings at the Housing Authority buildings, so that residents would be aware of the meetings and also be able to provide comments on the plan. The Senior Center/Council on Aging posted flyers and also included information about the public meetings in their newsletters.

No other feedback was received from businesses or neighboring communities during the plan update process. Any future input received from the public, as well as any other stakeholders, will be incorporated into the Plan during future regular updates.

## **Incorporation with Other Planning Documents**

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

- ***Northampton Comprehensive Emergency Management Plan (CEMP)*** – the Critical Infrastructure section was used to identify those infrastructure components in Northampton that have been identified as crucial to the function of the City; the CEMP was also used to identify mitigation capabilities, identify vulnerable populations, and potential emergency shortcomings.

- ***Subdivision Rules and Regulations*** – These were used to identify policies the City has in place and actions the City is already taking to reduce hazard risks and improve resiliency.
- ***Northampton Zoning Ordinance*** - The City’s Zoning Ordinance was used to identify those regulations that the City has in place, and actions that the City is already taking that are reducing the potential impacts of natural hazards (i.e. floodplain regulations) and to improve climate resiliency.
- ***Massachusetts State Climate Adaptation and Hazard Mitigation Plan*** - This plan was used to ensure that the City’s HMP was consistent with the State’s Plan. Natural hazard and climate change data from the plan, as well as from Resilientma.org, was also utilized for Northampton’s HMP.
- ***Northampton Open Space and Recreation Plan*** – This plan was used to provide information about natural resources in Northampton, land protection, and growth and development patterns.
- ***Northampton MVP Summary of Findings*** – This plan assessed climate change impacts and natural hazards that affect the City, as well as actions to take to increase resilience. The plan was completed in 2019 and updated in 2020, and the actions identified in the plan informed the actions identified for the HMP.
- ***Sustainable Northampton Comprehensive Plan*** – This plan includes the Climate, Resilience and Regeneration Plan, which discusses the impacts of natural hazards and climate change on the City, and includes many strategies to increase resilience and reduce risk. Some of these strategies were incorporated into the HMP.
- ***FEMA Flood Insurance Study for Hampshire County (1979)*** - This report was released in 1979 as the most updated Flood Insurance Study (FIS) for Hampshire County. New preliminary flood maps were released in August 2025. The FIS revises and updates information on the existence and severity of flood hazards for Hampshire County. The FIS and accompanying Flood Insurance Rate Maps (FIRMs) include data on flooding sources, FEMA flood zone designations, base flood elevations, and discharge rates of flooding sources. This data was reviewed and incorporated into the plan update process by informing the risk assessment for flooding.
- ***The Flood and Natural Hazard Mitigation Plan for the City of Northampton*** – this plan was used to gather information on those actions and activities that the City is already undertaking in regards to pre-disaster mitigation for the City’s greatest threat, flooding. This included incorporating statistical research, existing mitigation measures, and project rankings for Northampton.
- ***Discovery Report for the Middle Connecticut Watershed, HUC-8 01080201, FEMA*** – this report prioritizes areas and infrastructure of concern within the watershed. A product of this planning process will include the remapping of selected major floodplains.

Elements of the previous HMP were also incorporated into other City plans and documents as well. The critical facilities list and hazard analysis informed the update of the Comprehensive Emergency Management Plan. The flooding analysis in particular informed updates and the update of the Open Space and Recreation Plan (helping to determine which parcels to target for protection would be most valuable for flood storage). The hazard analysis, vulnerability assessment, and mitigation strategies informed the Climate, Resilience and Regeneration Plan and the Comprehensive Plan.

## **Plan Adoption**

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In 2024, the City of Northampton began the process of updating its Hazard Mitigation Plan. Once the plan was provisionally approved by FEMA, the City Council held a public hearing to formally adopt the Plan Update.

## CHAPTER 2: LOCAL PROFILE

### Community Setting

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Northampton, Massachusetts, is approximately 36.1 square miles. It is midway between Connecticut to the south and Vermont to the north and between Albany, NY, to the west and Boston to the east.

The city lies within the Connecticut River watershed, located west of the river. The land nearest the Connecticut River has rich, fertile soils and a deep agricultural history. Adjacent to these fertile floodplains of the Connecticut River is the deep, flat glacial outwash, underlying much of the historic residential, commercial and industrial development in downtown Northampton, downtown Florence, and many other older established residential neighborhoods.

### City History

At the time of European colonization of New England, modern-day Northampton was part of the homeland of the Nonotuck people, who lived on both sides of the Connecticut River in the area around Amherst, Hadley, Hatfield, South Hadley, Northampton, and Easthampton.

The first European colonists began settling here in 1654, drawn by the rich agricultural soils in the floodplains of the river. The modern-day downtown area emerged as the city center, with early development situated on the east-west axis of Main Street and the north-south axis of Pleasant/King Streets.

Over the course of the 17<sup>th</sup> and 18<sup>th</sup> centuries, Northampton emerged as one of the principal municipalities in Western Massachusetts, due to its central location along major transportation routes. It eventually became the seat of Hampshire County, in addition to its role as the cultural and economic center of the county.

Agriculture has long played an important role in Northampton's economy, but during the 19<sup>th</sup> century Northampton also saw growth and prosperity through industry. The Mill River, which flows northwest to southeast through Northampton, was a valuable source of water power, and it led to the development of the villages of Florence and Leeds. By the late 19<sup>th</sup> century, important industries in Northampton included the manufacturing of baskets, silk, cotton, cutlery, furniture, sewing machines, silk, and tacks.

One of the worst disasters in the region's history occurred as a result of the industrial development along the Mill River. In 1865, a consortium of factory owners constructed a dam upstream in Williamsburg, for the purposes of storing excess water from spring snowmelt and then releasing it during the drier summer months, to ensure a steady flow of water for the mills. However, the dam was poorly constructed and it ultimately failed on May 16, 1874, causing considerable damage to several villages in Williamsburg and the villages of Florence and Leeds in Northampton. In total, 139 people were killed in the flood, making it the deadliest dam failure in U.S. history to that point.

During the 20<sup>th</sup> century, Northampton's economy shifted away from manufacturing, and service-based jobs instead became more common. This included education, such as Smith College, which was established in Northampton in 1871, and the Clarke Schools for Hearing and Speech (formerly Clarke School for the Deaf), which was established here in 1867.

Northampton has seen only limited population growth since the mid-20<sup>th</sup> century, which has helped to preserve the historic streetscapes of the city. The central business district retains many of its historic commercial buildings, and it remains a highly walkable, densely populated area that supports a variety of local businesses.

## Geography

Northampton has a varied topography that extends from the floodplains of the Connecticut River to the foothills of the Hilltowns region. The land along the Connecticut River includes the Meadows, an area of rich farmland that is still used for agricultural purposes. The city center is located on a bluff above the Meadows, and to the west the city's topography is comprised of rolling hills that are interspersed with streams and rivers. Elevations range from just over 100 feet in the Meadows to nearly 900 feet in the far western part of the city.

In total, the city of Northampton is about 35.8 square miles in area, including about 34.3 square miles of land and 1.5 square miles of water. Northampton is bordered by Hatfield to the northeast, Hadley to the east, Easthampton to the south, Westhampton to the west, and Williamsburg to the north.

## Demographics

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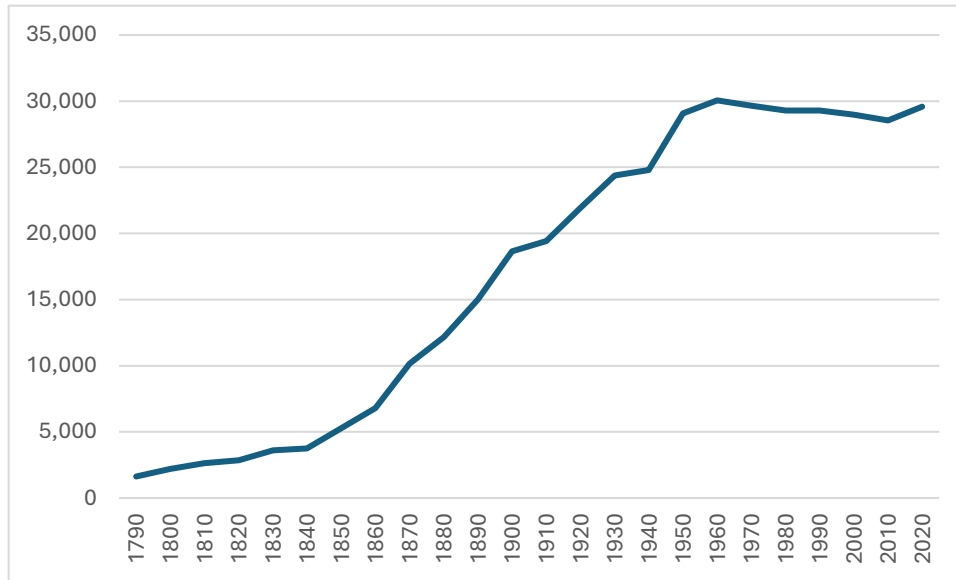
As of 2020, Northampton had a population of 29,571, which was a 3.6% increase from 28,549 residents in 2010. The racial composition of Northampton is 80.0% White, 3.1% Black, 0.3% Native American, 4.4% Asian, 0.0% Native Hawaiian/Pacific Islander, 3.7% of another race, and 8.4% of two or more races. Hispanic/Latino residents of any race comprised 9.1% of the population.

Overall, 14.6% of the city's population is under the age of 18, and 21.7% of the population is 65 and older. The median age is 42.8, which is slightly higher than the statewide (39.9 years) and countywide (38.3 years) medians.

The U.S. Census Bureau's American Community Survey (ACS) provides additional demographic information about Northampton. According to the 2023 ACS 5-year estimates, the median household income in Northampton is \$78,467, which is somewhat lower than the countywide median of \$86,391. The city has a poverty rate of 12.5%, which is slightly higher than the countywide rate of 10.9%. As is the case throughout Hampshire County, Northampton has high rates of educational attainment, with an estimated 61% of residents aged 25 or older having a bachelor's degree or higher.

As shown below in Figure 1, Northampton's population experienced rapid growth during the late 19<sup>th</sup> and early 20<sup>th</sup> centuries, but the city's population numbers have effectively plateaued since 1950, with decennial census numbers consistently ranging from about 28,500 to 30,000.

Figure 1: Northampton Population, 1790-2020



Source: U.S. Census Bureau

The overall population density of Northampton is 864 people per square mile. However, portions of the city are significantly more densely populated. The five census tracts that comprise the city center and the village of Florence have a combined population of 15,889 residents in an area of 3.97 square miles, for a density of 4,000 people per square mile. By contrast, the three census tracts that cover the northern, western, and southern parts of the city are much less developed, with 13,682 residents and a total land area of 30.27 square miles, amounting to 452 people per square mile. Overall, about 53.7% of the city's population lives on about 11.6% of the city's total land area.

## Housing

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As of the 2020 U.S. Census, there were a total of 13,668 housing units in Northampton, of which 869 (6.4%) were vacant at the time of the census. Of the occupied housing units, 55% were owner-occupied, and 45% were renter-occupied.

According to the Census Bureau's 2023 American Community Survey (ACS) 5-year estimates, about 46% of the occupied housing units in Northampton are single-family detached units. About 8% are attached single-family units, 10% are in 2-unit buildings, 13% are in buildings with 3 or 4 units, 8% are in buildings with 5 to 9 units, and 15% are in buildings with 10 or more units.

About 40% of occupied housing units were built in 1939 or earlier. Another 34% were built between 1940 and 1979, and 21% between 1980 and 2009. Only 5% of occupied housing units in Northampton have been built since 2010.

## Land Use and Infrastructure

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Northampton's location on the Connecticut River was a strong determinant on the growth of the city. The river bottom provided rich alluvial soils for agriculture and the river itself provided power and shipping opportunities for the silk industry. The gentle sloping terrain of the Berkshire foothills, in the western section of the city, helped keep development concentrated in the downtown center that grew along the banks of the river. The existing infrastructure reflects the influence of this geography.

### Land Use

According to the 2025 city assessor's data, residential development is the single largest land use category in Northampton, comprising about 6,750 acres, or about 33% of the city's area. The vast majority of this development is comprised of single-family homes, but the city also includes a significant amount of higher-density housing, including two-family and three-family homes, apartment complexes, and condominiums.

About 5,528 acres of land, or about 26.8% of the city, is classified as tax exempt, which primarily includes land owned by state or local governments or by nonprofit organizations. An additional 1,257 acres (6% of the city) is Chapter 61 forest land, 1,963 acres (10% of the city) is Chapter 61A agricultural land, and 833 acres (4% of the city) is Chapter 61B recreational land.

Commercial and industrial uses also cover a significant portion of the city. About 930 acres of land (5% of the city) is used primarily for commercial purposes, and about 690 acres of land (3% of the city) is classified as industrial or primarily industrial.

About 570 acres of land in Northampton is classified as developable land. Another 197 acres of land is classified as potentially developable, and 1,906 acres of land is classified as undevelopable vacant land. Overall, these vacant parcels cover about 2,673 acres, or 13% of the city.

### Transportation

#### *Roads and Highways*

Northampton sits in the heart of the crossroads of New England and, therefore, has many major thoroughfares running through its borders. The most significant transportation route, Interstate 91, has four exits in Northampton. Other major roadways are Routes 5, 9, 10 and 66. Route 9 connects Northampton with towns to the east including Hadley, Amherst, Belchertown, Ware and all points east as well as the westerly towns of Williamsburg, Cummington and Pittsfield. Route 66 connects Northampton with Westhampton, Huntington and the Hilltowns to the west. Routes 5 and 10 converge in Northampton, providing connections to Hatfield, Greenfield and Brattleboro, Vermont. Route 10 runs south from Northampton to connect with Easthampton and Route 141; Route 5 runs south from Northampton to connect with Holyoke, Springfield, and Enfield, Connecticut.

Since 2018, the city has led a collaboration to meet the region's unique challenges. ValleyBike share is designed to promote short bike trips within core communities, where clusters of large employers,

colleges, shopping, tourist destinations and residents can readily be connected. The program initially started with 50 bike share stations where people are able to rent bicycles. Northampton will be constructing new stations in the future.

### *Rail*

Northampton has one active rail line, which runs north to south along the Connecticut River. The rail line is used for both freight and passenger trains, including several Amtrak services. One daily *Vermont* train stops in Northampton in each direction, providing service from St. Albans, Vermont to Washington, D.C. In addition, Northampton is served by two daily *Valley Flyer* trains in each direction. These trains operate from Greenfield to New Haven, where connections are available to trains heading to New York City and other points south.

### *Public Transportation*

Served by various regional bus companies, including Greyhound and Peter Pan, downtown Northampton is the pulse point for public transportation in the city. Northampton also has multiple linkages to surrounding communities through both the Pioneer Valley Transit Authority (PVTA) and the Franklin Regional Transit Authority (FRTA). Bus lines operated by the PVTA travel roundtrip east-to-west along Route 9 to and from Amherst, Hadley and South Hadley. These fixed routes run hourly throughout the day and primarily serve Five College commuters. Bus stops are located in both high-volume sections of the city as well as intermittent locations along served routes. A PVTA bus route runs between downtown Northampton and downtown Florence during regular business hours. A PVTA bus route runs between downtown Northampton and the Holyoke Mall. Neighboring Easthampton has two bus routes that connect with Northampton, PVTA's Nashawannuck Express, which operates as a flex route shuttle, and a PVTA bus route.

A bus route maintained by FRTA runs between Northampton and Greenfield during regular business hours. The PVTA also provides demand-response transportation services for the elderly and disabled residents within their jurisdiction, which includes Northampton.

### *Bicycle & Pedestrian Infrastructure*

Northampton has an extensive network of multi-use trails, most of which were constructed along former railroad rights-of-way. This includes the Norwottuck Rail Trail, which connects Northampton to Hadley, Amherst, and Belchertown to the east; the Manhan Rail Trail, which connects to Easthampton to the south; and the Northampton Bikeway, which links the downtown area to the villages of Florence and Leeds, and the town of Williamsburg to the northwest. In total, Northampton has 14 miles of multi-use trails, and about 8.5 miles of bicycle lanes on its streets.

The city has a highly walkable downtown area, with sidewalks throughout the central business district and on most residential side streets. Overall, the city has about 23 miles of roadways with sidewalks on both sides, and 37 miles of roadways with sidewalks on one side.

## **Water and Sewer Service**

### *Public Drinking Water Supply*

City water is available to Florence, Bay State, Leeds, Village Hill and Northampton and along those routes where development has occurred. According to the 2023 Annual Statistical Report, the Northampton Water Division has 8,966 service connections, including 8,210 residential and 756 commercial/business service connections. About 98.4% of Northampton residents are served by municipal water. Another 120 residents (0.4%) are served by a privately-owned community water system, located at the Linda Manor Nursing Home. The remaining 1.2% of residents are served by private wells. As of 2023, there were 234 domestic wells in use in Northampton.

In 2023, approximately 99 percent of the municipal drinking water supply came from surface water sources, including the Ryan Reservoir in Whately and the Mountain Street Reservoir in Williamsburg, Hatfield, and Whately. The city owns, operates and maintains a water filtration plant in Williamsburg that treats and disinfects drinking water from these sources prior to distribution.

Additionally, Northampton gets approximately 1% of its drinking water supply from wells in the Florence section of Northampton. These wells have the capacity to provide up to half of the city's supply under demand, and have chlorination systems installed.

The primary water supply for the city is delivered through two transmission mains, a 36-inch main installed in 1993 below established roadways and a 20-inch cross-country main installed in 1901 and field-lined in 1958 that generally follows Beaver Brook from Route 9 to the Mountain Street reservoir with difficult and wet access that also traverses private property. Both mains are in service and needed for water distribution.

According to the Annual Statistical Report, the city withdrew 1.07 billion gallons of water from its sources in 2023, for an average of 2.94 million gallons per day. The city's maximum authorized withdrawal volume is 4.8 million gallons.

During dry periods in the summer and fall or any time that it is warranted, the city's DPW implements a water use restriction policy in order to comply with the MassDEP's requirements. DEP requires that water use be restricted when average daily stream flow in the Mill River drops below 26.3 cubic feet per second for a 3-day period or when the State issues a drought advisory. The Water Use Restriction can be lifted when the stream flow average meets or exceeds the minimum flow for 7 consecutive days. When a water use restriction is in place, there is a ban on non-essential outdoor watering.

The city has and continues to work with surrounding communities to acquire water supply lands and jointly preserve the watersheds. Additionally, much of Hatfield's drinking water aquifer is located in Northampton, and the city has aggressively regulated this area and acquired open space to protect Hatfield's water supply.

### *Sewer Service*

Northampton, Bay State, Leeds, Village Hill, and Florence have municipal sewer services, as do the connecting points in between. The city has a sewer treatment facility that treats effluent from both Northampton and neighboring Williamsburg, including institutional, commercial, and industrial users. Wastewater receives preliminary treatment, primary treatment, secondary treatment, and disinfection. Sludge is separated and dewatered and then trucked outside of Northampton for final disposal. Wastewater is discharged to the Connecticut River via outfall pipe.

The city has roughly 110 miles of sanitary sewer pipes. Outlying developed areas of Northampton are served by private septic systems regulated by the Board of Health.

## **Community Development and Development Trends**

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### **Zoning**

The city of Northampton has 20 base zoning districts and five overlay districts. The base districts include:

- **Six residential districts:** Rural Residence, Suburban Residence, Urban Residence A, Urban Residence B, Urban Residential C, and Water Supply Protection.
- **Five form-based districts:** Central Business–Core, Central Business–Side, Central Business–Gateway, Florence Village–Center, and Florence Village–General.
- **Three business districts:** General Business, Highway Business, and Neighborhood Business
- **Two industrial districts:** General Industry and Office Industrial
- **Four other districts:** Medical, Special Conservancy-Floodplain, Planned Village, and Farms, Forests and Rivers.

The overlay districts include:

- Educational Use Overlay
- Water Supply Protection Overlay
- Floodplain Overlay
- Sustainable Growth/Smart Growth Overlay
- National Flood Insurance Program

### **Development in Hazard Areas**

Most hazards identified in this plan are regional risks, therefore, all new development falls into the hazard area. The exception to this is flooding. Northampton is a participating member of the National Flood Insurance Program (NFIP). According to FEMA's Community Information System (CIS), there were 94 National Flood Insurance Policy (NFIP) policies in force in Northampton in May, 2025, including 81 residential policies and 13 non-residential policies. The majority of these policies are associated with structures located within the Special Flood Hazard Area (SFHA) or 100-year floodplain, shown on the Flood Insurance Rate Maps as zones beginning with the letters 'A' or 'V'.

## Current Development Trends

During the past five years, Northampton has seen new and infill development in various neighborhoods in the city. As effects of COVID 19 construction cost increases have continued to linger and financing costs have risen, many of the more significant projects that have been completed are multifamily, deed restricted affordable housing units. Several other multifamily housing projects have been permitted but are stalled, waiting for drops in interest rates and tariffs. Over 150 units have been permitted in and around downtown that fall into this category. There continues to be smaller-scale development in the commercial district of King Street, as well as a moderate growth of new single-family homes.

There has not been any development in flood zones or other areas determined to be at high risk from the hazards identified in this plan, though downtown Northampton is located in the inundation area that would be affected by a failure of the Connecticut River levee system. The Special Conservancy Zoning District limits new construction in mapped 100 and 500 year floodplain areas.

The City has a stormwater management ordinance as well as a stormwater utility that provides funding for stormwater and flooding mitigation projects. While the new development described above has added a small amount of impervious surfaces, the City has also installed areas with Green Infrastructure and improved drainage systems that have simultaneously reduced flood risks.

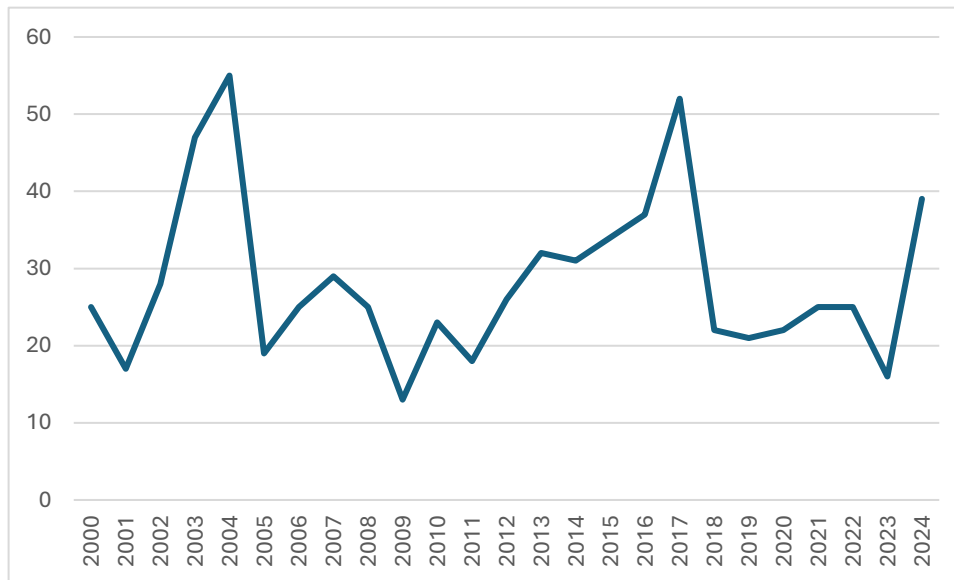
*Table 1: New Residential Permits Per Year in Northampton, 2000–2024*

Year	Total Residential Permits	Total Units	Single-Family Homes	2 Units	3–4 Units	5 or More Units
2000	25	26	24	1	0	0
2001	17	18	16	1	0	0
2002	28	40	25	1	1	1
2003	47	47	47	0	0	0
2004	55	63	47	8	0	0
2005	19	40	8	9	0	2
2006	25	35	22	1	0	2
2007	29	45	22	2	4	1
2008	25	59	19	0	1	5
2009	13	24	7	3	3	0
2010	23	37	21	0	1	1
2011	18	20	17	0	1	0
2012	26	26	26	0	0	0
2013	32	35	31	0	1	0

Year	Total Residential Permits	Total Units	Single-Family Homes	2 Units	3-4 Units	5 or More Units
2014	31	39	27	3	0	1
2015	34	37	33	0	1	0
2016	37	40	36	0	1	0
2017	52	111	50	0	0	2
2018	22	29	21	0	0	1
2019	21	30	20	0	0	1
2020	22	29	21	0	0	1
2021	25	34	24	0	0	1
2022	25	37	22	0	0	3
2023	16	44	14	0	0	2
2024	39	58	36	0	0	3

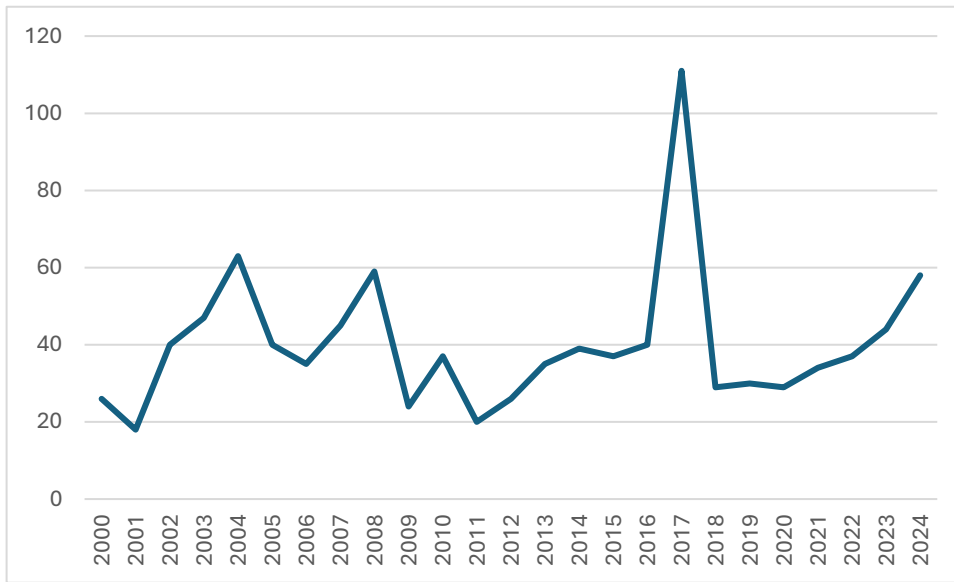
Source: Metropolitan Area Planning Council, Data Common

Figure 2: Number of New Residential Building Permits in Northampton Per Year, 2000–2024



Source: Metropolitan Area Planning Council, Data Common

Figure 3: Number of New Residential Units Per Year, 2000–2024



Source: Metropolitan Area Planning Council, Data Common

## Historic, Natural/Environmental, and Cultural Resources

### Natural Resources

The rich alluvial floodplains of the Connecticut River define Northampton’s eastern boundary. In the bottomlands, wetlands and farm fields continue to provide the same scenic and ecological benefits to Northampton that have existed for thousands of years since the end of the last ice age (and the corresponding formation and draining of Glacial Lake Hitchcock) some 12,000 years ago. On the city’s western boundary, the foothills of the Berkshires begin their slow, steady rise to the peak of Mount Greylock. To the north and south, the Connecticut River Valley stretches north to Vermont and South to Connecticut. These features, the river, the valley and the hills, frame Northampton and provide a home to not only Northampton’s dynamic population of more than 29,000 individuals but also to hundreds of species of flora and fauna.

#### *Forests and Fields*

As of 2016, the most recent year for which detailed land cover data is available, about 55% of Northampton was forested. The majority of this is deciduous forest, including oak, maple, and beech, but the city also has large areas of coniferous forests, including spruce, pine, and hemlock. Forests provide an abundance of timber, opportunities for recreation, wildlife habitat, the benefits of climate moderation, and the protection of water quality. The city’s Tree Warden has planted approximately 1,000 trees since 2020, with an average of 200 -250 per year, bolstering a robust urban forest that helps to mitigate the impacts of climate change. The forest and intermixed agricultural land also provide a visually pleasant landscape for residents and visitors too. The city's forests are mainly closed-canopied and middle-aged, having a great diversity of species, but no diversity of horizontal or vertical structural.

Tree species and forest composition reflect this variety of landforms. Because of Northampton's latitude, those species associated with northern hardwood forests are most common. In Northampton's floodplain, silver maple, cottonwood, elms, along with other species common to frequently inundated areas, are common. In higher, drier terrain, oaks, hickories, maples, black birch and scarlet oak are common species in fields, front lawns and gentle hills. On shady hillsides, it is common to find oaks, hickories, white birch and other species associated with transitional hardwood forests.

The forests and wetlands that fill Northampton's landscape also play host to a wide variety of wildlife. Bear, bobcat, minx, fishers, moose and deer have all been sighted in Northampton, and the city's wetlands and water bodies are important homes for salamanders, frogs, turtles and snakes as well as many fish species.

### *Surface Water*

Northampton water resources include open water bodies, wetlands, floodplain, and drinking water supplies and aquifers. These water resources are all sensitive ecological resources, but they also provide excellent agricultural, forest, open space, scenic, recreation, and wildlife habitat resources for the city's residents.

The Connecticut River forms Northampton's eastern boundary and is the city's most significant river. The Mill River and the Manhan River are two smaller, but important, rivers for the city to monitor and protect. The Mill River runs parallel to downtown Northampton, was once diverted, and has had an Army Corps levee system constructed to reduce flooding risk. The Connecticut River and Mill River both have floodplains, and each has a pumping station that works in conjunction with their levee systems. The Manhan River flows through Northampton's southwestern edge, enters Easthampton, and then drains into the Connecticut River Oxbow. There are 9 major brooks: Marble Brook, Turkey Brook, Beaver Brook, Day Brook, Roberts Meadow Brook, Clark Brook, Broad Brook, Hannum Brook and Parsons Brook.

### *Wetlands*

According to MassDEP wetlands data, there are about 2,680 acres of wetlands in Northampton. This includes about 1,155 acres of wooded swamps, 260 acres of deep marshes, 170 acres of shallow marshes or fens, 3 acres of bogs, and 930 acres of open water. Many, but certainly not all, of the city's wetlands are mapped by the National Wetlands Inventory with local supplemental data extracted from permit filings.

### *Beaver Dams*

Beaver activity continues to be an issue in Northampton. Some wetland areas have been flooded by beaver dam construction, which can have positive ecological benefits and result in additional wetland creation. Sometimes beaver activity is detrimental to property, causing problems for local landowners (e.g., flooding of wells, septic systems, lawns, out-buildings), or for roadway infrastructure. Addressing emergency impacts from beaver activity can be completed through review and approval of the Board of Health and Conservation Commission.

### *Groundwater – Water Supply*

Northampton has a public drinking water aquifer located in Florence. The city also shares an aquifer with Hatfield, which is in the Broad Brook area of Northampton, and neighboring Easthampton's aquifer is located in the West Farms area of Northampton.

The Northampton Aquifer has three delineated Zone II recharge areas. A Zone II is area of an aquifer that contributes to a well under the most severe pumping and recharge conditions that can be anticipated. Threats to Zone II recharge areas can include contamination from residential use, roadways, hazardous materials, oil contamination and agricultural uses.

### *Floodways*

Over 5,000 acres in Northampton is located within the 100-year flood zone. This includes extensive tracts of mostly undeveloped agricultural land along the Connecticut River in the eastern part of the city, but other flood zone areas are located along the smaller waterways in Northampton, including the Mill River, which passes diagonally through the city from northwest to southeast; Bassett Brook in the southwestern part of the city; and Broad Brook in the northeastern corner.

### *Protected Open Space*

Northampton has a significant amount of open space that is protected in perpetuity, including land owned by municipal, state, and federal governments, along with private landowners. The city of Northampton owns about 4,573 acres of permanently protected land, including about 3,773 acres that are managed by the Conservation Commission and 511 acres that are managed by the DPW as drinking water protection areas. The state government owns about 380 acres of protected land, and the federal government owns 199 acres, which comprises part of the Silvio O Conte National Fish and Wildlife Refuge. Land trusts own about 674 acres, including the Massachusetts Audubon Society's Arcadia Wildlife Sanctuary, and private landowners own about 904 acres that are protected through conservation restrictions, agricultural preservation restrictions, or similar legal mechanisms.

Overall, about 6,731 acres, or 10.5 square miles, of land in Northampton is permanently protected open space, amounting to nearly 30% of the city's total area. This land plays an important role in mitigating natural hazards in Northampton, including stormwater retention, soil stabilization, and moderating the effects of urban heat islands.

## **Historic & Cultural Resources**

Northampton has 15 listings on the National Register of Historic Places, including 7 historic districts and 8 individual listings. The historic districts include most of the downtown area along the Main Street corridor, which features many residential, commercial, and mixed-use properties from the 19<sup>th</sup> and early 20<sup>th</sup> centuries. Other historic districts are primarily residential, featuring historic and architecturally significant homes from the 18<sup>th</sup> and 19<sup>th</sup> centuries, including the Pomeroy Terrace Historic District, the Fort Hill Historic District, and the Parsons, Shepherd, and Damon Houses Historic District. The other three historic districts are comprised of the campuses of the Clarke

Schools for Hearing and Speech, the Veterans Administration Hospital, and the former Northampton State Hospital. Individual listings on the National Register of Historic Places in Northampton include several homes that were part of the Underground Railroad, along with the former home of President Calvin Coolidge, which is now a private residence on Massasoit Street.

Other important cultural resources in Northampton include the Historic Northampton museum, the Smith College Museum of Art, and the Forbes Library, which includes the Calvin Coolidge Presidential Library and Museum. The city also has many different performing arts venues, including the Academy of Music Theatre, A.P.E. Gallery, BOMBYX Center for Arts & Equity, Iron Horse, Northampton Center for the Arts, Northampton Community Arts Trust, Parlor Room, and Pines Theater at Look Park.

## **Commerce, Industry, and Academia**

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Northampton is a major employment center for the surrounding region. According to 2022 data from the U.S. Census Bureau's OnTheMap tool, about 21,745 people are employed in Northampton, including 17,770 who live outside of Northampton but commute into the city for work.

Northampton's economy is primarily based on service industry jobs, including healthcare, education, trade/transportation/utilities, retail trade, and leisure/hospitality.

In addition to employment, Northampton also draws visitors from surrounding communities, including college students from the Five Colleges region. Northampton's central business district has many retail stores, restaurants, and cultural attractions that help support the local economy.

The Northampton Public Schools has a total enrollment of 2,496 students as of the 2024–25 school year. The school district includes four elementary schools (Bridge Street School, Jackson Road School, Leeds School, and R. K. Finn Ryan School), one middle school (John F. Kennedy Middle School), and one high school (Northampton High School). Northampton is also home to Smith Vocational and Agricultural High School, a public vocational school that has an enrollment of 587 students as of the 2024–25 school year.

Aside from public schools, Northampton also has three private elementary schools (Montessori School of Northampton, Lander Grinspoon Academy, and Campus School of Smith College) and one private special education school (Clarke Schools for Hearing and Speech). Institutions of higher learning include Smith College and the Conway School of Landscape Design.

## **National Flood Insurance Program (NFIP) Participation and Community Rating System (CRS)**

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The following table summarizes Northampton's participation in and compliance with the NFIP, including NFIP policy and claim statistics as of June 2025.

