TOWN OF LYNNFIELD HAZARD MITIGATION PLAN 2025 UPDATE

Draft Plan
September 22, 2025

Prepared for:
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This plan was prepared for the Town of Lynnfield by the Metropolitan Area Planning Council (MAPC) under the direction of the Massachusetts Emergency Management Agency (MEMA) and the Massachusetts Department of Conservation and Recreation (DCR). The plan was funded by the Federal Emergency Management Agency's (FEMA) Pre-Disaster Mitigation (PDM) Grant Program.

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Public Meeting Participants and Community Stakeholders
Special thanks to the public meeting participants, residents, and community stakeholders who provided feedback.

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SECTION1. EXECUTIVE SUMMARY

Hazard Mitigation planning is a proactive effort to identify actions that can be taken to reduce the dangers to life and property from natural hazard events. In the communities of the Boston region of Massachusetts, hazard mitigation planning tends to focus most on flooding, the most likely natural hazard to impact these communities. Other common concerns are the impacts of extreme heat, drought, and nor'easters. This plan also considers how our changing climate will affect natural hazards. Warming temperatures will fuel changing precipitation patterns and an increasing frequency and intensity of severe storms. The Federal Disaster Mitigation Act of 2000 requires all municipalities that wish to be eligible to receive FEMA funding for hazard mitigation grants, to adopt a local multi-hazard mitigation plan and update this plan in five year intervals.

PLANNING PROCESS

Hazard Mitigation planning is a proactive effort to identify actions that can be taken to reduce the dangers to life and property from natural hazard events. In the communities of the Boston region of Massachusetts, hazard mitigation planning tends to focus most on flooding, the most likely natural hazard to impact these communities. However, the plan focuses on all categories of natural hazards that could potentially affect the community, including those that infrequently occur.

The Federal Disaster Mitigation Act of 2000 requires all municipalities that wish to be eligible to receive FEMA funding for hazard mitigation grants, such as Building Resilient Infrastructure and Communities (BRIC) and Flood Mitigation Assistance (FMA) to adopt a local multi-hazard mitigation plan and update this plan in five-year intervals.

This is an update of the 2018 Lynnfield Hazard Mitigation Plan, which was adopted by the Lynnfield Select Board on June 18, 2018.

Planning for this Hazard Mitigation Plan update was led by the Lynnfield Local Hazard Mitigation Team, composed of staff from a number of different Town Departments. This team met on the following dates focusing on various aspects of developing the updated plan:

Date	Topic of Discussion
July 15, 2024	Identify and map Critical Facilities, Local Hazard Areas, and Development
October 24, 2024	Review/update Existing Mitigation Measures and Hazard Mitigation Goals
February 25, 2025	Review the status of recommended mitigation measures from the 2018 plan
June 26, 2025	Review and finalize the mitigation strategy for the 2025 updated plan

Public participation in this planning process is important for improving awareness of the potential impacts of natural hazards and to build support for the actions the Town takes to

mitigate them. Lynnfield Emergency Management Agency (LEMA) hosted the first public meeting on January 27, 2025 and the second public meeting was hosted by the Lynnfield Select Board on September 22, 2025. The draft plan was posted online for public review, and a dedicated project email, LynnfieldResilience@MAPC.org, was set up to receive public comments and questions. Town didn't receive any particular comments through the email.

Key town stakeholders and neighboring communities were notified and invited to review the draft plan and submit comments. Although Lynnfield does not have any Environmental Justice areas identified by the Executive Office of Energy and Environmental Justice, there are residents more vulnerable to natural hazards such as the elderly. Several service organizations representing this population were notified and invited to participate, including:

- Council on Aging
- Greater Lynn Senior Services
- Lynnfield Housing Authority
- Veteran's Agent – Town of Lynnfield
- LIFE
- Lynnfield for Love
- A Healthy Lynnfield

See Documentation of Public Meetings in Appendix C.

RISK ASSESSMENT

The Lynnfield Hazard Mitigation Plan assesses the potential impacts to the Town from flooding, high winds, winter storms, brush fire, geologic hazards, extreme temperatures, and drought. Flooding, driven by hurricanes, northeasters and other storms, clearly presents the greatest hazard to the Town. These are described in Section 4 and the locations of hazard areas are shown on the map series in Appendix A.

The Lynnfield Local Hazard Mitigation Planning Team identified 32 Critical Facilities. These are also shown on the map series and listed in Table 20, identifying which facilities are located within the mapped hazard zones.

HAZARD MITIGATION GOALS

The Lynnfield Hazard Mitigation Team reviewed and discussed the goals from the previous 2018 Hazard Mitigation Plan. The Team modified the goals to reflect a more comprehensive approach and to incorporate climate resiliency for this 2025 plan update. Goals 5 through 14 were added by the local team for this updated plan. All of the goals are considered critical for the Town, and they are not listed in order of importance.

1. Prevent and reduce the loss of life, injury, public health impacts and property damages resulting from all identified natural hazards.

2. Build and enhance local mitigation capabilities to ensure individual safety, reduce damage to public and private property and ensure continuity of emergency services.

3. Increase cooperation and coordination among private entities, Town officials and Boards, State agencies and Federal agencies.

4. Increase awareness of the benefits of hazard mitigation through outreach and education.

5. Identify and seek funding for measures to mitigate or eliminate such known significant flood hazard area.

6. Integrate hazard mitigation planning as an integral factor in all relevant municipal departments, committees and boards.

7. Prevent and reduce the damage to public infrastructure resulting from all hazards.

8. Work with surrounding communities, state, regional and federal agencies to ensure regional cooperation and solutions for hazards affecting multiple communities.

9. Ensure that future development meets federal, state and local standards for preventing and reducing the impacts of natural hazards.

10. Take maximum advantage of resources from FEMA and MEMA to educate Town staff and the public about hazard mitigation.

11. Consider the potential impacts of future climate change and incorporate climate sustainability and resiliency in hazard mitigation planning.

12. Partner and work with climate vulnerable populations to reduce disproportionately experienced hazards.

13. Enhance data integrity and establish protocols for the disaster situation.

14. Conduct annual hazard mitigation team updates and make adjustment to planning accordingly

HAZARD MITIGATION STRATEGY

The Lynnfield Local Hazard Mitigation Planning Team identified a number of mitigation measures that would serve to reduce the Town's vulnerability to natural hazard events. Lynnfield would like to pursue intermunicipal dam management plan between Lynn Water and Sewer, Lynnfield, Saugus and Wakefield, upgrade culverts, incorporate drainage improvement as part of the green street project, address inadequate infrastructure management leading to intermunicipal flooding.

Overall, the hazard mitigation strategy recognizes that mitigating hazards for Lynnfield will be an ongoing process as our understanding of natural hazards and the steps that can be taken to mitigate their damages changes over time. Global climate change and a variety of other factors impact the Town's vulnerability and in the future. Local officials will need to work together across municipal lines and with state and federal agencies in order to understand and address these changes. The Hazard Mitigation Strategy will be incorporated into the Town's other related plans and policies.

PLAN REVIEW AND UPDATE PROCESS

The process for developing Lynnfield's Hazard Mitigation Plan 2025 Update is summarized in Table 1 below.

Table 1. Plan Review and Update Process

Chapter	Reviews and Updates
III – Public Participation	The Local Hazard Mitigation Planning Team placed an emphasis on public participation for the update of the Hazard Mitigation Plan, discussing strategies to enhance participation opportunities at the first local committee meeting. During plan development, the plan was discussed at two public meetings. The plan was also available on the Town's website for public comment.
IV – Risk Assessment	MAPC gathered the most recently available hazard and land use data and met with Town staff to identify changes in local hazard areas and development trends. Town staff reviewed critical infrastructure with MAPC staff in order to create an up-to-date list. MAPC also used the most recently available version of HAZUS and assessed the potential impacts of flooding using the latest data.
V - Goals	The Hazard Mitigation Goals were reviewed and endorsed by the Lynnfield Local Hazard Mitigation Planning Team.
VI – Existing Mitigation Measures	The list of existing mitigation measures was updated to reflect current mitigation activities in the Town.
VII & VIII – Hazard Mitigation Strategy	Mitigation measures from the 2018 plan were reviewed and assessed as to whether they were completed, in-progress, or deferred. The Local Hazard Mitigation Planning Team determined whether to carry forward measures into the 2025 Plan Update or modify or delete them. The Plan Update's hazard mitigation strategy reflects both new measures and measures carried forward from the 2018 plan. The Local Hazard Mitigation Team prioritized all of these measures based on current conditions.
IX – Plan Adoption & Maintenance	This section of the plan was updated with a new on-going plan implementation review and five year update process that will assist the Town in incorporating hazard mitigation issues into other Town planning and regulatory review processes and better prepare the Town for the next comprehensive plan update.

As indicated on Table 25, Lynnfield made progress on implementing mitigation measures identified in the 2018 Hazard Mitigation Plan. Six projects were completed, 12 projects were partially completed and 4 projects were not completed. Completed projects include drainage study at Fletcher Rd and Timberhill Rd, cleaning drainage at 30 Longbow Circle, and preparing cooling centers during extreme heat.

Other projects were partially completed, most notably addressing flooding around Saugus River and Reedy Meadow, upgrading culverts at Hawkes Brook at Fletcher Rd, and restoring drainage at Hawkes Brook. These strategies are moving forward in the 2025 plan update.

Moving forward into the next five year plan implementation period there will be many more opportunities to incorporate hazard mitigation into the Town's decision making processes.

Though not formally done in the 2018 Plan, the Town will document any actions taken within this iteration of the Hazard Mitigation Plan on challenges met and actions successfully adopted as part of the ongoing plan maintenance to be conducted by the Lynnfield Hazard Mitigation Implementation Team, as described in Section 9, Plan Adoption and Maintenance.

SECTION 2. INTRODUCTION

PLANNING REQUIREMENTS UNDER THE FEDERAL DISASTER MITIGATION ACT

The Federal Disaster Mitigation Act, passed in 2000, requires that after November 1 2004, all municipalities that wish to continue to be eligible to receive FEMA funding for hazard mitigation grants, must adopt a local multi-hazard mitigation plan and update this plan in five year intervals. This planning requirement does not affect disaster assistance funding.

Federal hazard mitigation planning and grant programs are administered by the Federal Emergency Management Agency (FEMA) in collaboration with the states. These programs are administered in Massachusetts by the Massachusetts Emergency Management Agency (MEMA) in partnership with the Department of Conservation and Recreation (DCR).