Table 2: City Participation in and Compliance with the NFIP

NFIP Topic	Sources of Information	Comments
Number of NFIP policies in the community and total coverage.	FEMA NFIP Services	As of June 2025, there were a total of 94 NFIP policies with a total premium amount of \$199,923, a building coverage of \$23,299,000, and contents coverage of 6,325,000.
History of claims and insurance payments.	FEMA NFIP Services	There have been a total of 74 NFIP claims for which \$776,219 has been paid.
Repetitive Loss Properties	FEMA NFIP Services	There are 10 NFIP repetitive loss properties and 2 FMA repetitive loss properties. These structures include 9 residential properties and 3 non-residential properties.
Format and location of FIRMS	Community	Hard copies of the FIRM are on file with the City Clerk, Office of Planning and Sustainability, and Building Department.
Date the community entered the NFIP and date of most recent FIRMS	FEMA NFIP Services	Northampton entered the NFIP in 1974. FIRMS have been effective since 1978 with the current map in effect since 1978. New flood maps for the City are currently in development and preliminary maps are due to be completed in fall of 2025.
Number of structures exposed to flood risk within the community	GIS Analysis	There are an estimated 417 structures within the SFHA and thus exposed to flood risk. Some of these may be garages, barns or other outbuildings.
Areas of flood risk with limited NFIP policy coverage	GIS Analysis, FPA	There is not address-specific data available from FEMA, but it is likely that property owners in the SFHA are underinsured, based on the number of properties in flood zones and the fact that there are only 94 current NFIP policies.
NFIP Administration in the community	Community	The City complies with the NFIP by enforcing floodplain regulations, maintaining current floodplain maps, and providing information to property owners and developers about floodplain regulations and building requirements. Floodplain regulations are administered through the enforcement of the City's zoning ordinance, by the Planning Board, the Conservation Commission, and the Building Inspector.
NFIP compliance	Community, FEMA NFIP program	The City is in good standing with the NFIP, and there are no outstanding compliance issues. The City will maintain compliance with the NFIP throughout the next 5-year hazard mitigation planning cycle by monitoring its

NFIP Topic	Sources of Information	Comments
		Floodplain Zone and ensuring that this zoning district accurately reflects the 100-year floodplain and FEMA Flood Insurance Rate Map.
Adoption of NFIP minimum floodplain management criteria via local regulation.	Community	Zoning Ordinance, Section 16, Floodplain Overlay District
Adoption of the latest effective Flood Insurance Rate Map (FIRM), if applicable	Community	Zoning Ordinance, Section 16. The Floodplain District is established as an overlay district. The district includes all special flood hazard areas within the City of Northampton designated as Zone A, AE, AH, AO, A99, V, or VE on the Hampshire County Flood Insurance Rate Map (FIRM) dated April 3, 1978, issued by the Federal Emergency Management Agency (FEMA) for the administration of the National Flood Insurance Program. These are defined by the 1% chance base flood elevations shown on the FIRM and further defined by the Hampshire County Flood Insurance Study (FIS) report dated November 1976. The FIRM and FIS report are incorporated herein by reference and are on file with the City Clerk, Office of Planning and Sustainability, and Building Department.
Appointment of a designee or agency to implement the addressed commitments and requirements of the NFIP	Community	The Assistant Director of Planning and Sustainability is the designated Floodplain Administrator in Northampton. The Building Inspector and Planning and Sustainability Department work together to implement the NFIP requirements.
Implementation and enforcement of local floodplain management regulations to regulate and permit development in SFHAs.	Community	Floodplain regulations are administered through the enforcement of the City's zoning ordinance, by the Planning Board, the Conservation Commission, and the Building Inspector.
Description of how participants implement the substantial improvement/substantial damage provisions of their floodplain management regulations after an event.	Community	The City implements the SI/SD provisions of its floodplain management regulations as required per the NFIP (CFR Title 44, Parts 59 - 65) and Massachusetts State Building Code (780 CMR). The City will also coordinate with State Flood Hazard Management Program staff to assure that proper practices are followed and that a post-disaster plan will be in place to implement all SI/SD provisions.

## CHAPTER 3: HAZARD IDENTIFICATION & RISK ASSESSMENT

### Statewide and Regional Climate Change Impacts

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This chapter examines the natural hazards which are identified as likely to affect Northampton and includes a summary of disasters that have affected or could affect Northampton. In order to identify natural hazards of concern for the Plan Update, the Committee and its consulting team reviewed the 2020 Northampton Hazard Mitigation Plan, the 2018 and 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan (SHMCAP), available hazard mapping, and other weather-related databases. Historical research and conversations with local officials and emergency management personnel were also used to identify and profile the natural hazards which are most likely to have an impact on the City.





The assessment conducted for the former HMP recognized the following 11 natural hazards that could potentially impact Northampton:

- Flooding
- Dam failure / Levee Breach
- Drought
- Extreme Temperatures
- Wildfires / Brushfires
- Invasive Species
- Hurricanes/ Tropical Storms
- Severe Winter Storm / Nor'Easter
- Severe thunderstorms / Wind / Tornadoes
- Earthquake
- Pandemic

All of the hazards identified and assessed in the 2020 HMP were determined to be relevant for the 2026 Plan Update.

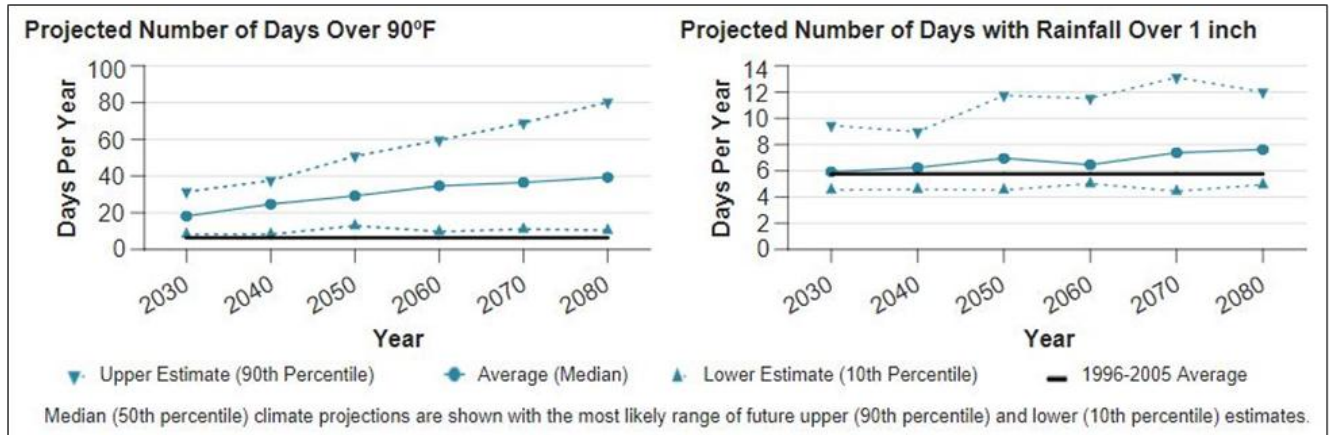
The 2018 Massachusetts State Hazard Mitigation and Climate Adaptation Plan (SHMCAP) identified the natural hazards that can occur in the state along with the climate change interaction for each, and the representative climate change impacts. The one hazard without a climate change interaction is earthquakes. These are shown in Table 3 below from the SHMCAP.

Table 3: Natural Hazards and Climate Change Interactions

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

The data shown below in Figure 4 gives the projections for the annual number of days over 90°F and the number of days with rainfall over 1 inch for Northampton. This data from Resilient.mass.gov gives projections ranging from the lowest estimates (10th percentile) to the highest estimates (90<sup>th</sup> percentile) depending on emissions scenarios, as well as the average. By 2080, Northampton could experience up to 80 days per year above 90°F and up to 12 days per year with rainfall over 1 inch. While these changes in temperature and precipitation will directly impact flooding and extreme temperatures (particularly high temperatures), research indicates that temperature increases will likely increase the frequency and intensity of strong storms such as hurricanes.

Figure 4: Climate Change Projections for Northampton



Source: Resilientma.gov

### Statewide and Regional Climate Change Impacts

[The Massachusetts Climate Change Assessment report](#) was issued in December 2022. This report provides region-specific data and analysis of climate change impacts for each of the seven regions of the Commonwealth. Southampton is within the “Greater Connecticut River Valley” region. The report identifies the most urgent impacts to five sectors (Human, Infrastructure, Natural Environment, Governance, and Economy) for the Greater Connecticut River Valley Region. Figure 5 below shows the top two or three most urgent impacts per sector.

Figure 5: Most Urgent Regional Climate Change Impacts



The City of Northampton has been subject to a number of federal disaster declarations along with all of Hampshire County. Some of these disaster declarations also correspond to emergency declarations in Massachusetts that applied to all or part of the state. Table 4 below lists all of the Massachusetts emergency declarations since 2011 that have applied to Northampton, along with the corresponding federal disaster declarations that applied to Northampton.

Table 4: Massachusetts Emergency Declarations and Federal Disaster Declarations affecting Northampton

Massachusetts Emergency	Start	Termination	Corresponding Federal Disaster Declaration	FEMA Public Assistance	Application to Northampton
Hurricane Lee	9/15/2023	9/16/2023	NA	NA	Yes
Severe Weather and Flooding	9/12/2023	9/16/2023	NA	NA	Yes
Covid-19 Pandemic	3/13/2020	5/11/2023	DR-4496-MA	All counties	Yes
Severe Winter Storm, Snowstorm, and Flooding	2/8/2013	2/9/2013	DR-4110-MA	All counties	Yes
Severe Snow and Snowstorm	10/29/2011	10/30/2011	DR-4051-MA	Middlesex, Worcester, Hampden, Hampshire, Franklin, Berkshire	Yes
Tropical Storm Irene	8/27/2011	8/29/2011	DR-4028-MA	Barnstable, Dukes, Plymouth, Bristol, Norfolk, Hampden, Hampshire, Franklin, Berkshire	Yes
Severe Storms and Tornadoes	6/1/2011	6/1/2011	DR-1994-MA	Worcester, Hampden	No

## Natural Hazard Analysis Methodology

This chapter examines the hazards which are identified in the Massachusetts State Hazard Mitigation and Climate Adaptation Plan and by the Northampton HMP Update Steering Committee as likely to affect Northampton. The analysis is organized into the following sections: Hazard Description, Location, Extent, Previous Occurrences, Probability of Future Events, Impact, and Vulnerability. A description of each of these analysis categories is provided below.

### Hazard Description

The natural hazards identified for Northampton’s 2026 HMP update are: flooding, dam failure / levee breach, drought, extreme temperatures, wildfire/brushfire, invasive species, hurricane/ tropical storm, severe winter storm/nor’easter, severe thunderstorms / wind / tornado, earthquake, and pandemic/epidemic. Many of these hazards result in similar impacts to a community. For example, hurricanes, tornadoes and severe snowstorms may cause wind-related damage.

### Location

Location refers to the geographic areas within the planning area that are affected by the hazard. Some hazards affect the entire planning area universally, while others apply to a specific portion, such as a floodplain or area that is susceptible to wildfires. Classifications are based on the area that would potentially be affected by the hazard, as shown below in Table 5.

*Table 5: Location of Occurrence, Percentage of City Impacted by Given Natural Hazard*

Location of Occurrence	Percentage of Town Impacted
Large	More than 50% of the city affected
Medium	10 to 50% of the city affected
Small	Less than 10% of the city affected

### Extent

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

### Previous Occurrences

Previous hazard events that have occurred are described. Depending on the nature of the hazard, events listed may have occurred on a local, state-wide, or regional level. Where information is available on emergency costs for specific events, that information is provided.

### Probability of Future Events

The likelihood of a future event for each natural hazard was classified according to scale shown in the following scale in Table 6:

Table 6: 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

## Vulnerability Assessment

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

Impact refers to the effect that a hazard may have on populations, the built environment, and the environment, based on the assessment of extent described above. Very generally, impacts are classified according to the scale shown in Table 7.

Table 7: Impacts, Magnitude of Multiple Impacts of Given Natural Hazard

Impacts	Potential magnitude of impacts to people	Potential magnitude of impacts to property
Catastrophic	Multiple injuries or deaths possible.	50 - 100% of property in affected area damaged or destroyed. Disruption to facilities for 1 week or more.
Critical	Significant injuries and health effects possible.	10 - 50% of property in affected area damaged or destroyed. Disruption to facilities for 3 days or more.
Limited/Moderate	Minor injuries and health effects, if any. People may be displaced or lose access to heat, cooling, or water.	Up to 10% of property in affected area damaged or destroyed. Disruption to facilities for a day or more.
Minor	No injuries or health effects.	Only minor property damage and minimal disruption on quality of life. Possible temporary disruption of facilities.

### Built Environment Impact

The built environment sector includes all buildings in Northampton, including critical facilities owned by the municipality and critical infrastructure sectors that provide or link to key lifeline services, social welfare, and economic development.

In order to determine estimated losses due to natural hazards in Northampton, the assessor's data of the total value of all structures in Northampton was used - \$4,325,186,873. This excludes both the land value and contents of the structure. The damage calculations are rough estimates and likely reflect worst-case scenarios. Computing more detailed damage assessment based on assessor's records is a labor-intensive task and beyond the scope of this project. Human losses are not calculated during this exercise, but could potentially occur depending on the type and severity of the hazard.

### *Population Impacts*

Vulnerability of populations is influenced by three factors: exposure or contact with the hazard; sensitivity or degree to which people or communities are affected by the exposure to the hazard; and capacity to adapt or the ability of communities, institutions, or people to adjust and respond to and recover from potential hazards.

The major health impacts from natural hazards and climate change include:

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

In most natural hazard events, the vulnerability of a population is largely dependent on local preparedness and availability of human resources for social services staffing and supplies distribution. While this plan does not aim to recommend specific emergency preparedness and response activities, it should be noted that preparing for emergencies by training a large group of public and professional responders to ensure continuity of operations during a hazard event can be a critical tool for mitigating the overall impacts of any hazard event.

Changes in population patterns can affect the impacts of natural hazards. Over time, the makeup of socially vulnerable populations in a community can change, which affects how the community needs to prepare for and respond to natural hazards and climate change impacts. While there is not currently significant climate migration from the coasts and other more vulnerable areas impacting Northampton, that is likely to occur over time.

### *Changes in Land Use/Development*

Increased development, both residential and commercial, can affect the city's vulnerability to natural hazards and climate change impacts. This is especially true for development that occurs in areas that are more vulnerable to natural hazards such as flooding or severed winds. Northampton has had moderate development since the last plan, primarily residential. None of this development has been in floodplains or in areas vulnerable to localized flooding or other hazards.

### *Hazard Risk Index Rating*

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

- 1 – Highest risk
- 2 – High risk
- 3 – Medium risk
- 4 – Low risk
- 5 – Lowest risk

The ranking is qualitative and is based, in part, on local knowledge of past experiences with each type of hazard. The size and impacts of a natural hazard can be unpredictable. However, many of the mitigation strategies currently in place and many of those proposed for implementation can be applied to the expected natural hazards, regardless of their unpredictability. Table 8 below gives the rating for the location, probability of future events, impact and overall vulnerability for each hazard determined to affect Northampton.

Table 8: Hazard Identification and Analysis for Northampton

Hazard	Location of Occurrence	Probability of Future Events	Impact	Hazard Risk Index
Flooding	Medium	High	Limited (with loss of key transportation routes)	2–High Risk
Dam Failure / Levee Breach	Medium	Low	Critical	3–Medium Risk
Drought	Large	Moderate	Minor	4–Low Risk
Extreme Temperatures	Large	High	Limited	2–High Risk
Wildfire / Brushfire	Medium	Moderate	Minor	3–Medium Risk
Invasive Species	Medium	High	Minor	4–Low Risk
Hurricane/ Tropical Storm	Large	Moderate	Limited	3–Medium Risk
Severe Winter Storm / Nor’easter	Large	High	Limited	3–Medium Risk
Severe Thunderstorm / Wind / Tornado	Small	Severe thunderstorms: Moderate Winds: Moderate Tornadoes: Low	Limited	Severe thunderstorms: 4–Low Risk Winds: 3–Medium Risk Tornadoes: 4–Low Risk
Earthquake	Large	Low	Limited	4–Low Risk
Pandemic	Large	Low	Critical	3–Medium Risk

# Flooding

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## Hazard Description

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

- Continental storms are typically low-pressure systems that can be either slow or fast moving. These storms originate from the west and occur throughout the year.
- Coastal storms, also known as nor'easters, usually occur in late summer or early fall and originate from the south. The most severe coastal storms, hurricanes, occasionally reach Massachusetts and generate very large amounts of rainfall.
- Thunderstorms form on warm, humid summer days and cause locally significant rainfall, usually over the course of several hours. These storms can form quickly and are more difficult to predict than continental and coastal storms.

A floodplain is the relatively flat, lowland area adjacent to a river, lake or stream. Floodplains serve an important function, acting like large “sponges” to absorb and slowly release floodwaters back to surface waters and groundwater. Over time, sediments that are deposited in floodplains develop into fertile, productive farmland like that found in the Connecticut River Valley. In the past, floodplain areas were also often seen as prime locations for development. Industries were located on the banks of rivers for access to hydropower. Residential and commercial development occurred in floodplains because of their scenic qualities and proximity to the water. Although periodic flooding of a floodplain area is a natural occurrence, past and current development and alteration of these areas will result in flooding that is a costly and frequent hazard.

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

- **Flash floods** are the product of heavy, localized precipitation in a short time period over a given location. Flash flooding events typically occur within minutes or hours after a period of heavy precipitation, after a dam or levee failure, or from a sudden release of water from an ice jam. Most often, flash flooding is the result of a slow-moving thunderstorm or the heavy rains from a hurricane. In rural areas, flash flooding often occurs when small streams spill over their banks. However, in urbanized areas, flash flooding is often the result of clogged storm drains (leaves and other debris) and the higher amount of impervious surface area (roadways, parking lots, roof tops).
- **General floods** may last for several days or weeks and are caused by precipitation over a longer time period in a particular river basin. Excessive precipitation within a watershed of a stream or river can result in flooding particularly when development in the floodplain has obstructed the natural flow of the water and/or decreased the natural ability of the groundcover to absorb and retain surface water runoff (e.g., the loss of wetlands and the higher amounts of impervious surface area in urban areas).

The National Flood Insurance Program (NFIP) data on flood insurance policies, repetitive loss (RL) properties, and severe repetitive loss (SRL) properties are useful for determining the location of areas

vulnerable to flood and severe storm hazards. A RL property is a property for which two or more flood insurance claims of more than \$1,000 have been paid by the NFIP within any 10-year period since 1978. A SRL property is defined as one that “has incurred flood-related damage for which 4 or more separate claims payments have been paid under flood insurance coverage, with the amount of each claim payment exceeding \$5,000 and with cumulative amount of such claims payments exceeding \$20,000; or for which at least 2 separate claims payments have been made with the cumulative amount of such claims exceeding the reported value of the property” (FEMA).

## **Location**

FEMA last published flood insurance rate maps for Hampshire County in the late 1970s, and the City of Northampton adopted those maps to stay compliant with NFIP participation and for residents to remain eligible to buy flood hazard insurance through NFIP. These maps are being updated and preliminary new maps were released in August 2025.

The Critical Facilities and Past Hazard Areas map for the City of Northampton shows the 100-year and 500-year flood zones identified by FEMA flood maps. The 100-year flood zone is the area that will be covered by water as a result of a flood that has a one percent chance of occurring in any given year. Likewise, the 500-year flood has a 0.2 percent chance of occurring in any given year. In Northampton, the 100-year flood zone covers narrow bands of level floodplain land along the Mill River, the Mill River Diversion, Basset Brook / Parsons Brook, Broad Brook, Manhan Brook, Roberts Meadow Brook, and the Connecticut River. In several areas, the flood zone widens out to encompass farmland, some residential land, and industrial lands. There are also significant areas of localized flooding, including on Lower Elm Street and Avis Circle.

When ice jams occur, water flow can be backed up in the Connecticut River and Mill River and flood nearby low lying lands.

The National Flood Insurance Program has produced maps that identify floodplains across America. The following waterbodies have been designated as contributing to flooding in Northampton: Mill River, Mill River Diversion, Parsons Brook / Basset Brook, Broad Brook, Marble Brook, Connecticut River, Roberts Meadow Brook, Manhan River.

Based on an approximate flood elevation at Route 5 in downtown Northampton of 124' MSL for the 100-year flood (FEMA A Zone), roughly 3,960 acres or 18% of Northampton including 167 acres of downtown could be affected by flooding of the Connecticut River alone. Some other areas outside of the mapped flood zone may still be subject to local flooding and to larger rarer storm events.

Therefore, the percentage of City impacted by the flood hazard is considered to be “Medium” (10 to 25 percent of the city).

## **Extent**

The observed 1971 - 2000 average annual precipitation for Northampton and surrounding areas in the Connecticut River watershed is 46.4 inches, with the majority of rainfall occurring in the spring and summer. Relative to this baseline, the total annual precipitation in this watershed is expected to

increase by 1.3” to 6.2” by 2050, and winter precipitation is expected to increase by up to 25% by mid-century, and by up to 37% by 2100 (resilient MA, 2018).

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

Table 9 below shows the historical flooding crests, or highest recorded water levels, for the Mill River. The river’s minor flood stage is 11 feet, a height which it has reached 28 times in Northampton since 1950. The river’s action stage is 9 feet, a height which has been reached 16 times in Northampton since 1950. Five of the top 9 recorded crest elevations have occurred in the past ten years.

*Table 9: Historical Crests of the Mill River in Northampton*

Rank	Date	Height	Stage
1	08-28-2011	16.42 ft	Minor Flood
2	04-16-2007	15.58 ft	Minor Flood
3	12-18-2023	14.37 ft	Minor Flood
4	10-09-2005	13.72 ft	Minor Flood
5	02-25-2016	13.47 ft	Minor Flood
6	10-30-2017	12.80 ft	Minor Flood
7	04-03-2005	12.73 ft	Minor Flood
8	12-25-2020	12.39 ft	Minor Flood
9	09-30-2015	12.32 ft	Minor Flood
10	03-07-2011	12.26 ft	Minor Flood
11	09-29-2011	12.20 ft	Minor Flood
12	09-28-2003	12.11 ft	Minor Flood
13	03-31-2010	11.83 ft	Minor Flood
14	03-09-2008	11.81 ft	Minor Flood
15	08-19-1955	11.78 ft	Minor Flood
16	12-21-2018	11.64 ft	Minor Flood
17	12-12-2008	11.55 ft	Minor Flood
18	09-07-2011	11.50 ft	Minor Flood
19	09-02-2021	11.45 ft	Minor Flood

Rank	Date	Height	Stage
20	09-17-1999	11.42 ft	Minor Flood
21	09-08-2011	11.38 ft	Minor Flood
22	01-10-2024	11.31 ft	Minor Flood
23	12-08-2011	11.27 ft	Minor Flood
24	03-24-2024	11.25 ft	Minor Flood
25	08-13-2014	11.21 ft	Minor Flood
26	12-21-2012	11.18 ft	Minor Flood
27	09-18-2018	11.04 ft	Minor Flood
28	12-01-2020	11.03 ft	Minor Flood
29	06-06-1982	10.98 ft	Action Stage
30	11-03-2018	10.81 ft	Action Stage
31	10-15-2005	10.81 ft	Action Stage
32	02-14-2008	10.58 ft	Action Stage
33	11-09-2006	10.47 ft	Action Stage
34	03-23-2010	10.46 ft	Action Stage
35	04-05-1984	10.42 ft	Action Stage
36	05-13-2006	10.39 ft	Action Stage
37	10-28-2006	10.30 ft	Action Stage
38	12-27-2009	10.29 ft	Action Stage
39	04-24-2005	10.27 ft	Action Stage
40	02-07-2008	10.11 ft	Action Stage
41	10-25-2005	10.02 ft	Action Stage
42	10-15-1955	9.81 ft	Action Stage
43	03-31-1951	9.38 ft	Action Stage
44	09-12-1960	9.10 ft	Action Stage

Source: NOAA, National Water Prediction Service

Table 10 shows the historical flooding crests on the Connecticut River. The major flood stage for the river is 120 feet, which has been reached three times since 1935. The moderate flood stage is 115 feet, which has been reached 17 times since 1935. The minor flood stage is 112 feet, which has been reached 64 times since 1935. The action stage is 110 feet, which has been reached 11 times since 1935.

Table 10: Historic Crests of the Connecticut River in Northampton

Rank	Date	Height	Stage
1	03-19-1936	129.40 ft	Major Flood
2	09-22-1938	125.00 ft	Major Flood
3	05-31-1984	120.80 ft	Major Flood
4	04-06-1960	119.90 ft	Moderate Flood
5	01-01-1949	118.60 ft	Moderate Flood
6	04-01-1987	118.00 ft	Moderate Flood
7	03-23-1948	117.70 ft	Moderate Flood
8	03-29-1953	117.60 ft	Moderate Flood
9	08-30-2011	117.16 ft	Moderate Flood
10	05-05-1940	117.00 ft	Moderate Flood
11	10-09-2005	116.30 ft	Moderate Flood
12	03-15-1977	116.20 ft	Moderate Flood
13	06-03-1952	116.00 ft	Moderate Flood
14	04-03-1976	115.70 ft	Moderate Flood
15	07-12-2023	115.53 ft	Moderate Flood
16	04-23-1969	115.50 ft	Moderate Flood
17	04-01-1951	115.40 ft	Moderate Flood
18	04-24-1958	115.30 ft	Moderate Flood
19	03-24-1968	115.20 ft	Moderate Flood
20	05-01-1956	115.00 ft	Moderate Flood
21	07-02-1973	114.90 ft	Minor Flood
22	04-07-1952	114.80 ft	Minor Flood
23	04-19-1982	114.80 ft	Minor Flood
24	04-17-1996	114.60 ft	Minor Flood
25	04-04-2005	114.60 ft	Minor Flood
26	03-19-1973	114.60 ft	Minor Flood
27	04-01-1998	114.60 ft	Minor Flood
28	03-27-1979	114.60 ft	Minor Flood
29	04-17-2007	114.50 ft	Minor Flood
30	12-16-1983	114.50 ft	Minor Flood
31	04-13-1947	114.40 ft	Minor Flood
32	04-18-1994	114.40 ft	Minor Flood
33	04-24-2001	114.30 ft	Minor Flood
34	04-05-1959	114.30 ft	Minor Flood
35	02-26-1981	114.20 ft	Minor Flood
36	12-22-1973	114.20 ft	Minor Flood
37	05-14-1996	114.20 ft	Minor Flood
38	04-02-1962	114.10 ft	Minor Flood
39	04-02-2004	114.00 ft	Minor Flood
40	04-02-1977	114.00 ft	Minor Flood
41	12-19-2023	113.97 ft	Minor Flood

Rank	Date	Height	Stage
42	03-18-1990	113.90 ft	Minor Flood
43	05-06-1972	113.90 ft	Minor Flood
44	04-08-1984	113.70 ft	Minor Flood
45	01-19-2006	113.70 ft	Minor Flood
46	04-01-1993	113.50 ft	Minor Flood
47	03-22-1945	113.50 ft	Minor Flood
48	04-01-1986	113.50 ft	Minor Flood
49	04-14-2011	113.46 ft	Minor Flood
50	03-29-1976	113.40 ft	Minor Flood
51	11-30-1959	113.40 ft	Minor Flood
52	04-17-1993	113.40 ft	Minor Flood
53	04-21-1972	113.30 ft	Minor Flood
54	10-30-2003	113.20 ft	Minor Flood
55	04-17-2014	113.12 ft	Minor Flood
56	04-17-2019	113.00 ft	Minor Flood
57	10-27-2005	113.00 ft	Minor Flood
58	03-31-2003	113.00 ft	Minor Flood
59	01-10-1998	112.90 ft	Minor Flood
60	04-15-2008	112.90 ft	Minor Flood
61	02-27-2016	112.88 ft	Minor Flood
62	04-18-2011	112.81 ft	Minor Flood
63	03-31-2010	112.80 ft	Minor Flood
64	04-17-1955	112.80 ft	Minor Flood
65	09-08-2011	112.70 ft	Minor Flood
66	04-06-1950	112.70 ft	Minor Flood
67	10-21-1975	112.60 ft	Minor Flood
68	04-04-1967	112.50 ft	Minor Flood
69	05-07-1989	112.50 ft	Minor Flood
70	05-26-1979	112.50 ft	Minor Flood
71	04-08-1989	112.40 ft	Minor Flood
72	04-16-1964	112.40 ft	Minor Flood
73	04-04-1963	112.40 ft	Minor Flood
74	12-19-2000	112.40 ft	Minor Flood
75	01-28-1996	112.40 ft	Minor Flood
76	03-08-2024	112.31 ft	Minor Flood
77	04-23-2019	112.28 ft	Minor Flood
78	04-06-1974	112.20 ft	Minor Flood
79	05-05-1971	112.20 ft	Minor Flood
80	03-24-2010	112.20 ft	Minor Flood
81	04-26-1970	112.10 ft	Minor Flood
82	08-20-1955	112.00 ft	Minor Flood
83	04-19-1954	112.00 ft	Minor Flood

Rank	Date	Height	Stage
84	04-11-1980	112.00 ft	Minor Flood
85	12-13-2008	111.90 ft	Action Stage
86	04-06-2000	111.80 ft	Action Stage
87	12-01-1959	111.80 ft	Action Stage
88	04-05-1990	111.80 ft	Action Stage
89	05-21-2006	111.80 ft	Action Stage
90	04-17-2002	111.70 ft	Action Stage
91	12-26-1990	111.70 ft	Action Stage
92	04-04-1973	111.60 ft	Action Stage
93	04-30-1988	111.60 ft	Action Stage
94	05-05-1983	111.60 ft	Action Stage
95	12-26-2003	111.50 ft	Action Stage

Source: NOAA, National Water Prediction Service

The increased amount of strong precipitation events and overall increase in rainfall resulting from climate change will likely result in more flooding in the region.

### Previous Occurrences

Between 1954 and 2025, Massachusetts was included in seven FEMA declared flood-related disasters (DR) or emergencies (EM) classified as one or a combination of the following hazards: severe storms, flooding, and inland and coastal flooding. Northampton may not have been impacted by all of these events. According to the USACE Ice Jam Database, there were 233 reported ice jams in Massachusetts between 1920 and 2025, 12 of which were located in Northampton as shown below in Table 11 (USACE, 2025).

Table 11: Historic Ice Jams in Northampton

River	Jam Date	Water Year	Jam Type	Gage Number
Connecticut River	03/13/1936	1936	-	?
Mill River	02/08/1941	1941	-	01171500
Mill River	01/02/1945	1945	-	01171500
Connecticut River	03/01/1946	1946	Break-up	?
Mill River	03/09/1950	1950	-	01171500
Mill River	01/23/1957	1957	-	01171500
Mill River	01/22/1959	1959	-	01171500
Mill River	01/25/1964	1964	-	01171500
Bassett Brook	02/09/1965	1965	-	01171800
Mill River	02/08/1965	1965	-	01171500
Bassett Brook	02/13/1966	1966	-	01171800
Bassett Brook	03/18/1968	1968	-	01171800

Source: USACE Ice Jam Database

Though not recorded in the USACE Ice Jam Database, the most significant ice jam event that has occurred in Northampton in recent years was in the winter of 2018 along the Connecticut River. Large blocks of floating ice caused significant damage to floating and permanent structures at the Connecticut River Greenway. The gangway, docks, harbor, and railings were damaged to a cost of roughly \$30,000. In response, the city cut out the damaged rails, but Northampton Community Rowing has not yet replaced the gangway and docks. The harbor, dug out when the New Haven and Northampton Canal was built in the early 1800s, silted in more than it had in all that time. The city has never dredged the area, and based on the great expense of doing so it may never happen.

Major flood events which have impacted Northampton in the past 100 years are identified in Table 12 below. Loss and impact information could vary depending on the source. Therefore, the accuracy of monetary figures discussed is based only on the available information identified during research for this plan.

*Table 12: Floods Causing Significant Damage in Northampton, 1914–2025*

<b>Date</b>	<b>Description</b>	<b>Cost of Damage</b>	<b>Cost Adjusted for Inflation</b>
12/19/2023	Heavy rain caused flooding from the Mill River at West Street, Meadow Street in Florence, and Reservoir Road and Main Street in Leeds.	NA	NA
7/12/2023	Heavy rain over two days caused flooding of both the Mill and Connecticut Rivers. The Connecticut River reached 115.53 feet, and the Mill reached 14.37 ft. Farms and community garden plots at Grow food Northampton Community Farm were flooded and lost valuable crops. Farms flooded by Connecticut River waters included Smiarowski Farm, Szawlowski Farm, and Mountain View Farm. These farms lost many crops as it was the middle of the growing season. Estimated losses for just Smaiarowski Farm were \$1.5-\$2 million.	NA	NA
9/18/2018	Flash Flood from heavy rainstorm. Total rainfall amounts reached two to five inches. The Mill River reached Flood Stage at 11.04 ft.	NA	NA
10/25/2017	Flood from Heavy Rain - In Northampton, flood waters closed the intersection of Main and Market Streets. A car was trapped by flood waters on West Street near Smith College.	NA	NA
8/5/2017	Flood from Heavy Rain - Flooding in Northampton peaked between 2 and 3 PM. At 2:14 PM, State Street had between eight and twelve inches of flooding between Bedford Terrace and Summer Street. Several manhole covers came off due to flooding, including three on Elm Street near Childs Park and one on Old South Street. At 2:27 PM, Jackson Street was flooded and impassable, with the water two feet deep on King Street near the Bluebonnet Diner. At 2:40 PM, an	NA	NA

Date	Description	Cost of Damage	Cost Adjusted for Inflation
	underpass near North Street and Market Street was flooded and impassable.		
2/25/2016	Flood from Heavy Rain - In Northampton, the Mill River overflowed its banks resulting in flooding on Meadow Street in Leeds. On 2/27 CT River reached Flood Stage at 112.88 ft.	NA	NA
9/30/2015	Flood from Heavy Rain - Twelve inches of water was flooding portions of Route 9 near in Haydenville the Northampton town line.	NA	NA
8/27/2011	Hurricane Irene	\$96,400	\$111,600
4/15/2007 – 4/16/2007	100-year flood Mill River Floodplain	NA	NA
9/16/1999	Tropical Storm Floyd, Flooding to Mill River Floodplain	\$900,000	\$1,394,000
3/31/1987 – 4/7/1987	Connecticut River Floodplain	\$126,000	\$286,000
5/28/1984 – 6/5/1984	50-year flood Connecticut River Floodplain	\$377,000	\$937,000
6/6/1982	50 to 100 year flood Mill River Floodplain	\$104,000	\$278,000
3/15/1977	10-year flood; Connecticut River Floodplain	\$112,000	\$447,000
4/6/1960	10-year flood; Connecticut River Floodplain	\$38,000	\$331,000
10/15/1955	50 to 100-year flood Mill River Floodplain	\$48,000	\$462,000
3/29/1953	10-year flood Connecticut River Floodplain	\$40,000	\$387,000
6/3/1952	10-year flood Connecticut River Floodplain	\$38,000	\$370,000
1/1/1949	10-year flood Connecticut River Floodplain	\$37,000	\$401,000
3/23/1948	10-year flood Connecticut River Floodplain	\$32,000	\$323,000
9/22/1938	100-year flood Connecticut River Floodplain	\$81,500	\$1,492,000
3/13/1936	100-year flood Connecticut River Floodplain	\$200,000	\$3,714,000

Northampton’s most significant flood event on record was the “the Great Flood” of March 1936. The account of the flood is as follows:

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

## Probability of Future Events

Based upon previous data, there is a “high” chance (between 40 percent and 70 percent in the next year) of flash flooding or general flooding occurring in Northampton. This is partly a function of the presence of the Connecticut River and the Mill River, both of which contain significant floodplain acreage in Northampton.

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

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

In actuality, flooding occurs more frequently than this because the current FEMA-defined flood zones are based on historical patterns of rainfall intensity and frequency, and do not take into account the impacts that climate change will have on Northampton. Overall, it is anticipated that the severity of flood-inducing weather events and storms will increase as a result of climate change. Research has shown that rainfall is increasingly concentrated into the most severe events (Easterling, 2017). While trends in overall precipitation are less clear, the increase in severe rainfall events will exacerbate the risk of localized flooding. In future years, it is likely that the currently designated 10-year, 25-year, 100-year and 500-year floodplains of the Mill River and Connecticut River will flood more frequently due to climate change. The city of Northampton believes this to be a substantial risk.

The National Weather Service maintains water level gauges on the Mill River and Connecticut River in Northampton, to monitor flooding. The NWS has various flooding classifications based on water level. These classifications and their definitions are:

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

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

- water over banks and in yards
- no building flooded, but some water may be under buildings built on stilts (elevated)
- personal property in low lying areas needs to be moved or it will get wet
- water overtopping roads, but not very deep or fast flowing
- water in campgrounds or on bike paths
- inconvenience or nuisance flooding
- small part of the airstrip flooded, and aircraft can still land

- one or two homes in the lowest parts of city may be cut off or get a little water in the crawl spaces or homes themselves if they are not elevated

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

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

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

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

Various critical facilities are at risk within Northampton's floodplain:

#### **100-year floodplain**

- EPA Tier II Facility on Island Road in the Connecticut River Oxbow area
- The Northampton Airport

- Fair Grounds—potential gathering spot for thousands of people and livestock during the Three County Fair. In addition, the area is also susceptible to localized flooding.
- Sections of Route 5, Mount Tom Road, and Route 10 at the South St bridge with the flood control drop structure underneath, cutting off southbound access to the City.
- Waterlines and sewer lines mounted on the City’s bridges—a flood that destroyed a bridge could result in a potential loss of services for residential populations.
- Road adjacent to the Mill River (causing destruction to road)
- Power substations at Smith College, King Street, and Route 5 at Easthampton line

### **500-year floodplain**

- Group Home/Assisted Living Facility and Paradise Pond Transitional Apartments within the Mill River’s floodplain on West Street

In addition, there are several facilities that are located outside the floodplain because of the City’s levee system. Should this system fail, these facilities would be at risk:

- Power facilities located on West Street
- The City’s wastewater treatment facility
- Much of downtown

### **Localized flooding**

The Hazard Mitigation Committee identified several points in the City as areas that flood frequently but are outside of the community’s Flood Insurance Rate Map boundaries. The locations of these areas and the impact of flooding to them are the following:

- Ice pond culvert on Route 66/Rocky Hill Road has a history of flooding and is on a primary evacuation route.
- King Street Brook including roadways and properties near Church Street, Stoddard Street, State Street, and Perkins Avenue, Prospect Street, Barrett Street, King Street, Damon Road and the Northampton Bikeway
- Elm Street Brook including the low areas on Elm Street, Riverside Drive, Nutting Avenue, Ormond Street, Milton Street and Federal Street.
- Austin Circle and Ryan Road School.
- Reservoir Road. The road was closed during Hurricane Irene.
- The area along the historic Day Avenue Brook including low areas on Orchard Street, Elizabeth Street, Grant Avenue, Lincoln Avenue, Day Avenue, Sherman Avenue, Coolidge Avenue, Hubbard Avenue and Marshall Street
- Williams Street Brook.