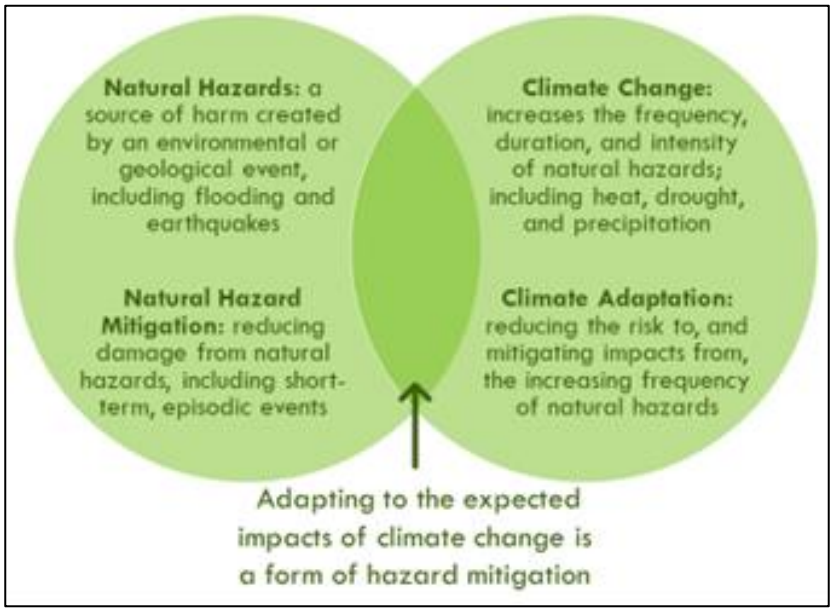
The Town of Lynnfield contracted with the Metropolitan Area Planning Council (MAPC), to assist the Town in updating its local Hazard Mitigation Plan, which was approved by FEMA in 2018. The updated local plan produced under this contract is designed to meet the requirements of the Disaster Mitigation Act for the Town of Lynnfield, addressing local and regional concerns and hazards that impact the Town.

WHAT IS A HAZARD MITIGATION PLAN?

Natural hazard mitigation planning is the process of determining how to systematically reduce or eliminate the loss of life and property damage resulting from natural hazards such as floods, earthquakes, and hurricanes. Hazard mitigation means to permanently reduce or alleviate the losses of life, injuries, and property resulting from natural hazards through long-term strategies. These long-term strategies include planning, policy changes, programs, projects, and other activities. FEMA's 2022 Local Mitigation Planning Policy Guide recognized that adapting to the expected impacts of climate change is a form of hazard mitigation. Therefore, this plan incorporates consideration of future risks due to projections for the increased frequency and severity of extreme weather fueled by global climate change effects.

As more is understood about the impacts of climate change, it is becoming increasingly important to recognize the relationship between climate change and many of the natural hazards addressed in hazard mitigation plans. This is addressed in FEMA's most recent Local Mitigation Planning Policy Guide (2022), and the last two editions of the Massachusetts State Hazard Mitigation Plan were also framed as Climate Adaptation Plans. Accordingly, MAPC has updated the format of local Hazard Mitigation Plans to incorporate climate considerations. Figure 1 illustrates the relationship between natural hazards and climate change.

Figure 1. Natural Hazards and Climate Change



PREVIOUS FEDERAL/STATE DISASTERS

The Town of Lynnfield has experienced 24 natural hazards that triggered federal or state disaster declarations since 1991. These are listed in Table 2 below. Most of these events involved flooding, while eight were due to hurricanes or nor'easters, and seven were due to severe winter weather.

Table 2. Previous Federal/State Disaster Declarations

DISASTER NAME (DATE OF EVENT)	TYPE OF ASSISTANCE	DECLARED AREAS
Hurricane Bob (August 1991)	FEMA Public Assistance Project Grants	Counties of Barnstable, Bristol, Dukes, Essex, Hampden, Middlesex, Plymouth, Nantucket, Norfolk, Suffolk
	Hazard Mitigation Grant Program	Counties of Barnstable, Bristol, Dukes, Essex, Hampden, Middlesex, Plymouth, Nantucket, Norfolk, Suffolk (16 projects)

DISASTER NAME (DATE OF EVENT)	TYPE OF ASSISTANCE	DECLARED AREAS
No-Name Storm (October 1991)	FEMA Public Assistance Project Grants	Counties of Barnstable, Bristol, Dukes, Essex, Middlesex, Plymouth, Nantucket, Norfolk
	FEMA Individual Household Program	Counties of Barnstable, Bristol, Dukes, Essex, Middlesex, Plymouth, Nantucket, Norfolk
	Hazard Mitigation Grant Program	Counties of Barnstable, Bristol, Dukes, Essex, Middlesex, Plymouth, Nantucket, Norfolk, Suffolk (10 projects)
December Blizzard (December 1992)	FEMA Public Assistance Project Grants	Counties of Barnstable, Dukes, Essex, Plymouth, Suffolk
	Hazard Mitigation Grant Program	Counties of Barnstable, Dukes, Essex, Plymouth, Suffolk (7 projects)
March Blizzard (March 1993)	FEMA Public Assistance Project Grants	All 14 Counties
January Blizzard (January 1996)	FEMA Public Assistance Project Grants	All 14 Counties
October Flood (October 1996)	FEMA Public Assistance Project Grants	Counties of Essex, Middlesex, Norfolk, Plymouth, Suffolk
	FEMA Individual Household Program	Counties of Essex, Middlesex, Norfolk, Plymouth, Suffolk
	Hazard Mitigation Grant Program	Counties of Essex, Middlesex, Norfolk, Plymouth, Suffolk (36 projects)
1997	Community Development Block Grant-HUD	Counties of Essex, Middlesex, Norfolk, Plymouth, Suffolk
June Flood (June 1998)	FEMA Individual Household Program	Counties of Bristol, Essex, Middlesex, Norfolk, Suffolk, Plymouth, Worcester

DISASTER NAME (DATE OF EVENT)	TYPE OF ASSISTANCE	DECLARED AREAS
	Hazard Mitigation Grant Program	Counties of Bristol, Essex, Middlesex, Norfolk, Suffolk, Plymouth, Worcester (19 projects)
(1998)	Community Development Block Grant-HUD	Counties of Bristol, Essex, Middlesex, Norfolk, Suffolk, Plymouth, Worcester
March Flood (March 2001)	FEMA Individual Household Program	Counties of Bristol, Essex, Middlesex, Norfolk, Suffolk, Plymouth, Worcester
	Hazard Mitigation Grant Program	Counties of Bristol, Essex, Middlesex, Norfolk, Suffolk, Plymouth, Worcester (16 projects)
February Snowstorm (Feb 17-18, 2003)	FEMA Public Assistance Project Grants	All 14 Counties
January Blizzard (January 22, 2005)	FEMA Public Assistance Project Grants	All 14 Counties
Hurricane Katrina (August 29, 2005)	FEMA Public Assistance Project Grants	All 14 Counties
May Rainstorm/Flood (May 12-23, 2006)	Hazard Mitigation Grant Program	Statewide
April Nor'easter (April 15-27, 2007)	Hard Mitigation Grant Program	Statewide
Flooding (March, 2010)	FEMA Public Assistance FEMA Individuals and Households Program SBA Loan	Bristol, Essex, Middlesex, Suffolk, Norfolk, Plymouth, Worcester
	Hazard Mitigation Grant Program	Statewide
Hurricane Earl (September 2010)	FEMA Public Assistance Project Grants	Barnstable, Bristol, Dukes, Essex, Middlesex, Nantucket, Norfolk, Plymouth, Suffolk, and Worcester
Tropical Storm Irene (August 27-28, 2011)	FEMA Public Assistance	Statewide
Hurricane Sandy (October 27-30, 2012)	FEMA Public Assistance	Statewide

DISASTER NAME (DATE OF EVENT)	TYPE OF ASSISTANCE	DECLARED AREAS
Severe snowstorm and Flooding (February 8-09, 2013	FEMA Public Assistance; Hazard Mitigation Grant Program	Statewide
Blizzard of 2015 (January 26-28, 2015)	FEMA Public Assistance; Hazard Mitigation Grant Program	Statewide
Severe winter storm and Snowstorm (January 2018)		Essex, Middlesex, Norfolk, Suffolk, Worcester
Severe winter storm and flooding (March 2018)		Barnstable, Bristol, Essex, Nantucket, Norfolk, Plymouth
COVID-19 Pandemic (January 2020)		Statewide

Source: Database provided by MEMA

Since 2018, there have been five Massachusetts State Declared Disasters that affected Lynnfield. Below is a list of them, which includes several winter storms as well as the Covid-19 pandemic.

Table 3. State Disaster Declarations since 2018

Disaster Name	Date of Event	Declared Areas
Massachusetts Severe Winter Storm and Flooding	March 2-3, 2018	Statewide
Massachusetts Severe Winter Storm and Snowstorm	March 13-14, 2018	Statewide
Massachusetts Covid-19 Pandemic	January 20, 2020 – May 11, 2023	Statewide
Massachusetts Severe Winter Storm and Snowstorm	January 28-29, 2022	Statewide
Massachusetts Hurricane Lee	September 15-17, 2023	Statewide

Source: FEMA Declared Disasters; OpenFEMA Dataset: Disaster Declarations; and FEMA Declared Disasters.

FEMA FUNDED MITIGATION PROJECTS

The Town of Lynnfield has received funding from FEMA for one mitigation project under the Hazard Mitigation Grant Program (HMGP), shown in Table 4.

Table 4. FEMA-Funded Mitigation Projects

Project Description/Title	Scope of Work	Total Cost	Federal Funding	Local Funding	Status
Yorkshire Drive Drainage Improvements	Installation of new drainage structure and piping designed to handle a 25-year storm event.	$85,746	$59,604	$26,142	Completed

COMMUNITY PROFILE

The Town of Lynnfield is a traditional New England residential community located in the western part of Essex County, in the northeastern part of Massachusetts, known as the North Shore. Lynnfield is bordered by North Reading on the north; Reading on the west; Middleton, Peabody and Lynn on the east; and Saugus and Wakefield on the south. With a total area of 10.22 square miles, Lynnfield is 15 miles north of Boston, 19 miles east of Concord and 28 miles south of Newburyport. Lynnfield's location on the North Shore, with direct access to major highways, makes it easy for residents to commute within Metro Boston, and to access nearby mountains and beaches.

Today, Lynnfield is an upper-income residential suburban community predominantly composed of single-family homes where most residents work outside of the town. In recent years, Lynnfield has seen an increase in commercial and residential development interest, including the growth of Market Street, as the Greater Boston economy has grown. The Town has responded to this increased development pressure with a variety of plans and land use regulations (Lynnfield Vision Plan, 2024).

The Town is governed by a Select Board with a Town manager. The Town operates under a representative Town meeting format. The Town maintains a website at https://www.lynnfieldma.gov/.

The significant demographic characteristics of the Town of Lynnfield are summarized in Table 5. Some of these features are important to keep in mind for hazard mitigation as well as emergency preparedness and response in the Town.

Table 5. Town of Lynnfield Characteristics

Population	
Total population	12,925
Residents under 5 years old	7%
Residents 65 years old and over	19%
Race & Ethnicity	
White	82%
African American	2%
Native American	0%

Asian and Pacific Islander	8%
Other Race	0%
Multiple Races	3%
Latinx	5%
Household Income	
Total Households	4,621
Median Household Income	$172,484
Renter Occupied Median Household Income	$74,700
Languages	
Speak a language other than English at home	15%
Spanish	3%
Other European	7%
Asian	5%
Speaks English less than “very well”	1.59%
Other Equity Factors	
Total Population with a Disability	7%
Cost-Burdened Households	29%
Households with no vehicle	6%

Sources: US Census, 2020 Decennial Census and American Community Survey (ACS) 5-Year Estimates (2019-2023)

There are no Environmental Justice areas designated by the MA Executive Office of Energy and Environmental Affairs (Map 1A in Appendix A). An environmental justice population is a neighborhood where one or more of the following criteria are true:

- Median household income is 65 percent or less of the statewide median household income
- Minorities make up 40 percent or more of the population
- 25 percent or more of households identify as speaking English less than "very well"

SECTION3. PLANNING PROCESS & PUBLIC PARTICIPATION

MAPC employs a six-step planning process based on FEMA's hazard mitigation planning guidance focusing on local needs and priorities, but maintaining a regional perspective matched to the scale and nature of natural hazard events. Public participation is a central component of this process, providing critical information about the local occurrence of hazards while also serving as a means to build a base of support for hazard mitigation activities.

MAPC supports participation by the general public and other plan stakeholders through:

- Meetings and work with the Local Teams
- Two public meetings, advertised through email, webpage content, a flyer, press release to local media, and social media posts, and made available town-wide on Local Access TV,
- A public survey that gathered public input on the hazard mitigation issues in the Town;
- A project website at: https://www.lynnfieldma.gov/636/Hazard-Mitigation-Planning-2025 and a dedicated email for public comments, ResilientLynnfield@mapc.org
- Opening a public comment period at the second public meeting, and posting the draft plan to the project website to facilitate public review,
- Outreach to neighboring communities, boards and commissions, the local chamber of commerce and businesses, environmental NGO's, social service providers, and other local or regional entities

PLANNING PROCESS SUMMARY

The planning process outlined below is based on the guidance provided by FEMA in the Local Multi-Hazard Mitigation Planning Guidance. The process focuses on local problem areas and identifies needed mitigation measures based on where gaps occur in the existing mitigation efforts of the municipality. The planning process allows town staff to bring the most recent hazard information into the plan, including new hazard occurrence data, changes to a municipality's mitigation measures, and progress made on actions identified in previous plans.

1. **Map the Hazards**: MAPC relies on data from a number of different federal, state, and local sources in order to map the areas with the potential to experience natural hazards. This mapping represents a multi-hazard assessment of the municipality and is used as a set of base maps for the remainder of the planning process. A particularly important source of information is the knowledge drawn from local municipal staff on where natural hazard impacts have occurred, which is collected. These maps can be found in Appendix A.
2. **Assess the Risks & Potential Damages**: Working with local staff, critical facilities, infrastructure, vulnerable populations, and other features are mapped and

contrasted with the hazard data from the first step to identify those that might represent particular vulnerabilities to these hazards. Land use data and development trends are also incorporated into this analysis. In addition, MAPC develops estimates of the potential impacts of certain hazard events on the community. MAPC drew on the following resources to complete the plan:

- Town of Lynnfield, General Bylaws
- Town of Lynnfield, Zoning Bylaw
- Town of Lynnfield Vision Plan 2024
- Town of Lynnfield Open Space and Recreation Plan 2022
- Town of Lynnfield Municipal Vulnerability Preparedness Report 2020
- Town of Lynnfield Hazard Mitigation Plan Update 2018
- Town of Lynnfield Housing Production Plan 2006
- Town of Lynnfield Master Plan 2002
- Blue Hills Observatory
- Environment America Research and Policy Center, When It Rains It Pours – Global Warming and the Increase in Extreme Precipitation, July 2012
- FEMA, Disaster Declarations for States and Counties, 2023
- FEMA, Flood Insurance Study, Plymouth County, 2016
- FEMA Flood Insurance Rate Maps for Plymouth County, MA, 2012
- FEMA LOMR, Effective 12/13/17
- FEMA, HAZUS-MH, 2024
- FEMA, Local Mitigation Planning Policy Guide, 2022
- Massachusetts Climate Change Assessment, 2022
- MA Office of Coastal Zone Management, Sea Level Rise: Understanding and Applying Trends and Future Scenarios for Analysis and Planning, December 2013.
- MA Office of Dam Safety, Inventory of Massachusetts Dams
- Massachusetts State Hazard Mitigation and Climate Adaptation Plan, 2018, 2023
- Massachusetts State Hazard Mitigation Plan, 2013
- Metropolitan Area Planning Council, GIS Lab, Regional Plans and Data.
- New England Seismic Network, Boston College Weston Observatory
- NOAA Centers for Environmental Information
- Northeast States Emergency Consortium
- Tornado History Project
- US Census, 2020, American Community Survey
- USDA Forest Service, Wildfire Risk to Communities
- USGS, National Water Information System,
- U.S. Global Change Research Program, Fourth National Climate Assessment, 2018

3. **Review Existing Mitigation**: Municipalities in the Boston Metropolitan Region have an active history in hazard mitigation as most have adopted flood plain zoning districts, wetlands protection programs, and other measures as well as enforcing

the State building code, which has strong provisions related to hazard resistant building requirements. All current municipal mitigation measures are documented in the plan.

4. **Develop Mitigation Strategies**: MAPC works with the local municipal staff to identify new mitigation measures, utilizing information gathered from the hazard identification, vulnerability assessments, and the community's existing mitigation efforts to determine where additional work is necessary to reduce the potential damages from hazard events. Additional information on the development of hazard mitigation strategies can be found in Chapter 7.

5. **Plan Approval & Adoption**: Once a final draft of the plan is complete it is sent to MEMA for the state level review and, following that, to FEMA for approval. Typically, once FEMA has approved the plan the agency issues a conditional approval (Approval Pending Adoption), with the condition being adoption of the plan by the municipality. More information on plan adoption can be found in Chapter IX and documentation of plan adoption can be found in Appendix D.

6. **Implement & Update the Plan**: Implementation is the final and most important part of any planning process. Hazard Mitigation Plans must also be updated on a five-year basis making preparation for the next plan update an important on-going activity. Chapter IX includes more detailed information on plan implementation.

THE LOCAL MULTIPLE HAZARD COMMUNITY PLANNING TEAM

MAPC worked with the local community representatives to organize a local Hazard Mitigation Planning Team for Lynnfield. MAPC briefed the local representatives as to the desired composition of that team as well as the need for representation from the business community, civic organizations and citizens at large.

The Local Hazard Mitigation Planning Team is central to the planning process as it is the primary body tasked with developing a mitigation strategy for the community. The local team was tasked with working with MAPC to set plan goals, provide information on the hazards that impact the Town, existing mitigation measures, and help to develop new mitigation measures for this plan update. The Local Hazard Mitigation Planning Team membership can be found in Table 6 below.

The Local Hazard Mitigation Planning Team met four times on the dates listed below. The agendas for these meetings are included in Appendix B.

- **July 15, 2024**: discussed the project overview and update local hazard areas and critical facilities inventory
- **October 24, 2024**: updated hazard mitigation goals and existing mitigation measures
- **February 25, 2025**: updated the recommended mitigation strategies from the 2018 HMP and prepare for Public Meeting #1

- **June 26, 2025**: developed new recommended mitigation measures for the 2025 plan update and prepare for Public Meeting #2

Table 6. Membership of the Lynnfield Mitigation Team

Name	Representing
Patrick McDonald	Lynnfield DPW, GIS Coordinator
John Tomasz	Lynnfield DPW, Deputy Director/Town Engineer
Glenn Davis	Lynnfield Fire Chief
Nick Secatore	Lynnfield Police Chief
Coral Hope	Lynnfield Health Director
John Scenna	Lynnfield DPW, Director/Lynnfield Water District
Rob Dolan	Lynnfield Town Administrator
Emilie Cademartori	Lynnfield Planning and Conservation Director
Justin Lavy	Peabody Municipal Light Plant Safety Support

PUBLIC MEETINGS

Public participation in the hazard mitigation planning process is important, both for plan development and for later implementation of the plan. Residents, business owners, and other community members are an excellent source for information on the historical and potential impacts of natural hazard events and particular vulnerabilities the community may face from these hazards. Their participation in this planning process also builds understanding of the concept of hazard mitigation, potentially creating support for mitigation actions taken in the future to implement the plan.

To gather this information and educate residents on hazard mitigation, the Town hosted two public meetings, one during the planning process and one after a complete draft plan is available for review. The public had an opportunity to provide input to the hazard mitigation planning process at a public meeting held on January 27 hosted by the Lynnfield Emergency Management Agency. The draft plan was presented at a second public meeting on September 22 hosted by the Select Board. Both meetings were publicized in accordance with the Massachusetts Public Meeting Law. Both meetings were publicized on the Town's website and social media, and direct outreach by email. A Media Advisory was also sent to the local press. See public meeting notices in Appendix C.

LOCAL STAKEHOLDER INVOLVEMENT

The Town reached out to local stakeholders that might have an interest in the Hazard Mitigation Plan including neighboring communities, agencies, businesses, nonprofits, and other interested parties. Notice was sent to the following organizations and neighboring municipalities inviting them to review the Hazard Mitigation Plan and submit comments to the Town:

Table 7. Lynnfield Community Stakeholders

Town govt	Town of North Reading
Town govt	Town of Reading
Town govt	Town of Wakefield
Town govt	Town of Saugus
Town govt	City of Lynn
Town govt	City of Peabody
Community Based Organizations	Lynnfield for Love
Community Based Organizations	A Healthy Lynnfield
Community Based Organizations	Historical Society
Community Based Organizations	Lynnfield Moms Group
Community Based Organizations	Pillings Pond Association
Community Based Organizations	Lynnfield Rotary
Community Based Organizations	Friends of the Lynnfield Library
Community Based Organizations	Lynnfield Art Guild
Community Based Organizations	Garden Club
Community Based Organizations	Greater Lynn Senior Services
Community Based Organizations	Town of Lynnfield Veteran's Agent
Community Based Organizations	LIFE
Boards and Committee	Lynnfield Tree Committee
Boards and Committee	Open Space and Recreation Committee
Boards and Committee	Planning Board
Boards and Committee	Zoning Board
Boards and Committee	Conservation Commission
Boards and Committee	Lynnfield Library
Boards and Committee	School Committee
Boards and Committee	Finance Committee
Boards and Committee	Select Board
Boards and Committee	Council on Aging
Government Agency	Reading Municipal Light
Government Agency	Peabody Municipal Light
Housing Authority	Lynnfield Housing Authority

Although there are no Environmental Justice populations in Essex identified by the Executive Office of Energy and Environmental Affairs (Map 2 in Appendix A), in order to reach out to the more vulnerable members of the community such as the elderly and low-income residents, the Town reached out to the following entities:

- Ross Drive
- Life Inc, Center, Essex, Colonial Villages
- Windsor estates
- The senior center members
- Commons/Arbor Pt 40B
- Dale Road Group

- Lynnbrook Road residents

The draft plan was posted online for public review. [Insert the summary of the public comments received after the Public Forum 2].

HAZARD MITIGATION PUBLIC SURVEY

In addition to the public meetings the Town distributed an online survey to provide more in-depth feedback from residents and stakeholders on their concerns about natural hazards in Lynnfield, and the actions they suggested the Town should take. The results of the survey are summarized below, and a more detailed public survey analysis is included in the Appendix C.

The local team will review the comments received through the survey and will make appropriate changes before finalizing the plan.

The survey was open between January 27, 2025 till April 30, 2025. Total 85 people participated in the survey through the Qualtrics survey link. The survey was promoted through the project website (https://www.lynnfieldma.gov/636/Hazard-Mitigation-Planning-2025) as well as the first public meeting presentation.