Flooding can also cause damage to bridges, especially the lowest bridges in the City which are located in Florence at Pine Street and Meadow Street. Many water lines in the City are located on bridges and damage to these could disrupt the water supply.

## Vulnerability Assessment

### *Built Environment Impact*

Buildings, infrastructure, and other elements of the built environment are vulnerable to inland flooding. Buildings within the floodplain are highly vulnerable to inland flooding and are likely to become increasingly vulnerable as riverine flooding increases due to climate change (resilient MA, 2018).

There are approximately 4,150 acres of land within the FEMA mapped 100-year floodplain and 82 acres of land within the 500-year floodplain within the City of Northampton. According to the Assessor's data, there are approximately 417 residential structures located within the 100-year flood plain in Northampton. Some of these structures are likely outbuildings such as barns, garages, or sheds. According to FEMA reporting from June 2025, there are only 94 structures holding flood insurance through the National Flood Insurance Program. This may indicate that some structures within the 100-year floodplain, one of the highest flood risk areas in the city, may not have insurance against flood damage.

Utilizing the city's median home value of \$398,000 (American Community Survey, 2019-2023), and assuming 20 percent of damage to potentially 50 percent of homes in the floodplains, up to \$4,006,746 worth of damage could occur from a 100-year flood. This is a rough estimate of damage and likely a worst-case scenario. Computing more detailed damage assessments based on assessor's records is a labor-intensive task and beyond the scope of this project.

Areas where localized flooding has been a problem in the past will also be vulnerable to increased flooding from climate change, though their risk is presumed to be moderate.

The intersections of Church Street, Stoddard Street, State Street, and Perkins Avenue to Route 5 & 10 are susceptible to localized flooding. This neighborhood is medium density residential.

Approximately 18 structures could be affected by a flood incident. At a rate of 20 percent damage to 50 percent of the structures, the estimated cost of repairing these properties would be \$716,400.

The area surrounding Elm Street, Riverside Drive, Nutting Avenue, Ormond Street, and Federal Street is susceptible to localized flooding. Approximately 68 structures could be affected by a flood incident. At 20 percent damage to 50 percent of the structures, the estimated cost of repairing these structures would be \$2,706,400.

The City of Northampton's levee protection system, designed after the 1936 Hurricane, is designed to prevent flooding from up to a 500-year flood. The damage estimates above are based on one of two scenarios: 1) the levee system is structurally compromised or 2) flooding occurs that exceeds the design height of the levee system. Furthermore, flood control pump stations that are located at the WWTP are fairly old and showing signs of wear. These pump stations are essential to the City's standing flood mitigation capabilities and if they failed, they could create severe damage to both the treatment plant and the surrounding low-lying neighborhood.

On September 29, 2023, FEMA accepted the levee certification and determined that it met the requirements of the National Flood Insurance Program (NFIP) regulations and will show the Mill River Levee System and the Connecticut River Levee System as reducing the hazard from the base (1%-annual-chance) flood on the forthcoming FIRMs for the City of Northampton, Massachusetts. A rehabilitation of the flood control pump station is currently under design and will proceed to construction when funding is available.

The impacts of climate change will increase the vulnerability of the people who currently live in the 100-year flood plain, as well as those who live in the 500-year flood plain. More damage will occur in areas too small to have FEMA floodplain designation and not already zoned floodplain, such as Roberts Meadows Brook. Many of these areas already flood consistently, and so climate change will be potentially very damaging to these areas.

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

Flooding can cause direct damage to critical facilities and result in roadblocks and inaccessible streets that impact the ability of public safety and emergency vehicles to respond to calls for service. Gas stations located within the 100-year floodplain and the 500-year floodplain should take precautions to ensure a flood event would not result in facility damage or environmental contamination from a gas spill.

Most flood events that occur in Northampton are not accompanied by a FEMA Emergency or Disaster declaration and, as a result, all costs associated with the events are borne by local City budgets. In FY25, \$102,681 was spent from Northampton's Stormwater & Flood Control Enterprise Fund for flood control operations. Any City response to the events listed in the Previous Occurrences section above would have likely included payroll overtime for personnel, and operational costs for electricity, natural gas, fuel, and repair and maintenance costs for equipment, buildings, grounds, communication and supplies, and safety supplies. If the frequency of flooding increases in future years, so will the financial burden on taxpayers to support city response.

### *Population Impacts*

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

zone. Floodwater can also carry a wide range of infectious organisms from raw sewage and/or chemicals and hazardous materials swept away from containment areas.

The most vulnerable populations exposed to the flood hazard include people with low socioeconomic status, people over the age of 65, young children, people with disabilities or medical needs, and those with low English language fluency. Populations that live or work in proximity to facilities that use or store toxic substances are at greater risk of exposure to these substances during a flood event.

Increased flooding due to climate change will have disproportionate impacts to several special populations in Northampton. The socioeconomic status of residents in the floodplains is lower than the city as a whole, meaning that flooding will have more of an impact on lower income residents. Several facilities that serve special populations are located near the City's levee system, and would be within the floodplain should the levee system be compromised. These facilities include the Salvo House, ServiceNet, the Hampshire Dialysis Center, and the Northampton Senior Center. Flooding in this area will affect both low-income and market rate housing development. Other locations that provide critical social services or that support vulnerable populations are exposed to flooding, including the Meals on Wheels kitchen, the bike path where it crosses under the train tracks, and homeless tent encampments.

#### *Natural Resource Impact*

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

One common environmental effect of flooding is riverbank and soil erosion. Riverbank erosion occurs when high, fast water flows scour the edges of the river, transporting sediment downstream and reshaping the ecosystem. This process can clog riverbeds and streams, disrupting the water supply to downstream habitats. In Northampton, the FEMA SFHA overlaps with BioMap Critical Natural Landscapes and Core Habitat along the banks of the Mill and CT Rivers, as well as along Marble Brook, Bassett Brook, Parson's Brook and Broad Brook. These areas are particularly vulnerable to the impacts of bank destabilization and erosion from flooding.

#### *Changes in Land Use/Development*

The City's existing Special Conservancy zoning limits new development within areas up to the 500 year floodplain, but other uses, including farms, recreational areas including Maines Field, the boat docks at the Damon Road community boathouse, and community gardens in Florence, may occur in flood-prone areas. In 2023, the community gardens were flooded by high water from the Mill River.

#### *Hazard Risk Index Rating*

Based on the above analysis, Northampton has a hazard index rating of "2 – high risk" for flooding.

# Dam Failure/Levee Breach

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## Hazard Description

Dams and levees 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 or levee failure is not a common occurrence, but dams do represent a potentially disastrous hazard. When a dam or levee fails, the potential energy of the stored water behind the dam is released rapidly. Most dam or levee failures occur when floodwaters above overtop and erode the material components of the dam. Water running between a levee and original grade, and eroding dam materials, is also a potential risk. Often dam or levee breaches lead to catastrophic consequences as the water rushes in a torrent downstream flooding, an area engineers refer to as an “inundation area.” The number of casualties and the amount of property damage will depend upon the timing of the warning provided to downstream residents, the number of people living or working in the inundation area, and the number of structures in the inundation area.

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

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

The City of Northampton’s levees are part of the City’s Flood Control System constructed by the Army Corps of Engineers (USACE) between March 1939 and June 1941. The system is designed to protect a large portion of the City against flooding from the Connecticut River and the Mill River. The City of Northampton is responsible for maintenance and operation of the Northampton Flood Control System and for maintaining compliance with standards set forth by the USACE. The USACE conducts annual inspections of the Northampton Flood Control System.

## Location

There are 19 dams on public and private land in the city of Northampton, as well as one dam in West Whately and one dam in Williamsburg impacting the city’s drinking water supply. In addition, levee systems exist along the Mill River and Connecticut River. The names and hazard levels of the individual structures are shown below in Table 13.

Table 13: Dams and Levees in Northampton or Affecting Northampton

Dam Name	ID	Owner/Operator	Hazard Risk	Condition	Dam Purpose	Regulatory Authority	Most Recent Inspection	Date of most recent EAP
Paradise Pond Dam	MA00754	Private- Trustees of Smith College	High Hazard	Satisfactory	Recreation, Education	Office of Dam Safety (ODS)	09/19/24	11/01/2018
Roberts Meadow Lower Res. Dam	MA00753	City of Northampton	High Hazard	Fair	Recreation	ODS	07/18/24	09/01/24
Roberts Meadow Middle Res. Dam	MA00761	City of Northampton	High Hazard	Fair	Water Supply	ODS	07/18/24	09/01/24
Ryan Reservoir Dam (West Whately)	MA00520	City of Northampton	High Hazard	Fair	Water Supply	ODS	NA	NA
Mountain St. Res. Dam (Williamsburg)	MA00082	City of Northampton	High Hazard	Fair	Water Supply	ODS	07/27/22	12/01/23
Button Shop Dam #1	MA01254	Private -Richard and Eugene Tacy	Significant Hazard	Poor	Recreation	ODS	04/06/21	NA
Button Shop Dam #2	MA01255	Private – Richard and Eugene Tacy	Significant Hazard	Poor	Recreation	ODS	04/06/21	NA
Chartpak Dam	MA00758	Private – MA Realty Corp	Significant Hazard	Satisfactory	Unknown	ODS	11/26/18	12/17/19
Clear Falls Pool Dam	MA01648	Private	N/A	N/A	Recreation	Non-Jurisdictional	08/25/2006	
Cooks Dam	MA00756	City of Northampton	Significant Hazard	Fair	Recreation	ODS	05/18/22	09/23/24
Mill River - South St.	MA01010	City of Northampton	Significant Hazard	Satisfactory	Flood Control	ODS	07/28/2020	09/01/24
Vistron Dam	MA00759	Private- Nonotuck Mill, LLC	Significant Hazard	Fair	None	ODS	08/17/22	04/01/24
Fitzgerald Lake Dam	MA00496	City of Northampton	Low Hazard	Satisfactory	Recreation	ODS	04/26/23	
Rocky Hill Pond Dam	MA00495	Private- TCB Hospital Hill	Low Hazard	Poor	Flood Control	ODS	04/04/23	

Dam Name	ID	Owner/Operator	Hazard Risk	Condition	Dam Purpose	Regulatory Authority	Most Recent Inspection	Date of most recent EAP
Florence Ice Pond Dam	MA01649	Private – Joseph Misterka Inc.	N/A	N/A	N/A	Non-Jurisdictional	N/A	N/A
Howards Ice Pond Dam	MA02329	City of Northampton	N/A	N/A	N/A	Non-Jurisdictional	N/A	N/A
Look Park Pond Dam	MA01650	City of Northampton	N/A	N/A	N/A	Non-Jurisdictional	N/A	N/A
Meadowbrook Dam	MA01651	Private	N/A	N/A	N/A	Non-Jurisdictional	N/A	N/A
Mill River Dam-possibly breached	MA00755	Private	N/A	N/A	N/A	Non-Jurisdictional	N/A	N/A
Vaznis Farm Pond Dam	MA01647	Private	N/A	N/A	N/A	Non-Jurisdictional	N/A	N/A
Connecticut River levee system		USACE and City of Northampton						
Mill River levee system		City of Northampton						

Figure 6: Connecticut and Mill River Levee Systems



The failure of a high hazard dam or flood control levee could affect a “medium” amount of the land area in Northampton, or between 10 and 50 percent of the total land area.

The Connecticut River Flood Control System consists of approximately 4,800 linear feet of levee that extends from Pomeroy Terrace to the high ground west of Route 5 (Pleasant Street/Mount Tom Road). The levee has a maximum height of 23 feet. The Mill River Flood Control System consists of two levee sections. The Smith College Levee is located along the east bank of the Mill River between Paradise Pond Dam and West Street. The Diversion Levee extends from the Manhan Rail Trail to Hebert Avenue. Combined, these two sections of levee are approximately 2,000 feet in length with a maximum height of 25 feet.

While the state does not evaluate the hazard level of levees, the Hazard Mitigation Committee assessed both the Mill River levee system and Connecticut River levee system and determined the percent of City affected by their failure to be 5 percent and 15 percent respectively, meaning they would affect a "medium" amount of the total land area, but would flood some of the highest value areas in the city.

## **Extent**

Often dam breaches lead to catastrophic consequences as the water ultimately rushes in a torrent downstream, flooding the inundation area. The number of casualties and the amount of property damage will depend upon the timing of the warning provided to downstream residents, the number of people living or working in the inundation area, and the number of structures in the inundation area.

Dams in Massachusetts are assessed according to their risk to life and property. The state has three hazard classifications for dams:

### *High Hazard*

Dams located where failure or improper operation will likely cause loss of life and serious damage to homes, industrial or commercial facilities, important public utilities, main highways, or railroads.

### *Significant Hazard*

Dams located where failure or improper operation may cause loss of life and damage to homes, industrial or commercial facilities, secondary highways or railroads or cause interruption of use or service of relatively important facilities.

### *Low Hazard*

Dams located where failure or improper operation may cause minimal property damage to others. Loss of life is not expected.

## **Previous Occurrences**

There have been no catastrophic dam or levee failures in Northampton in over a century. The scars of an 1874 failure of a dam upriver of Northampton which largely destroyed the Northampton village of Leeds, however, remains a powerful reminder of the potential.

## Probability of Future Events

The committee determined that the frequency of dam failures is “low” with a 1 - 10 percent chance of a dam failing in any given year. As Northampton’s high hazard dams age, precipitation and impoundment volumes increase with climate change, and if maintenance is deferred, the likelihood of a dam failure will increase.

Mass DEP has evaluated the overall condition of 11 of the dams in Northampton. Of those evaluated, four were deemed “Satisfactory,” four were deemed “Fair,” and three were deemed “Poor.” Mountain Street Reservoir Dam in Williamsburg and the West Whately Reservoir Dam were also rated as “Fair.” An explanation for each of these ratings is provided below.

- **SATISFACTORY** - Minor operational and maintenance deficiencies. Infrequent hydrologic events would probably result in deficiencies.
- **FAIR** - Significant operational and maintenance deficiencies, no structural deficiencies. Potential deficiencies exist under unusual loading conditions that may realistically occur. Can be used when uncertainties exist as to critical parameters.
- **POOR** - Significant structural, operational, and maintenance deficiencies are clearly recognized under normal loading conditions.

Northampton’s levee systems along the Mill River and Connecticut River were very well constructed in 1940 and are regularly maintained, though a sufficiently large flood could cause structural damage to the levee and cause it to partially breach. Given current conditions, the primary risk is where the levees meet the original grade that water, with enough hydrostatic pressure, could slip below the levees. In 2023 FEMA accepted the levee certification and determined that it met the requirements of the National Flood Insurance Program (NFIP) regulations and will show the Mill River Levee System and Connecticut River Levee System as reducing the hazard from the base (1%-annual chance) flood on the forthcoming FIRMs for Northampton.

## Vulnerability Assessment

### *Built Environment Impact*

The city faces a “critical” impact from failure of dams or levees with a high hazard level, with 25 percent of Northampton affected. While the state does not evaluate the hazard level of levees, the Hazard Mitigation Committee assessed both the Mill River levee system and Connecticut River levee system and determined the percent of city affected by their failure to be 5 percent and 25 percent respectively.

Complete failure of a high significant hazard dam or levee in Northampton could potentially impact up to 25 percent of structures in the City. Assuming 20 percent damage to 20 percent of structures in the City, dam or levee failure could result in property losses of approximately \$173,007,475. Other dams are not expected to have a risk to property and people. Costs are based on the total value of all structures in Northampton of \$4,325,186,873.

Flooding from dam failure or levee breach can also cause direct damage to critical facilities and result in roadblocks and inaccessible streets that impact the ability of public safety and emergency vehicles to respond to calls for service. There are a number of critical facilities in the levee-protected zone. For instance, the wastewater treatment facility is in the levee-protected zone – if any part of the flood control system, such as the levee of pump stations, were to fail, this would be one of the first facilities to flood. This and other critical facilities in the levee-protected area should take precautions to ensure a flood event would not result in facility damage or environmental contamination.

A catastrophic failure of Northampton’s flood control system would impact many of the downtown businesses. FEMA research has shown that nearly 1 in 4, or 25% of businesses do not return after a major catastrophic event. This would have a major impact on City tax income and operating budget. A significant loss of homes due to the same levee failure or a dam failure could also have major tax implications that could strain City cash flow for years after the event.

### *Population Impacts*

The most vulnerable populations exposed to the Dam Failure / Levee Breach hazard include people in frontline communities, those with low socioeconomic status, over the age of 65, young children, people with medical needs, and those with low English language fluency. Populations that live or work in proximity to facilities that use or store toxic substances within the affected area of a dam failure or levee breach are at greater risk of exposure to these substances. Populations identified by the 2020 Census as minority, low income, and English isolated that are living in an area protected by a levee are particularly vulnerable.

Advance weather forecasting, blockades, and emergency alerts and warnings help to minimize the total number of injuries and casualties that typically result from dam failure or levee breach. While dam failure can lead to flash flood conditions that are harder to mitigate with early warning messages, even a relatively low-level flood can be hazardous and can result in direct mortality to individuals interacting with the flood zone.

### *Natural Resource Impact*

Dam failures and levee breaches result in severe and flash flood conditions leading to substantial damage to the environment and natural resources, particularly in areas where human development has interfered with natural flood-related processes. The Francis P. Ryan Reservoir Dam and the adjacent West Whately Reservoir Dam retain one of the City’s primary sources of drinking water and are rated in “Fair” condition according to the Office of Dam Safety (ODS) regulations. Improvements to the spillways and embankments are required to address current deficiencies and to provide sufficient capacity to pass the one half the Probable Maximum Flood (1/2 PMF) without overtopping the dams. These improvements are currently in progress.

### *Land Use/Development Impact*

There has been a limited amount of new residential development within the inundation zones of the high and significant hazard dams, as well as the levees, in Northampton. These new homes will not have a significant impact on the City’s vulnerability to dam failure. However, it is important for any

new residents in these areas to be added to emergency contact lists in the event of a dam or levee failure.

*Hazard Risk Index Rating*

Based on this analysis, Northampton has a hazard index rating of “3 – moderate risk” from dam failure or levee breach.

# Drought

## Hazard Description

Drought is a normal, recurrent feature of climate. It occurs almost everywhere, although its features vary from region to region. In the most general sense, drought originates from a deficiency of precipitation over an extended period of time, resulting in a water shortage for some activity, group, or environmental sector. Reduced crop, rangeland, and forest productivity; increased fire hazard; reduced water levels; increased livestock and wildlife mortality rates; and damage to wildlife and fish habitat are a few examples of the direct impacts of drought. Of course, these impacts can have far-reaching effects throughout the region and even the country.

## Location

Because of this hazard’s regional nature, a drought would impact the entire city, meaning the location of occurrence is “large” or over 50 percent of the city affected. How a drought is experienced can depend on geographic factors such as land use change, the existence of dams, and water supply withdrawals or diversions. For example, impervious surfaces associated with development can exacerbate the effects of drought due to decreased groundwater recharge.

## Extent

The severity of a drought would determine the scale of the event and would vary among city residents depending on whether the residents’ water supply is derived from a private well or the public water system.

The U.S. Drought Monitor also records information on historical drought occurrence. The U.S. Drought Monitor categorizes drought on a D0-D4 scale as shown below in Table 14.

Table 14: U.S. Drought Monitor Classifications

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

Source: U.S. Drought Monitor, <http://droughtmonitor.unl.edu/classify.htm>

## Previous Occurrences

Northampton had limited experience with severe drought conditions in the past, although this is changing as drought conditions related to climate change become more frequent. Massachusetts has suffered significant droughts several times in the last century, with four major droughts within the last 10 years that have impacted Northampton (2016-2017, 2020, 2022, and 2024). Other major droughts occurred in 1929-1932, 1939-1944, 1961-1969, and 1980-1983. While these droughts affected Northampton as well, they were more impactful in other areas of the state and in communities with less reliable water supplies.

Table 15 below indicates previous occurrences of drought in Hampden County since 2000, based on the U.S. Drought Monitor:

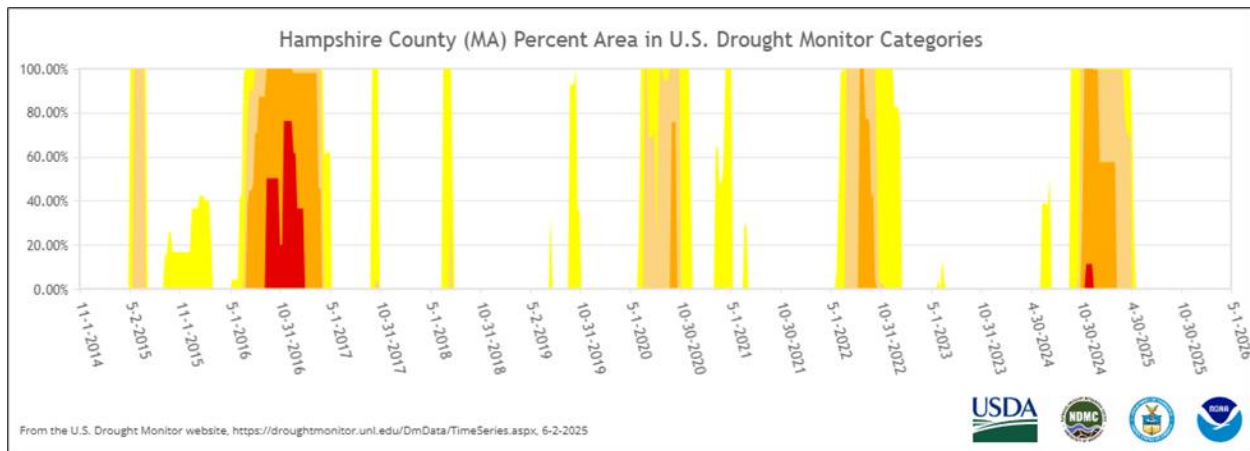
*Table 15: Annual Drought Status in Hampshire County, 2003–2024*

Year	Maximum Severity	Percent of County Affected
2003	None	
2004	D0	57.36%
2005	D1	1.79%; D0 conditions in 100%
2006	D0	100%
2007	D1	73.05%; D0 conditions in 100%
2008	D0	0.55%
2009	D0	73.49%
2010	D1	46.15%; D0 conditions in 100%
2011	None	
2012	D2	100%
2013	D1	99.87%
2014	D1	100%
2015	D1	100%
2016	D3	76.31%; D2 conditions in 100%
2017	D3	61.64%; D2 conditions in 98.04%
2018	D1	35.46%; D0 conditions in 100%
2019	D0	93.15%
2020	D2	75.73%; D1 conditions in 100%
2021	D0	100%
2022	D2	100%
2023	D0	82.46%
2024	D3	11.35%; D2 conditions in 100%

Source: U.S. Drought Monitor

Figure 7 below shows the incidences of drought in Hampshire County in a time series model from 2014–2024. As can be seen on this graph, the drought in 2016–2017 was the most extreme and significant for the county. The droughts in 2020, 2022 and 2024 were significant as well, falling into the severe category in 2020 and 2022, and a short period of extreme drought in 2024. The drought in the fall of 2024 led to the occurrence of a large number of brushfires in western Massachusetts, including one in Northampton.

Figure 7: Incidences of drought in Hampshire County from 2014–2025



During the 2016–2017 drought, the lack of adequate rainfall coupled with warm summer temperatures over a span of months prompted authorities to implement water-use restrictions for residents and businesses alike. The City’s Water Department actively managed the two water supply reservoirs and activated their two groundwater wells to supplement supply from the reservoirs. Restrictions were placed on the allowable time and location for outdoor watering, including the use of hoses and sprinklers. The partial water ban was in accordance with the state's Water Management Act and Northampton’s Public Water Supply Water Management Act permit with MassDEP. Similar bans were enacted and enforced during the droughts in 2020, 2022 and 2024.

### Probability of Future Events

Based on previous occurrences of drought, as well as the likelihood of future droughts due to changes in temperature and precipitation related to climate change, the HMP Committee suggested that the probability of drought occurring in Northampton is “high,” (40 - 70% in a given year).

The frequency and intensity of droughts are projected to increase during summer and fall as higher temperatures lead to greater evaporation and earlier winter and spring snowmelt, and precipitation patterns become more variable and extreme. Also due to climate change, the proportion of precipitation falling as rain instead of snow in our region and the length of time snowpack remains

are both expected to decrease. This reduces the period during which snow melt can recharge groundwater supplies, bolster streamflow, and provide water for the growing period.

According to Resilientma.org, there could be up to 2 more consecutive dry days per year by the middle of the century in the lower Connecticut River watershed. However, many factors, such as water supply sources, population, economic factors, and infrastructure, may affect the severity and length of a drought event.

Average temperatures in the Pioneer Valley have been increasing over time due to climate change, and this trend is likely to continue in the future. Higher temperatures due to climate change will likely have an effect on future drought risk in Northampton. A slight decrease in summer precipitation will also support more frequent droughts, especially short-term (1 to 3 months).

However, the city's local aquifer supply would help to reduce the effects of widespread drought on the local water supply. The impact of a drought is thus "minor," with very few damages to people or property likely to occur.

### *Secondary Hazards*

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

## **Vulnerability Assessment**

### *Built Environment Impact*

The impact of droughts is categorized by the U.S. Drought Monitor include:

- Slowing or loss of crops and pastures
- Water shortages or restrictions
- Minor to significant damage to crops, pastures;
- Low water levels in streams, reservoirs, or wells

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

Due to the water richness of Western Massachusetts, Northampton is not likely to be impacted by anything other than a major, extended drought. The committee thus considered the impact of a drought to be "minor," with a minimal amount of damage to people or property likely to occur. While a major, extended drought would require water saving measures to be implemented to ensure that the city has a sufficient water supply, there would be no significant damage to structures or loss of life resulting from the hazards.

### *Population Impacts*

The entire population of Northampton would be vulnerable to the impacts of a drought. Residents with a private water supply such as a well, homeless residents, and populations with respiratory health conditions are most vulnerable. The City implements water use restrictions during droughts, however these mainly impact the use of water for outdoor watering and cleaning.

Agricultural operations in Northampton have been affected by droughts. Drought is a more serious threat to upland farms, as the soil in the Meadows and other low areas hold moisture longer. The Agricultural Commission has heard from farmers who have experienced reduced crop yields and poor second and third haying operations.

### *Natural Resource Impact*

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

### *Economic Impact*

Economic impacts of drought can be significant in the agriculture, recreation, forestry, and energy sectors. Coca-Cola, a major employer and economic driver in Northampton, relies on local water sources for its productivity. A prolonged drought may lead to reduced production capability or temporary closure. Farmers in the Meadows area of Northampton work with particularly fertile and wet soil conditions, and therefore are not equipped with irrigation systems that would be required to maintain crop viability in the case of a severe drought. Farms that use river water for irrigation have had to contend with higher expenses during droughts to the cost of pumping the water.

Impacts on the individual level include the need to buy water from an alternative source during a drought emergency. Crop failure can also increase food prices, straining a portion of the economy.

### *Hazard Risk Index Rating*

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

# Extreme Temperatures

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## Hazard Description

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

More broadly, extreme temperatures can be defined as those that are far outside the normal ranges. The average highs and lows of the hottest and coolest months in the nearby town of Amherst, the closest site for which data was available, are provided in Table 16 below.

Table 16: Monthly Temperature Averages

	July (Hottest Month)	January (Coldest Month)
Average High (°F)	83.9	34.8
Average Low (°F)	61.5	15.1

Source: NOAA NWS, 2020. *Monthly Climate Normals (2006 – 2020) Amherst, MA*

The highest temperature recorded at the Amherst station for the period from 1893 to present was 104°F on July 4, 1911 (NOAA NOW Data, Boston / Norton Weather Forecast Office, <https://w2.weather.gov/climate/xmacis.php?wfo=box>).

Projected temperature extremes will shift with climate change, according to research conducted by the Massachusetts Executive office for Energy and Environmental Affairs and the University of Massachusetts, Amherst. By 2050, summer maximum temperatures (including the presumed hottest month of July) are expected to reach as high as 87.7°F in the Connecticut River Basin, as opposed to a 1971-2000 baseline of 80.2°F (resilientma.org).

### Extreme Cold

Extreme cold does not have a threshold temperature, but rather is defined as prolonged periods of excessively cold weather. This may vary by region based on average temperatures in the region. Extreme cold events are when temperatures drop well below normal in an area. Generally, extreme cold temperatures are characterized by the ambient air temperature dropping to or below 0 degrees Fahrenheit (°F) (National Weather Service [NWS] 2015). When winter temperatures drop significantly below normal, staying warm and safe can become a challenge. Extremely cold temperatures may accompany or follow a winter storm, which may also cause power failures and icy roads. Many homes will be too cold, either due to a power failure or because the heating system is not adequate for the weather. Extensive exposure to extreme cold temperatures can cause frostbite or hypothermia and can become life-threatening. The homeless, the elderly, and people with disabilities are often most vulnerable. Furthermore, power outages during cold weather may result in

inappropriate use of combustion heaters, cooking appliances, and generators in poorly ventilated areas, which can lead to increased risk of carbon monoxide poisoning. During extreme cold, pipes may freeze and burst in many buildings with unreinforced masonry.

### *Extreme Heat*

Extreme heat is defined by the Center for Disease Control (CDC) as temperatures which hover 10 degrees or more above the average high temperature for a region and that last for several weeks (CDC 2016). Heat waves cause more fatalities in the U.S. than the total of all other meteorological events combined. According to EPA data, between 1979 and 2022, more than 14,000 Americans died directly from heat-related causes (EPA, 2025). In Massachusetts, a heat wave is defined as 3 or more days of temperatures of 90°F or above and is often accompanied by high humidity. The designation implies an extended period of unusually high atmosphere-related heat stress, which forces affected populations to make temporary modifications in lifestyle to avoid adverse health consequences (MA HMCAP, 2018). Projected heat days and heat waves can have an increased impact in areas with a greater amount of impervious surface, such as buildings, roads, parking lots, and driveways. These can become “heat islands” as dark asphalt and roofs store the heat from the sun. Impacts from heat stress can exacerbate pre-existing respiratory and cardiovascular conditions.

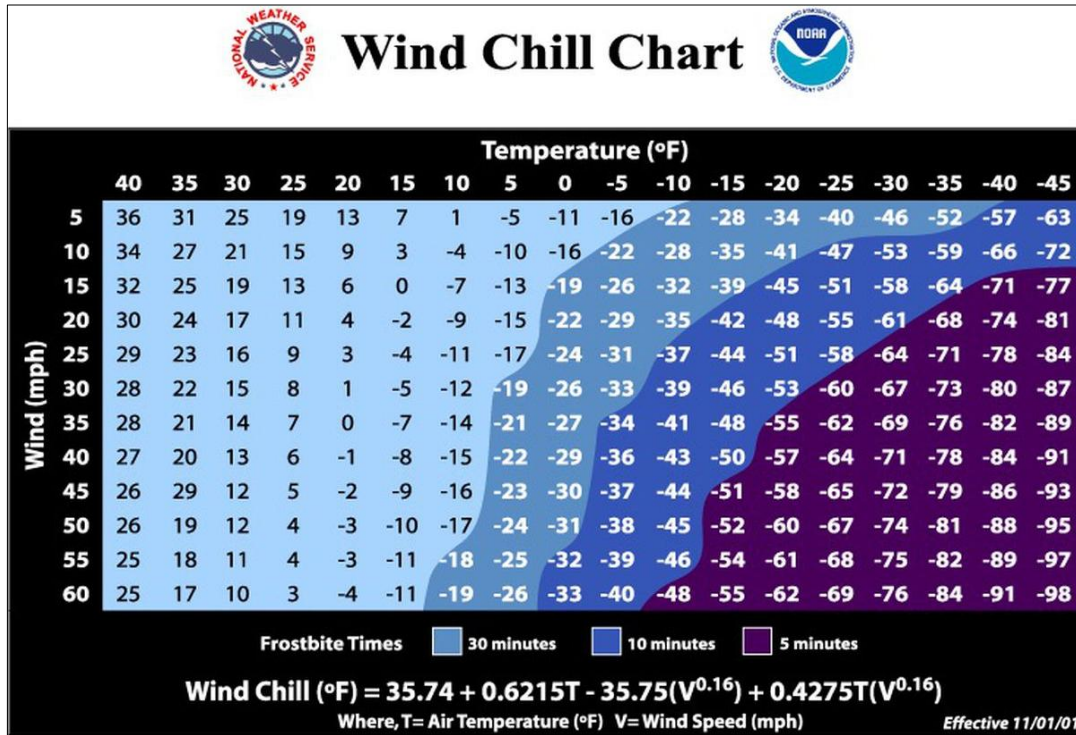
### **Location**

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

### **Extent**

The extent (severity or magnitude) of extreme cold temperatures are generally measured through the Wind Chill Temperature (WCT) Index. Wind Chill Temperature is the temperature that people and animals feel when outside and it is based on the rate of heat loss from exposed skin by the effects of wind and cold. The chart shows three shaded areas of frostbite danger. Each shaded area shows how long a person can be exposed before frostbite develops. In Massachusetts, a wind chill warning is issued by the NWS Taunton Forecast Office when the Wind Chill Temperature Index, based on sustained wind, is -25°F or lower for at least three hours. The WCT is presented in Figure 8.

Figure 8. NWS Wind Chill Index



Source: NWS 2024

The NWS Heat Index is used to measure extremely hot temperatures, combining relative humidity with actual air temperature to determine the risk to humans. The NWS issues a Heat Advisory when the Heat Index is forecast to reach 100-104°F for 2 or more hours, and an Excessive Heat Warning if the Heat Index is forecast to reach 105°F or higher for 2 or more hours. The chart in Figure 9 indicates the relationship between heat index and relative humidity and illustrates the adverse effects that prolonged exposure to heat and humidity can have on an individual.

Figure 9. NWS Heat Index Chart

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

Source: National Weather Service (NWS), Heat Index, 2024

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

### Previous Occurrences

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

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

The lowest temperature recorded at the Barnes Municipal Airport in Westfield for the period from 1893 to present was -30°F on January 22, 1961 (NOAA NOW Data, Boston / Norton Weather Forecast Office, <https://w2.weather.gov/climate/xmacis.php?wfo=box>). According to NOAA’s National Centers for Environmental Information Storm Events Database, between 1/2000 and 12/2024, Massachusetts

experienced 37 extreme cold and wind chill events. None of these events were reported for Hampshire County, however.<sup>1</sup>

NOAA's National Centers for Environmental Information Storm Events Database provides data on excessive heat. Between 2000 and 2024, Massachusetts experienced 16 heat or excessive heat days, however none of these were reported for Hampshire County.<sup>2</sup> Extreme temperatures are classified as medium frequency events. According to the 2018 Massachusetts State Hazard Mitigation and Climate Adaptation Plan, between four and five heat waves (3 or more consecutive days of 90° +F temperatures) occur annually in Massachusetts. In 2024, the city opened cooling shelters twice and a warming center once.

## Probability of Future Events

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

The NE CASC data support the trends of an increased frequency of extreme hot weather events and a decreased frequency of extreme cold weather events. Figure 10 and Figure 11 below show the projected changes in these variables between 2020 and the end of this century.

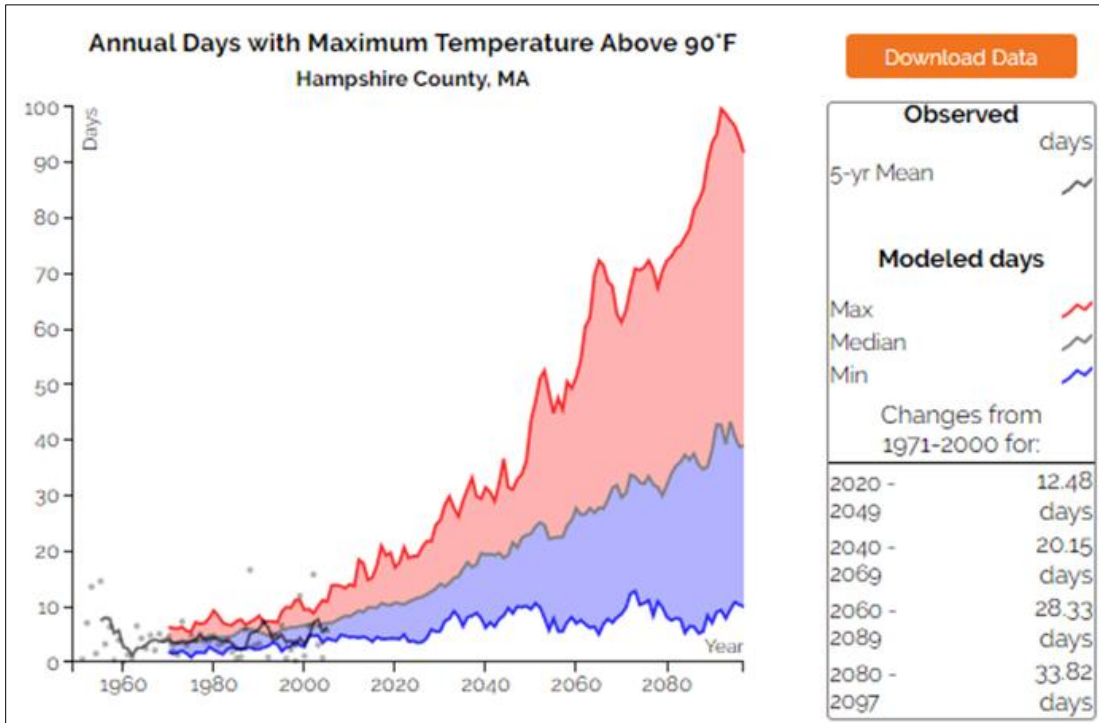
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[https://www.ncdc.noaa.gov/stormevents/listevents.jsp?eventType=%28Z%29+Cold%2FWind+Chill&beginDate\\_mm=01&beginDate\\_dd=01&beginDate\\_yyyy=2000&endDate\\_mm=12&endDate\\_dd=31&endDate\\_yyyy=2024&county=ALL&hailfilter=0.00&tornfilter=0&windfilter=000&sort=DT&submitbutton=Search&statefips=25%2CMASSACHUSETTS](https://www.ncdc.noaa.gov/stormevents/listevents.jsp?eventType=%28Z%29+Cold%2FWind+Chill&beginDate_mm=01&beginDate_dd=01&beginDate_yyyy=2000&endDate_mm=12&endDate_dd=31&endDate_yyyy=2024&county=ALL&hailfilter=0.00&tornfilter=0&windfilter=000&sort=DT&submitbutton=Search&statefips=25%2CMASSACHUSETTS)

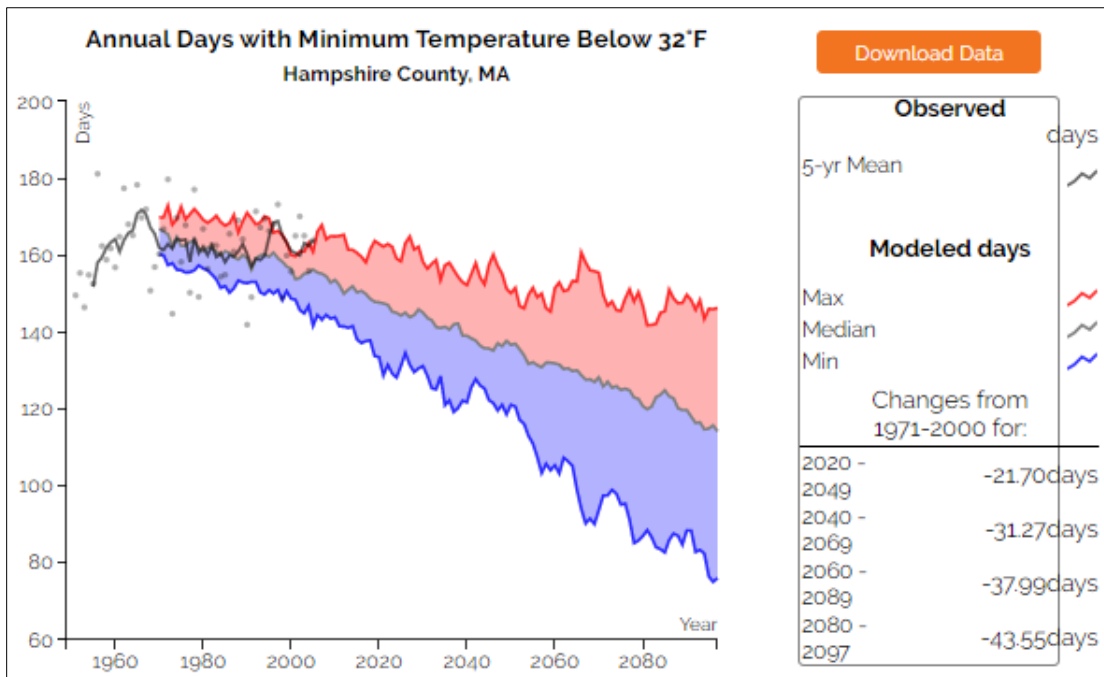
<sup>2</sup>[https://www.ncdc.noaa.gov/stormevents/listevents.jsp?eventType=%28Z%29+Excessive+Heat&beginDate\\_mm=11&beginDate\\_dd=01&beginDate\\_yyyy=1999&endDate\\_mm=11&endDate\\_dd=30&endDate\\_yyyy=2021&](https://www.ncdc.noaa.gov/stormevents/listevents.jsp?eventType=%28Z%29+Excessive+Heat&beginDate_mm=11&beginDate_dd=01&beginDate_yyyy=1999&endDate_mm=11&endDate_dd=30&endDate_yyyy=2021&)

Figure 10. Projected Annual Days with Temperature Above 90°F



Source: Resilient MA, 2019

Figure 11. Projected Annual Days with Temperature below 32°F



Source: Resilient MA, 2019

### *Secondary Hazard*

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

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

### **Vulnerability Assessment**

According to recent downscaled climate projections for Massachusetts, high, low, and average temperatures in Hampshire County are likely to increase significantly over the next century as a result of climate change (resilient MA, 2019), as are the occurrences of days over 90°F, 95°F, and 100°F. This pattern change will put long-term stress on a variety of social and natural systems, and will exacerbate the influence of discrete events. Multiple instance of heat stress could occur during any given extreme heat event, and therefore, the City faces a “Limited/Moderate” impact from extreme temperatures.

Extreme temperature can have a significant impact to human health, commercial/agricultural business. In the event of an extreme cold or heat event, multiple health impacts and minor injuries would be possible.

### *Built Environment Impact*

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

### *Population Impacts*

Extensive exposure to extreme cold temperatures can cause frostbite or hypothermia and can become life-threatening. Extreme cold and extreme heat are dangerous situations that can result in health emergencies for individuals without shelter or some other way to stay cool, or who live in homes that

are poorly insulated, or without adequate heat or air conditioning. Power outages may also result in inappropriate use of combustion heaters and other appliances, as discussed under Secondary Impacts above. The largest concern in Northampton during heat waves is older adults (over 65) who are also more likely to have pre-existing health conditions. There are also individuals with medical conditions who are vulnerable to extreme heat, and even young adults and healthy individuals can succumb to heat if they participate in strenuous physical activities during hot weather. Other vulnerable individuals include the homeless, and renters and households with lower incomes, who are less likely to have air conditioning or may not use it due to the cost.

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

As shown in Figure 9, the NWS Heat Index chart describes the impacts of extreme high temperatures when coupled with higher humidity levels (which are characteristic of the Pioneer Valley region) as follows:

- Extreme Danger: Heat stroke likely.
- Danger: Sunstroke, muscle cramps, and/or heat exhaustion likely. Heatstroke possible with prolonged exposure and/or physical activity.
- Caution: Fatigue possible with prolonged exposure and/or physical activity.
- Since heat index values were devised for shady, light wind conditions, exposure to full sunshine can increase heat index values by up to 15°F.

According to the 2018 SHMCAP, the interaction of heat and cardiovascular disease had caused approximately 25 percent of the heat related deaths since 1999. Other vulnerability indicators relative to extreme heat are presented below in Table 17.

*Table 17: General Vulnerability Indicators*

Location	Estimated Increase in Average Temperature by 2100 (°F)	Percentage Population Aged 65 or Older	Percentage Population Aged Younger than 5 Years	Percentage Population Living Below the Poverty Level
Hampshire County	+5.23 to +9.63°	19.7%	3.4%	10.1%
Northampton	N/A	20.5%	2.8%	12.5%

*Source: U.S. Census Bureau Quick Facts, Hampshire County and Northampton MA. 2019 - 2023.*

### *Natural Resource Impact*

Individual extreme temperature events usually have a limited long-term impact on natural systems, although unusual frost events occurring after plants begin to bloom in the spring can cause significant

damage. However, changing average temperatures and the changing frequency of extreme climate events will likely have a major impact on natural resources throughout the Commonwealth and worldwide (2018 SHMCAP).

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

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

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

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

### *Economic Impact*

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

The agricultural industry is most directly at risk in terms of economic impact and damage due to extreme temperature and drought events. Extreme heat can result in drought and dry conditions, which directly impact livestock and crop production (2018 SHMCAP) and also have adverse impacts on outdoor entertainment and dining, an important part of Northampton's downtown economy.

### *Land Use/Development Impacts*

Residential and commercial development in Northampton will not have a significant impact on the City's vulnerability to extreme heat or cold events. New development is required to install electric

heat pumps (air source or ground source) for both heating and cooling, ensuring that any new residential structures will have cooling. These building will not be at any greater risk of power outages and heat loss in the winter than buildings heated by fossil fuel sources.

#### *Hazard Risk Index Rating*

Based on the above assessment, Northampton has a hazard index rating of “2 - high risk” from extreme temperatures.

# Wildfire/Brushfire

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## Hazard Description

Wildfires are typically larger fires, involving full-sized trees as well as meadows and scrublands. Brushfires are uncontrolled fires that occur in meadows and scrublands, but do not involve full-sized trees. Typical causes of brushfires and wildfires are lightning strikes, human carelessness, and arson.

FEMA has classifications for 3 different classes of wildfires:

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

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

## Location

While Northampton is a city with a dense, well-defined downtown, it still contains several thousand acres of largely undeveloped space. The rural-urban interface is most pronounced in those sections of city that are experiencing development, most notably Florence and Leeds. The total amount of city that could be affected by wildfire is categorized as “medium,” at between 10 to 50 percent of the total area.

## Extent

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

Approximately 1,150 acres of land in Northampton is forested according to MassGIS Land Cover/Land Use data, and is therefore at risk of fire. Forested areas in Northampton cover many of the city’s outlying areas, which can be remote and difficult for emergency crews to access. In drought conditions, a brushfire or wildfire would be a matter of concern. A large wildfire could damage much of the land mass, including vital watershed lands, in a short period of time.

The overall extent of wildfires is shown in Table 18 below:

Table 18: Wildfire Ratings

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

## Previous Occurrences

Northampton had not experienced a wildfire until 2024, with the Fitzgerald Lake fire. Due to drought and windy conditions, and fire that was assumed to be human-caused, 52 acres burned in the Broad Brook Greenway conservation area. Based on this and other major wildfires that have occurred in western Massachusetts, it is estimated that another wildfire would likely destroy around 50 to 500 acres of forested area.

Relatively few wildfires have been recorded in the past 100 years in the Pioneer Valley, and none has ever resulted in a FEMA disaster declaration. However, several have occurred during the past 20 years, as shown in the list below:

- 1995 – Russell, 500 acres burned on Mt. Tekoa
- 2000 – South Hadley, 310 acres burned over 14 days in the Litihia Springs Watershed
- 2001 – Ware, 400 acres burned
- 2010 – Russell, 320 acres burned on Mt. Tekoa
- 2012 – Eastern Hampden County, dry conditions and wind gusts created a brush fire in Brimfield, and burned 50 acres
- 2016 - Montgomery, 60 acres burned on Mt. Tekoa
- 2024 - Northampton, 55 acres burned in Fitzgerald Lake/Broad Brook conservation area
  - Monson- 44
  - Great Barrington – 1,670
  - Montgomery - 65

As a point of reference, the total number of any type of fire incidence in Northampton for the years 2019 - 2023 is provided below. The “Total # of Incidents” includes structural and vehicle fires, while incidents classified as “other” could include, but do not necessarily include, brush fires. The Northampton Fire Department responds to house fires and the few “wildfires” that occur.

*Table 19: Total Fire Incidents in Northampton*

Year	Total # of Incidents	Other Fires
2019	46	37
2020	46	23
2021	38	11
2022	56	18
2023	43	17

*Source: City of Northampton Fire Department*

### **Probability of Future Events**

In accordance with the SHMCAP, the Northampton Hazard Mitigation Committee found it is difficult to predict the likelihood of wildfires in a probabilistic manner because of the number of variables involved. Research has found that the frequency of lightning strikes – an occasional cause of wildfire – could increase by approximately 12 percent for every degree Celsius of warming (2018 SHMCAP). However, most fires in Massachusetts are human caused. The primary factor increasing the likelihood of wildfires occurring in Northampton is the increasing occurrence of droughts. The Committee determined the probability of future events to be “moderate” (10 percent to 40 percent probability in the next year).

Climate scenarios project summer temperature increases between 3.2°F and 7.3°F and fall precipitation decreases of up to 11 percent by 2050 in Northampton. 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.

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.

## **Vulnerability Assessment**

While a large wildfire could damage much of the landmass of Northampton, these areas are not populated by people, meaning that wildfire affected areas are not likely to cause damage to property. For this reason, the city faces a “minor” impact from wildfires, with very few damages likely to occur.

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

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

### *Built Environment Impact*

Using a total value of all structures in Northampton of \$4,325,186,873 and an estimated 50 percent of damage to 1 percent of all structures, the estimated amount of damage from a wildfire or large brushfire is \$21,625,934. The cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included in this estimate.

For the purposes of this planning effort, all elements of the built environment located near forested areas are considered exposed to the wildfire hazard.

Critical facilities are particularly important for routine city operation and emergency response in case of a severe wildfire. Energy distribution lines are subject to wildfire risk because most poles are made of wood and susceptible to burning. Transmission lines are also at risk to faulting during wildfires, which can result in a broad area outage.

### *Population Impacts*

Damage to homes and property are impacts from wildfires that could affect Northampton residents, particularly the relatively small percentage that live in the wildland-urban interface area. Human health and the lives of residents and responders are at risk from wildfire. The most vulnerable populations include emergency responders and those within a short distance of the interface between

the built environment and the wildland environment. Additionally, all Northampton residents could be impacted by smoke from wildfires that are local, regional, or from a distance. As Hampshire County residents have experienced since 2022, local air quality can be significantly impacted by wildfires from as far away as western Canada. Vulnerable populations in Northampton, such as the elderly, small children, outdoor laborers, and anyone with respiratory issues or compromised immune systems, are more likely to be impacted by smoke from wildfires.

#### *Natural Resource Impacts*

Fire can serve important ecological purposes as a natural part of many ecosystems. Functions include facilitating the nutrient cycling from dead and decaying matter, removing diseased plants and pests, and regenerating seeds or stimulating germination of certain plants. This is an important part of the cycle in the very limited Pine Barrens section of Northampton, which developed with a fire ecology. Conversely, wildfires can also have significant negative impacts on the environment. Specifically, the ash they generate can distort the flow of nutrients through an ecosystem, reducing the biodiversity that can be supported and adding to stream and waterbody sedimentation and eutrophication.

#### *Economic Impacts*

The initial loss of structures and the subsequent loss of revenue from destroyed businesses from a wildfire can have major economic impacts on a community. Individuals and families will face economic challenges if their home is impacted by wildfire. The exposure of homes to this hazard is widespread. The overall cost of fires in Northampton in 2024 was \$233,500 for property loss and \$127,680 for content loss (this loss was not all due to wildfires and brushfires).

#### *Hazard Risk Index Rating*

Based on the above assessment, Northampton has a hazard risk index of “3 – medium risk” from wildfires.

# Invasive Species

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## Hazard Description

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

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

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

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

Invasive plant species such as Asian honeysuckles, bittersweet, Japanese barberry, Japanese knotweed, autumn olive, burning bush, multiflora rose, garlic mustard, and glossy buckthorn, are considered by the Massachusetts Department of Agricultural Resources, New England Wildflower Society, U.S. Forest Service, and others as some of the worst invaders in the region.

Non-native insects and nematodes which currently threaten the region are the emerald ash borer (EAB), Asian Longhorned beetle (ALB), Red Pine Scale, Beech Leaf Disease, Hemlock Woolly Adelgid (HWA), and Spotted Lanternfly (SLF).

Emerald ash borer (EAB) is an exotic beetle that was discovered in southeastern Michigan in the summer of 2002. The larvae feed in the cambium between the bark and wood, producing S-shaped

galleries that girdle and kill branches and trees. As of 2025, EAB has been confirmed in most Massachusetts communities where Ash Trees exist, including Northampton.

The Asian longhorned beetle (*Anoplophora glabripennis*, or ALB) is a major threat to hardwood trees. The species has decimated tree stock in Worcester County, but has not yet spread to western Massachusetts.

Red Pine Scale (RPS) is an exotic invasive insect originating from Asia that only attacks Red Pine, one of North America's only native pine species of "Eurasian" descent. RPS is a piercing, sucking insect that overtakes trees in large numbers, with tens of thousands of the tiny insects feeding on the inner bark of the tree's crown. Red pine trees succumb quickly, and mortality can be hastened by compounding threats such as attacks by bark beetles or periods of drought. The insect spread into MA in the 1990s and has decimated areas of watershed land in Northampton.

Hemlock woolly adelgid, a small aphid-type insect, was introduced into Massachusetts in 1988 from an already existing infestation in Connecticut. The insect attacks both the Carolina and Eastern hemlock and is capable of severely weakening and killing its host plants. It is atypical of most insect species in the Northeast in that it is inactive for much of the growing season and very active throughout the winter. Hemlock woolly adelgid is currently present in the region, and has been positively identified on a number of conservation lands in Northampton.

Spotted lanternfly (*Lycorma delicatula* or "SLF") is an invasive insect first detected in Pennsylvania in 2014. It causes damage to trees and other woody plants by feeding on their sap. While the primary host plant of SLF is the invasive tree-of-heaven, researchers have found that it also targets grapevines, hops, and fruit trees, as well as maples, birches and other trees. It has the potential to impact a broad range of economically important crops which include grapes and wine, apples, peaches and maple syrup. SLF infestation was confirmed in Northampton in 2025.

Beech leaf disease was first identified in Ohio in 2012. According to DCR, The disease complex is associated with an invasive foliar nematode species, *Litylenchus crenatae*. The disease causes damage to a tree's leaves, leading to reduced vigor and can eventually lead to tree mortality. Infected trees of all ages and in both urban and forested settings have been observed in Massachusetts, in almost every community.

## **Location**

Invasive species can travel far distances (either via natural mechanisms or accidental human interference) and therefore can propagate rapidly over a large geographic area, often with no natural predators. Open freshwater ecosystems generally don't have physical barriers to prevent establishment (outside of physiological tolerances) so invasive species can quickly spread once introduced, and find myriad opportunities for transport to new locations (by boats, for example).

In general, invasive species are most threatening to native or minimally managed ecosystems in Northampton. This includes many of the rivers and streams throughout the City, conservation lands, as well as the City's water supply watershed land serving reservoirs in Williamsburg, Whately and

Conway. The total amount of City land that could be impacted by invasive species is categorized as “medium,” between 10 percent to 50 percent of the total area.

## Extent

Many invasive species have been identified in Northampton, with dozens present at several conservation properties with histories of past disturbance. Invasive insect species are also documented throughout the city, and those known to be present are also having the greatest impact on conservation areas and other forested tracts, carrying the potential to alter the region’s forests. Hemlock woolly adelgid has weakened large stands of hemlocks throughout Massachusetts and similarly led to declining health of hemlock trees across the city. The Asian longhorned beetle has the potential to cause more damage than Dutch elm disease, chestnut blight and spongy moths combined, destroying millions of acres of America's treasured hardwoods, including national forests and backyard trees. With no current cure, early identification and eradication are critical to its control. The Emerald ash borer causes the most amount of damage to ash trees in its larval stage. Heavily infested trees exhibit canopy dieback, beginning at the top of the tree. When emerald ash borer populations are high, small trees can die within 1-2 years of initial infestation, while larger trees may take 3-4 years before succumbing to this pest.

A full list of “Invasive” terrestrial, freshwater, and marine species are available through the Division of Fisheries and Wildlife at <https://www.mass.gov/info-details/invasive-plants> and in the 2018 SHMCAP, which also includes details on the nature of the ecological and economic challenges presented by each species as well as information on when and where the species was first detected in Massachusetts. Despite the presence of these species, their impacts have not been clearly recorded. Anticipated impacts include increased tree mortality leading to more downed trees and power outages during storm events. Additionally, the Massachusetts Department of Agricultural Resources maintains a [town-by-town invasive species dashboard](#) with invasive species information specific to each community.

Other species, while not yet well established in the region, are of particular concern to human health. These include species like the Asian tiger mosquito (*Aedes albopictus*). This invasive mosquito, originally from southeast and subtropical Asia has moved through the Eastern U.S. and has recently arrived in Massachusetts. Capable of spreading West Nile Virus, Equine Encephalitis, Zika, and numerous other tropical diseases, this aggressive mosquito is likely range-limited by cold winter temperatures, suitable landscape conditions (it prefers urban areas), and variation in moisture. As winter temperatures increase, the species is likely to become more prevalent in Massachusetts and throughout the Northeast, increasing the risk of serious illness for residents in summer months.

## Previous Occurrences

As mentioned above, many invasive plant and animal species are present in Northampton. These include plant species such as Asian honeysuckles, bittersweet, Japanese barberry, Japanese knotweed, autumn olive, burning bush, multiflora rose, garlic mustard, and glossy buckthorn. The insect and nematode species present in Northampton include Emerald Ash Borer (EAB), Asian Longhorned

beetle (ALB), Red Pine Scale, Beech Leaf Disease, Hemlock Woolly Adelgid (HWA), and Spotted Lanternfly (SLF). Some of these species were introduced as early as the 1800s (Gypsy Moth), while others were introduced as recently as the last couple of years (Spotted Lanternfly for example). The problems caused by both the plant and insect/nematode species are ongoing, generally occurring on a regular basis or in years when there are significant outbreaks.

## Probability of Future Events

Changes in temperature and precipitation may increase chances of a successful invasion of non-native species. To become an invasive species, the species must first be transported to a new region, colonize and become established, and then spread across the new landscape. Climate change may impact each stage of this process. Species may shift their ranges north as the climate warms and be successful in regions they previously had not colonized. Invasives may also be able to spread more rapidly in response to climate change, given their high dispersal rates and fast generation times. These faster moving species may be at a competitive advantage if they can move into new areas before their native competitors.

Here in the Northeast, observed and projected warming conditions are particularly concerning for some invasives because species ranges in temperate regions are often limited by extreme cold temperatures or snowfall, both of which we will see less of in coming decades. There is concern that aquatic species, such as hydrilla (*Hydrilla verticillata*) and water hyacinth (*Eichhornia crassipes*), may be able to survive and overwinter in Massachusetts with increased temperatures and reduced snowfall. Nutria (*Myocastor coypus*), large, non-native, semi-aquatic rodents that are currently established in Maryland and Delaware, are likely to move north with warming temperatures - perhaps as far as Massachusetts.

Extreme cold winter temperatures are also critical limiting factors for many forest pests, and warming is expected to increase their survival and lead to expansions and outbreaks. For example, the current impact of hemlock woolly adelgid (*Adelges tsugae*) in Massachusetts has likely been limited by cold winter temperatures, as many infested forest stands are surviving while in more southerly ranges there is near complete mortality from this pest. But the adelgid has already expanded its range with warming winter temperatures and is likely to have increased survival and higher reproductive rates in the northern portion of its range as temperatures warm, likely leading to more significant impacts on forests.

In many cases, efforts to control invasive species growth are met by opposition either from natural processes or social factors. As an example, Northampton has management plans for its watershed forests, and these plans guide a number of efforts to regenerate native flora and mitigate the spread of invasive plant species. However, much of the forest regeneration that does occur is promptly browsed by deer (and to a lesser extent, moose). Recommended actions for addressing this issue include exploring ways to control the deer population, or exploring ways to reduce deer access to recently harvested areas, but these are politically fraught issues.

Given these considerations, and the fact that some invasive species are already present in Northampton, the frequency of occurrence and annual probability of this hazard is High.

## **Vulnerability Assessment**

Invasive species in Northampton will not likely contribute directly to injuries, significant property damage, or facility shutdown and therefore the impact is deemed “Minor.” However, while the impacts of invasive species may not be as direct as the impacts of other natural hazards in Northampton, our changing climate is creating an environment in which invasive species could become more of a widespread threat to native habitats, native species, and agricultural commodities.

Anticipated impacts of declining tree health include more downed trees and subsequent power outages (due to weakened or dead trees falling on powerlines) during storm events. The hemlock woolly Adelgid, for instance, mainly damages varieties of Hemlock trees. Hemlock, like White Pine, is a foundation tree species, and when any foundation species experiences widespread illness and/or mortality they leave room for invasive plant species to take over, causing declines in wildlife habitat and water quality. Deer use healthy hemlock stands for winter shelter, so there could be a detrimental impact to the deer population, and hunting, caused by the loss of hemlock. Hemlocks provide shade to waterways, so their loss could mean warmer streams and lower water quality, potentially impacting aquatic life. The hemlock is not a comparatively very valuable wood product, but it is used for logging and wood products, so there are economic threats to its loss (Brrokline, 2017). Another example of the impact is illustrated by Northampton’s experience with large stands of red pine that died quickly and en masse. The City took on several significant logging contracts to remove dead and dangerous trees that threatened adjacent roadways and power lines. This clearing results in a prime opportunity for invasive plants to get established.

The impact of the emerald ash borer could be more significant. Ash logs are more valuable than hemlock logs, but the bigger concern with the loss of ash is the cascading ecological impacts. There are over 40 arthropod obligate species that are threatened by the loss of ash trees (they depend on ash for their survival), and ripple effects of the loss of these arthropods and the interrelationships aren’t even fully known at this point. Ash is a valuable tree for wood products and logging, so the economic impacts on a regional scale could be severe. More locally, though, the cost to Northampton for removing dead or dying trees, and the aesthetic and community open space impacts caused by their loss could be significant.

Many invasive plants in Northampton threaten forest regeneration, and multi-flora rose and Asiatic bittersweet can destroy mature trees. Smaller invasive plants such as garlic mustard, purple loosestrife, and goutweed present a threat to native herbaceous plants. Jeffrey Ward, Chief Scientist at the Connecticut Agricultural Experiment Station, described the health threat posed by Japanese barberry as a forest infested with Japanese barberry harbors an average of 120 black-legged ticks per acre while a forest without barberry harbors an average of only 10 black-legged ticks per acre. Black-legged ticks are known to transmit the causal agents of several diseases, including Lyme disease. Japanese knotweed can take over roadside vegetation and limit visibility, impacting road safety.

The impacts of invasive species may interact with those of climate change, magnifying the negative impacts of both threats. Furthermore, due to the very traits that make them successful at establishing in new environments, invasives may be favored by climate change. These traits include tolerance to a broad range of environmental conditions, ability to disperse or travel long distances, ability to compete efficiently for resources, greater ability to respond to changes in the environment with changes in physical characteristics, high reproductive rates, and shorter times to maturity.

#### *Built Environment Impact*

In Northampton, tree mortality resulting from invasive species infestation can lead to blocked roads and downed powerlines, as well as increased erosion, wildfire risk, and tree clearing expenses.

#### *Population Impacts*

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

#### *Natural Resource and Agricultural Impacts*

Risk to native or minimally managed ecosystems has increased as dispersion of exotic species has increased. One of the greatest challenges facing Northampton in the management of invasive species is that many cannot be effectively eradicated at a community or regionwide scale (e.g., Japanese knotweed, Beech leaf disease, and bittersweet) without the use of herbicides. This has been the only way to effectively manage intrusion of invasive plant species on the flood control levies and in other locations throughout the City, creating a secondary hazard to local ecosystems if not correctly applied and to citizen opposition.

The Nature Conservancy reports that invasive species have contributed directly to the decline of 42% of the threatened and endangered species in the United States. Further, the annual cost to the U.S. economy is estimated at \$120 billion per year, with more than 100 million acres suffering from invasive plant infestation. Freshwater ecosystems and estuaries are especially vulnerable to invasion, as these areas are very difficult to contain and reverse.<sup>3</sup>

#### *Land Use/Development Impacts*

Residential and commercial development in Northampton since the last plan has had a limited impact on the City's vulnerability to invasive species. Invasive species are most prevalent in disturbed and degraded areas. The heavy equipment used for construction can transport invasives, and woody

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<sup>3</sup> The Nature Conservancy, <https://www.nature.org/en-us/about-us/where-we-work/united-states/ohio/stories-in-ohio/invasive-species-protecting-native-plants-and-animals/>.

debris or soil from cleared areas containing seeds or rhizomes can speed the distribution of invasive species. Many invasives were initially planted intentionally for erosion control, gardens or other uses, and have spread over time.

#### *Hazard Risk Index Rating*

Based on the above analysis, Northampton has a hazard index rating of “3 – medium risk” from invasive species.

# Hurricanes/Tropical Storms

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## Hazard Description

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

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

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

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

## Location

Because of the hazard’s regional nature, all of Northampton is at risk from hurricanes, meaning the location of occurrence is “large.” Ridgetops are more susceptible to wind damage. Areas susceptible to flooding are also likely to be affected by heavy rainfall.

## Extent

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

Scale (Table 20), which rates hurricane wind intensity on a scale of 1 to 5, with 5 being the most intense.

Table 20: Saffir-Simpson Hurricane Wind Scale

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

### Previous Occurrences

Between 1954 and 2025, Hampshire County was included in 4 Tropical Storm events, according to the NOAA Storm Events Database. Northampton may not have been impacted by all of these events.

The primary event that impacted Northampton was Tropical Storm Irene in 2011. According to NOAA’s Historical Hurricane Tracks tool, there have been 33 hurricanes or tropical storms in recorded history that tracked within 60 nautical miles (69 miles) of Northampton. They are shown in Table 21 below.

*Table 21: Major Hurricanes in the Northampton Area*

<b>Hurricane/Storm Name</b>	<b>Year</b>	<b>Saffir/Simpson Category (when within 60 nautical miles of Northampton)</b>
Unnamed	1851	Tropical Storm
Unnamed	1858	H1
Unnamed	1861	Tropical Storm
Unnamed	1861	Tropical Storm
Unnamed	1863	Tropical Storm
Unnamed	1869	H3
Unnamed	1872	Tropical Storm
Unnamed	1874	Tropical Storm
Unnamed	1878	H1
Unnamed	1888	Tropical Storm
Unnamed	1893	H1
Unnamed	1893	Tropical Storm
Unnamed	1894	H1
Unnamed	1897	Tropical Storm
Unnamed	1908	Tropical Storm
Unnamed	1934	Tropical Storm
Unnamed	1938	H3
Unnamed	1949	Tropical Storm
Able	1952	Tropical Storm
Carol	1954	H3
Brenda	1960	Tropical Storm
Donna	1960	H1
Unnamed	1961	Tropical Storm
Unnamed	1968	Tropical Storm
Doria	1971	Tropical Storm
Belle	1976	Tropical Storm

Hurricane/Storm Name	Year	Saffir/Simpson Category (when within 60 nautical miles of Northampton)
Gloria	1985	H1
Bertha	1996	Tropical Storm
Floyd	1999	Tropical Storm
Hanna	2008	Tropical Storm
Irene	2011	Tropical Storm
Isaias	2020	Tropical Storm
Henri	2021	Tropical Storm

Source: NOAA, Historical Hurricane Tracks

## Probability of Future Events

Northampton’s location in western Massachusetts reduces the risk of extremely high winds that are associated with hurricanes and tropical storms, although it can experience some high wind events. Based upon past occurrences, the HMP Committee suggested that there is a “moderate” probability (10 percent to 40 percent in any given year) of hurricanes or tropical in Northampton. Climate change is projected to result in more severe weather, including increased occurrence of hurricanes and tropical storms. Because of this, the occurrence of hurricanes will increase in the future.

## Vulnerability Assessment

### *Built Environment Impact*

The entire City could be vulnerable to the impact of a hurricane or tropical storm, although wind damage and flooding would likely impact a smaller area. A description of the damages that could occur due to a hurricane is described by the Saffir-Simpson scale, as shown in Table 20 above. The city faces a “limited/moderate” impact from hurricanes, with potentially 10 - 25 percent of property damaged or destroyed. Using a total value of all structures in Northampton of \$4,325,186,873 and an estimated 10 percent of damage to 5 percent of all structures, the estimated amount of wind damage from a hurricane is \$21,625,934. Estimating that flooding would create 10 percent of damage to 20 percent of structures, the resulting damage would be \$86,503,737. The cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included in this estimate.

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

Sometimes, wind gusts of only 40 to 45 mph can cause scattered power outages from downed trees and wires. This is especially true after periods of prolonged drought, excessive rainfall, or insect damage, since all are situations that can weaken the root systems and branches and make them more

susceptible to the winds' effects. Roads may become impassable due to downed trees or roadway flooding resulting from a severe wind or thunderstorm.

#### *Population Impacts*

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

#### *Natural Resource Impacts*

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

#### *Land Use/Development Impacts*

The residential and commercial development in Northampton since the previous plan will not significantly impact the City's vulnerability to hurricanes and tropical storms. There has not been any substantial development in the floodplains, and the City has many mitigation measures in place to limit localized flooding from stormwater. There is farmland in the floodplains that may be impacted by flooding from hurricanes and tropical storms, however most of these storms occur at the end of or after the growing season.

#### *Hazard Risk Index Rating*

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

# Severe Winter Storm/Nor'easter

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## Hazard Description

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

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

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

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

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

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

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

## Location

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

## Extent

The Northeast Snowfall Impact Scale (NESIS) developed by Paul Kocin of The Weather Channel and Louis Uccellini of the National Weather Service (Kocin and Uccellini, 2004) characterizes and ranks

high-impact Northeast snowstorms. These storms have large areas of 10-inch snowfall accumulations and greater. NESIS has five categories: Extreme, Crippling, Major, Significant, and Notable. The index differs from other meteorological indices in that it uses population information in addition to meteorological measurements. Thus NESIS gives an indication of a storm's societal impacts.

NESIS scores are a function of the area affected by the snowstorm, the amount of snow, and the number of people living in the path of the storm. The aerial distribution of snowfall and population information are combined in an equation that calculates a NESIS score which varies from around one for smaller storms to over ten for extreme storms. The raw score is then converted into one of the five NESIS categories. The largest NESIS values result from storms producing heavy snowfall over large areas that include major metropolitan centers. Table 22 below shows the five categories of storms.

Table 22: Northeast Snowfall Impact Scale Categories

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

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

The Sperry-Piltz Ice Accumulation (SPIA) Index, shown below in Table 23, is a prediction tool (algorithm) that can be used in conjunction with National Weather Service data to predict the impact of winter weather in terms of ice damage.

Table 23: Sperry-Piltz Ice Accumulation (SPIA) Index

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

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

## Previous Occurrences

Based on data available from the National Oceanic and Atmospheric Administration, there have been 88 winter storms since 1956 that have registered on the NESIS. Of these, a total of 36 storms were Category 3 or higher, and are listed below in Table 24, in order of their NESIS severity.

Table 24: Category 3, 4, and 5 Winter Storms that Affected the Northeast Urban Corridor, 1956–2024

Start Date	NESIS Value	NESIS Category	NESIS Classification
3/12/1993	13.20	5	Extreme
1/6/1996	11.78	5	Extreme
3/2/1960	8.77	4	Crippling
12/13/2022	8.52	4	Crippling
1/22/2016	7.66	4	Crippling
2/15/2003	7.50	4	Crippling
2/2/1961	7.06	4	Crippling
1/11/1964	6.91	4	Crippling
1/21/2005	6.80	4	Crippling
1/19/1978	6.53	4	Crippling
12/25/1969	6.29	4	Crippling
2/10/1983	6.25	4	Crippling
2/14/1958	6.25	4	Crippling
1/29/1966	5.93	3	Major
2/5/1978	5.78	3	Major
2/12/2007	5.63	3	Major
2/23/2010	5.46	3	Major
1/29/2015	5.42	3	Major
1/21/1987	5.40	3	Major
2/8/1994	5.39	3	Major
1/9/2011	5.31	3	Major
2/1/2011	5.30	3	Major
2/11/2014	5.28	3	Major
3/12/2017	5.03	3	Major
1/30/2021	4.93	3	Major
12/24/2010	4.92	3	Major
2/17/1979	4.77	3	Major

Start Date	NESIS Value	NESIS Category	NESIS Classification
2/18/1972	4.77	3	Major
12/11/1960	4.53	3	Major
2/4/2010	4.38	3	Major
2/7/2013	4.35	3	Major
2/22/1969	4.29	3	Major
2/9/2010	4.10	3	Major
2/12/2006	4.10	3	Major
1/29/2014	4.08	3	Major
1/18/1961	4.04	3	Major

Between 2020 and 2025, Hampshire County was not included in any FEMA declared severe winter storm-related disasters (DR) or emergencies (EM). It should be noted that because population is used as a criteria for FEMA declarations, the storms that rank higher will be those that impact densely populated areas and regions such as Boston and other large cities and, as such, might not necessarily reflect the storms that impact less populated areas. For example, one of the most famous storms in the Commonwealth in modern history was the Blizzard of '78, which dropped over two feet of snow in the Boston area during 65 mph winds that created enormous drifts and stranded hundreds of people on local highways. The storm hit the snow-weary city that was still digging out of a similar two-foot snowstorm 17 days earlier. Although Hampshire County received snow from this storm, it was not listed in the declaration.