The top three natural hazards that concern Lynnfield residents the most appear to be flooding, drought, and extreme heat. Survey responses to question "how have these hazards impacted you?" showed a more detailed description of how people experienced these natural hazards in Lynnfield. Below is a brief summary of the survey responses by hazard types:

- Flooding: Concerns around chronic flooding issues in the Wirthmore Lane Neighborhood (neighborhoods off Wirthmore Lane and Perry Ave), basement flooding issues due to the proximity to the Reedy Meadow, storm drains being clogged and not properly managed, excess water issues from the Beaver Dam Brook side of Main Street into the meadow
- Wind: Trees falling down during the wind storms, power outages with the wind events, need for better tree management especially as it interferes with the power lines
- Drought: Annual water bans are causing inconvenience in managing gardens, drought is causing more frequent brushfire
- Extreme heat: Heat waves have been a public health concern, especially for children and the older population.

While Lynnfield residents think that all of the mitigation strategies are fairly equally important, the mitigation strategy that got the most votes was "Designing resilient infrastructure such as roads, bridges, and buildings."

Survey respondents submitted many great ideas for the question asking, "if there is anything else that people want to share". Those included but not limited to: properly regulating all development so that it has less environmental impact, fixing road infrastructure near Pillings Pond, developing better ways to deal with the water shortage exacerbated by drought beyond annual water bans, better tree management, better emergency management including robust communication system, addressing chronic flooding issues in the neighborhoods, and providing education and assessment for residents.

One thing to note is that this survey results may not represent lived experience of all Lynnfield residents. For instance, a significant number of the survey participants reported that they own a home in Lynnfield (82.2%) and there were no survey respondents who said they rent in Lynnfield. Only 6% of the survey participants were younger than 35 years old, 60% of the survey participants' household income was $150,000 or more, and 86% of the survey participants' household income was higher than $100,000. Overall it shows that the demographic of the survey participants tend to be older and affluent homeowners.

CONTINUING PUBLIC PARTICIPATION

Following the adoption of the plan update, the planning team will continue to provide residents, businesses, and other stakeholders the opportunity to learn about the hazard mitigation planning process and to contribute information that will update the town's understanding of local hazards. As the review of the plan is conducted by the Hazard Mitigation Team, these will be placed on the Town's web site, and any meetings of the Hazard Mitigation I Team will be publicly noticed in accordance with town and state open meeting laws.

PLANNING TIMELINE

PLAN UPDATE PROCESS 2024-2025

July 15, 2024	1st Meeting of the Lynnfield Hazard Mitigation Team
October 24, 2024	2nd Meeting of the Lynnfield Hazard Mitigation Team
February 25, 2025	3rd Meeting of the Lynnfield Hazard Mitigation Team
January 27, 2025	Public Meeting #1 hosted by the Select Board
June 26, 2025	4th Meeting of the Lynnfield Hazard Mitigation Team
TBD	Public Meeting #2 hosted by the Select Board
TBD	Draft Plan Update submitted to MEMA
TBD	Notice of Approval Pending Adoption issued by FEMA
TBD	Adoption of the Plan by the Town
TBD	FEMA Formal Approval of the plan for 5 years

PLAN IMPLEMENTATION MILESTONES 2024-2029

After this plan update is approved by FEMA for a five-year period, the Town should take note of the following milestones for the ongoing implementation, review, and updating of this plan:

2026-27	Conduct Mid-Term Plan Survey on Progress
2027	Seek FEMA grant to prepare next plan update

2028	Begin process to update the plan
2029	Submit Draft 2028 Plan Update to MEMA and FEMA
2029	FEMA approval of 2029 Plan Update

SECTION 4. RISK ASSESSMENT

The risk assessment analyzes the potential natural hazards that could occur within the Town as well as the relationship between those hazards and current land uses, potential future development, and critical infrastructure. This section also includes a vulnerability assessment that estimates the potential damages that could result from certain large-scale natural hazard events. In order to update Lynnfield's risk assessment, MAPC gathered the most recently available hazard and land use data and met with the Local Team to identify changes in local hazard areas and development trends. MAPC also used FEMA's damage estimation software, Hazards US (HAZUS).

The projected impacts of our warming climate on natural hazards are integrated throughout this risk assessment. Key impacts include rising temperatures, which in turn affect precipitation patterns and extreme weather. Analysis of these impacts included in this plan aligned closely with the data and assessment presented in Massachusetts' State Hazard Mitigation and Climate Adaptation Plan (SHMCAP) and the Massachusetts' 2022 Climate Change Assessment.

> *"Global climate is changing rapidly compared to the pace of natural variations in climate that have occurred throughout Earth's history. Global average temperature has increased by about 1.8°F from 1901 to 2016, and observational evidence does not support any credible natural explanations for this amount of warming; instead, the evidence consistently points to human activities, especially emissions of greenhouse or heat-trapping gases, as the dominant cause."*
> Fourth National Climate Assessment, 2018 (Chapter 2-1)

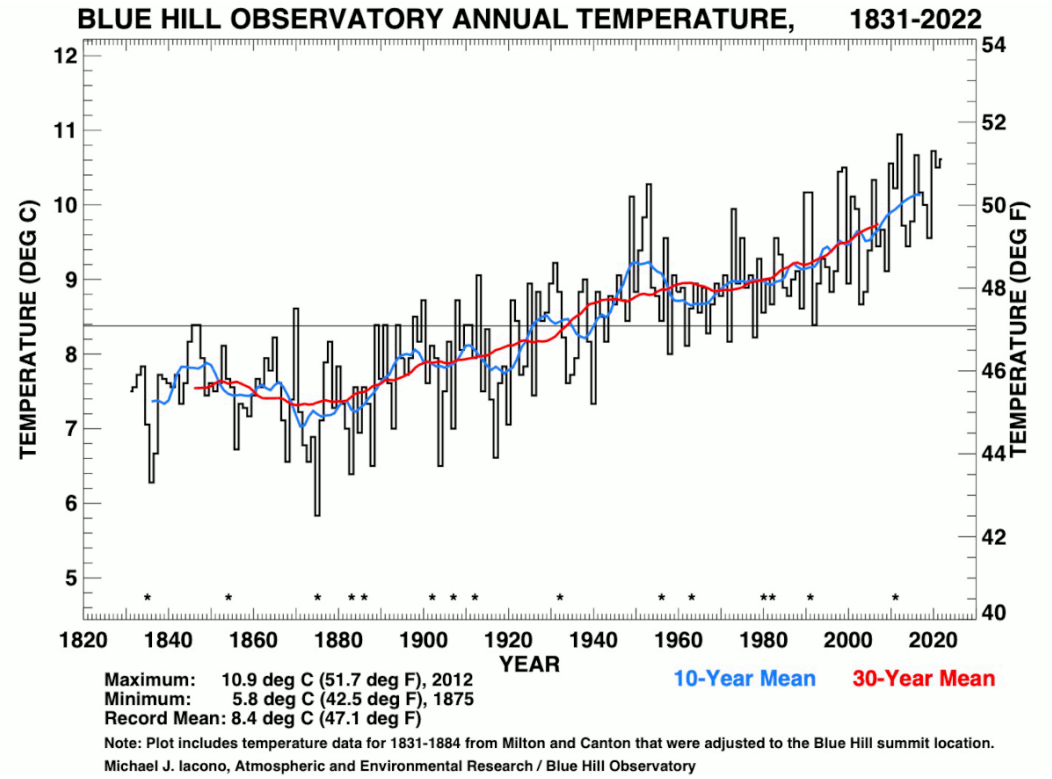
CLIMATE CHANGE OBSERVATIONS AND PROJECTIONS

Climate change observations come from a variety of data sources that have measured and recorded changes in recent decades and centuries. Climate change projections, however, predict future climate impacts and, by their nature, cannot be observed or measured. As a result of the inherent uncertainty in predicting future conditions, climate projections are generally expressed as a range of possible impacts.

TEMPERATURE

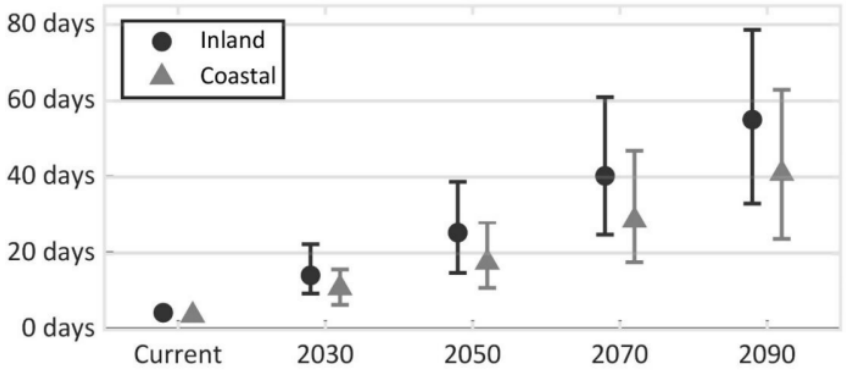
Our climate has always been regulated by gases, including carbon dioxide, methane, and nitrous oxide, which blanket the earth. These gases trap heat that would otherwise be reflected out to space; without them our planet would be too cold to support life. We refer to these gases as "greenhouse gases" (GHGs) for their heat trapping capacity. The combustion of fossil fuels, our primary energy source in the age of industrialization, releases GHGs into the atmosphere. In the past century, human activity associated with industrialization has contributed to a growing concentration of GHGs in our atmosphere. Records from the Blue Hill Observatory in Milton, MA show that average temperatures (30-year mean) have risen approximately 3 degrees (F) in the almost 200 years since record keeping began in 1831. See Figure 7 below for more information.

Figure 2. Observed Increase in Temperature



Climate projections include an increase in average temperature and in the number of extreme heat days. Extreme cold days are projected to decrease in number. By 2030, the summer mean temperature could increase by 3.6°F from the historical period (1950-2013). By 2070, there could be 58 fewer days below freezing, which could lead to an increase in ticks. By mid-century, the State anticipates about 25 more days per year where the temperature exceeds 90°F for inland areas, and about 19 more days above 90°F for coastal areas (Commonwealth of Massachusetts, 2022).