The October Snowstorm in 2011, which caused major damages and disruptions across New England, also impacted Northampton. Most Northampton residents of the City were without electricity for over a week. This storm had particularly serious impacts because it occurred when most trees were still in full foliage. Most winter storms that hit Northampton are more manageable but require significant City resources. Northampton DPW was awarded reimbursements from FEMA for emergency work require as a result of this event.

According to the NOAA storm events database, there were five significant ice storms in Hampshire County between 2000 and 2025. The 2018 Massachusetts State Hazard Mitigation and Climate Adaptation Plan indicates that ice storms of lesser magnitudes occur on at least an annual basis. Areas located in higher elevations are more likely to experience ice storms. In recent history, there has been no loss of life from snow or ice storms in Northampton, but each year there are incidences of property damage and personal injuries.

Well-known as one of the most serious storms to impact Pioneer Valley communities in recent history was the Ice Storm of December 11, 2008. The storm created widespread downed trees and power outages all across New York State, Massachusetts and New Hampshire. Over one million customers were without electricity, with 800,000 without power three days later and some without

power weeks later. Challenging living conditions were exacerbated by extremely cold temperatures in the days following the event.

## **Probability of Future Events**

Based upon the availability of records for Hampshire County and the NESIS scale, the likelihood that a severe snow storm will affect Northampton is “high” (between 40 and 70 percent in any given year).

Research on climate change indicates that there is great potential for stronger, more frequent storms as the global temperature increases. Extreme weather events—including extreme precipitation and snowfall levels—are anticipated to occur more frequently as climate change occurs. However, as temperatures throughout the year increase, it is possible that nor’easter events may become more concentrated in the coldest winter months when atmospheric temperatures are still low enough to result in snowfall rather than rain. More information about the effect of Climate Change can be found at the Climate Change Clearinghouse for the Commonwealth at [www.resilientma.org](http://www.resilientma.org).

The Massachusetts State Hazard Mitigation and Climate Adaptation Plan has additional information about the impact of climate change and can be accessed at <http://www.resilientma.org/shmcap-portal/index.html#/full-plan>.

## **Vulnerability Assessment**

### *Built Environment Impact*

The impact from a severe winter storm event could be considered “limited/moderate,” with 10 - 25 percent or more of property in the affected area damaged or destroyed, and the possibility of relatively few injuries and health impacts. Using an estimated value of \$4,325,186,873 for all property in the City and an estimated 5 percent of damage to 10 percent of residential structures, approximately \$21,625,934 worth of damage could occur from a severe snowstorm. Computing more detailed damage assessments based on assessor’s records is a labor-intensive task and beyond the scope of this project. The cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included in this estimate.

The weight from multiple snowfall events can test the load ratings of building roofs and potentially cause significant damage. For example, the roof of JFK Middle School is not designed for multiple heavy snowfalls. Multiple freeze-thaw cycles can also create large amounts of ice and make for even heavier roof loads.

Other impacts from snowstorms and ice storms include:

- Disrupted power and phone service
- Unsafe roadways and increased traffic accidents
- Infrastructure and other property are also at risk from severe winter storms and the associated flooding that can occur following heavy snow melt.
- Tree damage and fallen branches that cause utility line damage and roadway blockages
- Damage to telecommunications structures

- Reduced ability of emergency officials to respond promptly to medical emergencies or fires

The city of Northampton's power and communication infrastructure are vulnerable to the impacts of a severe winter storm. Because many of Northampton's streets are lined with mature trees, a severe snow or ice storm could also cause damage and power outages from downed trees. This could cause residents and businesses to lose power and could impact the city's ability to operate normally, impacting the city's economy. Additionally, buildings with flat roofs are especially vulnerable to damage, especially when the snow is wet and heavy.

Most winter storm events that occur in Northampton are not accompanied by a FEMA Emergency or Disaster declaration and, as a result, all costs associated with the events are borne by local city budgets. Any city response to the events listed in the Previous Occurrences section above would have likely included payroll overtime for DPW staff. Furthermore, spending on snow and ice operations in the city typically exceeds the budgeted amount and, because it comes out of the General Fund, requires a city council transfer to cover the deficit. For example, the original allocation for FY25 was \$500,000 and the amount expended was \$741,168. This included personnel services and ordinary maintenance for: repair and maintenance of vehicles, snow removal, communication, weather reports, vehicle supplies, fuel, snow removal supplies and food. As climate change has resulted in slightly lower winter temperatures, the City has seen an increase in multiple-precipitation storms, where precipitation may start as rain, change to snow or ice, and then back to rain, or start as snow or ice and change to rain. Responding to these types of storms often require additional removal operations and resources. If the frequency of severe and multiple – precipitation winter storms increase in future years, so will the financial burden on taxpayers to support city response.

### *Population Impacts*

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

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

### *Natural Resource Impact*

Severe winter weather is common in Massachusetts and native species and habitats are well adapted to withstand most winter weather. However, lower average winter temperatures are negatively

affecting many native species and encouraging the prevalence of both invasive species and vectors for diseases such as ticks.

#### *Land Use/Development Impact*

The residential and commercial development that has occurred in Northampton since the last plan will not significantly impact the City's vulnerability to snow and ice storms, although it does add slightly to the economic burden of responding to these storms.

#### *Hazard Risk Index Rating*

Based on the above assessment, Northampton has a hazard index rating of "3 — medium risk" from severe winter storms and nor'easters.

# Severe Thunderstorms/Wind/Tornadoes

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## Hazard Description

A thunderstorm is a storm with lightning and thunder produced by a cumulonimbus cloud, usually producing gusty winds, heavy rain, and sometimes hail. As defined by the National Weather Service, a thunderstorm is considered to be a severe thunderstorm when it is capable of producing hail that is an inch or larger, or wind gusts over 58 miles per hour.

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

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

## Location

As per the Massachusetts Hazard Mitigation Plan, the entire city is at risk of high winds, severe thunderstorms, and tornadoes. The plan also identifies Northampton and the surrounding communities as having a high frequency of tornado occurrence within Massachusetts. However, the actual area affected by thunderstorms, wind, or tornadoes is “small,” with less than 10 percent of the city affected.

## Extent

An average thunderstorm is 15 miles across and lasts 30 minutes; severe thunderstorms can be much larger and longer. Southern New England typically experiences 10 to 15 days per year with severe thunderstorms.

Tornadoes are measured using the Enhanced Fujita Scale, shown with the following categories and corresponding descriptions of damage in Table 25.

*Table 25: Enhanced Fujita Scale Levels and Descriptions of Damage*

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

The extent of hail, which can be present in severe thunderstorms, is shown in Table 26 below.

*Table 26: Hail Extent*

Hail Size (in.)	Object Analog
0.50	Marble, moth ball
0.75	Penny
0.88	Nickel
1.00	Quarter
1.25	Half dollar
1.50	Walnut, ping pong
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: <http://www.spc.noaa.gov/misc/tables/hailsize.htm>

## Previous Occurrences

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

There have been a total of 16 recorded tornadoes in Hampshire County, as shown in Table 27 below. Five of these are known to have passed through Northampton, most recently with an F1 tornado in 2000. In addition, many neighboring communities have seen significant tornado activity, including Hatfield and Hadley.

*Table 27: Recorded Tornadoes in Hampshire County*

Date	Scale	Hampshire County Town(s) Affected
8/14/1834	Unknown	Worthington, Cummington, Goshen, Williamsburg
9/4/1873	F2	Northampton
9/4/1873	F2	Granby
8/16/1954	F1	Ware
7/5/1957	F1	Hadley
8/14/1958	F2	Northampton
7/2/1961	F0	Hatfield
7/21/1961	F2	Hatfield, Hadley, South Hadley
5/20/1963	F2	Hatfield, Hadley
5/27/1965	F1	Northampton
8/11/1966	F2	South Hadley, Granby
9/13/1971	F3	Northampton
7/5/1984	F1	Chesterfield
6/2/2000	F1	Northampton
9/1/2013	EF0	Belchertown
2/26/2017	EF1	Goshen

## Probability of Future Events

One measure of tornado activity is the tornado index value. It is calculated based on historical tornado events data using USA.com algorithms. It is an indicator of the tornado level in a region. A higher tornado index value means a higher chance of tornado events. The Tornado Index Values for Hampshire County, the state, and the United States are shown in Table 28.

Table 28: Tornado Index for Hampshire County

Location	Index
Hampshire County	125.73
Massachusetts	87.60
United States	136.45

Source: <http://www.usa.com/cummington-ma-natural-disasters-extremes.htm>

Based upon the available historical record, even given Northampton’s location in a high-density cluster of state-wide tornado activity, there is a “low” probability (1-10 percent chance in any given year) of a tornado affecting the city.

As per the Massachusetts Hazard Mitigation Plan, there are approximately 10 to 30 days of thunderstorm activity in the state each year. Thus, there is a “moderate” probability (10 percent to 40 percent chance in any given year) of a severe thunderstorm or winds affecting the city.

## Vulnerability Assessment

### *Built Environment Impact*

Overall, Northampton faces a “limited” impact from severe thunderstorms, winds, or tornadoes, with 10 percent or less of the City affected. Using a total value of all structures in Northampton of \$4,325,186,873 and an estimated 10 percent of damage to 5 percent of all structures, the estimated amount of damage from a tornado is \$21,625,934. The cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included in this estimate.

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

The potential for locally catastrophic damage is a factor in any tornado, severe thunderstorm, or wind event. In Northampton, a tornado that hit the residential areas would leave much more damage than a tornado with a travel path that ran along the city’s forested uplands, where little settlement has occurred. Most buildings in the city 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 85 percent of the City’s housing was constructed prior to this date.

Sometimes, wind gusts of only 40 to 45 mph can cause scattered power outages from downed trees and wires. This is especially true after periods of prolonged drought or excessive rainfall, since both are situations that can weaken the root systems and make them more susceptible to the winds’ effects.

Roads may become impassable due to downed trees or roadway flooding resulting from a severe wind or thunderstorm.

#### *Population Impacts*

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

#### *Natural Resource Impacts*

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

#### *Land Use/Development Impact*

The residential and commercial development that has occurred in Northampton since the last plan will not significantly impact the City's vulnerability to severe thunderstorms, wind, and tornadoes, although it does add slightly to the economic burden of responding to these storms.

#### *Hazard Risk Index Rating*

Based on the above assessment, Northampton has a hazard index rating of "4- low risk" from severe thunderstorms and tornadoes, and a "3 – Medium risk" from high winds.

# Earthquakes

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## Hazard Description

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

## Location

Because of the regional nature of the hazard, the entire city of Northampton is susceptible to earthquakes. This makes the location of occurrence “large,” or over 50 percent of the total area.

## Extent

The magnitude of an earthquake is measured using the Richter Scale (Table 29), which measures the energy of an earthquake by determining the size of the greatest vibrations recorded on the seismogram. On this scale, one step up in magnitude (from 5.0 to 6.0, for example) increases the energy more than 30 times. The intensity of an earthquake is measured using the Modified Mercalli Scale (Table 30). This scale quantifies the effects of an earthquake on the Earth’s surface, humans, objects of nature, and man-made structures on a scale of I through XII, with I denoting a weak earthquake and XII denoting an earthquake that causes almost complete destruction.

*Table 29: Richter Scale Magnitudes and Effects*

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

Table 30: Modified Mercalli Intensity Scale

Scale	Intensity	Description Of Effects	Corresponding Richter Scale Magnitude
I	Instrumental	Detected only on seismographs.	
II	Feeble	Some people feel it.	< 4.2
III	Slight	Felt by people resting; like a truck rumbling by.	
IV	Moderate	Felt by people walking.	
V	Slightly Strong	Sleepers awake; church bells ring.	< 4.8
VI	Strong	Trees sway; suspended objects swing, objects fall off shelves.	< 5.4
VII	Very Strong	Mild alarm; walls crack; plaster falls.	< 6.1
VIII	Destructive	Moving cars uncontrollable; masonry fractures, poorly constructed buildings damaged.	
IX	Ruinous	Some houses collapse; ground cracks; pipes break open.	< 6.9
X	Disastrous	Ground cracks profusely; many buildings destroyed; liquefaction and landslides widespread.	< 7.3
XI	Very Disastrous	Most buildings and bridges collapse; roads, railways, pipes and cables destroyed; general triggering of other hazards.	< 8.1
XII	Catastrophic	Total destruction; trees fall; ground rises and falls in waves.	> 8.1

Source: U.S. Federal Emergency Management Agency

## Previous Occurrences

The most recent earthquakes to affect New England are shown in Table 31 below. Table 32 shows the number of felt earthquakes that have been recorded in the northeastern states.

Table 31: Largest Earthquakes in New England, 1940–2024

Location	Date	Magnitude
Ossipee, NH	December 20, 1940	5.5
Ossipee, NH	December 24, 1940	5.5
Dover-Foxcroft, ME	December 28, 1947	4.5
Kingston, RI	June 10, 1951	4.6
Portland, ME	April 26, 1957	4.7
Middlebury, VT	April 10, 1962	4.2
Near NH Quebec Border, NH	June 15, 1973	4.8
West of Laconia, NH	Jan. 19, 1982	4.5

Plattsburg, NY	April 20, 2002	5.1
Bar Harbor, NH	October 3, 2006	4.2
Hollis Center, ME	October 16, 2012	4.6
Bliss Corner, MA	November 8, 2020	3.6
Tewksbury, NJ	April 5, 2024	4.8

Source: Northeast States Emergency Consortium website, [www.nesec.org/hazards/earthquakes.cfm](http://www.nesec.org/hazards/earthquakes.cfm)

Table 32: Number of Felt Earthquakes in the Northeast States

State	Years of Record	Number of Felt Earthquakes	Years with Damaging Earthquakes
Connecticut	1678–2016	115	1791
Maine	1766–2016	454	1973, 1904
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 Felt Earthquakes		2030	

Source: <https://nesec.org/earthquakes-hazards/>

## Probability of Future Events

One measure of earthquake activity is the Earthquake Index Value. It is calculated based on historical earthquake events data using USA.com algorithms. It is an indicator of the earthquake activity level in a region. A higher earthquake index value means a higher chance of earthquake events. Data was used for Hampshire County to determine the Earthquake Index Value as shown in Table 33 below.

Table 33: Earthquake Index for Hampshire County

Location	Index
Hampshire County	0.17
Massachusetts	0.70
United States	1.81

Source: <http://www.usa.com>

Based upon existing records, there is a “low” probability (1-10 percent probability in any given year) of an earthquake in Northampton.

## **Vulnerability Assessment**

### *Built Environment Impact*

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

While a significant earthquake, estimated to be approximately of magnitude 6.1 or higher, would cause a “critical” impact, with more than 25 percent of Northampton affected, a smaller earthquake that is more likely to occur in Northampton would have "minor" impact, with only small damage to property. As shown in the table of the Richter Scale above, an earthquake of 6.0 or lower would result in at most slight damage to well-designed buildings, which are the vast majority of structures in Northampton. Earthquakes between 3.5 and 5.4 would be felt but rarely cause damage, and earthquakes smaller than 3.5 would not be noticed. Therefore, the overall impact rating for earthquake in Northampton is considered to be “limited.”

Using a total value of all structures in Northampton of \$2,742,056,662 and an estimated 100 percent of damage to 25 percent of all structures (“critical” impact), the estimated amount of damage from an earthquake is \$685,514,166. The cost of repairing or replacing the roads, bridges, utilities, and contents of structures is not included in this estimate.

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

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

A catastrophic earthquake in Northampton would impact all structures, commercial and residential alike. FEMA research has shown that nearly 1 in 4, or 25%, of businesses do not return after a major catastrophic event. The loss of 25% of businesses would have a major impact on City tax income and operating budget. A significant loss of homes due to the same earthquake could also have major tax implications that could strain City cash flow for years after the event.

#### *Population Impacts*

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

#### *Changes in Land Use/Development*

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

#### *Hazard Risk Index Rating*

Based on the above analysis, Northampton has a hazard index rating of “4- low risk” from earthquakes.

# Pandemic and Epidemic

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## Hazard Description

Pandemic is defined as an epidemic occurring worldwide, or over a very wide area, crossing international boundaries and usually affecting a large number of people. Different from a pandemic, an epidemic occurs when new cases of a certain disease, in a given population, substantially exceed what is expected. An epidemic may be restricted to one locale, and if it becomes global it is called a pandemic. The severity of any pandemic can be higher when a large number of people in the population lack pre-existing immunity to the causative agent or when a larger proportion of the population is infected. Organisms that cause pandemics may be transmitted from animals to humans, but the potential to cause a pandemic is increased when organisms are readily transmitted from human to human, especially before a person has any symptoms.

A pandemic will cause both widespread and sustained effects and is likely to stress the resources of the federal, state, and local governments and health departments. The Massachusetts Department of Public Health is the primary agency responsible for the study, planning, isolation/quarantine and actions, surveillance, and reporting for all public health emergencies in Massachusetts.

The following diseases, in alphabetical order, have potential to become widespread, potentially affecting Northampton.

**Coronavirus** is a kind of common virus that causes an infection in the nose, sinuses, or upper throat. There are many different kinds of coronaviruses, and while most are not dangerous, some cause disease. Coronavirus disease (COVID-19 or SARS-CoV-2) is one such infectious disease caused by a newly discovered coronavirus that emerged in China in December 2019. The COVID-19 virus spreads primarily through droplets of saliva or discharge from the mouth or nose when an infected person coughs or sneezes. Most people infected with the COVID-19 virus will experience mild to moderate respiratory illness and recover without requiring special treatment, and symptoms tend to present within 14 days of exposure to the virus. Older people and those with underlying medical problems like cardiovascular disease, diabetes, chronic respiratory disease and cancer, are more likely to develop serious illness. SARS, or severe acute respiratory syndrome, is another type of coronavirus that had an outbreak originating in China in 2003 and spread to other countries before ending in 2004.

**Ebola virus disease** is a rare and deadly disease caused by infection with one of the Ebola virus species. Ebola viruses are transmitted through direct contact with contaminated blood or body fluids of a person who is sick or has died from Ebola. Ebola virus may have spread in central and west Africa as a result of handling wild animals hunted for food. Ebola was first discovered in 1976 near the Ebola River in what is now the Democratic Republic of the Congo and the virus is now found in several African countries (<https://www.cdc.gov/vhf/ebola/outbreaks/history/distribution-map.html>) where outbreaks have occurred sporadically. There have been no reported cases of Ebola virus disease contracted in the United States, but in 2014, two U.S. residents were infected with Ebola virus while

traveling to areas where it is found, and were diagnosed in the United States; two healthcare workers who provided care for the first of these patients also became infected with Ebola virus (CDC 2020).

**HIV**, or human immunodeficiency virus, is a viral infection that can be transmitted between two individuals by exposure to certain body fluids through sexual intercourse, sharing needles or syringes, from an infected mother to child during pregnancy or breastfeeding, and by receiving a blood transfusion, blood products, or organ/tissue transplants that are contaminated by HIV (currently an extremely small risk in the United States). If left untreated after HIV is contracted, the viral infection severely compromises the immune system and leads to AIDS (acquired immune deficiency syndrome). There is no effective cure for HIV, but it can be controlled with proper medical care and antiretroviral therapy. The first official report of what became known as the AIDS epidemic occurred in 1981 (CDC 2020).

**Influenza** (Flu) is an infectious viral disease of birds and mammals commonly transmitted through the air through coughing and sneezing. Influenza type A viruses are found in many different animals and in rare cases can evolve to infect humans ([https://www.cdc.gov/flu/other\\_flu.htm](https://www.cdc.gov/flu/other_flu.htm)). Influenza B viruses circulate widely only among humans. People who have influenza can have some or all of these symptoms: fever, cough, sore throat, runny nose, muscle aches, headaches, fatigue, and sometimes vomiting and diarrhea. Complications from influenza virus infection can be moderate (e.g., sinus or ear infections) to severe (e.g., pneumonia, inflammation of the heart [myocarditis], inflammation of the brain [encephalitis], failure of multiple organs, and death).

The CDC describes an influenza pandemic as a global outbreak of a new influenza A virus when new (novel) influenza A viruses emerge which are able to infect people easily and spread from person to person in an efficient and sustained way. New/novel influenza virus strains, or strains that had not circulated widely among the living population caused pandemics in the late 20th and 21st centuries (<https://www.cdc.gov/flu/pandemic-resources/basics/past-pandemics.html>). Vaccines against a novel pandemic influenza will not be available immediately in most pandemics (CDC 2020).

**Measles** (also known as rubella) is a serious respiratory disease caused by the measles virus. It can lead to pneumonia, encephalitis (swelling of the brain), and death. Measles is one of the most contagious of all infectious diseases: approximately 90% of susceptible people with close contact to someone with measles will get measles. The virus spreads through aerosols produced by coughing or sneezing. The measles-mumps-rubella (MMR) vaccine protects against measles (CDC 2020).

**Mosquito-borne diseases** are those transmitted to humans by the bite of an infected mosquito. They include Chikungunya, dengue, malaria, Saint Louis encephalitis (SLE), West Nile virus (WNV) disease, and Zika virus disease. Diseases included in this plan that seem most relevant to Northampton are West Nile virus disease and Zika virus disease.

**West Nile** virus is the leading cause of mosquito-borne disease in the continental United States and is most commonly spread to people by mosquito bites. About 1 in 5 people who are infected have a fever and other symptoms. About 1 out of 150 infected people develop a serious, sometimes fatal,

illness. There are no vaccines to prevent WNV disease in humans and no specific medications to treat WNV disease. WNV has been reported from all states in the continental United States (CDC 2020).

**Zika** virus is mostly transmitted by the bite of an infected *Aedes* species mosquito (*Aedes aegypti* and *Aedes albopictus*), but can also spread through sex, from an infected pregnant woman to her fetus, and likely by transfusion of tainted blood. Many people infected with Zika virus won't have symptoms or will only have mild symptoms. The most common symptoms of Zika virus disease are fever, rash, headache, joint pain, red eyes, and muscle pain. Zika virus infection during pregnancy can cause a birth defect of the brain called microcephaly and other severe brain defects. It is also linked to other problems, such as miscarriage, stillbirth, and other birth defects. Anyone who lives in or travels to an area where local transmission of Zika virus is occurring can be infected. Once a person has been infected, he or she is likely to be protected from future infections.

Prior to 2014, very few travel-associated cases of Zika virus disease were identified in the United States. In 2015 and 2016, large outbreaks of the virus occurred in the Americas, resulting in an increase in travel-associated cases in the U.S., widespread transmission in Puerto Rico and the U.S. Virgin Islands, and limited local transmission in Florida and Texas. Cases in the U.S. started to decline in 2017, and in 2018 and 2019 no confirmed Zika virus disease cases were reported from United States territories.

The mosquito species known to transmit Zika virus are able to live and reproduce in some areas of Massachusetts, and this range may change to cover the entire state given warming temperatures associated with climate change. Furthermore, these mosquitos could be imported (for example, in tires or potted plants) from areas where they occur (CDC 2020).

**Mumps** is a contagious disease that is caused by the mumps virus. It is spread through saliva or mucus from the mouth, nose, or throat through coughing, sneezing or talking, sharing items such as cups or eating utensils, and touching contaminated objects. Mumps typically starts with a few days of fever; headache, muscle aches, tiredness, and loss of appetite, and is followed by swelling of salivary glands. Some people who get mumps have very mild or no symptoms; most people with mumps recover completely in a few weeks. Others may experience symptoms and serious complications. There is no specific treatment for mumps. Anyone who is not immune from either previous mumps infection or from vaccination can get mumps. However, outbreaks can also occur in a highly vaccinated population, especially in settings where people are in close contact, such as colleges and camps (CDC 2020).

**Norovirus**, formerly called norwalk-like virus, is a very contagious virus that causes diarrhea, vomiting, and abdominal pain in humans. Fever, chills, headache, body aches and fatigue may also be present. Norovirus is sometimes called the stomach flu or stomach bug. However, norovirus illness is not related to the flu which is caused by influenza virus.

Norovirus is spread through contaminated food or water, by contact with an infected person, or by contamination of environmental surfaces. A person usually develops symptoms 12 to 48 hours after being exposed to norovirus. Most people with norovirus illness get better within 1 to 3 days. The

virus has an incubation period of 24 to 48 hours. Infected individuals are symptomatic for one to two days, but can still spread the virus for up to two weeks after recovering (CDC, 2020).

## **Location**

By definition, a pandemic affects entire populations over large areas, so all of the City of Northampton could be affected. Densely populated areas have greater potential for person-to-person transmission than less densely populated areas. Areas of abundant standing water (including areas used for flood irrigation or dumping sites with discarded plastic and tires) which provide a breeding site for mosquitos could be more prone to an outbreak of mosquito-borne diseases.

## **Extent**

The exact size and extent of an infected population depends on factors related to the virus organism, the people or animals affected, and the environment. Factors related to the organism include what species it affects, how much of an organism is needed to establish an infection, how the organism is transmitted, and how stable it is in a given environment. Factors related to people include how susceptible they are to infection, how long they are infectious, and the amount of contact between infected and uninfected individuals.

## **Previous Occurrences**

Infectious diseases have been causing human illness and death since the dawn of human existence. The effective prevention and control of these diseases is one of the major reasons for increases in life expectancy. In 1701, Massachusetts passed legislation requiring the isolation of the sick for better preventing the spread of infection. Since then, Massachusetts has led the nation in infection prevention and control. Reportable conditions are captured by the Massachusetts Virtual Epidemiologic Network (MAVEN). MAVEN is an integrated, web-based surveillance and case management system that enables state and local health departments to appropriately share public health, clinical, and case management data efficiently and securely over the Internet. MAVEN provides automatic notifications around the clock to state and local officials of any event requiring immediate attention. (MA SHA, 2019 )

The most recent flu pandemics occurred in 1889-90, 1918, 1957, 1968 and 2009. The 1918 pandemic resulted in an estimated 500,000 deaths in the United States (out of a total population then of about 105 million), the 1968 pandemic caused an estimated 34,000 US deaths (out of a total population then of about 201 million), and the 2009 (H1N1) pandemic resulted in approximately 12,500 US deaths (out of a total population then of about 305 million) (CDC, 2017 ). The H1N1 flu (also referred to as the swine flu) was first recognized in the Commonwealth in April of 2009. The H1N1 flu was identified by authorities as a pandemic as it spread quickly to many parts of the world and was declared a public health emergency in Massachusetts.

Since its emergence as a human disease in 1938, the mosquito-borne virus of eastern equine encephalitis (EEE) has caused just over 115 identified human cases and 56 deaths as of August 2025, and left 80% of survivors with permanent neurological damage in Massachusetts. West Nile virus,

which first appeared in the US in 1999, has caused at least 262 cases of clinical disease in Massachusetts. Instances of other diseases and viruses profiled in this chapter may be more common, though not at a pandemic scale.

Between 1954 and 2020, FEMA declared one pandemic-related disaster in the State of Massachusetts. This declaration was made for all counties in the state on March 27, 2020 for the COVID-19 Pandemic. Four months earlier, in December, 2019, the Municipal Health Commission in Wuhan, China, had reported a cluster of cases of pneumonia in Wuhan, Hubei Province. A novel coronavirus that likely surfaced in a Chinese seafood and poultry market was eventually identified. Officials confirmed the first recorded case of the virus outside of China in Thailand on January 13, 2020, and by the end of that month the World Health Organization (W.H.O.) situation report indicated 7818 total confirmed cases worldwide, with the majority of these in China, and 82 cases reported in 18 countries outside China including the United States. The first confirmed case in the United States was in Washington State, where a man in his 30s developed symptoms after returning from a trip to Wuhan. On February 11, the W.H.O. proposed an official name for the disease caused by the new coronavirus: COVID-19, an acronym that stands for coronavirus disease 2019. COVID-19 was characterized as a pandemic on March 11, 2020. As of July 2025 there has been a total of approximately 2,048,722 cases of COVID-19 cases reported in Massachusetts since the start of the pandemic, and 21,035 deaths (usafacts.org). In Hampshire County, there were a reported 40,167 cases and 368 deaths in that same time period.

The City of Northampton Department of Public Health ordered closures of non-essential businesses and some play areas and recreational facilities during the height of the pandemic. Schools were closed and local emergency shelters activated. The Northampton High School was used as a primary shelter for the City's most vulnerable residents who lack housing, and was run cooperatively by the City's Department of Public Health, Medical Reserve Corps Coordinator, and ServiceNet, with support from Northampton's Fire Rescue and Police Departments and Cooley Dickinson Hospital. The Division of Public Health and Nursing managed the vaccine program for the city and provided data and public education.

## **Probability of Future Events**

Future occurrences of pandemic events are expected to continue, although the probability of a major pandemic impacting Northampton in any given year is "Low," or between 1 and 10 percent. As bacteria and viruses continually evolve, there is always the opportunity for new diseases to occur. Factors in Northampton that heighten the probability of occurrences of such events include large numbers of transient residents such as college students, and the large number of visitors that move in and out of the city on a daily basis, which could lead to disease transmission through individuals transporting or coming into contact with infected persons. Factors that reduce the probability of occurrence of high infection rates include the overwhelmingly white racial make-up of the city as well as the relatively high incomes of most residents and the very few multi-family residences in which people may be unable to social distance.

Although many of the diseases listed earlier in this section have not been experienced at pandemic magnitudes, there is the potential of a pandemic occurring at any time, with pandemic influenza being the most likely.

Pandemics are unpredictable. While history offers useful benchmarks, there is no way to know the characteristics of a pandemic virus before it emerges. Nevertheless, public health officials must make assumptions to facilitate planning efforts. According to the 2006 Pandemic Influenza Preparedness, Response, and Recovery Guide published by Homeland Security, Federal planning efforts assume the following about the certain eventuality of the next pandemic influenza virus:

- Susceptibility to the pandemic influenza virus will be universal.
- Efficient and sustained person-to-person transmission signals an imminent pandemic.
- Epidemics will last 6 to 8 weeks in affected communities.
- Multiple waves (periods during which community outbreaks occur across the country) of illness are likely to occur with each wave lasting 2 to 3 months. Historically, the largest waves have occurred in the fall and winter, but the seasonality of a pandemic cannot be predicted with certainty.

Worldwide, there has been an apparent increase in reports of infectious diseases, which is reflective of rapid demographic, environmental, social, technological, and other changes in human society. Projections are that climate change will likely affect changes in transmission patterns of infectious diseases, although the relationship between climate change and infectious diseases is complex and not well understood. The ranges and impacts of important pathogens might change as a result of changing temperatures and precipitation. Changing climate might increase or change the range of disease vectors such as mosquitoes or rodents. Heavy rainfall and flooding can be associated with waterborne disease outbreaks, especially where the drinking water supply is not treated.

## **Vulnerability Assessment**

While all individuals could experience pandemic impacts, the COVID-19 crisis showed that the most vulnerable were the elderly, especially in nursing homes, individuals with pre-existing health issues, housing insecurities, Frontline communities, and front-line workers including health care workers, social service providers, delivery personnel, etc. Other infectious diseases have higher risks for children and pregnant women.

### *Built Environment Impact*

Pandemics can have a severe economic impact and obviously can have a critical impact on public health, however, they are not likely to have a significant impact on the built environment.

### *Population Impacts*

Pandemics throughout history have exacerbated existing public health and socioeconomic disparities. When diseases become associated with certain people and communities, the stigma and bigotry that can result often lead to dangerous secondary impacts that often interfere with effective public health responses. Racial inequalities and health disparities that exist in a society before a pandemic put

disadvantaged and disenfranchised people at greater risk of severe symptoms and complications. During the COVID-19 outbreak in both New York City and Barcelona, low income neighborhoods where poorer families are more likely to live in close-quarter housing experienced disproportionately high occurrences of the disease. These populations are also more likely to work in low-skill labor force, working as supermarket tellers and elder care providers, which were deemed essential during the crisis and therefore led to increased exposure to the virus. In Northampton, the greatest challenge for local emergency responders has been providing adequate sheltering for the region's homeless and nursing home residents, while also abiding by social distancing requirements.

Other social impacts of pandemics are the result of strained or suspended community, religious, and social activities. Schools may be closed for extended periods of time, increasing pressure on families with working parents. Similarly, places of worship may be closed. Social isolation due to quarantine and social-distancing guidelines, fear, and unemployment and financial factors can lead to or worsen existing mental health illness, and lead to an increase in domestic violence and intimate partner violence.

### *Natural Resource Impacts*

Widespread mortality and economic shifts that result from a pandemic can lead to profound impacts on the natural environment. According to anthropologist Elic Weitzel, the social and economic fallout from the 14th century bubonic plague that wiped out at least one-third of Europe's population within a few years had dramatic long-term environmental consequences. Farm fields, abandoned because laborers died or had to move for economic opportunity, reverted to forest land, lowering atmospheric carbon dioxide levels. A glacial ice core also revealed a reduction in atmospheric lead pollution due to a slowdown in mining and metallurgical activity. Modern pandemics that necessitate social distancing or shelter in place orders will reduce airplane and automobile traffic and fossil fuel combustion, reducing contaminant loads from stormwater runoff entering waterways, and more. In 2020, public health restrictions to prevent the spread of Covid-19 resulted in a sharp dip in air pollution across China, Europe and the US, rapidly reducing carbon emissions from the burning of fossil fuels. Some estimates showed environmental pollution reduced up to 30%, and mobility reduced up to 90%. It should be noted that any environmental impacts are minor compared to the great social and economic losses inflicted by a pandemic.

### *Economic Impacts*

In addition to the impact on human health, the impact of a pandemic to national, state, and local economies would be severe. A pandemic will likely reduce dramatically the number of available workers in all sectors, and significantly disrupt the movement of people and goods, which will threaten essential services and operations within and across many economic sectors, especially those that cannot transition easily to remote working. Given today's highly mobile population, disease outbreaks may occur simultaneously throughout the country making the reallocation of human and material resources more difficult than in other disaster or emergency situations.

Rates of employee absenteeism will depend on the severity of the pandemic. In a severe pandemic, absenteeism attributable to illness, the need to care for ill family members, and fear of infection

would be highest during the peak weeks of a community outbreak, with lower rates of absenteeism during the weeks before and after the peak. Certain public health measures (closing schools, quarantining household contacts of infected individuals, “snow days”) are likely to increase rates of absenteeism.

Economic impacts of a pandemic will be experienced in the short and long term. During a quarantine period, lost revenues from parking, meals, excise, and marijuana taxes, among others, could have a major impact on the City’s operating budgets. Unlike an extended power outage that could force similar business closures, economic shutdowns or slowdowns due to a pandemic can last months or even years, leading to uncertainty that could limit investments in other important areas such as infrastructure improvement.

As described in the Dam/Levee Failure and Earthquake hazard profiles above, FEMA research has shown that nearly 1 in 4, or 25%, of businesses do not return after a major catastrophic event. Social distancing and other restrictions placed on businesses during the COVID-19 pandemic restricted revenues and had a significant impact on the City’s businesses. A small number of businesses had to close as a result of the pandemic restrictions and other factors. This also impacted the City tax income and operating budget.

#### *Land Use/Development Impact*

The residential and commercial development that has occurred in Northampton since the last plan will not impact the City’s vulnerability to pandemics. There has been a small amount of multi-family units built, and this will not significantly increase the density of housing.

#### *Hazard Risk Index Rating*

Based on the above analysis, Northampton has a hazard index rating of “3 - medium risk” from pandemics.

## **Other Hazards**

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In addition to the hazards identified above, the Hazard Mitigation Committee reviewed the full list of hazards listed in the 2018 Massachusetts State Hazard Mitigation and Climate Adaptation Plan. Due to the location and context of the city, coastal erosion, landslides, and tsunamis, were determined to not be a threat. Coastal hazards do not affect Northampton as it is inland, and there is no area of the city that is vulnerable to landslides.

## CHAPTER 4: CRITICAL FACILITIES

### Facility Classification

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Section 201.6 44CFR states that a Local Hazard Mitigation Plan risk assessment shall provide a description of the jurisdictions vulnerability to the identified hazards of concern and this vulnerability should be described in terms of:

- The types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas.

The law does not specify or define the term “Critical Facility,” but instead allows each unique planning effort to identify and define those facilities and infrastructure that are critical to providing emergency services to the planning area. These definitions can and should be unique to the defined planning area.

FEMA defines critical facilities as facilities/infrastructure that are critical to the health and welfare of the population and that are especially important following hazard events. Critical facilities include, but are not limited to, shelters, police and fire stations, and hospitals. For the purposes of the Northampton Hazard Mitigation Plan Update, a Critical Facility is defined as a building, structure, or location which:

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

#### Critical Facilities within Hazard Areas

Northampton's Hazard Mitigation Committee reviewed the Critical Facilities list from the 2015 Plan, and made updates based on local knowledge and updated MassGIS data to create the following list.

Northampton's Hazard Mitigation Committee has broken up this list of facilities into two categories:

- Facilities needed for Emergency Response in the event of a disaster, referred to as Emergency Response Facilities and Services, as well as facilities essential for the everyday operations of the City.
- Facilities/Populations that the Committee wishes to protect in the event of a disaster.

The Critical Facilities Map at the end of this Plan identifies these facilities.

### Category 1: Emergency Response Services

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

Table 34: Emergency Response Services Facilities

Facility Type	Name	Address	Purpose/Notes
Emergency Operations Center	Northampton Fire Department	Carlton Drive	Generator
	Northampton Police Department (Secondary EOC)	Center Street	Generator
Fire Department	Northampton Fire Department	Carlton Drive	Generator
	Florence Substation	Maple Street	Generator
Police	Northampton Police Station	Center Street	
	State Police Station B-6	North King Street	
	Hampshire County Sheriff	Rocky Hill Road	
Transportation Network Maintenance	DPW Complex	Locust Street	Generator
	Forests, Parks, and Cemeteries Facility	320 North Maple Street	
	MassDOT Highway Maintenance Shed #1		
	MassDOT Highway Maintenance Shed #2		
Potable Water	Water Treatment Plant	Mountain Street, Williamsburg	Generator
Drinking Water Pump Stations	PRV Station	Route 9, Leeds	
Waste Water and Flood Control	Northampton Wastewater Treatment Plant	Hockanum Road	Generator
	Seven wastewater pump stations	Rick Drive, Williams St, Burts Pit Rd, Mt Tom Rd, Atwood Drive, Glendale Rd, Bradford St	Most have generators
	Flood control pump stations that are located at the WWTP	33 Hockanum Rd	Diesel Generator
	West Street flood control pump station	West Street	Gas Generator
Emergency Fuel Storage	DPW Complex Fuel Depot – two above-ground storage tanks, diesel and gasoline, just under 12,000 gallons each	125 Locust Street	Diesel Generator
	Fire Department Headquarters – Diesel storage tank		
Emergency Shelters	Smith Vocational and Agricultural High School (Regional Shelter)	80 Locust Street	Generator
	Senior Center (cooling/warming center)	67 Conz Street	

Facility Type	Name	Address	Purpose/Notes
	Forbes Library	20 West Street, Northampton	
	Lilly Library	19 Meadow Street, Florence	
	Division of community care (HHS)	1 Roundhouse Plaza	
	Manna Soup Kitchen	48 Elm Street	
	Clinical and Support Options (CSO)	29 Industrial Drive East	
Transfer Station	Northampton Transfer Facility	Locust Street	
	Secondary Transfer Facility	Glendale Road	
Helicopter Landing Sites	Northampton Airport	Old Ferry Road	
	Cooley Dickinson Helicopter Pad	Hospital Road	
Primary Evacuation Routes	Interstate 91		
	US Route 5		
	MA Route 10		
	MA Route 9		
	MA Route 66		
Bridges Located on Evacuation Routes	Earle Street (MA 10)		
	Calvin Coolidge Bridge (MA 9)		
	I-91 Bridges		
	Bicycle and pedestrian only bridges over CT River, North Street, Main Street (MA 9), and Easthampton Road (US 5)		
Registered Communications Towers	Crown Atlantic Company LLC	Atwood Drive	
	SBA Infrastructures LLC	254 Old Wilson Road	
	IWG Towers Assets I LLC	790 Florence Road	
	City of Northampton	26 Carlon Drive yes	
	American Towers LLC –hosts a repeater for the Police Department as well as other cell subleases	170 Glendale Road yes	
	Commonwealth of Massachusetts	555 North King Street (at State Police) yes	

Facility Type	Name	Address	Purpose/Notes
	Global Tower LLC through American Towers LLC	Haydenville Road (on Smith Vocational land) yes	
	Cell tower	King Street yes	
Critical IT Equipment	DPW Water Treatment Plant	Mountain Street, Williamsburg	
	Puchalski Municipal Building	212 Main Street	
	Emergency Communications Center	26 Carlon Drive	
	Northampton High School	380 Elm Street	
	DPW Administration Building	125 Locust Street	
	Northampton IT Offices, James House	42 Gothic Street	
Communications and Utilities	National Grid power sub-stations	West Street, King Street, and Florence Junction	
	Verizon Station	Masonic Street	

Of the critical emergency response facilities listed in Category 1, the following are known to be equipped with back-up power generation capabilities to support at least partial facility operation during an outage of the power grid.

- Northampton High School
- JFK Middle School
- Northampton VA Medical Center
- Cooley Dickinson Hospital
- Smith College Campus School
- Hampshire County House of Correction
- Fire Department / Emergency Operations Center
- Northampton Police Department
- Northampton Department of Public Works
- Municipal Building
- Smith Vocational & Agricultural High School
- Smith College (multiple)
- Wastewater Treatment Plant
- Water Treatment Plant
- Wastewater Treatment Plant Flood Control System
- Wastewater Pump Stations (7 – not all have permanent back-up power, but all are equipped with hookups to connect to mobile generator)

## Category 2: Populations and Facilities to Protect

This category includes populations and facilities that would need to be protected and aided in the event of a disaster. It also includes facilities that would be vulnerable in disasters where evacuation is necessary due to the potentially large numbers of people located there.

Table 35: Populations and Facilities to Protect

Facility Type	Name	Address	Purpose/Notes
Medical Facilities	Cooley Dickinson Hospital	Elm Street	
	Hampshire County Dialysis Center	Conz Street	
	US Veterans (VA) Medical Center Hospital	North Main Street	
Vulnerable Populations	Climate-vulnerable frontline populations – homeless, single room occupancy (SRO) and public housing residents, and food insecure		
	Individuals without a reliable form of private transportation		
	Populations with functional needs/disabilities		
	Elderly – Significant population in Downtown Areas		
	Hampshire County Jail and House of Correction	Rocky Hill Road	
	Community Enterprises - (job training, employment, case management, education and housing support for people with disabilities)	Pleasant Street	
Elderly/Disabled Housing	Walter Salvo House	Conz Street	
	Frank J. Cahill	Fruit Street	
	Harold J. Forsander	High Street	
	Joan Tobin Manor	Maple Street	
	Joseph McDonald House	Old South Street	
Large Multi-Family and Rental Apartments	The Lorraine SRO	96 Pleasant Street	
	Meadowbrook Apartments	491 Bridge Rd, Florence	
	Hampshire Heights	241 Jackson Street	
	Florence Heights	178 Florence Road, Florence	
	Care One Nursing Home – Elm Street	Elm Street	

Facility Type	Name	Address	Purpose/Notes
Nursing Homes / Assisted Living	Linda Manor / Zoe Life Retirement Community	Haydenville Road	
	Lathrop Retirement Community	South Street	
	Rockridge	North King Street	
	River Valley Rest Home	Pine Street	
	Christopher Heights	Hospital Hill	
Schools	Bridge Street School	Bridge Street	
	Jackson Street School	Jackson Street	
	John F Kennedy Middle School	Bridge Road	
	Lander Grinspoon Academy	Prospect Street	
	Leeds School	Florence Street	
	Montessori School of Northampton	Bates Street	
	New Directions School (Cutchins Program)	Pomeroy Terrace	
	Northampton High School	Elm Street	
	(RK Finn) Ryan Road School	Ryan Road	
	Smith College	Elm Street	
	Smith College Campus School	Prospect Street	
	Smith Vocational and Agricultural High School	Locust Street	
Houses of Worship	Blessed Sacrament Church	Elm Street	
	College Church	Pomeroy Terrace	
	Congregation B'Nai Israel	Prospect Street	
	Edwards Church	Main Street	
	Christ Science Society	4 Center Street	
	First Churches	129 Main Street	
	Kingdom Hall – Jehovah's Witness	Bridge Street	
	Northampton Friends Meeting		
	St. Elizabeth Ann Seton	King Street	
	St. John's Episcopal Church	Elm Street	
	Unitarian Society	Main Street	
Florence Congregational Church	130 Pine Street		

Facility Type	Name	Address	Purpose/Notes
Historic Buildings/ Sites	Academy of Music	274 Main Street	
	Calvin Coolidge House	Massasoit Street	
	Dimmock Estate - Grove Hill Mansion	Front Street	
	First Congregational Church	Main Street	
	Graves Avenue	8-22 Graves Avenue	
	Hampshire County Court House	Gothic Street	
	Hotel Northampton	King Street	
	Memorial Hall	Main Street	
	Northampton VA Medical Center	North Main Street	
	Sylvester Graham House	Pleasant Street	
	The Manse	Prospect Street	
	Unitarian Church	Main Street	
	West Farms Church	West Farms Street	
	Elm Street Historic District		
	Fort Hill Historic District		
	Northampton Downtown Historic District		
Pomeroy Terrace Historic District			
Large Employment Centers	Smith College	Elm Street	
	Cooley Dickinson Hospital	Elm Street	
	VA Medical Center	North Main Street	
	L-3 Harris	Prince Street/ State Route 66	
	Coca Cola	Industrial Drive	
	PCA Northampton	Mount Tom Road	
	Downtown Central Business District	Routes 5 & 9	
Libraries	Forbes Library	20 West Street	
	Lilly Library	19 Meadow Street	
	Smith College Library	Elm Street	
Gathering and Recreation Spaces	Academy of Music	274 Main Street	
	The Iron Horse	18 Center Street	

Facility Type	Name	Address	Purpose/Notes
	Northampton Center for the Arts	33 Hawley Street	
	Northampton Community Music Center	139 South Street	
	Hampshire Regional YMCA	286 Prospect Street	
	Northampton Athletic Club	306 King Street	
	The Hotel Northampton	36 King Street	
	Thornes Marketplace	150 Main Street	

## Critical Facilities in Hazard Areas

Table 36: Critical Facilities and Evacuation Routes Potentially Affected by Hazard Areas

Hazard Type	Hazard Area	Critical Facilities Affected	Evacuation Routes Affected
Flooding	Mill River Connecticut River	Should the levee system fail, the entire downtown would be flooded, including emergency operations from the police station; Part of Leeds Village Apartments senior housing is in flood zone; cell towers of Atwood Drive and Bridge Street	Route 10 in extreme conditions, Route 5; Route 66/ Rocky Hill Road at Ice Pond Road; Route 9.
Dam Failure/ Levee Breach	Varies depending on structure	Site Specific	Site Specific
Drought	Entire City	Firefighting operations	None
Extreme Temperatures	Entire City	None	None
Wildfire/ Brushfire	Spring Street Ryan Rd. Chesterfield Rd.	Site Specific	Site Specific
Invasive Species	Conservation lands, forests	Potential for increased erosion, sedimentation, heat islands, disease vectors and disease, loss of street trees	None
Hurricane/ Tropical Storm	Mill River Connecticut River	Should the levee system fail, much of downtown would be flooded	Route 10 in extreme conditions, Route 5; Route 66; Route 9.
Severe Winter Storm/ Nor'easter	Entire City	Cooley Dickinson-possible power outage Nursing Homes-Rock Ridge	Route 10 in extreme conditions, Route 5; Route 66; Route 9.
Severe Thunderstorms / Wind / Tornadoes	Entire City	Site Specific	Site Specific

Hazard Type	Hazard Area	Critical Facilities Affected	Evacuation Routes Affected
Earthquake	Entire City	Emergency operations; residential and commercial structures; emergency shelters; waste management and treatment plants	Route 91 in extreme conditions, Route 5; Route 66; Route 9.
Pandemic	Entire City	Staffing of certain critical facilities could be impacted by reduced willingness of volunteers to risk exposure.	None

## CHAPTER 5: MITIGATION STRATEGIES

One of the steps of this Hazard Mitigation Plan is to evaluate all of the City’s existing policies and practices related to natural hazards and identify potential gaps in protection. After reviewing these policies and the hazard identification and assessment, the Hazard Mitigation Committee developed a set of hazard mitigation strategies it would like to have implemented moving forward.

The City of Northampton has developed the following goal to serve as a framework for mitigation of the hazards identified in this plan. The goal addresses present-day concerns of local residents, business owners, and officials in Northampton.

### *Goal Statement*

To minimize injury and the loss of life, damage to property, and the disruption of governmental services and general business activities due to the following hazards: flooding, severe winter storm/nor’easter, severe thunderstorm/wind/tornado, hurricane/tropical storm, wildfire/brushfire, earthquake, dam failure/levee breach, extreme temperature, invasive species, drought, and pandemic.

## Existing Mitigation Capabilities and Strategies

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The City of Northampton had many mitigation capabilities in place prior to the update of this Hazard Mitigation Plan in 2025. These capabilities are described on the following pages and in Table 35. They have been evaluated in the “Effectiveness” column, and if any strategies could make them more effective, they are described in the “Potential Changes” column.

### **Flooding**

The key factors in flooding are the water capacity of water bodies and waterways, the regulation of waterways by flood control structures, and the preservation of flood storage areas and wetlands. As more land is developed, more flood storage is demanded of the city’s water bodies and waterways. The city currently addresses this problem with a variety of mitigation tools and strategies. Flood-related regulations and strategies are included in the city’s zoning ordinance, and subdivision regulations. Infrastructure like dams and culverts are in place to manage the flow of water.

### *Management Plans*

The Comprehensive Emergency Management (CEM) Plan for Northampton lists the following measures for flood planning:

- Identify areas in the community that are flood prone and define methods to minimize the risk. Review National Flood Insurance Maps.
- Disseminate emergency public information and instructions concerning flood preparedness and safety.
- Community leaders should ensure that Northampton continues to be enrolled in the National Flood Insurance Program.

- Strict adherence should be paid to land use and building codes, (e.g. Wetlands Protection Act), and new construction should not be built in flood-prone areas.
- Ensure that flood control works are in good operating condition at all times.
- Natural water storage areas should be preserved.
- Maintain plans for managing all flood emergency response activities including addressing potentially hazardous dams.

The Local Emergency Flood Plan for Northampton lists the following measures for flood planning that require action at various Connecticut River and Mill River elevations when a flood event occurs. A summary of actions include notifications to emergency dispatch, public works and closure of roads, etc. No flood planning strategies are outlined in this document.

### *Subdivision Rules and Regulations*

Northampton’s Subdivision Rules and Regulations govern the subdivision of land and were adopted for the purpose of “protecting the safety, convenience and welfare of the inhabitants of Northampton by regulating the laying out and construction of ways in subdivisions providing access to the several lots there [and]...for securing safety in the case of fire, flood, panic, and other emergencies.” The Subdivision Rules and Regulations contain several provisions that mitigate the potential for, and impact of, flooding. The City’s subdivision regulations explicitly offer standards for residential development seeking Low Impact Development (LID) option, in addition to requiring compliance to the Mass DEP Stormwater Handbook.

There is a range of regulatory techniques available to prevent flood damage in Northampton. These include:

- When a Definitive Plan is submitted, proponents must delineate natural waterways and floodways.
- All Definitive Plans must comply with the Massachusetts’ Wetlands Protection Act (Chapter 131, Section 40) and Wetlands Protection Ordinance and retain all wetlands and flood lands.
- When permitting the subdivision, the planning board must ensure that the regulations of the Water Supply Protection District are met, when the development is located within the WSP. This works to retain flood and rainwater storage capacity in Northampton’s critical waterways.
- Stormwater drainage and infiltration systems must be designed to withstand 1, 2, 10 and 100 year storms in Northampton.
- When a plan is developed and submitted to the Planning Board, all definitive plans must indicate, clearly, any floodplain lands and demonstrate compliance with the City’s Floodplain District.

### *Northampton Zoning Ordinance*

The City of Northampton has adopted several land use regulations that serve to limit or regulate development in floodplains, to manage stormwater runoff, and to protect groundwater and wetland

resources, the latter of which often provide important flood storage capacity. To review the City of Northampton's Zoning Ordinance, visit [www.northamptonma.gov/plan](http://www.northamptonma.gov/plan).

The City of Northampton has established a set of ordinances designed in part to “lessen congestion in the streets; to conserve health; to secure safety from fire, flood, panic, and other dangers” The Zoning Ordinance include several provisions that mitigate the potential for flooding, including:

- Any body of water or wet area that is proposed for filling and is proposed to receive 500 cubic yards of fill, or where the proposed area exceeds 10,000 s.f., must receive permission from the Conservation Commission and must: a) not be located within the Special Conservancy District, b) be executed within the context of existing plans, c) sufficiently document the impacts on downstream locations, d) be designed not to impair surface drainage or increase erosion, e) be designed to minimize off-site accumulation of fill materials, f) must not impair any septic disposal systems, and g) no filling shall cause water or other materials to intrude upon a neighboring property without the express permission of the neighbor.
- The site plan review process shall: have all stormwater systems approved, floodplains and water bodies must be delineated, an erosion control plan that prevents infill of water bodies must be approved, not result in water damage to surrounding properties, not result in an increase in surface water runoff from 1, 2 or 10 year storm events in the Central Business District.
- The Special Conservancy Zoning District has been created in Northampton to maintain the natural and safe flow of floodwaters, and to protect persons and property by ensuring that development does not interfere with flood storage capacity. The District also prevents the construction of residencies and the addition of fill; these preserve the natural hydrology of the City's watershed lands and provides storage areas for rain waters. Construction of new residential development is prohibited in this district within the 500-year flood plain. The 500-year flood plain is used as an estimate for the increased precipitation predicted due to climate change.
- The Farms, Forest and Rivers Overlay District (FFR) encourages the preservation of open space and caps impervious surface area at 25 percent of the total lot size. The FFR works to maintain open space and rainwater storage areas and, as such, makes the City less susceptible to damage from flooding.
- The Water Supply Protection District prohibits the use of toxic chemicals and restricts the excavation land within those lands that are critical to the City's drinking water supplies. This works to maintain natural hydrology.
- The Open Space Residential Development (OSRD) ordinance requires that 50 percent of a new subdivision (when ordinance is used) be preserved as open space. This preserves open space and can slow and store rain waters.

### *Open Space Acquisition Program*

The city purchases land area for open space either in fee or by agriculture and conservation restrictions. A quarter of the city, including its only bog, is now protected land, with about 20

percent owned by the city and the balance owned by state or federal government, or farmers or forest owners who have agreed to property restrictions. This includes floodplain and flood prone areas. Specific actions involved in the city's Open Space Acquisition Program are identification of high-risk flooding areas, working with land owners, and acquiring land in conjunction with land owners and state conservation programs.

### *River and Stream Protection*

The city of Northampton follows the standards established by the Wetlands Protection Act, which protects water bodies and wetlands through the city Conservation Commission. The city also has instituted its Wetlands Ordinance and Special Conservancy District, an overlay district that provides restrictions on use categories, the use of septic tanks and leach fields, as well as on any impacting of the flood storage capacity of the land. The city also has a Water Supply Protection District, which prohibits the use of septic tanks within the city's aquifer protection district and creates greater buffer distances from certain wetlands.

### *Stormwater Utility and Flood Control Ordinance*

Passed by the city council in 2014, the utility pays for necessary stormwater and flood control system construction and maintenance. Property owners in Northampton are billed based on the amount of stormwater runoff their land generates, with the calculation based on the amount of impervious and pervious surface on site.

### *Public Education and Outreach*

The city conducts outreach to homeowners' associations to ensure they are maintaining culverts and stormwater management areas and getting them replaced as needed. The city has been especially active in working with the Ice Pond Neighborhood Association, whose detention pond caused significant damage to a nearby road, the Tinkham Woods Neighborhood Association, whose restrictive covenants and detention pond is 30 years old, and the Saw Mill Hills Neighborhood Association, who donated some of the common land to the city for permanently protected open space and to ensure no new development would occur there that would tax the stormwater system.

### *Code RED – City's Reverse 911 Program*

Residents can sign up to receive Reverse-911 Emergency Notifications via landline, cell, text and/or email. City public safety officials send voice messages to thousands of residents and businesses within minutes with specific information about emergencies and time-sensitive local community issues including flooding, dam failure, extreme temperatures, wildfire, hurricanes and other natural disasters. Code RED has worked well for the City for more than 5 years since the previous HMP. It is well utilized by emergency management and can now target a defined area with specific messaging.

### *National Flood Insurance Program*

The National Flood Insurance Program has produced maps that identify floodways across America. Northampton is a participating member of the National Flood Insurance Program, and had the following NFIP policy and claim statistics as of June 2025:

- FIRMs have been effective since May 31, 1974 with the current map in effect since April 3, 1978. New preliminary maps are due to be released in 2025.
- Northampton has 94 in-force policies in effect for a total of \$23,299,000 worth of insurance.
- There have been a total of 74 NFIP claims for which \$692,800 has been paid. Of these claims, 61 have been residential and 13 have been non-residential.
- There have been 10 NFIP Repetitive Loss Properties in Northampton, eight of which were residential, and two non-residential. Nine of these are classified as repetitive loss and one is classified as a severe repetitive loss. There have also been two flood mitigation Assistance (FMA) Repetitive Loss Properties. One was residential and one non-residential.
- The City will maintain compliance with the NFIP throughout the next 5-year Hazard Mitigation Planning cycle by monitoring its Flood Plain Overlay District and ensuring that the district accurately reflects the 100-year flood plain and FEMA Flood Insurance Rate Map (FIRM).

The Flood Insurance Rate Maps in Hampshire County are in the process of being updated by FEMA, and draft maps will potentially be released in late 2025. When these maps are updated, the City of Northampton will adjust its zoning to accommodate changes to the location of floodplains.

### *Community Rating System*

Northampton currently participates in the National Flood Insurance Program's Community Rating System, a program based on incentivizing implementation of suggested floodplain management activities for communities who wish to more thoroughly manage or reduce the impact of flooding in their jurisdiction. Through use of the rating system (CRS rating), a community's floodplain management efforts can be evaluated for effectiveness. The rating, which indicates an above average floodplain management effort, is then factored into the premium cost for flood insurance policies sold in the community. The higher the rating achieved in that community, the greater the reduction in flood insurance premium costs for local property owners. Northampton currently has a CRS Class 8 rating, which confers up to a 20% discount on insurance premiums for NFIP policy holders in the city.

### *Flood Control Structures*

FEMA has identified the following flood control structures in Northampton: Northampton Connecticut and Mill River Flood Control Levees, constructed by the U.S. Army Corps of Engineers. The city regularly maintains these levees, floodwalls and flood control pumping stations as per U.S. Army Corps of Engineers requirements. See the Dam Failure/Levee Breach section for more detail.

### *Culvert Inventory and Prioritization*

Northampton DPW began conducting culvert assessments in 2019 using the North Atlantic Aquatic Connectivity (NAACC) assessment protocol for aquatic organism passage. Culverts were prioritized for assessments based first on their location along a coldwater fishery (CWF), and second on perennial and intermittent streams. When the NAACC Condition Assessment manual was released

later that year, DPW staff added condition assessments to their data collection process. Culverts for which sufficient data had been collected were then evaluated for geomorphic compatibility using a rapid assessment tool developed for the Vermont Agency of Natural Resources. As of the writing of this plan in 2025, most culverts on streams that are CWF have been assessed, and several of the culverts on non-CWF streams have been assessed, but more than 50 culverts throughout the city have not yet been evaluated.

#### *Northampton Open Space, Recreation, and Multiuse Trail Plan 2018-2025*

The Open Space, Recreation, and Multiuse Trail Plan inventories the City's natural features and promotes natural resource preservation in the City, including areas in the floodplain. Wetlands, aquifer recharge areas, farms, open space, rivers, streams, and brooks are addressed in the plan, which encourages forestland and farmland protection to help conserve the City's flood storage capacity.

#### *Northampton Climate Resilience & Regeneration Plan*

In 2021, the City developed Sustainable Northampton , the City's Comprehensive Plan. which will be incorporated into the City's Master Plan, Sustainable Northampton. The plan includes the Climate Resilience & Regeneration Plan, which lays out a pathway for the City to mitigate climate change, build capacity to anticipate, adapt, and thrive in a changing climate, and reduce the City's contribution to climate change. Many of these strategies include ways to improve resilience and to plan for increased climate events, like flooding.

Table 37: Existing Flood Mitigation Measures

Existing Action	Description	Area Covered	Effectiveness	Potential Changes
Comprehensive Emergency Management Plan	The CEM Plan lists the following measures for flood planning: Identify areas in the community that are flood prone, review National Flood Insurance Maps, disseminate emergency public information and instructions concerning flood preparedness and safety, adhere to land use and building codes, ensure that flood control works are in good condition, and preservation of natural are in good operating condition at all times.	Entire City.	Effective.	None.
Subdivision Rules and Regulations	Definitive plan requires delineating natural waterways and floodways. The subdivision regulations must comply with zoning protections for natural features. Subdivision drainage must be designed to withstand 1, 2 10 and 100 year storms. Utilities must be buried. Stormwater management in new development must be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates. If LID subdivision, must be compliant with DEP Stormwater Handbook and additional requirements.	Entire City.	Somewhat effective for mitigating or preventing localized flooding of roads and other infrastructure. Somewhat effective for controlling impacts from stormwater runoff. Prevents flood damage to infrastructure. Effective for preventing increased stormwater discharge.	None.
Zoning Ordinance: Site Plan Review	Requires the site plan to show erosion control, drainage facilities, stormwater runoff, no net change to water supply.	Entire City	Somewhat effective	None

Existing Action	Description	Area Covered	Effectiveness	Potential Changes
Special Conservancy	Preserves the floodplain through preventing new residential development in 500-year flood plain. Planning Board and Conservation Commission approval for construction, while allowing conservation by right. Commercial development is also severely restricted.	Area designated on Zoning Map	Effective	None
Floodplain Overlay	Preserves and protects for various commercial areas not protected by Special Conservancy District.	Area designated on Zoning Map	Somewhat effective	None
Farm, Forest and Rivers Overlay District	Protects vulnerable, sensitive and important ecosystems through requiring that all construction be sited to minimize a project's footprint on the land; allows clustering and sets a 25% maximum footprint for infrastructure.	Area designated on Zoning Map	Somewhat effective	None
Water Supply Protection District	Preserves primary and secondary recharge areas through preventing the use of hazardous chemicals—either through strict conditions or outright prohibitions.	Area designated on Zoning Map	Somewhat effective	None
Open Space Residential Development Ordinance	Allows development while conserving valuable open space.	Entire City	Effective at maintaining flood storage land.	Consider adding more specific impacts to address including topographic change, removal of cover vegetation, risk of erosion or siltation and

Existing Action	Description	Area Covered	Effectiveness	Potential Changes
				increased storm water runoff.
Open Space Acquisition Program	The City is currently purchasing about 0.5 percent of the City's land area either in fee or by agriculture and conservation restrictions. Specific actions involved in the City's Open Space Acquisition Program are identification of high-risk flooding areas, working with land owners, and acquiring land in conjunction with land owners and state conservation programs.	Areas within the 100-year Floodplain.	Effective.	None.
Wetlands Ordinance	Provides additional protection for Protects resource areas above the MA Wetlands Protection Act wetlands, including floodplains, rivers and bordering and isolated wetlands.	All wetlands and floodplains.	Effective.	None.
Stormwater Utility and Flood Control Ordinance	Charges property owners for stormwater runoff based on amount of impervious and pervious surface on their land, in order to pay for improvements to stormwater system and flood control system.	Entire City.	Effective.	None.
Northampton Open Space, Recreation, and Multiuse Trail Plan 2018 – 2025	Inventories natural features and promotes natural resource preservation in the City, including areas in the floodplain; such as wetlands, aquifer recharge areas, farms and open space, rivers, streams and brooks.	Entire City	Effective in identifying sensitive resource areas, including floodplains. Encourages forestland and farmland protection, which will help conserve the	Continue implementing the Seven-Year Action Plan strategies, particularly those dealing with

Existing Action	Description	Area Covered	Effectiveness	Potential Changes
			City's flood storage capacity.	protection of forests, farmland and floodplain forests.
Participation in the National Flood Insurance Program	As of 2025, there were 94 homeowners with flood insurance policies.	Areas identified by the FEMA maps.	Somewhat effective, provided that the City remains enrolled in the National Flood Insurance Program.	The City should consider re-applying for Community Rating System status and continue to work with MEMA regarding flood mitigation requirements.
Participate in NFIP Community Rating System (CRS)	As of 2025, the City holds a Class 8 rating, which confers up to a 20% discount on insurance premiums for NFIP policy holders in the City.	Entire City	Effective in reducing insurance premiums for NFIP policy holders.	A new Class 8 prerequisite will require communities to adopt and enforce at least a 1-foot freeboard requirement for all residential buildings constructed, substantially improved, and/or reconstructed due to substantial damage, throughout its Special Flood

Existing Action	Description	Area Covered	Effectiveness	Potential Changes
				Hazard Area (SFHA) where base flood elevations have been determined. This requirement may limit the feasibility of the city maintaining its Class 8 rating.
FEMA Risk Mapping Assessment & Planning	Discovery Report 01 inventoried local flood hazard and risks with help from city. Next phase of study includes study of riverine zones A and AE within Connecticut Watershed. Updates FIRMs.	Entire City	Effective	
Climate Resilience & Regeneration Plan	Provides for design standards and exploration of policies raising requirements for new design storm intensities and rainfall distributions, closed drainage systems, and increasing stormwater conveyance capacity through blue-green-gray infrastructure.	Entire City	Effective	The city needs to continue to implement strategies from the plan.
Maintenance of Northampton Connecticut and Mill River Flood Control Levees	The city regularly maintains the flood control levees along the Connecticut and Mill Rivers, as required by the U.S. Army Corps of Engineers. The city is currently completing studies to assess necessary improvements to this infrastructure to keep it in good maintenance.	Mill River and Connecticut River flood plains	Effective.	Improvements to flood control structures (see list of future strategies)
Maintenance of channel behind Fire Department	Department of Public Works maintains the channel behind the Fire Department to	Fire Department	Effective.	None.

Existing Action	Description	Area Covered	Effectiveness	Potential Changes
	prevent the marsh from flooding the Fire Department building.	and nearby marsh.		
Hampshire County Shelter System Concept of Operations	Shelter System Concept of Operations outlines process of which a shelter would open in Northampton based on flooding or other natural disaster. Smith Vocational HS is identified as a Primary and Animal Facility and JFK Middle School as a Secondary Facility. Smith has limited generator capacity.	Entire City	Somewhat effective.	The City is in the process of obtaining funding to install solar with battery backup at Smith Vocational, which would make the HS a more resilient shelter.
CodeRED – Reverse 911 System	Emergency Management can target messaging to certain areas or the entire city to inform of emergencies and time-sensitive community issues, like flooding.	Entire City	Effective.	Continue to increase enrollment

## **Dam Failure / Levee Breach**

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

### *Management Plans and Regulatory Measures*

The Northampton Comprehensive Emergency Management (CEM) Plan contains the following mitigation measures for dam failure:

- Develop and conduct public education programs concerning dam hazards.
- Maintain up-to-date plans to deal with threat and actual occurrence of dam over-spill or failure.
- Emergency Management and other local government agencies should familiarize themselves with technical data and other information pertinent to the dams which impact Northampton. This should include determining the probable extent and seriousness of the effect to downstream areas.
- Dams should be inspected periodically and monitored regularly.
- Repairs should be attended to promptly.
- As much as is possible burdens on faulty dams should be lessened through stream re-channeling.
- Identify dam owners.
- Determine minimum notification time for downstream areas.
- Contaminate-laden waste (including dams that hold back pollution from traveling downstream).

### *Permits Required for New Dam Construction*

Massachusetts State Law (M.G.L. Chapter 253 Section 45) regulates the construction of new dams. A permit must be obtained from the Department of Conservation and Recreation (DCR) before construction can begin. One of the permit requirements is that all local approvals or permits must be obtained. All new dams must adhere to seismic requirements set forth in the 8th Edition of the Massachusetts State Building Code.

### *Dam Inspections and Removal of Dams*

The DCR requires that dams rated as Low Hazards are inspected every ten years and dams that are rated as Significant Hazards are inspected every five years. High Hazard dams must be inspected every two years. Of the four city-owned dams in Northampton, both Middle and Lower Roberts dams are designated as high hazard dams, and the Mill River dam is designated as a significant hazard, and the Fitzgerald Lake Dam is designated as low hazard. The city dams are in good shape according to the DPW.

### *Zoning*

There is no mention made regarding the construction of new dams in Northampton.

### *Restrictions on Development*

There are no City restrictions on dam locations. The DCR issues permits for new dams and does have the authority to deny a permit if it is determined that the design and/or location of the dam is not acceptable.

### *Levee Maintenance*

The city regularly maintains the levee systems on the Mill River and Connecticut River in accordance with the U.S. Army Corps of Engineers requirements to ensure the flood control system is in good repair. It should be noted that vegetation management is usually a routine maintenance activity, however, the DPW identified that major vegetation management to maintain its levees included a significant amount of tree and wood growth removal where woody growth should not be present. The DPW is now more responsive to vegetation management after a period of time of deferred maintenance. Some other related repairs due to the deferred maintenance include floodwall concrete repair, raising the earthen levees in several areas, and other minor repairs to the both the Connecticut River and Mill River systems.

### *FEMA Levee Accreditation*

Years after the current Northampton FIRM mapping was completed, FEMA promulgated a requirement that flood control systems be accredited in accordance with certain engineering evaluations that demonstrate adequate protection for the 1% probability flood event.

In 2018, the city initiated an engineering evaluation of its levees and flood control system to establish capital improvement priorities and prepare documentation to submit to FEMA for accreditation of the system in advance of map modernization. Continuing. Initial assessment of the Hockanum Road flood control pump station is completed and Phase 1 rehabilitation designs are in progress. Condition assessment and repair of some sections of toe drains are also in progress. Future needs include, but are not limited to vegetation management at Mill and Connecticut River levees. On September 29, 2023, FEMA accepted the levee certification and determined that it met the requirements of the National Flood Insurance Program (NFIP) regulations and will show the Mill River Levee System and the Connecticut River Levee System as reducing the hazard from the base (1%-annual-chance) flood on the forthcoming FIRMs for the City of Northampton, Massachusetts

These projects are mainly paid for through the existing city stormwater enterprise fund, which is capped at \$2 million per year. However, this stormwater enterprise fund supports personnel and routine maintenance as well as drainage capital projects and is not enough for all the capital projects that may be needed going forward., and additional funding sources are being explored.

Table 38: Existing Dam Failure and Levee Breach Hazard Mitigation Measures

Existing Action	Description	Area Covered	Effectiveness	Potential Changes
Comprehensive Emergency Management Plan	The CEM Plan includes a variety of public education and regular maintenance initiatives for dam and levee safety.	Entire City	Effective	None
Permits required for new dam construction	State law requires a permit for the construction of any dam.	Entire City	Effective. Ensures dams are adequately designed.	None
Dam Inspections	DCR has an inspection schedule that is based on the hazard rating of the dam (low, medium, high hazard).	Entire City	Dams located on private land must be inspected by property owner. The City's Conservation Commission is responsible for inspecting two City-owned dams and DPW for three City-owned dams.	None
Evacuation Plans	Comprehensive evacuation plans ensure the safety of the citizens in the event of dam failure.	Inundation areas in city	Effective	None
Identification of inundation zones	Mapped inundation zones identify areas where dam breaches would result in a loss of life and damage to property.	Inundation areas in city	Effective	None
Emergency Action Plans	EAPs are in place for the two Roberts Meadows dams, which includes identification of City inundation areas	Inundation areas in city	Effective	None
Local Emergency Flood Plan	Plan lists measures that require action at various Connecticut River and Mill River elevations when a flood event occurs.	Inundation areas in city	Effective	None
Levee maintenance	The City regularly maintains the levee systems on the Mill River and Connecticut River in accordance with the U.S. Army Corps	Inundation areas in city	Effective	None

Existing Action	Description	Area Covered	Effectiveness	Potential Changes
	of Engineers requirements to ensure the flood control system is in good repair.			
Remove unnecessary City-owned dams and other manmade structures where feasible, support efforts to pursue removal of privately owned dams:	The city removed the Upper Roberts Reservoir Dam in 2018. The Office of Planning and Sustainability continues to work with private property owners and watershed organizations to progress towards removal of Mill River dams	Dam failure	Effective	None
CodeRED – Reverse 911 System	Emergency Management can target messaging to certain areas or the entire city to inform of emergencies and time-sensitive community issues, like dam failure.	Entire City	Mostly effective	Increase enrollment

## **Drought**

Although Massachusetts does not face as extreme droughts as many other places in the country, it is susceptible to dry spells and drought. There have been two severe droughts since 2020, and climate change is likely to increase the prevalence and severity of droughts. Drought can most likely be effectively mitigated in regions like the Pioneer Valley if measures are put into place, such as ensuring that groundwater is recharged.