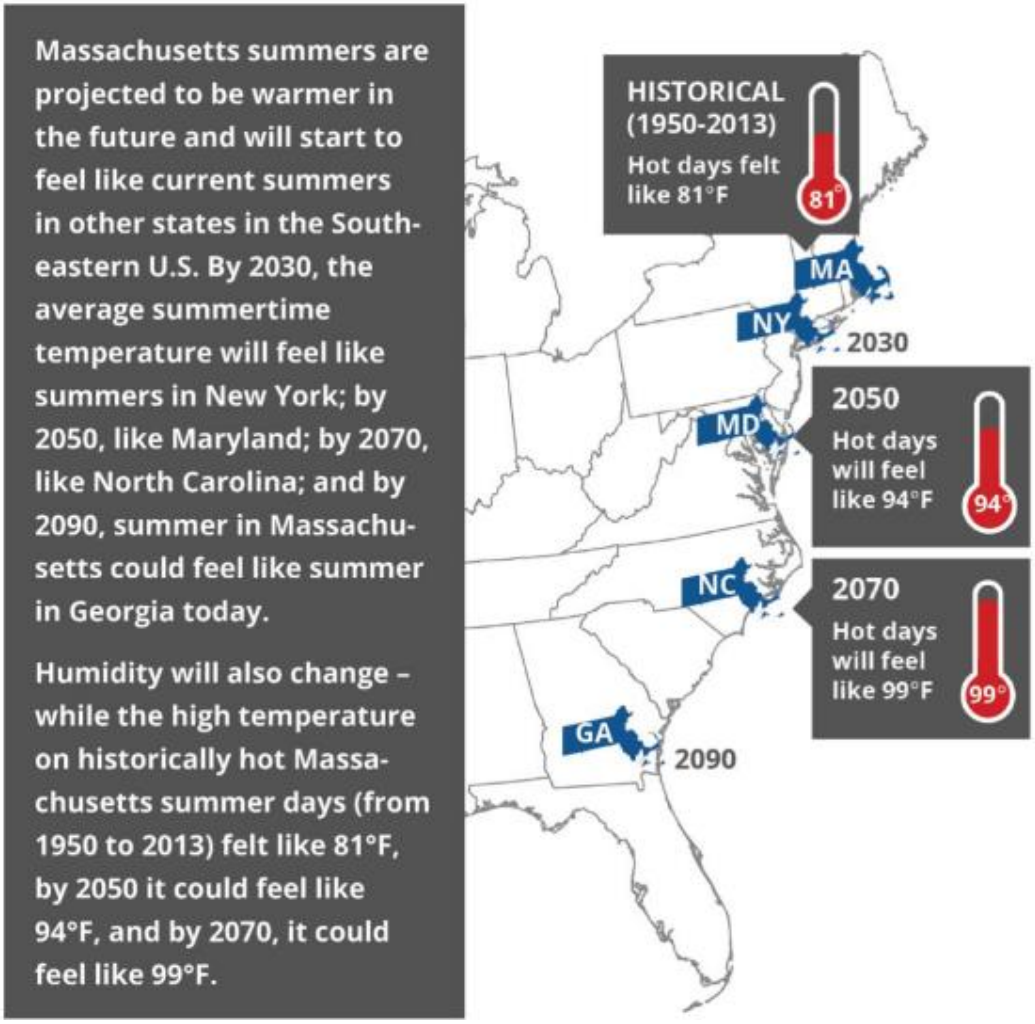
Figure 3. Change in the Annual Number of Days Over 90°F Compared to Today



Sources: 2022 MA Climate Change Assessment and Stochastic Weather Generator

These changes could result in Massachusetts summers feeling like a more southern state, as described in the infographic in Figure 4 from the State's 2022 Climate Change Assessment.

Figure 4. Change in Average Summertime Temperatures for Massachusetts

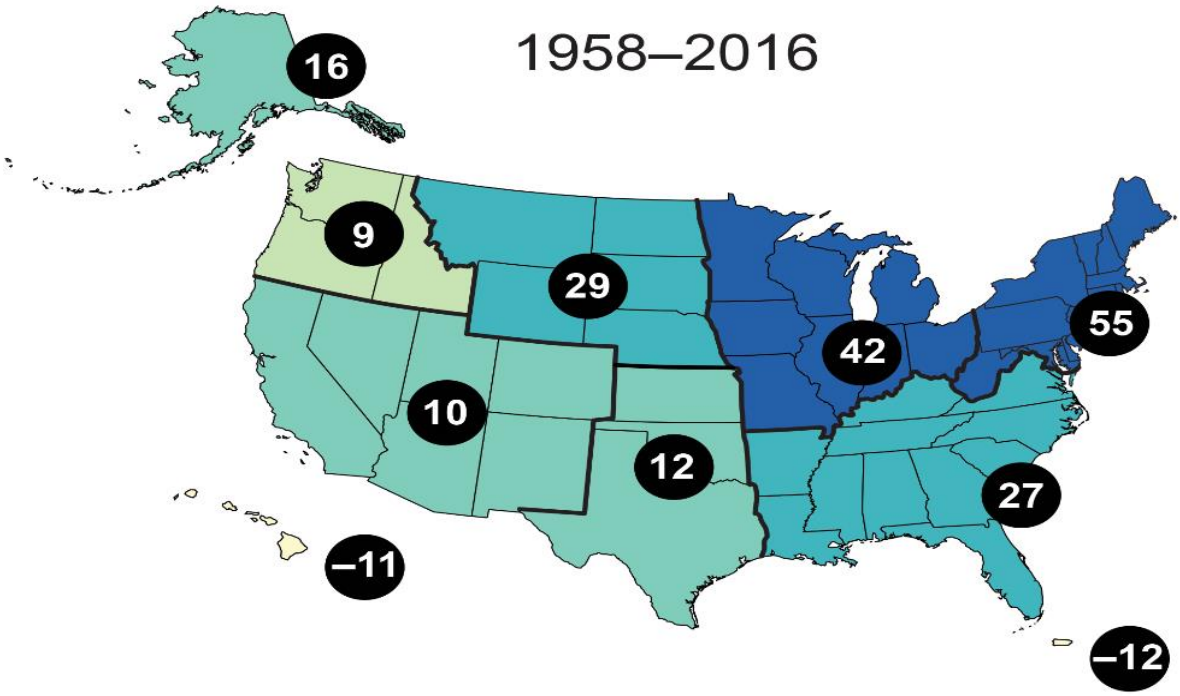


Source: 2022 MA Climate Change Assessment

PRECIPITATION PATTERNS

Annual precipitation in Massachusetts has increased by approximately 10% in the fifty-year period from 1960 to 2010 (MA EEA, 2011). Moreover, there has been a significant increase in the frequency and intensity of large rain events. For the Northeast US, according to the Fourth National Climate Assessment 2018, in the past sixty years there has been a 55% increase in the amount of annual precipitation that falls in the top 1% of storm events, as shown in Figure 5 below (US Global Change Research Program, 2018). Changes in precipitation are fueled by warming temperatures which increase evaporation and, therefore, the amount of water vapor in the air.

Figure 5. Observed Change in Total Annual Precipitation in the Heaviest 1% Events

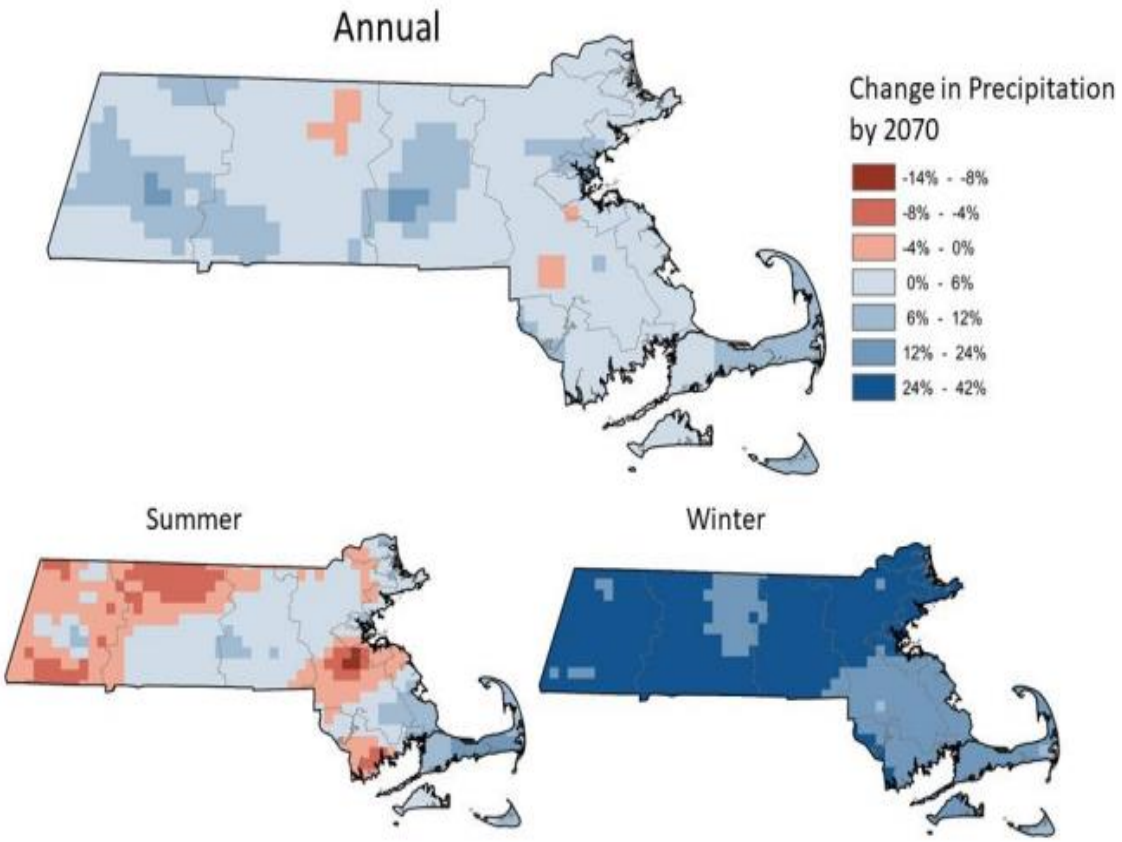


Source: Fourth National Climate Assessment, 2018
Numbers circled in black indicate % change.

Massachusetts' 2022 Climate Change Assessment anticipates that most parts of the State will see a future increase in annual total precipitation of less than 8% per year. Most of these increases are anticipated during the winter months (see Figure 6 below).

Additionally, the historic 10% annual chance daily rainfall event (2.8-4.0" of rain) could occur four times more frequently by 2090 (Commonwealth of Massachusetts, 2022).

Figure 6. Change in Annual and Seasonal Precipitation in 2070 Compared to Today



Source: 2022 MA Climate Change Assessment. The current climate is the 1986-2005 era, the projection for 2070 is for a 20-year era centered on 2070. Maps show LOCA downscaled GCM projections at the 50th percentile across 20 LOCA GCMs that overlap with the GCMs used in the Stochastic Weather Generator.

Despite overall increasing precipitation, more frequent and significant summer droughts are also a projected consequence of climate change. This is due to projections that precipitation will increase in winter and spring and decrease slightly in the summer and, as a result of earlier snow melt, and higher temperatures that will reduce soil moisture. Massachusetts' 2022 Climate Change Assessment anticipates that these changes will vary by region. The North and South Shore region where Essex is located may experience slightly more consecutive dry days, and significantly more days without rain per year, by 2090 (Commonwealth of Massachusetts, 2022). See Figure 7 below for more information.

Figure 7. Consecutive dry day events (number of multiple-dry-day events per year)

Panel A: Consecutive dry day events (number of multiple-dry-day events per year)

Region	Baseline	2030	2050	2070	2090
Berkshires & Hilltowns	29	29	30	30	31
Greater Connecticut River Valley	31	31	32	32	33
Central	32	32	32	33	33
Eastern Inland	32	32	32	33	33
Boston Harbor	31	31	32	32	33
North & South Shores	31	31	32	32	33
Cape, Islands, & South Coast	31	31	32	32	33
Statewide	**31**	**31**	**31**	**32**	**33**
Statewide Percent Change	**0%**	**1%**	**2%**	**4%**	**6%**

Source: Stochastic Weather Generator

Panel B: Annual number of days without rain (days per year)

Region	Baseline	2030	2050	2070	2090
Berkshires & Hilltowns	159	161	165	167	170
Greater Connecticut River Valley	171	172	175	178	181
Central	180	182	185	188	192
Eastern Inland	186	181	185	188	193
Boston Harbor	192	185	192	194	198
North & South Shores	184	182	187	190	195
Cape, Islands, & South Coast	186	182	187	191	194
Statewide	**176**	**175**	**179**	**182**	**187**
Statewide Percent Change	**0%**	**-1%**	**2%**	**3%**	**6%**

Source: 2022 MA Climate Change Assessment.
The Town of Essex is located in the North & South Shores region.