### *State Regulations*

The city of Northampton follows the state's Water Management Act, which limits the amount of water consumption during a state-issued Water Emergency Declaration. For more information visit: [www.mass.gov/eea/agencies/massdep/water/drinking/the-massachusetts-water-management-act-program.html](http://www.mass.gov/eea/agencies/massdep/water/drinking/the-massachusetts-water-management-act-program.html).

### *City Operations*

The city of Northampton routinely works to identify and repair water system leaks. Current water loss due to leakage is less than 10 percent of the total consumption. In addition, the city installed irrigation well at Florence Field, and is also working with Smith College to determine the feasibility of irrigation wells on campus, which would further conserve the city's water supply.

Table 39: Existing Drought Mitigation Measures

Existing Action	Description	Area Covered	Effectiveness	Potential Changes
Massachusetts Water Management Act	Regulates amount of water that can be used during a Water Emergency Declaration.	Entire City	Effective	None
Identification and reduction of water system leaks	The Department of Public Works routinely inspects and repairs water system leaks.	Entire City	Effective	None
Water System Emergency Response Plan	Plan includes information about what City will do in response to water emergencies, including droughts.	Entire City	Effective	None

## **Extreme Temperatures**

A Continuity of Operations Plan outlines city government’s functions and responsibilities in a natural disaster, which includes extreme temperatures, and relocation of services during these declared disasters.

### *Zoning Ordinance*

In 2016, the city adopted a Zoning Ordinance (§350-12.3 Significant Trees) requiring that projects that meet site plan approval thresholds must replace any trees that are cut which are deemed “significant”, which is any tree of 20 inches diameter breast height (DBH) or larger or any other tree specifically identified as a specimen tree on any Tree Inventory Plan adopted by the Planning Board.

### *Northampton Community & Resilience Hub*

A Community & Resilience Hub is currently in final stages of design to renovate a selected historic building that will support Northampton residents who face chronic and acute stress due to natural and human-caused disasters, climate change, and social and economic challenges. This Hub will serve as the central location for daily coordinated services and the distribution of various resources for people currently struggling in our community. With non-profit partnerships among local service providers, food access, health care, laundry and shower facilities will be provided. Additionally, during major disruptions like a future disaster or pandemic, the Hub would provide the service and resource distribution citywide to all residents. The Hub will play a role in the planning of preparing and responding to disaster events and serve as one of the City’s cooling and warming shelter in the case of extreme temperatures.

### *City Resilience Projects*

In 2019, the Public Shade Tree Commission adopted a planting plan and planting list based on tree species that would be able to accommodate climate change and invasive species pressure. The Public Shade Tree Commission works in collaboration with the city Tree Warden and a private citizens’ group, Tree Northampton. Together they promote ecological stewardship, volunteering to support Northampton’s tree program by caring and planting trees all over the city.

In addition to the tree planting plan and revised planting list, the city continues to participate in resilient activities, such as replanting and reforesting an 80-acre golf course with money from the Significant Tree Fund and MVP grant. Additional tree planting projects for resilience include at Connecticut River Park, where Northampton Community Rowing serves as a partner in doing ongoing watering of newly planted trees.

Table 40: Existing Extreme Temperatures Mitigation Measures

Existing Action	Description	Area Covered	Effectiveness	Potential Changes
Relocation of public safety operations	The Police and Fire Departments have a relocation plan in the case of an emergency	Entire City	Effective	None
Zoning Ordinance	The City adopted a significant tree zoning ordinance in 2016	Entire City	Effective	None
Zoning Ordinance	Requires tree planting in parking lots and along street frontage	Entire City	Effective	None
CodeRED – Reverse 911 System	Emergency Management can target messaging to certain areas or the entire city to inform of emergencies and time-sensitive community issues, like extreme temperatures.	Entire City	Mostly effective	Increase enrollment in CodeRed

## **Wildfires/Brushfires**

Wildfire and brushfire mitigation strategies involve educating people about how to prevent fires from starting, as well as controlling burns within the City.

### *Management Plans*

The Northampton Comprehensive Emergency Management Plan does not include any specific information on wildfires.

### *Regulatory Measures*

**Burn Permits:** The City of Northampton does allow open burning under the guidelines of the Department of Environmental Protection. Open Burning is authorized from January 15 to May 1. Burning is permitted between the hours of 10 a.m. and 4 p.m. The Officer in Charge of the Fire Department will determine if burning will be allowed at the beginning of the shift and can suspend burning if weather conditions change.

**Subdivision Review:** The procedures for the submission of preliminary and definitive subdivision plans require that the fire department be an active participant in the review of proposed subdivision plans. This involves verifying that proficient water supplies exist and that access routes to and from a given subdivision adequately meet public safety needs.

**Public Education/Outreach:** The Northampton Fire Department maintains a public outreach program that targets children and seniors with the intention of spreading information about fire safety within these two populations. Furthermore, the City has a safety inspection program that works to ensure that fire safety standards are being met.

### *Restrictions on Development*

There are currently no restrictions on development that are based on the need to mitigate the hazards of wildfires and brushfires.

Table 41: Existing Wildfire/Brushfire Hazard Mitigation Measures

Existing Action	Description	Area Covered	Effectiveness	Potential Changes
Burn Permits	Residents are permitted to obtain burn permits over the phone. State police personnel provide information on safe burn practices.	Entire City	Effective	None
Subdivision Review: Fire Safety	The Fire Department is involved in the review of subdivision plans.	Entire City	Effective	None
	The city of Northampton has extensive public water supplies and all residents are within the City's fire prevention operations.	Entire City	Would be effective in providing for an increase in fire suppression capacity.	None
	Regulations allow lower water flows above certain elevations for sprinkler systems and water storage in houses that are not connected to city water lines.	Entire City	Effective	None
Public Education/ Outreach	The Fire Department has an ongoing educational program in the schools.	Entire City	Effective	None

## Invasive Species

The spread of invasive species is a serious concern as species ranges shift with a changing climate. People can also carry invasive plant species on their clothing if walking through trails that may be present in soils.

### Management Plans

The Open Space, Recreation & Multi-use Trails Plan offers a strategy of using volunteers to remove invasive species when exotics and non-native plants compete with local plants and degrade animal life. In 2012-2013, DCR approved Forest Management Plans for watershed forests in Northampton that identified invasive species as a threat to forest regeneration and overall forest health. Those plans provide a roadmap for future efforts to control invasive plant populations in the watershed to reduce the amount of forest cover lost to invasive plants. Among other things, the plans recommended managing invasives (bittersweet, etc.) to ensure a resilient forest that continues to provide a sustained supply of high quality water.

### Regulatory Measures

Plants and trees invasive to Massachusetts are not allowed in the Highway Business Zone, per the Zoning Ordinance. Additionally, replacement trees shall be noninvasive deciduous or coniferous trees (as defined by the city's Tree List and Planting Guidelines) planted on or off site, as approved as part of a site plan or administrative site plan, or on any city-owned property with approval by the Office of Planning and Sustainability. The City Planning and Sustainability Department supports the Boards that oversee many of the regulatory requirements of tree planting, like requirements in site plan approval, subdivision regulation, or zoning relief.

Table 42: Existing Invasive Species Mitigation Measures

Existing Action	Description	Area Covered	Effectiveness	Potential Changes
Open Space, Recreation & Multi-Use Trails Plan	Invasive plant species removal via volunteer and city collaboration	Entire City	Effective	None
Zoning Ordinance	Requirement of non-invasive trees to be planted in HB Zoning District	HB Zoning District	Effective	None
	Replacement trees shall not be noninvasive deciduous or coniferous trees as defined by the city's tree list.	Entire City	Effective	None
Subdivision Regulations	Definitive Plan requirement for a tree inventory identifying significant groups of trees or any tree over 12 inches in diameter, including species Standards for planting include a tree list for shade trees within a subdivision	Entire City	Effective	None

## **Hurricane / Tropical Storm AND Severe Thunderstorm / Wind / Tornado**

Hurricanes, severe thunderstorms, and tornadoes all generate high winds that can fell trees, down electrical wires, and generate hurtling debris. This common characteristic means that the same set of mitigation strategies applies equally to all four hazards. For example, current land development regulations, such as restrictions on the height of telecommunications towers, can help prevent wind damages from all four types of hazards. In addition to wind damage, hurricanes can generate significant flooding that damages buildings, infrastructure and threatens human lives. All of the existing mitigation measures listed in the Flooding section are also hurricane mitigation measures.

### *Management Plans*

The Comprehensive Emergency Management (CEM) Plan for Northampton includes the following mitigation measures for hurricanes, severe thunderstorms, wind, and tornadoes:

- Develop and enforce building codes to enhance structural resistance to high winds.
- Develop and disseminate emergency public information and instructions concerning disaster safety, especially guidance regarding in-home protection and evacuation procedures, and locations of public shelters.

### *Zoning*

The Telecommunications Facilities Zoning Ordinance requires that telecommunications towers be setback from adjacent property lines. This requirement prevents telecommunications facilities and ice on those facilities from falling and damaging neighboring properties.

### *Restrictions on Development*

The City's Subdivision Ordinance requires that all new subdivisions have buried utility lines.

### *Mobile Homes*

According to the Northampton Zoning Ordinance, mobile homes are not an allowed use. However, all regulations and legal protections given to victims of fires or other natural disasters must be followed, and such regulations are located in M.G.L. Chapter 40A.

### *State Building Code*

For new or recently built structures, the primary protection against wind-related damage is construction that adheres to the State Building Code, which, when followed, results in buildings that withstand high winds. The City of Northampton employs a building inspector for all inspection duties and responsibilities.

### *Flood Mitigation Strategies*

Because one of the primary impacts of hurricanes and severe thunderstorms is intense rainfall that generates flooding, all of the flood mitigation strategies discussed above are also mitigation strategies for hurricanes and severe thunderstorms.

Table 43: Existing Hurricane / Tropical Storm / Severe Thunderstorm / Wind / Tornado Mitigation Measures

Existing Action	Description	Area Covered	Effectiveness	Potential Changes
Comprehensive Emergency Management Plan	The CEM includes the following mitigation measures: 1) Develop and enforce building codes to enhance structural resistance to high winds and 2) develop and disseminate emergency public information and instructions concerning disaster safety, especially guidance regarding in-home protection and evacuation procedures, and locations of public shelters.	Entire City	Effective	None
Zoning regulations for tele-communications facilities	No facility shall exceed 220 feet in height as measured from the mean finished grade at facility base. No tower, exclusive of any attachments, shall be erected nearer to any property line than a distance equal to twice the vertical height.	Entire City	Effective	Consider adding safety and prevention of wind-related damage as a stated purpose.
Subdivision Regulations – Utilities (electric and telephone)	The City requires all utilities for new subdivisions to be underground.	Entire City	Somewhat effective for ensuring that utility service is uninterrupted by severe storms in new areas of residential development.	Work with utility companies to underground new utility lines in general and existing utility lines in locations where repetitive outages occur
Zoning Regulations regarding new mobile homes	Mobile homes are not an allowed use in all districts.	Entire City	Effective	None
State Building Code	The City of Northampton has adopted the Massachusetts State Building Code.	Entire City	Effective	None

Existing Action	Description	Area Covered	Effectiveness	Potential Changes
CodeRED – Reverse 911 System	Emergency Management can target messaging to certain areas or the entire city to inform of emergencies and time-sensitive community issues, like hurricanes and severe weather events.	Entire City	Mostly Effective	Increase enrollment in CodeRed

## Severe Winter Storm / Nor'easter

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

The city's current mitigation tools and strategies focus on preparedness, with many regulations and standards established based on safety during storm events. To the extent that some of the damages from a winter storm can be caused by flooding, flood protection mitigation measures also assist with severe snowstorms and ice storms.

### *Management Plans*

The Comprehensive Emergency Management (CEM) Plan for Northampton lists the following mitigation measure for severe winter storms:

- Develop and disseminate emergency public information concerning winter storms, especially material which instructs individuals and families how to stock their homes, prepare their vehicles, and take care of themselves during a severe winter storm.

To the extent that some of the damages from a winter storm can be caused by flooding, all of the flood protection mitigation measures undertaken by the city can also be considered as mitigation measures for severe snowstorms/ice storms.

### *Restrictions on Development*

There are no restrictions on development that are directly related to severe winter storms. However, the Subdivision Rules and Regulations do set grade limits on driveways and address frontage variances for flag lots to ensure that roads and driveways will be passable in the winter.

The City of Northampton Subdivision Rules and Regulations set grade limits on streets that are included in Section 7:01: Streets and Ways and as part of Section 7:22: Underground Utility Systems, which, although not specified as weather hazard mitigation, can serve to minimize accident potential and power loss from severe winter storms. The City of Northampton Zoning Ordinance also regulates common driveways.

### *State Building Code*

For new or recently built structures, the primary protection against snow-related damage is construction according to the State Building Code, which addresses designing buildings to withstand snow loads. Northampton has a full-time, professional building inspector on its staff.

### *Improvements to Backup Power Supply*

The city continues working to improve the electrical resiliency of its emergency facilities, in case of power loss from hazards such as snowstorms. This includes assessing the feasibility of municipal

buildings for photovoltaic facilities with battery backup. The city is also working to improve the resiliency of the energy grid that serves emergency services and critical facilities.

The Climate Resilience & Regeneration Plan lays out a pathway to retrofit, upgrade and require new constructions of buildings and energy systems that can better withstand floods, heat waves, and extreme storms. Some recommendations include the development of microgrids and distributed energy systems with battery storage, particularly to power emergency services, providing backup power if the grid fails.

Table 44: Existing Severe Winter Storm / Nor'easter Mitigation Measures

Existing Action	Description	Area Covered	Effectiveness	Potential Changes
Comprehensive Emergency Management Plan	The CEM Plan lists the following mitigation measure for severe winter storms: Develop and disseminate emergency public information concerning winter storms, especially material which instructs individuals and families how to stock their homes, prepare their vehicles, and take care of themselves during a severe winter storm.	Entire City	Effective	None
Subdivision Regulations – Design Standards for Roads Standards for Flag Lots	Standards include street grade regulations (five to eight percent maximum). Requires that snow management strategy be a clear part of the conditions to permit a flag lot.	Entire City	Effective	None
Subdivision Regulations – Utilities (electric and telephone)	The City requires all utilities for new subdivisions to be underground.	Entire City	Somewhat effective for ensuring that utility service is uninterrupted by severe storms in new areas of residential development.	Work with utility companies to underground existing utility lines in locations where repetitive outages occur.
State Building Code	Northampton follows the Massachusetts State Building Code.	Entire City	Effective	None
Resiliency of electrical grid	Implementing improvements to electrical systems of emergency facilities.	Entire City	Effective	None

Existing Action	Description	Area Covered	Effectiveness	Potential Changes
Electrical grid for emergency services	Working to ensure resiliency of microgrid for emergency service facilities, and reviewing Smith College as a model.	Entire City	Effective	None
Stretch Energy Code	The City adopted the Specialized Energy Code, which is stricter than the stretch code, resulting in buildings that will have increased energy efficiency and lower greenhouse gas emissions.	Entire City	Effective	None

## Earthquake

Although there are five mapped seismological faults in Massachusetts, there is no discernible pattern of previous earthquakes along these faults nor is there a reliable way to predict future earthquakes along these faults or in any other areas of the state. Consequently, earthquakes are arguably the most difficult natural hazard for which to plan.

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

### *Management Plans*

The Northampton Comprehensive Emergency Management Plan lists the following mitigation measures for earthquakes:

- Community leaders in cooperation with Emergency Management Personnel maintain an assessment of structures and land areas that are especially vulnerable to earthquake.
- Strict adherence should be paid to land use and earthquake resistant building codes for all new construction.
- Periodic evaluation, repair, and/or improvement should be made to older public structures.
- Emergency earthquake public information and instructions should be developed and disseminated.

### *State Building Code*

State and local building inspectors are guided by regulations put forth in the Massachusetts State Building Code. The first edition of the Massachusetts State Building Code went into effect on January 1, 1975 and included specific earthquake resistant design standards. These seismic requirements for new construction have been revised and updated over the years and are part of the current, 8th edition of the Massachusetts State Building Code. Given that most structures in Massachusetts were built before 1975, many buildings and structures do not have specific earthquake resistant design features. In addition, built areas underlain by artificial fill, sandy or clay soils are particularly vulnerable to damage during an earthquake.

### *Restrictions on Development*

There are no seismic-related restrictions on development beyond that in the building code.

*Table 45: Existing Earthquake Mitigation Measures*

Existing Action	Description	Area Covered	Effectiveness	Potential Changes
Comprehensive Emergency	The CEM Plan includes measures for earthquake preparation that include keeping an assessment of	Entire City	Effective	None.

Existing Action	Description	Area Covered	Effectiveness	Potential Changes
Management Plan	structures and land areas that are especially vulnerable to earthquakes, strict adherence to building code, periodic evaluation, repair, and/or improvement to older public structures, and dissemination of public information about how to prepare for earthquakes.			
State Building Code	The City of Northampton has adopted the 10th Edition of the State Building Code.	Entire City	Effective for new buildings only	Evaluate older structures to be used as shelters and determine if they are earthquake resistant as per 10th Edition of the State Building Code.

## Pandemic

The Comprehensive Emergency Management (CEM) Plan for Northampton includes the following mitigation measures for pandemics:

- Develop and disseminate emergency public information and instructions concerning personal health, hygiene, and sanitation.
- Developing epidemic intelligence, evaluation, prevention and detection of communicable diseases and disease control operations.
- Collection of vital statistics.

### *Northampton Resilience Hub*

Northampton is working to create a Community Resilience Hub to support Northampton residents who face chronic and acute stress due to natural and human-caused disasters, climate change, and social and economic challenges. It will serve the 1% (homeless and others under the most severe chronic stress), the 15% (below the poverty line), the 40% (housing-burdened and under chronic stress) and the 100% (those at risk of acute, but not regular, adverse events), by providing access to resource, developing a network of neighbors, and building social resilience. This Hub is proposed to coordinate the distribution of various resources and services during normal times to more challenged populations through partnership with local service providers, public private partnerships, etc.; however, during major disruptions like a future disaster or pandemic, the Hub would provide the service and resource distribution citywide to all residents as now the Hub would play a role in the planning of preparing and responding to disaster.

*Table 46: Existing Pandemic Measures*

Existing Action	Description	Area Covered	Effectiveness	Potential Changes
Comprehensive Emergency Management Plan	The CEM Plan includes measures for pandemics that include development and dissemination of public information regarding personal health and hygiene, developing epidemic intelligence and disease control operations, and collecting vital statistics.	Entire City	Effective	None

## Prioritized Implementation Plan

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Many of the action items previously identified in the 2020 Hazard Mitigation Plan are currently continuing, either because they require more time to secure funding or their construction process is ongoing. In addition, the Hazard Mitigation Committee identified several new strategies to pursue. These new strategies are based on experience with currently implemented strategies, as well as the hazard identification and risk assessment in this plan. Overall mitigation strategy priorities have not changed significantly since the last version of this plan, with specific mitigation strategies addressing all identified hazards through a combination of planning, public outreach, and infrastructure improvements. However, the urgency to address flooding issues has increased since the last plan as there have been several major incidences of flooding in the city in the last three years. There is also an increased focus on wildfire due to the increased frequency and severity of droughts, and the occurrence of a large brushfire in the Fitzgerald Lake Conservation Area in 2024.

### Prioritization Methodology

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

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

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

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

**Cost effectiveness** – in order to maximize the effect of mitigation efforts using limited funds, priority is given to strategies low-cost that would require low-cost investments by the City. For example, regular tree maintenance is a relatively low-cost operational strategy that can significantly reduce the length of time of power outages during a winter storm. Strategies that have identified potential funding streams, such as the Hazard Mitigation Grant Program, that would off-set the cost of an expensive project are also given higher priority.

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

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

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

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

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

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

## Cost Estimates

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

- **Low** – cost less than \$50,000
- **Medium** – cost between \$50,000 – \$250,000
- **High** – cost over \$250,000

Cost estimates take into account the following resources:

- City staff time for grant application and administration (based on estimated average hourly rate of city staff)
- Consultant design and construction cost (based on estimates for projects obtained from City and general knowledge of previous work in city)
- City staff time for construction, maintenance, and operation activities (based on estimated average hourly rate of city staff)

## Project Timeline

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

Table 47: Status of Previous Mitigation Strategies

	Mitigation Action	Status	Mitigation Category	Hazards Mitigated	Responsible Department/Board	Timeline	Potential Funding Source(s)	Estimated Cost	Priority
1	Continue current improvement strategies for flood control facility and implement recommendations.	Partially completed, continuing	SIP	Flooding, Hurricanes, Thunderstorms	City Council, Mayor’s Office, Department of Public Works	2 years	MVP grant, HMGP, CIP, Stormwater Utility	\$1M	High
2025 Status: Continuing. Initial assessment of Hockanum Road flood control pump station completed and Phase 1 rehabilitation design in progress. Condition assessment and repair of some sections of toe drains in progress. Future needs include, but are not limited to vegetation management at Mill and Connecticut River levees. On September 29, 2023, FEMA accepted the levee certification and determined that it met the requirements of the National Flood Insurance Program (NFIP) regulations and will show the Mill River Levee System and the Connecticut River Levee System as reducing the hazard from the base (1%-annual-chance) flood on the forthcoming FIRMs for the City of Northampton, Massachusetts									
2	Retrofit existing or install new back-up power sources at government buildings to supplement existing fuel sources with external generators and photovoltaic cells.	Partially completed, continuing	SIP	All hazards	Central Services, Emergency Management Director, Department of Public Works, Fire Department	4 years	HMGP, CIP	<\$500,000	High (formerly medium)
2025 Status: Generator installed at Police Department and at DPW/Landfill. In process of installing solar PV and battery storage at Smith Vocational High School, which would provide 72 hours of operation in a power outage and provide grid services during normal operations.									
3	Evaluate and make needed improvements to King Street Brook drainage area from Round Hill through Barrett Street marsh to the Connecticut River. Evaluate feasibility and design options to install automated debris racks at the stone arch structure	Partially completed, ongoing	SIP, NSP	Flooding, Hurricanes, Thunderstorms	Department of Public Works	4 years	MVP, HMGP	High	High
2025 Status: City completed evaluation of potential for and initial design of nature-based design at Jackson Street School to hold back some water completed using MVP funds. Short term improvements at the Barrett Street marsh beaver dam and downgradient stream completed by DPW. DPW continues to implement short-term improvements to the King Street Brook area of flooding including cleaning out of the culverts and removing beaver dams and impediments to minimize flooding to residential areas on State Street									

	Mitigation Action	Status	Mitigation Category	Hazards Mitigated	Responsible Department/Board	Timeline	Potential Funding Source(s)	Estimated Cost	Priority
	and Church Street. An assessment and conceptual design has been completed for the construction of a berm to improve flow through the culvert under the Northampton Bikeway but funding has not been determined. Additional evaluation of other improvements may be necessary.								
4	Make needed improvements to address flooding of Elm Street Brook and Williams Street Brook	Continue	SIP, NSP	Flooding, Hurricanes, Thunderstorms	Department of Public Works	4 years	HMGP funds	High	High
	2025 Status: Evaluation of potential nature-based solutions at Elm Street and elsewhere along the stream have been completed. Elm Street Brook flooding will be incrementally addressed by a new strategy to build infiltration trenches and other structures on City right of way and properties to reduce flows in the watershed. The Day Avenue Brook outfall and pipe across Damon Rd have been reconstructed and improved as part of the Damon Rd reconstruction project. Much work remains to be done to mitigate the flood problems in these two distinct watersheds.								
5	Develop a more formalized beaver management strategy to build upon current process	Partially completed, ongoing	LPR, NSP	Flooding, Hurricanes, Thunderstorms	Conservation Commission, Planning and Sustainability, Planning and Sustainability	4 years	Department of Public Works, Planning and Sustainability	Low	Medium (previously high)
	2025 Status: Ongoing, site-specific. Annual contract overseen by OPS for O&M and inspection of existing beaver exclusion devices citywide. Do on ad-hoc basis as beaver issues arise.								
6	Public education outreach for floodplain related information	Completed but ongoing	EAP	Flooding, Hurricanes, Thunderstorms.	Planning and Sustainability	Every year	Operating budget	Low	Medium
	2025 Status: The City distributes floodplain related information at the Forbes Library and does annual mailing outreach to repetitive loss areas of the floodplain and to banking and real estate services.								
7	Develop an outreach program to ensure that owners of private stormwater systems are maintaining culverts, floodwater storage areas and other stormwater management structures.	Completed but ongoing	EAP	Flooding, Hurricanes, Thunderstorms	Department of Public Works	2 years	Department of Public Works / Volunteers	Low	Medium (previously low)
	2025 Status: The DPW and Office of Planning and Sustainability will continue to monitor the status of maintenance of private stormwater systems and reach out to homeowners' associations and other owners of private stormwater systems to educate about on-going operation and maintenance responsibilities.								
8	Conduct on-going review of impacts of	9	Conduct on-going review	9	Conduct on-going review of impacts of	9	Conduct on-going review of	9	Conduct on-going review

	Mitigation Action	Status	Mitigation Category	Hazards Mitigated	Responsible Department/Board	Timeline	Potential Funding Source(s)	Estimated Cost	Priority
	climate change on people, property, and critical facilities in Northampton		of impacts of climate change on people, property, and critical facilities in Northampton		climate change on people, property, and critical facilities in Northampton		impacts of climate change on people, property, and critical facilities in Northampton		of impacts of climate change on people, property, and critical facilities in Northampton
Status: Periodic assessments as part of Northampton Resilience strategy, MVP applications, FEMA hazard mitigation plans, primarily focused on downscaling regional climate data supplementing by local information when needed. In addition the City's planning for a community and resilience hub includes understanding impacts on frontline communities. Potential for a partnership between the City, State, and other municipalities to build on the ongoing map modernization FEMA study of the watershed projecting floodplain limits in 1, 2, 10 year storms.									
9	Complete recently initiated inventory and prioritization of culvert repairs throughout the City. Upgrade, repair, or remove undersized stormwater drainage systems as appropriate.	Partially completed. Revised and ongoing	SIP	Flooding, hurricanes, thunderstorms	City Council, Mayor's Office, DPW, Planning and Sustainability	5-20 years	DPW, Planning Sust., HMGP	Very High	Medium
2025 Status: Culvert removal and upgrades are moving forward on a priority basis, with work proceeding as funding is available. Priorities also provided for culverts that have partially or completely failed.									
10	Investigate opportunities for incentivizing utility companies for undergrounding utilities. Conduct background research of similar approaches in other communities.	Not completed due to lack of staff capacity. Carry over to update	LPR	All hazards	Planning and Sustainability, PVPC	3 years	MVP, HMGP funds	Medium	Low
11	Work with local building official and Hampshire county emergency response providers to identify an earthquake-resilient regional shelter	Not completed due to lack of staff capacity, carry over to update.	LPR	Earthquake	Building Inspector, EMD, WRSHAC	2 years	FEMA, WRSHAC, Hampshire County Emergency Shelter	Low	Low

	Mitigation Action	Status	Mitigation Category	Hazards Mitigated	Responsible Department/Board	Timeline	Potential Funding Source(s)	Estimated Cost	Priority
	to comply with latest version of the building code.								
12	Educate homeowners on how to prepare for a tornado or hurricanes.	Completed but ongoing. Add flash flood events.	EAP	Tornadoes, hurricanes	Emergency Management Director, Fire Department	2 years	Western Region Homeland Security Advisory Council, Capital Budget	Low	Low
13	Achieve FEMA Accreditation of flood control system. Borings and full analysis of flood control levees underway (funded by MVP grant and stormwater utility)	Completed	SIP, LPR	Flooding, Hurricanes, Thunderstorms	City Council, Mayor's Office, Department of Public Works, Planning and Sustainability	2 years, based on FEMA mapping modernization project for the Middle Connecticut watershed	MVP, HMGP, CIP, Stormwater Utility	< \$750,000 - \$2M	High
14	Complete the toe drain inspections that were started in 2015, install new access manholes, and spot repair collapsed segments of toe drain, as needed.	Completed	SIP	Flood	Department of Public Works	2 years	Department of Public Works, EEA Dam and Seawall Repair Grant Program	\$680,000	High
15	Wastewater Treatment Plant (WWTP) upgrades in accordance with the 2016 Comprehensive Wastewater Management Plan (CWMP)	Partially completed, carry over to update	SIP	Flood, Hurricane/Tropical Storm/ Severe Wind	Department of Public Works	20 years	Department of Public Works, Clean Water State Revolving Funds (CWSRF)	FY18, \$900,000 FY21-22 \$10M	High
16	Rehabilitate the Francis P. Ryan Reservoir Dam and the West Whately Reservoir Dam to meet Office of Dam Safety requirements	In process. Design in underway, will go to permitting stage when	SIP	Flood, Dam/ Levee Failure	Department of Public Works	5 years	Department of Public Works, EEA Dam and Seawall Repair Grant Program	Approx. \$6M	High

	Mitigation Action	Status	Mitigation Category	Hazards Mitigated	Responsible Department/Board	Timeline	Potential Funding Source(s)	Estimated Cost	Priority
		acquire funding.							
17	Develop Community & Resilience Hub as a downtown physical facility with a coordinated program for frontline communities and all residents who face chronic and acute stress due to disasters, pandemics, climate change, and other social and economic challenges.	In process. Site is secured.	SIP	Pandemic, all hazards	Planning and Sustainability	5 years	HMGP, MVP, other state grants	High	High
18	Restore Rocky Hill Greenway-Pine Grove Golf Course: Restore former golf course to a natural system, removing catch basins, reservoirs, concrete blocks and other fill, and grass cover, and restoring wetlands, floodplain, natural riparian channel, and floodplain.	In process	NSP, SIP	Flood	Planning and Sustainability	5 years	HMGP, MVP, other state grants	\$1.5M	High
2025 Status: Received DER priority project designation. Partnering with DER and MassAudubon on restoration design and construction, with all necessary permits received. Updates available at <a href="https://northamptonma.gov/2587/Pine-Grove-Restoration">https://northamptonma.gov/2587/Pine-Grove-Restoration</a> . The failed culvert at Old Wilson Road will be removed in 2026, a pedestrian bridge installed, and Nashawannuck Brook restored. Funding will be sought to pursue further restoration elements.									
19	Replace Ice Pond outlet structure. Combination of natural systems enhancement and reconstruction of outlet	Completed	NSP, SIP	Flood	Planning and Sustainability	3 years	MVP for design, HMGP	\$350,000	High

	Mitigation Action	Status	Mitigation Category	Hazards Mitigated	Responsible Department/Board	Timeline	Potential Funding Source(s)	Estimated Cost	Priority
	structure to capture stormwater that is threatening and has previously damaged Rocky Hill Road/Route 66.								
20	Purchase at risk properties in floodplain. Purchase and remove structures from floodplain. Purchase other flood prone properties for permanently protected open space preservation.	Ongoing, carry over to update	LPR, NSP	Flood	Planning and Sustainability	10 years	HMGP, LAND, FLWCF	\$1 M	High
21	Public education to minimize the impact of invasive species. Continue growing an existing volunteer program to mechanically manage invasive plant populations.	Partially completed and ongoing	EAP	Invasive Species	Planning and Sustainability, Conservation Commission, DPW	2 years	Staff time, CPA	Low	Low
22	Conduct annual forest surveys on conservation lands to identify new invasive infestations and initiate rapid response efforts to control those infestations before they become established populations	Partially completed and ongoing	NSP	Invasive Species	Planning and Sustainability, Conservation Commission, DPW	5 years	Staff Time, MVP, DCR	Low-Medium	Medium

	Mitigation Action	Status	Mitigation Category	Hazards Mitigated	Responsible Department/Board	Timeline	Potential Funding Source(s)	Estimated Cost	Priority
23	Public education campaigns to minimize the impact of extreme temperature events (1) promote utility and state-funded residential insulation and air sealing incentive programs (2) promote increased use of high-efficiency air source heat pumps for residential heating and cooling, particularly to populations sensitive to extreme temperatures.	Partially completed and ongoing. Data work underway to understand cooling needs of unhoused populations.	EAP	Extreme temps	Central Services / Energy & Sustainability Commission	Annually, biennially or triennially as funding and staff time allows	Massachusetts Clean Energy Center, operating budget (staff time), utility partnership(s), resident volunteers	Low	Low
24	Increase shade trees for cooling.	Completed, but ongoing. The City has planted 200-250 trees annually.	NSP	Extreme temps	DPW	Short and long term	DPW Budget, significant tree mitigation fund, volunteers.	Medium	Medium
25	Review city and regional emergency response plans to better prepare for pandemics, recognizing how design of place for social distancing leading up to any event can impact risk levels for vulnerable populations during a pandemic. Also, review and update HMP through a new lens based on our	Partially completed and ongoing	LPR	All hazards, pandemic	Emergency Management, Planning and Sustainability, Board of Health	2 years	HMGP, FEMA	Low	High

	Mitigation Action	Status	Mitigation Category	Hazards Mitigated	Responsible Department/Board	Timeline	Potential Funding Source(s)	Estimated Cost	Priority
	experience with COVID-19.								

**Mitigation Category:**

**Local Plans and Regulations (LPR)** – These actions include government authorities, policies, or codes that influence the way land and buildings are being developed and built.

**Structure and Infrastructure Project (SIP)** - These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area, or constructing structures to reduce hazard impacts. This action could apply to public or private structures as well as critical facilities and infrastructure.

**Natural Systems Protection (NSP)** – These actions minimize damage and losses and also preserve or restore the functions of natural systems.

**Education and Awareness Programs (EAP)** – These actions inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. These actions may also include participation in national programs, such as StormReady and Firewise Communities

**Acronyms and Abbreviations:**

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

**Costs:**

Where actual project costs have been reasonably estimated:

Low < \$50,000  
 Med \$50,000 to \$250,000  
 High > \$250,000

Where actual costs cannot reasonably be established at this time:

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

Table 50: New Mitigation Strategies to Implement

	Mitigation Action	Status	Mitigation Category	Hazards Mitigated	Responsible Department/Board	Timeline	Potential Funding Source(s)	Estimated Cost	Priority
1	Continue current improvement strategies for the flood control facility.	Continued from last plan.	SIP	Flooding, Hurricanes, Thunderstorms	City Council, Mayor's Office, Department of Public Works	2026 - 2028	MVP grant, HMGP, CIP, Stormwater Utility, DPW Budget, EEA Dam and Seawall Repair Grant Program	High	High
Phase 1 upgrades in progress - major electrical upgrades, fuel storage tank replacement, and sewer line replacement. Vegetation management needed at Mill and Connecticut Rive levees.									
2	Retrofit existing or install new back-up power sources at government buildings to supplement existing fuel sources with external generators and photovoltaic cells.	Continued from last plan, in progress	SIP	Extreme heat and cold, snow/ice storms, hurricanes, tornadoes	Central Services, Emergency Management Director, Department of Public Works, Fire Department	2026 - 2029	HMGP, CIP, Climate Leaders	High	High
3	Evaluate and make needed improvements to King Street Brook drainage area	Continued from last plan, in progress	SIP, NSP	Flooding, Hurricanes, Thunderstorms	Department of Public Works	2026 - 2029	MVP, HMGP	High	High

	Mitigation Action	Status	Mitigation Category	Hazards Mitigated	Responsible Department/Board	Timeline	Potential Funding Source(s)	Estimated Cost	Priority
	from Round Hill through Barrett Street marsh to the Connecticut River. Evaluate feasibility and design options to install automated debris racks at the stone arch structure.								
DPW continues to implement short-term improvements to the King Street Brook area of flooding including cleaning out of the culverts and removing beaver dams and impediments to minimize flooding to residential areas on State Street and Church Street. An assessment and conceptual design has been completed for the construction of a berm to improve flow through the culvert under the Northampton Bikeway but funding has not been determined. Additional evaluation of other improvements may be necessary.									
4	Make needed improvements to address flooding of Elm Street Brook and Williams Street Brook	Continued from last plan, in progress	SIP, NSP	Flooding, Hurricanes, Thunderstorms	Department of Public Works	2026 - 2029	HMGP funds	High	High
5	Implement beaver management strategies to build upon current process	Continued from last plan, in progress	LPR, NSP	Flooding, Hurricanes, Thunderstorms	Conservation Commission, Planning and Sustainability, Planning and Sustainability	2026 and ongoing	Department of Public Works, Planning and Sustainability	Low	Medium (previously high)
Ongoing, site-specific. Annual contract overseen by OPS for O&M and inspection of existing beaver exclusion devices citywide. Do on ad-hoc basis as beaver issues arise.									

	Mitigation Action	Status	Mitigation Category	Hazards Mitigated	Responsible Department/Board	Timeline	Potential Funding Source(s)	Estimated Cost	Priority
6	Continue public education and outreach for floodplain related information	Continued from last plan, Ongoing	EAP	Flooding, Hurricanes, Thunderstorms	Planning and Sustainability	2026 and ongoing	Operating budget	Low	Medium
The City distributes floodplain related information at the Forbes Library and does annual mailing outreach to repetitive loss areas of the floodplain and to banking and real estate services.									
7	Develop an outreach program to ensure that owners of private stormwater systems are maintaining culverts, floodwater storage areas and other stormwater management structures.	Continued from last plan, Ongoing	EAP	Flooding, Hurricanes, Thunderstorms	Department of Public Works	2026 - 2030	Department of Public Works / Volunteers	Low	Medium
The DPW and Office of Planning and Sustainability will continue to monitor the status of maintenance of private stormwater systems and reach out to homeowners' associations and other owners of private stormwater systems to educate about on-going operation and maintenance responsibilities.									
8	Conduct on-going review of impacts of climate change on people, property, and	Continued from last plan, Ongoing	LPR	Extreme temperatures, flooding, severe storms	Planning and Sustainability	2026 and ongoing	HMGP funds	Low	Medium

	Mitigation Action	Status	Mitigation Category	Hazards Mitigated	Responsible Department/Board	Timeline	Potential Funding Source(s)	Estimated Cost	Priority
	critical facilities in Northampton								
<p>Periodic assessments as part of Northampton Resilience strategy, MVP applications, FEMA hazard mitigation plans, primarily focused on downscaling regional climate data supplementing by local information when needed. City’s planning for a community and resilience hub includes understanding impacts on frontline communities. Currently collecting data to understand cooling needs of unhoused populations and their locations. Potential for a partnership between the City, State, and other municipalities to build on the ongoing map modernization FEMA study of the watershed projecting floodplain limits in 1, 2, 10 year storms.</p>									
9	Upgrade, repair, and remove undersized stormwater drainage systems as appropriate, based on inventory and prioritization schedule.	Continued from last plan.	SIP	Flooding, hurricanes, thunderstorms	City Council, Mayor’s Office, DPW, Planning and Sustainability	2026 - 2031	DPW, Planning Sust., HMGP	Very High	Medium
<p>Upgrades and repairs of stormwater systems and culverts are ongoing based on specific needs, condition assessments and in coordination with the schedule for roadway reconstruction. In 2019, the City initiated a six year design project to redesign Main Street and improve green infrastructure to retain water longer, and added rain gardens to Pulaski Park to catch some Main Street stormwater. Additionally, the 2018 <i>Technical Memorandum-Infrastructure Resilience Strategy Recommendations for the Northampton Climate and Resiliency Plan</i> provides guidance on the specific design storm to use for determining stormwater infrastructure sizing. In 2019, Planning and Sustainability’s <i>Design with Nature</i> project assessed opportunities for nature-based solutions to hold stormwater before it reaches stormwater systems and causes flooding. Removal of culverts for drainage improvements is best practice in some cases – the culverts at Old Wilson Rd, Federal Street and Love Field will likely be removed. Failed culverts at Federal and Lovefield Streets will be studied further.</p>									
10	Investigate opportunities for incentivizing utility companies for undergrounding utilities. Conduct background	Continued from last plan.	LPR	Snow/ice storms, thunderstorm, high wind, tornadoes, hurricanes	Planning and Sustainability, PVPC	2028 - 2030	MVP, HMGP funds	Medium for research, high for implementation.	Low

	Mitigation Action	Status	Mitigation Category	Hazards Mitigated	Responsible Department/Board	Timeline	Potential Funding Source(s)	Estimated Cost	Priority
	research of similar approaches in other communities.								
11	Work with local building official and Hampshire county emergency response providers to identify an earthquake-resilient regional shelter to comply with latest version of the building code.	Continued from last plan.	LPR	Earthquakes	Building Inspector, EMD, WRSHAC	2028 - 2030	FEMA, WRSHAC, Hampshire County Emergency Shelter	Low	Low
12	Educate homeowners on how to prepare for a tornado, hurricanes, and flash floods.	Continued from last plan. Ongoing	EAP	Tornadoes, hurricanes, flooding	Emergency Management Director, Fire Department	2026 and ongoing	Western Region Homeland Security Advisory Council, Capital Budget	Low	Medium
The City's Emergency Management Coordinator is active in the Western Region Homeland Security Advisory Council, which regularly conducts public outreach programs for preparedness. These efforts will continue moving forward.									

	Mitigation Action	Status	Mitigation Category	Hazards Mitigated	Responsible Department/Board	Timeline	Potential Funding Source(s)	Estimated Cost	Priority
13	Wastewater Treatment Plant (WWTP) upgrades in accordance with the 2016 Comprehensive Wastewater Management Plan (CWMP)	Continued from last plan.	SIP	Flooding, hurricanes, severe thunderstorms	Department of Public Works	2026 - 2028	Department of Public Works, Clean Water State Revolving Funds (CWSRF)	High - \$30,000,000	High
14	Rehabilitate the Francis P. Ryan Reservoir Dam and the West Whately Reservoir Dam to meet Office of Dam Safety requirements.	Continued from last plan. Design is underway for both; will go to the permitting stage once funding acquired.	SIP	Flood, Dam/Levee Failure	Department of Public Works	2027 - 2030	Department of Public Works, EEA Dam and Seawall Repair Grant Program	High Approx. \$10M	High
15	Develop Community & Resilience Hub as downtown physical facility with coordinated program for frontline communities and residents who	Continued from last plan. Continue construction of hub.	SIP	Extreme heat and cold, pandemic, snow/ice storms	Planning and Sustainability	2026 - 2031	HMGP, MVP, other state grants	High	High

	Mitigation Action	Status	Mitigation Category	Hazards Mitigated	Responsible Department/Board	Timeline	Potential Funding Source(s)	Estimated Cost	Priority
	face chronic and acute stress due to disasters, pandemics, climate change, and other social and economic challenges.								
16	Restore Rocky Hill Greenway-Pine Grove Golf Course to a natural system, removing catch basins, reservoirs, concrete blocks and other fill, and grass cover, and restoring wetlands, floodplain, natural riparian channel, and floodplain.	Continued from last plan, underway. Received DER priority project designation . Partnering with DER and MassAudubon on restoration permitting and design.	NSP, SIP	Flooding, hurricanes, thunderstorms	Planning and Sustainability	2026 - 2031	HMGP, DER, MVP, other state grants	High \$1.5M	High
17	Purchase at risk properties in floodplain. Purchase and remove structures from floodplain.	Continued from last plan, ongoing.	LPR, NSP	Flooding, hurricanes, thunderstorms	Planning and Sustainability	2026 and ongoing	HMGP, LAND, FLWCF	High \$1 M	High

	Mitigation Action	Status	Mitigation Category	Hazards Mitigated	Responsible Department/Board	Timeline	Potential Funding Source(s)	Estimated Cost	Priority
	Purchase other flood prone properties for permanently protected open space preservation.								
18	Public education to minimize the impact of invasive species. Continue growing an existing volunteer program to mechanically manage invasive plant populations.	Continued from last plan, ongoing	EAP	Invasive Species	Planning and Sustainability, Conservation Commission, DPW	2026 and ongoing	Planning and sustainability staff time, CPA	Low	Low
19	Conduct annual forest surveys on conservation lands to identify new invasive infestations and initiate rapid response efforts to control those infestations before they become	Continued from last plan, ongoing	NSP	Invasive Species	Planning and Sustainability, Conservation Commission, DPW	2026 and ongoing	Planning and Sustainability staff time, MVP, DCR	Low-Medium	Medium

	Mitigation Action	Status	Mitigation Category	Hazards Mitigated	Responsible Department/Board	Timeline	Potential Funding Source(s)	Estimated Cost	Priority
	established populations								
20	Public education campaigns to minimize the impact of extreme temperature events, including expanded notifications about heating and cooling center availability.	Continued from last plan, ongoing	EAP	Extreme heat and cold	Central Services / Energy & Sustainability Commission	2026 - 2029	MA Clean Energy Center, MassSave, (utility partnerships), resident volunteers	Low- Medium	Low
<p>(1) promote utility and state-funded residential insulation and air sealing incentive programs</p> <p>(2) promote increased use of high-efficiency air source heat pumps for residential heating and cooling, particularly to vulnerable populations.</p>									
21	Increase shade trees for cooling.	Continued from last plan, ongoing	NSP	Extreme temps	DPW	2026 and ongoing	DPW Budget, significant tree mitigation fund, volunteers.	Medium	Medium
22	Review city and regional emergency response plans to better prepare for pandemics,	Continued from last plan, in progress.	LPR	Pandemic	Emergency Management, Planning and Sustainability, Board of Health	2026 -2027	HMGP, FEMA	Low	High

	Mitigation Action	Status	Mitigation Category	Hazards Mitigated	Responsible Department/Board	Timeline	Potential Funding Source(s)	Estimated Cost	Priority
	recognizing how social distancing can impact risk levels for vulnerable populations.								
23	Conduct outreach and education about wildfire prevention, such as how to keep homes safe and clear of debris.	New	EAP	Wildfire	Fire Department	2026 and ongoing	Fire Department Budget	Low	Medium
24	Implement drought communication plans when necessary to facilitate timely communication to officials, emergency management and the general public.	New	LPR, EAP	Drought	DPW	2026 and ongoing	DPW Water Division Budget	Low	Medium-Low
25	Install solar PV and battery storage at Smith Vocational High School, which	New	SIP	Severe snow/ice, hurricanes, tornadoes, severe	Climate Action and Project Administration	2026-2027	DOER, MVP	High	High

	Mitigation Action	Status	Mitigation Category	Hazards Mitigated	Responsible Department/Board	Timeline	Potential Funding Source(s)	Estimated Cost	Priority
	would provide 72 hours of operation in a power outage and provide grid services during normal operations.			thunderstorms , extreme temperatures					
26	Promote community engagement and involvement in Green Infrastructure (GI) efforts, such as adopting a raingarden maintenance task force, and neighborhood campaigns for planting rain gardens and other GI in yards.	New	EAP, NSP	Flooding, hurricanes, thunderstorms	Planning and Sustainability Department, DPW	2026 - 2030	Planning and Sustainability funds, DPW funds	Low	Medium

**Mitigation Category:**

**Local Plans and Regulations (LPR)** – These actions include government authorities, policies, or codes that influence the way land and buildings are being developed and built.

**Structure and Infrastructure Project (SIP)** - These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area, or constructing structures to reduce hazard impacts. This action could apply to public or private structures as well as critical facilities and infrastructure.

**Natural Systems Protection (NSP)** – These actions minimize damage and losses and also preserve or restore the functions of natural systems.

**Education and Awareness Programs (EAP)** – These actions inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. These actions may also include participation in national programs, such as StormReady and Firewise Communities

*Acronyms and Abbreviations:*

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

*Costs:*

*Where actual project costs have been reasonably estimated:*

Low < \$50,000  
Med \$50,000 to \$250,000  
High > \$250,000

## CHAPTER 6: PLAN REVIEW, EVALUATION, IMPLEMENTATION, AND ADOPTION

### Plan Adoption

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Upon completion of the draft Hazard Mitigation Plan, a public meeting was held on \_\_\_\_\_ to receive comments. The Hazard Mitigation Plan was then submitted to the Massachusetts Emergency Management Agency (MEMA) and the Federal Emergency Management Agency for their review. Upon receiving conditional approval of the plan by FEMA, the plan was presented to the Northampton City Council and adopted.

### Plan Implementation

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The implementation of this plan begins upon its approval by FEMA and formal adoption by the City Council. Those City departments and boards responsible for ensuring the development of policies, ordinance revisions, and programs as described in Sections 5 and 6 of this plan will be notified of their responsibilities immediately following approval. The Hazard Mitigation Committee will oversee the implementation of the plan.

### Incorporation with Other Planning Documents

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During yearly update meetings for the Hazard Mitigation Plan, the Hazard Mitigation Committee will review whether any of the plans or documents listed below are in the process of being updated or revised, as well as whether any new plans are being developed. If so, the Hazard Mitigation Committee will provide the Hazard Mitigation Plan to relevant City staff and brief them on the contents of the Plan, and work with them on incorporating the data and actions from the plan into their planning efforts. The Hazard Mitigation Committee will also review current City programs and policies to ensure that they are consistent with the mitigation strategies described in this plan.

- Comprehensive Emergency Management Plan
- Zoning Ordinance and Subdivision Regulations
- Open Space, Recreation, and Multiuse Trail Plan updates
- Sustainable Northampton Comprehensive Plan
- Future updates of the City of Northampton Community Resilience Building Workshop Summary of Findings
- Northampton Climate Resilience and Regeneration Plan

After this plan has been approved by both FEMA and adopted by the local government, links to the plan will be emailed to all City 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.

## Plan Monitoring and Evaluation

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The measure of success of the Northampton Hazard Mitigation Plan will be the number of identified mitigation strategies implemented. In order for the city to become more disaster resilient, there must be a coordinated effort between elected officials, appointed bodies, city employees, regional and state agencies involved in natural hazard mitigation, and the general public.

The Northampton Hazard Mitigation Committee will meet on an annual basis or as needed (i.e., following a natural disaster) to monitor the progress of implementation, evaluate the success or failure of implemented recommendations, and brainstorm for strategies to remove obstacles to implementation. As the Hazard Mitigation Plan is monitored and evaluated, the Committee will add information about hazard events / disasters that have occurred in the prior planning year in order to avoid missing them in the next update.

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

### *Plan Mission and Goal*

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

### *Hazard Identification and Risk Assessment*

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

### *Existing Mitigation Strategies*

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

### *Proposed Mitigation Strategies*

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

### *Review of the Plan and Integration with Other Planning Documents*

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

Following these discussions, it is anticipated that the committee may decide to reassign the roles and responsibilities for implementing mitigation strategies to different city departments and/or revise the estimated costs, timelines for implementation, or priority of one or more proposed action. The committee will review and update the plan every year, beginning in 2026. The meetings of the committee will be organized and facilitated by Planning and Sustainability. Public participation will be a critical component of the Hazard Mitigation Plan maintenance process. The Hazard Mitigation Committee will hold all meetings in accordance with Massachusetts open meeting laws. Hard copies of the plan will be available in City Hall and at Forbes Library. Any proposed amendments resulting from annual Committee meetings will be advertised and posted on the city's website and the Planning and Sustainability listserv newsletter. Any changes will be preceded by a public hearing and solicitation of public comments.

# CHAPTER 7: APPENDICES

## Appendix A: Documentation of the Planning Process

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### Committee Meeting Agendas and Records of Attendance

Northampton Hazard Mitigation Plan Update Steering Committee

#### Meeting #1 Agenda

Virtual Zoom Meeting

June 4, 2025

1. Introductions
2. Overview of Hazard Mitigation Planning Process (see HMP Overview.doc)
  - a. What is Hazard Mitigation Planning
  - b. Planning process and requirements
    - a. Items to be reviewed/ updated from current HMP
      1. Recent and planned development projects
      2. History of natural hazards in last 5 years
      3. Critical facilities inventory and map
      4. Hazard risk assessments
      5. Mitigation capabilities
      6. Status of previously identified mitigation strategies
      7. New mitigation strategies
    - b. Build on the lessons learned from recent planning
      1. MVP planning and action grants
      2. Northampton Climate Resiliency and Regeneration Plan
3. Confirm which hazards to include in the plan and review/update the location, probability of occurrence, impact and hazard risk index for each.
4. Confirm/Update Planning Goal: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to the following hazards: flooding, severe snowstorms/ice storms, severe thunderstorms, hurricanes, tornadoes, wildfires/brushfires, earthquakes, dam failures, and drought.
5. Schedule next meeting and discuss format

#### Attendees:

Sarah LaValley  
Matthew Lemberg  
Tony Kusnierz  
Doug McDonald  
James Thompson

## Northampton Hazard Mitigation Plan Update Steering Committee

### **Meeting #2 Agenda**

Virtual Zoom Meeting

June 17, 2025

1. Review and update Critical Facilities
2. Update occurrences of previous hazards
3. Discuss public meeting format and schedule
4. Schedule next committee meeting

### **Attendees**

Sarah LaValley

Matthew Lemberg

Tony Kusnierz

Doug McDonald

James Thompson

Katie Deppen

## Northampton Hazard Mitigation Plan Update Steering Committee

### **Meeting #3 Agenda**

Virtual Zoom Meeting

July 31, 2025

1. Review updates to previous occurrences and impacts of hazards
2. Review and update mitigation capabilities worksheet/table
3. Update the status of previous mitigation strategies
4. If time, discuss new strategies to implement

### **Attendees**

Sarah LaValley

Matthew Lemberg

Tony Kusnierz

Doug McDonald

James Thompson

Katie Deppen

## Public Meeting Documentation

Public Meeting #1 Press Release:

### **MEDIA RELEASE**

FOR IMMEDIATE RELEASE

July 24, 2025

Contact: Kate Norton, [publicaffairs@pvpc.org](mailto:publicaffairs@pvpc.org), 617-838-6083

### **City of Northampton to hold Public Engagement Event for Hazard Mitigation Plan**

**NORTHAMPTON** – Residents, businesses, and surrounding community members are invited to provide input on the City of Northampton Hazard Mitigation Plan at a public meeting on August 5 at 6 p.m. at the Northampton Senior Center. The Senior Center is located at 67 Conz Street, Northampton. Attendees will learn about what the city is doing to prepare for natural hazards and the impacts of climate change and have the opportunity to share ideas and concerns.

The purpose of the Hazard Mitigation Plan (HMP) is to assess Northampton’s risks from natural hazards and climate change impacts, and provide an action plan to reduce the city’s vulnerabilities. The Hazard Mitigation Plan is being completed by the City of Northampton with assistance from the Pioneer Valley Planning Commission (PVPC) and is funded by the Federal Emergency Management Agency (FEMA). Upon completion, the plan will be submitted to the Massachusetts Emergency Management Agency (MEMA) and FEMA for review and approval. A FEMA-approved HMP makes the community eligible for federal and state mitigation grant funding.

The meeting will include a discussion of natural hazards and climate impacts in Northampton, and the hazard mitigation planning process. Municipal officials and PVPC staff will be available to answer questions and respond to input about this project. The meeting provides an opportunity for community members to share feedback that will be incorporated into the plan. All members of the public, representatives from surrounding communities, and other interested parties are invited to attend the event.

For more information about this event, please contact PVPC’s Mimi Kaplan at [mkaplan@pvpc.org](mailto:mkaplan@pvpc.org) or (413) 781-6045.

Public Meeting #1 Presentation:

**NORTHAMPTON HAZARD MITIGATION PLAN (HMP) PUBLIC MEETING**  
AUGUST 5, 2025

1

**MITIGATION VS. PREPAREDNESS**

Hazard Mitigation	Emergency Preparedness
Planning and zoning	Evacuation plans and emergency shelters
Open space preservation	Radio communications equipment
Education and outreach	Emergency response drills
Infrastructure improvements	

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**THANK YOU TO THE COMMITTEE**

- Sarah LaValley – Assistant Director of Planning and Sustainability
- Victor Caputo – Captain of Administration, Northampton Police
- Donna LaScola – Director of Public Works
- Tony Kuzniars – Supervisor of School Maintenance
- Kevin Ross – Building Commissioner
- Matthew Lemberg – EHS Division Chief and Assistant Fire Chief
- Kelly Schuetz – Emergency Dispatch Director
- Kade Deppen – Director, Central Services
- Doug McDonald – Stormwater Manager
- James Thompson – GIS Coordinator

2

**BENEFITS OF UPDATING THE HAZARD MITIGATION PLAN**

- Makes communities eligible to apply for Hazard Mitigation funds from FEMA
- Identifies cost-effective actions to reduce risk
- Helps communities prevent future losses and save money on disasters
- Makes communities more resilient to natural hazards and impacts of climate change
- Increases awareness of hazards and risks
- Can save lives!

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**WHAT IS HAZARD MITIGATION?**

**FEMA** “Any sustained action taken to reduce or eliminate long-term risk to people and property from natural hazards.”

**Examples:**

- Limiting development in high-risk areas
- Retrofitting structures to protect them from floods, high winds, etc.
- Drainage and flood control projects
- Fire safety education

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**COMPONENTS OF A HAZARD MITIGATION PLAN**

1. Hazard identification and description
2. Identification/mapping of critical infrastructure
3. Risk Assessment - how hazards impact buildings, property, and residents, especially vulnerable populations
4. Assessment of City's mitigation capabilities
5. Review of previous mitigation strategies and identification of new mitigation strategies

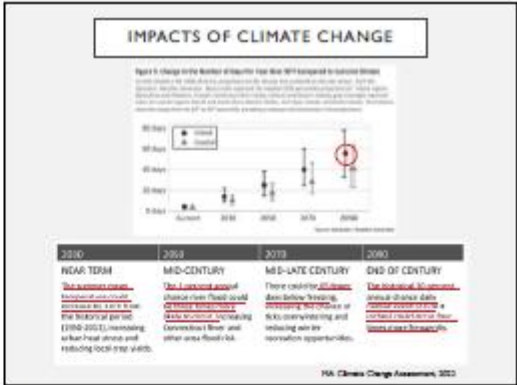
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### NATURAL HAZARD RISK ANALYSIS

Table 6 Hazard Identification and Analysis by Performance

Hazard	Location of Occurrence	Probability of Future Events	Impact	Level of Risk
Flooding	Proximal	High	Critical (not) loss of life; transportation impacts	2 - High Risk
Dam Failure (Lower Reach)	Proximal	Low	0 - None	3 - Medium Risk
Drought	Large	Moderate	Water	4 - Low Risk
Extreme Temperature	Large	High	Gridlock	2 - High Risk
Wildfire (Bluebird)	Proximal	Moderate	Water	3 - Medium Risk
Extreme Spring	Proximal	High	Water	4 - Low Risk
Hurricane/Tropical Storm	Large	Moderate	Gridlock	3 - Medium Risk
Severe Winter Storm (Ice Storm)	Large	High	Gridlock	3 - Medium Risk
Severe Winter Storm (Blizzard)	Small	Severe (occasional)	Gridlock	Severe (occasional)
Severe Winter Storm (Blizzard) - To 2000 (Risky)		Moderate		4 - Low Risk
Wildfire (To 2000)		Highly Probable		Medium Risk
		Frequent		Low Risk
		Low		4 - Low Risk
Earthquake	Large	Low	Gridlock	4 - Low Risk
Proximal	Large	Low	0 - None	3 - Medium Risk

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### TOP HAZARD CONCERNS IN NORTHAMPTON

- Localized flooding from heavy rains in numerous locations
- Riverine flooding from the Connecticut and Mill Rivers
- Potential serious flooding from hurricanes and tropical storms

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### MOST URGENT IMPACTS OF CLIMATE CHANGE FOR THE CONNECTICUT RIVER VALLEY

Human	Infrastructure	Natural Resources	Government	Industry
<p><b>Reduction in Food Safety and Security</b> due to production and supply chain issues, as well as damage during power outages.</p> <p><b>Health Impacts of Extreme Events and Power Outages</b>, including from injuries, food safety, and medical device failure.</p>	<p><b>Damage to Inland Buildings</b> from heavy rainfall and overwhelmed drainage systems.</p> <p><b>Damage to Electric Transmission and Utility Distribution Infrastructure</b> associated with heat stress and extreme events.</p>	<p><b>Shifting Distribution of Native and Invasive Species</b> as changing climate conditions favor certain species.</p> <p><b>Freshwater Ecosystem Degradation</b> due to warming waters, drought, and increased runoff.</p> <p><b>Forest Health Degradation</b> from warming temperatures, changing precipitation, intense storms, and increasing pest occurrences.</p>	<p><b>Increase in Costs of Responding to Climate Migration</b>, including planning for abrupt increases in local populations.</p> <p><b>Reduction in State and Municipal Revenue</b>, including a reduced property tax base due to inland flood risk.</p>	<p><b>Decrease in Agricultural Productivity</b> as crop yields are impacted by irrigation patterns, extreme weather, pests, and other climate factors.</p> <p><b>Reduction in the Availability of Affordable Housing</b> from direct damage (e.g., flooding) and the cost of increased demand.</p>

2022 NA Climate Change Assessment

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### TOP HAZARD CONCERNS IN NORTHAMPTON

- More frequent droughts, leading to increased risk of brush fires and impacts to agriculture
- Health impacts from increases in severity and frequency of extreme heat days and heat waves, especially to vulnerable populations.
- Power outages from high winds and snowfalls
- Increase in invasive insects and plants damaging native ecosystems and raising hazard risks

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### CRITICAL FACILITIES AND POPULATIONS/ASSETS TO PROTECT

- Fire and Police Stations, Emergency Operations Centers, Emergency Response Teams
- Emergency Shelters, Cooling and Warming Centers
- Utilities - Power grid, Water supply/Wastewater treatment
- Communication facilities
- Health care facilities,
- Custodial care facilities, Schools
- Vulnerable population housing
- Large places of employment
- Historic structures

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### HIGH PRIORITY MITIGATION STRATEGIES UNDERWAY OR COMPLETED

- Continue current improvement strategies for flood control facility and implement recommendations – underway, City has applied for funding.
- Achieve FEMA Accreditation of flood control system. Borings and full analysis of flood control levees – Completed.
- Retrofits existing or install new back-up power sources at government buildings to supplement existing fuel sources with external generators and photovoltaic cells. - underway



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### PUBLIC COMMENT

- What are your concerns about natural hazards and climate change impacts in Northampton?
- Thoughts about mitigation actions?
- Other questions or comments?



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### HIGH PRIORITY MITIGATION STRATEGIES UNDERWAY OR COMPLETED

- Rehabilitate Francis P. Ryan Dam and West Whately Reservoir Dam to meet Office of Dam Safety requirements. Design is underway, seeking funding for permitting stage.
- Wastewater Treatment Plant (WWTP) upgrades in accordance with the 2016 Comprehensive Wastewater Management Plan (CWMP) - underway
- Reconstruct Ice Pond outlet structure to reduce flooding on Rocky Hill Rd/Route 66– Completed with FEMA funding.
- Purchase at-risk properties in floodplains. (Pine Grove Golf Course, for example) - ongoing



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### THANK YOU!

CONTACT INFORMATION:  
MIMI KAPLAN  
PIONEER VALLEY PLANNING  
COMMISSION  
MKAPLAN@PVPC.ORG  
413-285-1188

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### HMP UPDATE - NEXT STEPS

- PVPC Completes Draft Plan with input from committee
- Hold Second Public Meeting
- Submit Plan to MEMA/revise as needed
- Submit Plan to FEMA/Revise as needed
- FEMA Approval
- City Council adopts
- City eligible to apply for funds from FEMA



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## **Northampton Hazard Mitigation Plan Update**

### **Public Meeting #2**

Virtual Zoom Meeting

June 22, 2020, 6:30 p.m.

#### **Agenda**

1. Welcome and introductions
2. Presentation of Draft Hazard Mitigation Plan Update
  - a. Review of Mitigation Strategy
3. Next Steps

#### **Attendance**

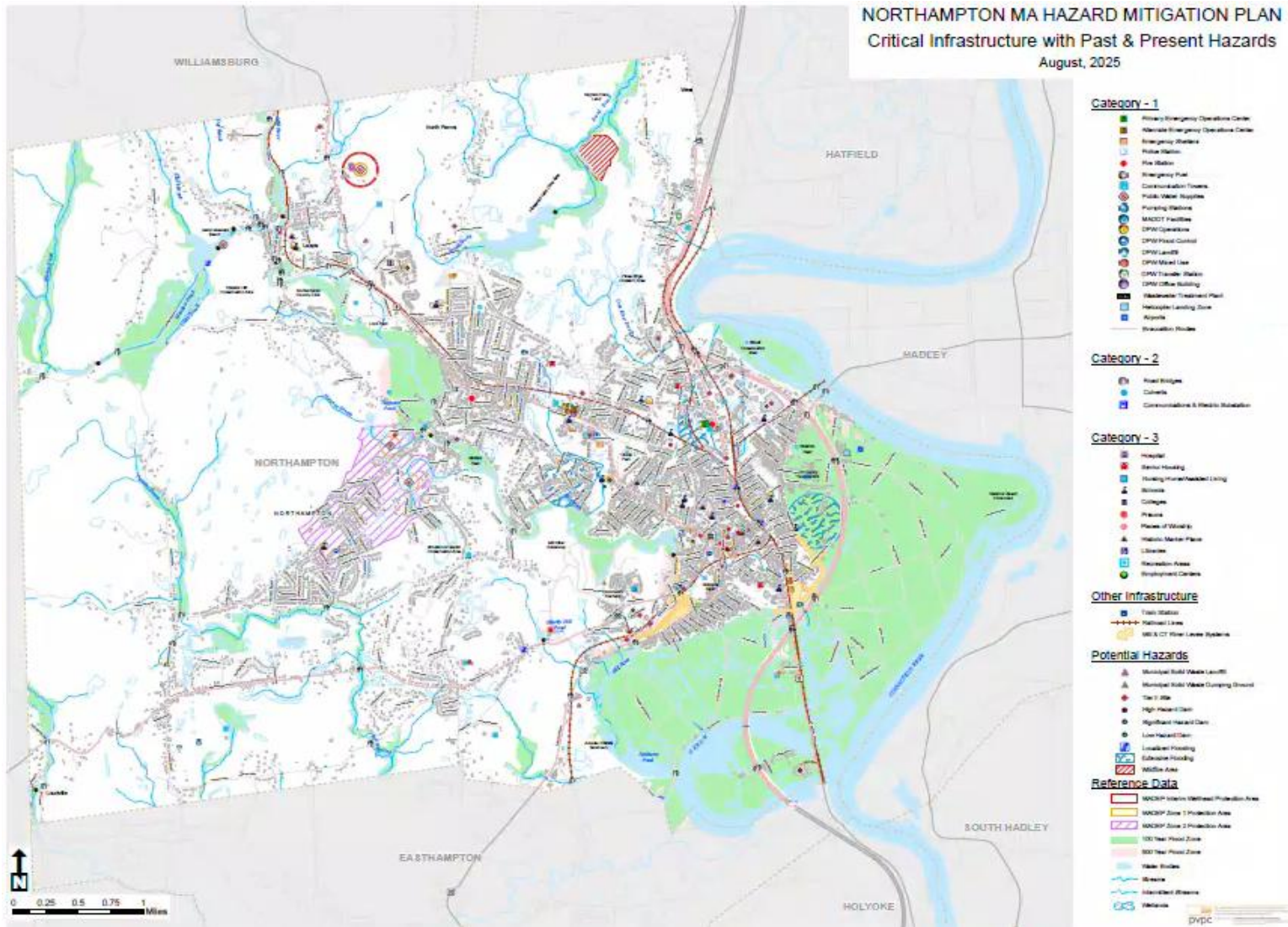
- Fred Zimnoch, Ward3
- David Veleta, DPW
- Andrew Peli, Northampton Fire
- Wayne Feiden, Planning & Sustainability
- Sarah LaValley, Planning & Sustainability
- Louis Hasbrouck, Northampton Building Department
- George Kohout, Planning Board
- Doug McDonald, DPW
- David Veleta, DPW
- Catherine Ratte PVPC
- Ken Comia PVPC

## Media and Press Release



Public Meeting #2 Presentation

# Appendix B – Past and Potential Hazards / Critical Facilities Map



## Appendix C: List of Acronyms

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CCRP	Northampton Climate Resilience and Regeneration Plan
CDC	Center for Disease Control
CEM	Community Emergency Management
CIS	FEMA Community Information System
COVID-19	Coronavirus Disease
CRB	Community Resilience Building
CRS	Community Rating System
DCR	Department of Conservation and Recreation
DPW	Northampton Department of Public Works
EOC	Emergency Operations Center
EOP	Emergency Operations Plan
FEMA	Federal Emergency Management Agency
FFR	Farms, Forest and Rivers Overlay District
FIRM	Flood Insurance Rate Maps
FMA	Flood Mitigation Assistance Program
FRTA	Franklin Regional Transit Authority
HMGP	Hazard Mitigation Grant Program
LEP	Limited English Proficiency
LID	Low Impact Development
MassDEP	Massachusetts Department of Environmental Protection
MassDOT	Massachusetts Department of Transportation
MassGIS	Massachusetts Bureau of Geographic Information
MAVEN	Massachusetts Viral Epidemiological Network
MEMA	Massachusetts Emergency Management Agency
MVP	Municipal Vulnerability Preparedness
NAACC	North Atlantic Aquatic Connectivity
NE CASC	Northeast Climate Adaptation Science Center
NFIP	National Flood Insurance Program
NOAA	National Oceanographic and Atmospheric Administration
OSRD	Open Space Residential Development
PDM	Pre-Disaster Mitigation Program
PVPC	Pioneer Valley Planning Commission
PVTA	Pioneer Valley Transit Authority
RiskMAP	FEMA Risk Mapping, Assessment, and Planning
SFHA	Special Flood Hazard Area
SHMCAP	State Hazard Mitigation and Climate Adaptation Plan
SRO	Single Room Occupancy
THIRA	Threat Identification and Risk Assessment
WHO	World Health Organization
WRHSAC	Western Region Homeland Security Advisory Council

## Appendix D – Technical Resources

### Agencies

Agency	Phone
Massachusetts Emergency Management Agency (MEMA)	(508) 820-2000
Hazard Mitigation Section	(617) 626-1356
Federal Emergency Management Agency (FEMA)	(617) 223-4175
Berkshire Regional Planning Commission (BRPC)	(413) 442-1521
Franklin Regional Council of Governments (FRCOG)	(413) 774-3167
Metropolitan Area Planning Council (MAPC)	(617) 451-2770
Pioneer Valley Planning Commission (PVPC)	(413) 781-6045
MA Board of Building Regulations & Standards (BBRS)	(617) 227-1754
DCR Water Supply Protection	(617) 626-1379
DCR Waterways	(617) 626-1371
DCR Office of Dam Safety	(508) 792-7716
DFW Riverways	(617) 626-1540
MA Dept. of Housing & Community Development	(617) 573-1100
Woods Hole Oceanographic Institute	(508) 457-2180
UMass-Amherst Cooperative Extension	(413) 545-4800
National Fire Protection Association (NFPA)	(617) 770-3000
New England Disaster Recovery Information X-Change (NEDRIX – an association of private companies & industries involved in disaster recovery planning)	(781) 485-0279
MA Board of Library Commissioners	(617) 725-1860
MA Highway Dept District 1	(413) 582-0599
MA Division of Marine Fisheries	(617) 626-1520
MA Division of Capital & Asset Management (DCAM)	(617) 727-4050
University of Massachusetts/Amherst	(413) 545-0111
Natural Resources Conservation Services (NRCS)	(413) 253-4350
MA Historical Commission	(617) 727-8470
U.S. Army Corps of Engineers	(978) 318-8502
Northeast States Emergency Consortium Inc. (NESEC)	(781) 224-9876

Agency	Phone
National Oceanic and Atmospheric Administration: National Weather Service	(508) 824-5116
US Department of the Interior: US Fish and Wildlife Service	(413) 253-8200
US Geological Survey	(508) 490-5000

## Mitigation Funding Resources

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

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

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

Energy	Department of Energy Resources (DOER)	The DOER provides grant funding for clean energy-related programs.	None
Energy	Green Communities Designation and Grant Program	Provides a road map along with financial and technical support to municipalities that pledge to cut municipal energy and meet other criteria.	Towns must be designated Green Communities in order to apply for funding.
Environment	Community Forest Grant Program	Funding to establish community forests.	None
Environment, Flood Mitigation	Culvert Replacement Municipal Assistance Grant Program	Grant to replace undersized, perched, and/or degraded culverts located in an area of high ecological value.	Culvert replacements must meet Massachusetts Stream Crossing Standards to the maximum extent feasible.
Environment	US Forest Service Community Forest Grant Program	Funding to acquire private forest land threatened by conversion and establish community forests.	None
Environment	Land Conservation Assistance Grant Program	Provides funding for property appraisals, OSRPs, other land conservation planning.	None
Environment	604b Grant Program	Water quality assessment and management planning.	None
Environment	Land Use Planning Grants	Support effort to plan, regulate, and act to conserve and develop land consistent with the Massachusetts' Sustainable Development Principles.	None
Environment	LAND Grant Program (Division of Conservation Services)	Helps cities and towns acquire land for conservation and passive recreation.	Municipality must have an approved OSRP
Environment	Federal Land & Water Conservation Fund (DCS)	Funding for the acquisition, development, and renovation of parks, trails, and conservation areas.	Municipality must have an approved OSRP
Environment	MassTrails Program	Trail protection, construction, and stewardship projects.	None

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

## Internet Resources

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

Sponsor	Website	Description
		details of recent impacts.
National Severe Storms Laboratory	<a href="http://www.nssl.uoknor.edu/">http://www.nssl.uoknor.edu/</a>	Information about and tracking of severe storms.
Independent Insurance Agents of America IIAA Natural Disaster Risk Map	<a href="http://www.iaa.iix.com/ndcmap.html">http://www.iaa.iix.com/ndcmap.html</a>	A multi-disaster risk map.
Earth Satellite Corporation	<a href="http://www.earthsat.com/">http://www.earthsat.com/</a>	Flood risk maps searchable by state.
USDA Forest Service Web	<a href="http://www.fs.fed.us/land">http://www.fs.fed.us/land</a>	Information on forest fires and land management.