CLIMATE CHANGE AND HAZARD MITIGATION

Following the outline of the Massachusetts State Hazard Mitigation and Climate Adaptation Plan (SHMCAP), this local hazard mitigation plan organizes consideration of natural hazards based on their relationship to projected climate changes.

Table 8 below, which is originally from the 2018 SHMCAP, summarizes the natural hazards reviewed in this plan, climate interactions, and expected impacts.

Table 8. Climate Change & Natural Hazards

Primary Climate Change Interaction	Natural Hazard	Other Climate Change Interactions	Representative Climate Change Impacts
 **Changes in Precipitation**	Inland Flooding	Extreme Weather	Flash flooding, urban flooding, drainage system impacts (natural and human-made), lack of groundwater recharge, impacts to drinking water supply, public health impacts from mold and worsened indoor air quality, vector-borne diseases from stagnant water, increased potential for loss of life, episodic drought, changes in snow-rain ratios, changes in extent and duration of snow cover, degradation of stream channels and wetland
	Drought	Rising Temperatures, Extreme Weather	
	Landslide	Rising Temperatures, Extreme Weather	
 **Sea Level Rise**	Coastal Flooding	Extreme Weather	Increase in tidal and coastal floods, storm surge, coastal erosion, marsh migration, inundation of coastal and marine ecosystems, loss of wetlands
	Coastal Erosion	Extreme Precipitation	
	Tsunami	Rising Temperatures	
 **Rising Temperatures**	Average/Extreme Temperatures	N/A	Shifting in seasons (longer summer, early spring, including earlier timing of spring peak flow), increase in length of growing season, increase of invasive species, increase in vector-borne illnesses (West Nile, Zika, EEE), ecosystem stress, energy brownouts from higher energy demands, more intense heat waves, public health impacts from high heat exposure and poor outdoor air quality, increased potential for loss of life, drying of streams and wetlands, eutrophication of lakes and ponds
	Wildfires	Changes in Precipitation	
	Invasive Species	Changes in Precipitation, Extreme Weather	
 **Extreme Weather**	Hurricanes/Tropical Storms	Rising Temperatures, Changes in Precipitation	Increase in frequency and intensity of extreme weather events, resulting in greater damage to natural resources, property, and infrastructure, as well as increased potential for loss of life

OVERVIEW OF HAZARDS AND IMPACTS

The risk assessment analyzes the potential natural hazards that could occur within the Town of Lynnfield as well as the relationship between those hazards and current land uses, potential future development, and critical infrastructure. Climate change is projected to have significant impacts on many natural hazards in Lynnfield. The Town completed climate vulnerability assessments and planning through the Lynnfield Municipal Vulnerability Preparedness Workshop led by the Town in 2020. This section also includes a vulnerability assessment that estimates the potential damages that could result from certain large scale natural hazard events.

In order to update Lynnfield's risk assessment, MAPC gathered the most recently available hazard and land use data and met with Town staff to identify changes in local hazard areas and development trends. The Resilient MA Plan, the SHMCAP (2018) and the State Hazard Mitigation Plan (2013) are key planning documents that examine natural hazards that have the potential to impact the Commonwealth. The 2013 State HMP set the stage by defining considerations such as frequency and severity and summarizing the frequency and severity of hazards of greatest concern. The 2018 SHMCAP used similar definitions for hazard considerations and expanded on this research by including additional climate projections. Because the 2013 State HMP includes definitions that were not specified in the SHMCAP, both resources are referred to in this report. MAPC also used FEMA's damage estimation software, HAZUS (described below).

Table 9 below summarizes the hazard risks for Lynnfield, with reference to the hazards in Massachusetts. This evaluation takes into account the frequency and severity of each hazard for Massachusetts and Lynnfield, based on available data, including:

- **State-level data**, including the Resilient MA Plan, the 2022 Climate Change Assessment, and 2018 SHMCAP.
- **County-level data** from NOAA's National Climatic Data Center and Storm Events Database for Essex County (where Essex is located)
- **Local-level information** including input from the Local Team, the hazard mapping included in Appendix A, and the HAZUS results.

The statewide hazard risk assessment is based on the definitions for hazard frequency and severity listed below. The statewide assessment was modified to reflect local conditions in Lynnfield using the same criteria.

Definitions of Hazard Frequency and Severity

Frequency

- **Very low:** Very unlikely; minimal examples of historical occurrences.
- **Low:** Likely to occur at least once by the end of the century; some examples of historical occurrences; anticipated every 100 years.
- **Medium:** Likely to occur at least once every 50 years (two or more occurrences in the next century)
- **High**: Almost certain to occur at least once a year.
- **Very High:** Almost certain to occur multiple times a year.

Severity

- **Minor**: Limited and scattered property damage; limited damage to public infrastructure and essential services not interrupted; limited injuries or fatalities.
- **Serious:** Scattered major property damage; some minor infrastructure damage; essential services are briefly interrupted; some injuries and/or fatalities.
- **Extensive:** Widespread major property damage; major public infrastructure damage (up to several days for repairs); essential services are interrupted from several hours to several days; many injuries and/or fatalities.
- **Catastrophic:** Property and public infrastructure destroyed; essential services stopped; numerous injuries and fatalities.

Table 9. Hazard Risks Summary

Hazard	Frequency		Severity	
	Massachusetts	Essex	Massachusetts	Essex
Flooding	High	High	Serious	Serious
Dam failures	Very Low	Very Low	Extensive	Serious
Hurricane/Tropical Storm	Medium	Medium	Serious	Serious
Tornadoes	Medium	Very Low	Serious	Serious
Thunderstorms	High	High	Minor	Minor
Nor'easter	High	High	Minor	Minor
Winter-Blizzard/Snow	High	High	Minor	Minor
Winter-Ice Storms	Medium	Medium	Minor	Minor
Earthquakes	Very Low	Very Low	Serious	Serious
Landslides	Low	Very Low	Minor	Minor
Brush fires	Medium	High	Minor	Minor
Extreme Temperatures	Medium	Medium	Minor	Minor
Drought	Low	Low	Minor	Minor
Coastal Hazards	High	N/A	Serious	N/A
Tsunami	Very Low	N/A	Extensive	N/A

Major Urban Fires	Low	N/A	Serious	N/A
Ice Jams	Low	N/A	Minor	N/A

Sources: *Resilient MA Plan (Frequency), State Hazard Mitigation Plan 2013 (Severity), HAZUS, Local information.*

FLOODING HAZARDS

Overview of Town-Wide Flooding

Flooding was the most prevalent serious natural hazard identified by local officials in Lynnfield. Given the location of Reedy Meadow and Saugus River, Town's subject to two kinds of flooding; riverine flooding when streams and rivers exceed the capacity of their natural or constructed channels to accommodate water flow and water overflows the banks, spilling out into adjacent low-lying, dry land or inland or stormwater flooding, where the rate of precipitation or amount of water overwhelms the capacity of natural and structured drainage systems to convey water causing it to overflow the system. These two types of flooding are often combined.

Inland and Stormwater Flooding

Flooding is generally caused by severe rainstorms, hurricanes, nor'easters, and thunderstorms. Severe rainstorms can occur year-round. Hurricanes are most common in the summer and early fall while Nor'easters are most common in winter. Spring snowmelt may exacerbate flooding during storm events. Climate change has the potential to exacerbate these issues over time due to increasing extreme rainfall events. Increase in average annual rainfall may also lead to more incidents of basement flooding caused by high seasonal groundwater levels.

Regionally Significant Floods

There have been a number of major floods that have affected the Metro Boston region over the last fifty years. Significant historic flood events have included those listed below (NOAA, 2024)

- The Blizzard of 1978
- January 1979
- April 1987
- October 1991
- December 1992
- October 1996
- June 1998
- March 2001
- April 2004
- May 2006
- April 2007
- March 2010
- December 2010
- March 2013
- January 2018
- March 2018
- June 2020

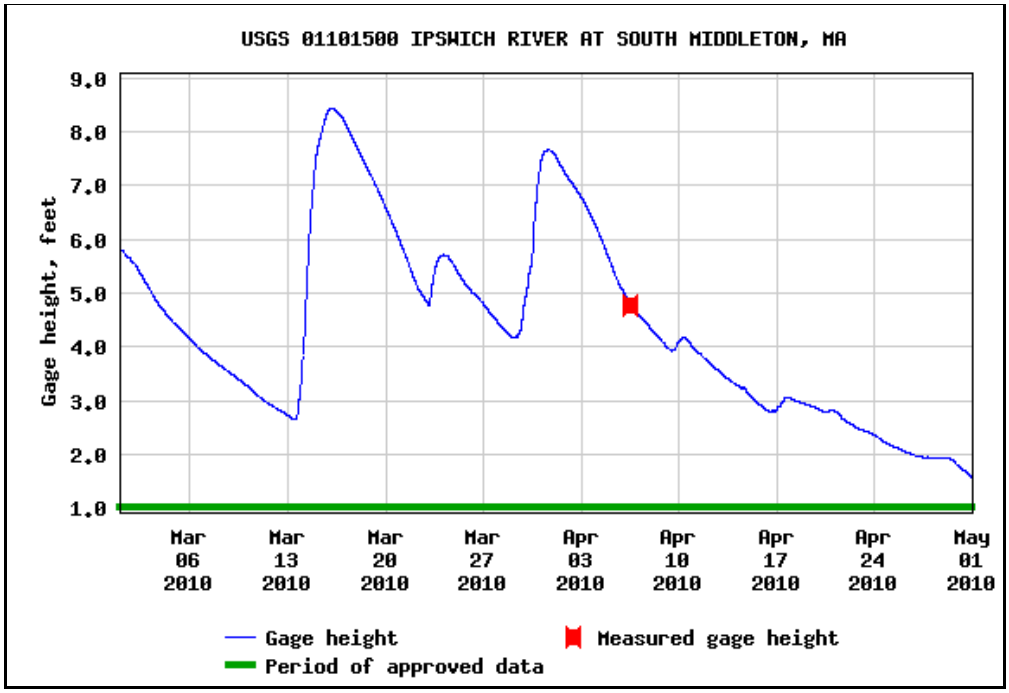
Most severe flooding event within last 15 years

The most severe flooding event in Eastern Massachusetts in the last 15 years occurred during March 2010, when a total of 17.7 inches of rainfall was recorded by the Blue Hills Observatory from three storms over 19 days from March 13 to 31. The weather pattern that consisted of early springtime prevailing westerly winds that moved three successive storms, combined with tropical moisture from the Gulf of Mexico, across New England. Torrential rainfall caused March 2010 to be the wettest month on record.

The March 2010 rainstorms fit the profile of a type of severe precipitation event expected to increase in frequency as the climate warms. That is, significant precipitation, falling in late winter as rain rather than snow, on frozen ground, and while vegetation is still dormant.

One indication of the extent of flooding is the gage height at the nearest USGS streamflow gauging station, which is on the Ipswich River in South Middleton. The USGS gage height, shown in Figure 15, exceeded 8 feet on March 16, 2010 and exceeded 7 feet on March 31, 2010. Normal gage height in March is about 4 feet.

Figure 8. Ipswich River Gage Heights, March-April 2010



Source, US Geological Service, National Water Information System

Previous Inland/Stormwater Flooding Events

The best available local data on previous inland flooding events in Lynnfield is from NOAA's National Centers for Environmental Information Storm Events Database, which provides county-level records of natural hazards (see Table 10). Essex County, which includes the Town of Essex, experienced 53 flood events from 2005 –2023. There were two deaths and three injuries reported and the total reported property damage in the county was $20.6 million dollars.

Table 10. Essex County Flood Events, 2005 - 2023

Date	Deaths	Injuries	Property Damage $
5/13/2006	2	0	$7,000,000
7/11/2006	0	0	$10,000
7/28/2006	0	0	$20,000
3/2/2007	0	0	$20,000
4/16/2007	0	0	$45,000
2/13/2008	0	0	$30,000
3/8/2008	0	0	0
8/8/2008	0	0	$25,000
9/6/2008	0	0	$5,000
3/14/2010	0	1	$9,800,000
3/30/2010	0	2	$3,270,000
4/1/2010	0	0	0
8/5/2010	0	0	$7,000
8/25/2010	0	0	0
10/4/2011	0	0	$305,000
6/23/2012	0	0	0
8/10/2012	0	0	0
6/24/2013	0	0	$5,000
7/1/2013	0	0	0
7/27/2014	0	0	0
10/23/2014	0	0	$30,000
12/9/2014	0	0	0
8/18/2015	0	0	0
8/18/2015	0	0	0
9/30/2015	0	0	0
6/29/2016	0	0	0
4/6/2017	0	0	0
6/27/2017	0	0	$2,000
7/8/2017	0	0	0
7/18/2017	0	0	0
9/6/2017	0	0	0
9/15/2017	0	0	$10,000
9/30/2017	0	0	$4,000
10/25/2017	0	0	0
1/13/2018	0	0	$5,000
8/11/2018	0	0	$10,000
8/12/2018	0	0	0
11/3/2018	0	0	0
4/15/2019	0	0	0
7/31/2019	0	0	$3,000
9/2/2019	0	0	$10,500
7/13/2020	0	0	0
7/23/2020	0	0	$1,000
9/10/2020	0	0	$1,000

Date	Deaths	Injuries	Property Damage $
7/9/2021	0	0	0
7/12/2021	0	0	0
7/30/2021	0	0	$10,000
8/19/2021	0	0	0
9/2/2021	0	0	0
11/12/2021	0	0	$16,400
10/17/2022	0	0	0
7/10/2023	0	0	0
8/8/2023	0	0	0
TOTAL	**2**	**3**	**$20.644,900**

Source: NOAA, National Centers for Environmental Information

Repetitive Loss Structures

As defined by the National Flood Insurance Program (NFIP), a repetitive loss property is any property which the NFIP has paid two or more flood claims of $1,000 or more in any given 10-year period since 1978. A Severe Repetitive Loss property is a property for which four or more claims of $5,000 each have been paid, with a cumulative amount exceeding $20,000; or for which at least two payments were made with a cumulative amount exceeding the value of the property. There are no Severe Repetitive Loss properties in Lynnfield. For more information on repetitive losses see https://www.fema.gov/txt/rebuild/repetitive_loss_faqs.txt and https://www.fema.gov/repetitive-flood-claims-grant-program-fact-sheet.

Table 11. Summary of Repetitive Losses and Claims in Lynnfield

Repetitive Loss Category	Number of Properties	Number of Losses	Total Building Payments	Total Contents Payments	TOTAL Payments
Repetitive Loss	3	6	$45,012.29	$8,584.55	$53,596.84
Severe Repetitive Loss	0	0	0	0	0
TOTAL Losses	3	6	$45,012.29	$8,584.55	$53,596.84

Source: Massachusetts Emergency Management Agency

DAMS AND DAM FAILURE

Dam failure can occur as a result of structural failure, independent of a hazard event, or as the result of the impacts of a hazard event such as flooding associated with storms or an earthquake. In the event of a dam failure, the energy of the water stored behind even a small dam can cause loss of life and property damage if there are people or buildings downstream. The number of fatalities from a dam failure depends on the amount of

warning provided to the population and the number of people in the area in the path of the dam's floodwaters.

DCR defines dam hazard classifications as follows:

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

Lynnfield Dams

Pilling's Pond Dam: The dam was built in the early 2000's but during the May 2006 flood, the abutments to the spillway began to erode and water began to circumvent the dam. The town determined that the dam needed to have two foot wing walls added. The Town applied for a Hazard Mitigation Grant from FEMA to build the wing walls but it was not approved.

Saugus River Dam: The Saugus River receives stormwater from eight communities and forms portions of the corporate boundaries between Lynnfield and Wakefield, and Wakefield and Saugus. Additionally, the Saugus River Dam is located in both Lynnfield and Wakefield, but is controlled and operated by the Lynn Water and Sewer Commission.

Based on the record of previous occurrences dam failure in Lynnfield is a Very Low frequency event as defined by the 2013 Massachusetts State Hazard Mitigation Plan. This hazard may occur less frequently than once in 100 years (less than 1% chance per year).

WIND RELATED HAZARDS

Wind-related hazards include hurricanes, tropical storms, and tornadoes as well as high winds during Nor'easters and thunderstorms. As with many communities, falling trees that result in downed power lines and power outages are an issue in Lynnfield. Information on wind related hazards can be found on Map 5 in Appendix B

A hurricane is a violent wind and rainstorm with wind speeds of 74-200 miles per hour. A hurricane is strongest as it travels over the ocean and is particularly destructive to coastal property as the storm hits the land. The Town's entire area is vulnerable to hurricanes. Hurricanes occur between June and November. A tropical storm has similar characteristics, but wind speeds are between 38 and 74 miles per hour.

Since 1900, 39 tropical storms have impacted New England (NESEC). Massachusetts has experienced approximately 32 tropical storms, nine Category 1 hurricanes, five Category 2 hurricanes and one Category 3 hurricane. A hurricane or storm track is the line that delineates the path of the eye of a hurricane or tropical storm.

As shown in Map 5 in Appendix A, tropical storms tracked through Lynnfield 1902 and 1942. In addition, Lynnfield experiences the impacts of hurricanes and tropical storms regardless of whether the storm track passes directly through the Town, and numerous hurricanes have affected the communities of eastern Massachusetts (see Table 15).

Table 12. Hurricane Records for Massachusetts, 1938 - 2025

Hurricane Event	Date
Great New England Hurricane	September 21, 1938
Great Atlantic Hurricane	September 14-15, 1944
Hurricane Doug	September 11-12, 1950
Hurricane Carol	August 31, 1954
Hurricane Edna	September 11, 1954
Hurricane Diane	August 17-19, 1955
Hurricane Donna	September 12, 1960
Hurricane Gloria	September 27, 1985
Hurricane Bob	August 19, 1991
Hurricane Earl	September 4, 2010
Tropical Storm Irene	August 28, 2011
Hurricane Sandy	October 29-30, 2012

Source: National Oceanic and Atmospheric Administration

Hurricane intensity is measured according to the Saffir/Simpson scale, which categorizes hurricane intensity linearly based upon maximum sustained winds, barometric pressure, and storm surge potential. These are combined to estimate potential damage. The following gives an overview of the wind speeds, surges, and range of damage caused by different hurricane categories:

Scale No. (Category)	Winds(mph) Storm	Surge (ft)	Potential Damage
1	74 – 95	4 - 5	Minimal
2	96 – 110	6 - 8	Moderate
3	111 – 130	9 - 12	Extensive
4	131 – 155	13 - 18	Extreme
5	> 155	>18	Catastrophic

Source: NOAA

Hurricanes typically have regional impacts beyond their immediate tracks. Falling trees and branches are a significant problem because they can result in power outages when they fall on power lines or block traffic and emergency routes. Hurricanes are a town-wide hazard in Lynnfield. Potential hurricane damages to Lynnfield have been estimated using HAZUS-MH.

TORNADOES

A tornado is a violent windstorm characterized by a twisting, funnel-shaped cloud. These events are spawned by thunderstorms and occasionally by hurricanes and may occur singularly or in multiples. They develop when cool air overrides a layer of warm air, causing the warm air to rise rapidly. Most vortices remain suspended in the atmosphere. Should they touch down, they become a force of destruction. Some ingredients for tornado formation include:

- Very strong winds in the mid and upper levels of the atmosphere
- Clockwise turning of the wind with height (from southeast at the surface to west aloft)
- Increasing wind speed with altitude in the lowest 10,000 feet of the atmosphere (i.e., 20 mph at the surface and 50 mph at 7,000 feet.)
- Very warm, moist air near the ground with unusually cooler air aloft
- A forcing mechanism such as a cold front or leftover weather boundary from previous shower or thunderstorm activity

Tornado damage severity is measured by the Fujita Tornado Scale, in which wind speed is not measured directly but rather estimated from the amount of damage. As of February 01, 2007, the National Weather Service began rating tornados using the Enhanced Fujita-scale (EF-scale), which allows surveyors to create more precise assessments of tornado severity. The EF-scale is summarized in Table 14.

Table 13. Enhanced Fujita Scale

Scale	Wind speed		Relative frequency	Potential damage	
	mph	km/h			
EF0	65–85	105–137	53.5%	Minor damage. Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over. Confirmed tornadoes with no reported damage (i.e., those that remain in open fields) are always rated EF0.	
EF1	86–110	138–178	31.6%	Moderate damage. Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.	
EF2	111–135	179–218	10.7%	Considerable damage. Roofs torn off well-constructed houses; foundations of frame homes shifted; mobile homes completely destroyed; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.	
EF3	136–165	219–266	3.4%	Severe damage. Entire stories of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations blown away some distance.	
EF4	166–200	267–322	0.7%	Extreme damage to near-total destruction. Well-constructed houses and whole frame houses completely leveled; cars thrown and small missiles generated.	
EF5	>200	>322	<0.1%	Massive Damage. Strong frame houses leveled off foundations and swept away; steel-reinforced concrete structures critically damaged; high-rise buildings have severe structural deformation. Incredible phenomena will occur.	

Source: SHMCAP 2018

The frequency of tornadoes in eastern Massachusetts is low; on average, there are six tornadoes that touchdown somewhere in the Northeast region every year. The strongest tornado in Massachusetts history was the Worcester Tornado in 1953 (NESEC).

The most recent significant tornado events in Massachusetts were in Springfield in 2011 and in Revere in 2014. The Springfield tornado caused significant damage and resulted in 4 deaths in June of 2011. The Revere tornado touched down in Chelsea just south of Route 16 and moved north into Revere's business district along Broadway and ended near the intersection of Routes 1 and 60. The path was approximately two miles long and 3/8 mile wide, with wind speeds up to 120 miles per hour. Approximately 65 homes had substantial damages and 13 homes and businesses were uninhabitable.

Since 1956 there have been 11 tornadoes in surrounding Essex County recorded by the NCDC. T No tornados were F3, one was F2, eight were F1 and two were F 0. These 11

tornadoes resulted in no fatalities and four injuries and up to $560,280 in damages, as summarized in .

Table 14. Tornado Records for Essex County

Date	Fujita Scale	Deaths	Injuries	Property Damage $	Length	Width
6/13/1956	F1	0	0	2500	1	10
11/21/1956	F2	0	0	25000	0.8	17
12/18/1956	F1	0	0	250	0.5	23
7/13/1960	F0	0	0	30	0.1	33
7/21/1962	F1	0	3	25000	2.7	33
5/19/1964	F0	0	0	2500	0.1	300
5/19/1964	F1	0	0	2500	2	300
8/10/1965	F1	0	0	0	3.6	33
7/1/1968	F1	0	1	250000	0.3	100
7/21/1972	F1	0	0	2500	0.3	20
8/15/1991	F1	0	0	250000	0.8	300
		0	**4**	**$560,280**		

Source: National Centers for Environmental Information

Buildings constructed prior to current building codes may be more vulnerable to damages caused by tornadoes. Evacuation of impacted areas may be required on short notice. Sheltering and mass feeding efforts may be required along with debris clearance, search and rescue, and emergency fire and medical services. Key routes may be blocked by downed trees and other debris, and widespread power outages are also typically associated with tornadoes.

Although tornadoes are a potential Town-wide hazard in Lynnfield, tornado impacts are relatively localized compared to severe storms and hurricanes. Damages from any tornado in Lynnfield would greatly depend on the track of the tornado.

SEVERE WINTER STORMS

Winter storms, including nor'easters, heavy snow, blizzards, and ice storms, are the most common and most familiar of the region's hazards that affect large geographic areas. The majority of blizzards and ice storms in the region cause more inconvenience than serious property damage, injuries, or deaths. However, periodically, a storm will occur which is a true disaster, and necessitates intense large-scale emergency response. The strongest among these are typically nor'easters.

NOR'EASTERS

A northeast coastal storm, known as a nor'easter, is typically a large counterclockwise wind circulation around a low-pressure center. Featuring strong northeasterly winds blowing in from the ocean over coastal areas, nor'easters are relatively common in the winter months in New England occurring one to two times a year. The storm radius of a

nor'easter can be as much as 1,000 miles and these storms feature sustained winds of 20 to 40 mph with gusts of up to 70 mph. These storms are accompanied by heavy rains or snows, depending on temperatures.

Previous occurrences of nor'easters include the storm events included in Table 16. Many of the historic flood events identified in the previous section were precipitated by nor'easters, including the "Perfect Storm" event in 1991. More recently, blizzards in February 2013, January 2015, and in March 2018 were large nor'easters that caused significant snowfall amounts.

Table 15. Nor'easter Events for Massachusetts, 1978 - 2025

Date	Nor'easter Event
February 1978	Blizzard of 1978
October 1991	Severe Coastal Storm ("Perfect Storm")
December 1992	Great Nor'easter of 1992
January 2005	Blizzard/Nor'easter
October 2005	Coastal Storm/Nor'easter
April 2007	Severe Storms, Inland & Coastal Flooding/Nor'easter
January 2011	Winter Storm/Nor'easter
October 2011	Severe Storm/Nor'easter
February 2013	Blizzard of 2013
January 2015	Blizzard of 2015
March 2015	March 2015 Nor'easters
January 2018	January 2018
March 2018	March 2018

Many of the historic flood events identified in the previous section were precipitated by nor'easters, including the "Perfect Storm" event in 1991. More recently, large nor'easters in 2015 and 2018 caused significant damage across the coast.

Lynnfield is vulnerable to both the wind and precipitation that accompanies nor'easters. High winds can cause damage to structures, fallen trees, and downed power lines leading to power outages. Intense rainfall can overwhelm drainage systems causing localized flooding of streams as well as urban stormwater ponding and localized flooding. Fallen tree limbs as well as heavy snow accumulation and intense rainfall can impede local transportation corridors, and block access for emergency vehicles. Due to its location on the coast, the entire Town could be at risk from the wind, rain or snow impacts from a nor'easter, depending on the track and radius of the storm.

Based on the record of previous occurrences, nor'easters in Lynnfield are high frequency events as defined by the Resilient MA Plan. This hazard is almost certain to occur at least once a year.

BLIZZARDS & HEAVY SNOW

Winter storms are a combination hazard because they often involve wind, ice, and heavy snow fall. The National Weather Service defines "heavy snow fall" as an event generating at least four inches of snowfall within a 12-hour period (NOAA, 2009). Blizzards and winter storms are often associated with a nor'easter event (see nor'easters section above).

A blizzard is a winter snowstorm with sustained or frequent wind gusts to 35 mph or more, accompanied by falling or blowing snow which reduces visibility to or below ¼ mile. These conditions must be the predominant conditions over a three-hour period. Extremely cold temperatures are often associated with blizzard conditions but are not a formal part of the definition. The hazard related to the combination of snow, wind, and low visibility significantly increases when temperatures drop below 20 degrees.

The Regional Snowfall Index (RSI) characterizes and ranks the severity of northeast snowstorms. RSI has five categories: Extreme, Crippling, Major, Significant, and Notable. RSI scores are a function of the area affected by the storm, the amount of snow, and the number of people living in the path of the storm. The largest RSI values result from storms producing heavy snowfall over large areas that include major metropolitan centers. The RSI categories are shown in Table 19.

Table 16. Regional Snowfall Index

Category	RSI	Value Description
1	1 – 3	Notable
2	3-6	Significant
3	6-10	Major
4	10-18	Crippling
5	18+	Extreme

Source: 2018 SHMCAP

The best available data on previous occurrences and impacts of heavy snow events in Lynnfield is available for Essex County from the NOAA National Centers for Environmental Information (NCEI). From 2010 to 2023, Essex County experienced 33 days with heavy snowfall events, resulting in no injuries or deaths, and property damage of $147,600, as shown in Table 20.

Table 17. Heavy Snow and Blizzard Events in Essex County 2010-2023

Date	Deaths	a	Damage-$
1/18/2010	0	0	0
2/16/2010	0	0	15000
1/12/2011	0	0	0

Date	Deaths	a	Damage-$
1/26/2011	0	0	0
2/8/2013	0	0	0
3/7/2013	0	0	0
3/18/2013	0	0	0
12/14/2013	0	0	0
12/17/2013	0	0	0
1/2/2014	0	0	0
1/18/2014	0	0	10000
2/5/2014	0	0	0
2/13/2014	0	0	0
2/18/2014	0	0	0
1/24/2015	0	0	0
1/26/2015	0	0	0
2/2/2015	0	0	0
2/8/2015	0	0	0
2/14/2015	0	0	0
2/5/2016	0	0	40000
3/14/2017	0	0	30000
3/14/2017	0	0	50000
12/1/2019	0	0	500
1/18/2020	0	0	0
12/16/2020	0	0	0
1/7/2022	0	0	0
1/28/2022	0	0	500
2/25/2022	0	0	0
1/20/2023	0	0	0
1/23/2023	0	0	600
2/23/2023	0	0	0
3/3/2023	0	0	0
3/14/2023	0	0	1000
	0	**0**	**$147,600**

Source: NOAA, National Centers for Environmental Information

Another indication of previous severe winter events is the list of Presidentially declared disasters for blizzards and snowstorms. There have been 14 in Massachusetts since 1978, as shown in Table 21. The most significant single winter storm was the "Blizzard of 1978," which resulted in over three feet of snowfall and multiple day closures of roadways, businesses, and schools. The record snowfall of January 2015 resulted from a series of storms over that month. The most recent significant winter event was Winter Storm Kenan (January 29, 2022), which resulted in 30.9" of snow in Massachusetts (Stucker, 2022).

Table 18. Winter-Related Federal Disaster Declarations, 1978-2023

Disaster Name	Date of Event
Coastal Storms, Flood, Ice & Snow	February 1978
Winter Coastal Storm	December 1992
Blizzard	March 1993
Blizzard	January 1996
Snowstorm	March 2001
Snowstorm	February 2003
Snowstorm	December 2003
Snowstorm	January 2005
Severe Winter Storm, Snowstorm	January 2011
Severe Winter Storm, Snowstorm, Flooding	February 2013
Severe winter storm, snowstorm, flooding	January 2015
Severe winter storm and Snowstorm	March 2018
Severe winter storm and flooding	March 2018
Severe winter storm and snowstorm	January 2022

Sources: OpenFEMA Dataset: Disaster Declarations and FEMA Declared Disasters

The majority of blizzards and ice storms in the region cause more inconvenience than serious property damage, injuries, or deaths. However, periodically, a storm will occur which is a true disaster, and necessitates intense large-scale emergency response. The impacts of winter storms are often related to the weight of snow and ice, which can cause roof collapses and also causes tree limbs to fall. This in turn can cause property damage and potential injuries. Power outages may also result from fallen trees and utility lines.

A number of public safety issues can arise during snowstorms. Impassible streets are a challenge for emergency vehicles and affect residents and employers. Large piles of snow can also block sight lines for drivers, particularly at intersections. Refreezing of melting snow can cause dangerous roadway conditions. In addition, transit operations may be impacted, as they were in the 2015 blizzards which caused the closure of the MBTA system for one day and limited services on the commuter rail for several weeks.

OTHER SEVERE WEATHER

THUNDERSTORMS

While less severe than the other types of storms discussed, thunderstorms can lead to localized damage and represent a hazard risk for communities. A thunderstorm typically features lightning, strong winds, and rain and/or hail. Thunderstorms sometime give rise to tornados. On average, these storms are only around 15 miles in diameter and last for

about 30 minutes. A severe thunderstorm can include winds of close to 60 mph and rain sufficient to produce flooding. The severity of thunderstorms ranges from commonplace and of short duration to intense storms that cause damage due to high winds, flooding, or lightning strikes.

The extent of damages from high winds is described by the Beaufort Wind Scale (Table23), which was developed in 1805 by Sir Francis Beaufort of the U.K. Royal Navy.

Table 19. Beaufort Wind Scale

Force	Wind (Knots)	WMO Classification	Appearance of Wind Effects	
			On the Water	On Land
0	< 1	Calm	Sea surface smooth and mirror-like	Calm, smoke rises vertically
1	1-3	Light Air	Scaly ripples, no foam crests	Smoke drift indicates wind direction, still wind vanes
2	4-6	Light Breeze	Small wavelets, crests glassy, no breaking	Wind felt on face, leaves rustle, vanes begin to move
3	7-10	Gentle Breeze	Large wavelets, crests begin to break, scattered whitecaps	Leaves and small twigs constantly moving, light flags extended
4	11-16	Moderate Breeze	Small waves 1-4 ft. becoming longer, numerous whitecaps	Dust, leaves, and loose paper lifted, small tree branches move
5	17-21	Fresh Breeze	Moderate waves 4-8 ft taking longer form, many whitecaps, some spray	Small trees in leaf begin to sway
6	22-27	Strong Breeze	Larger waves 8-13 ft, whitecaps common, more spray	Larger tree branches moving, whistling in wires
7	28-33	Near Gale	Sea heaps up, waves 13-19 ft, white foam streaks off breakers	Whole trees moving, resistance felt walking against wind
8	34-40	Gale	Moderately high (18-25 ft) waves of greater length, edges	Twigs breaking off trees, generally impedes progress

			of crests begin to break into spindrift, foam blown in streaks	
9	41-47	Strong Gale	High waves (23-32 ft), sea begins to roll, dense streaks of foam, spray may reduce visibility	Slight structural damage occurs, slate blows off roofs
10	48-55	Storm	Very high waves (29-41 ft) with overhanging crests, sea white with densely blown foam, heavy rolling, lowered visibility	Seldom experienced on land, trees broken or uprooted, "considerable structural damage"
11	56-63	Violent Storm	Exceptionally high (37-52 ft) waves, foam patches cover sea, visibility more reduced	
12	64+	Hurricane	Air filled with foam, waves over 45 ft, sea completely white with driving spray, visibility greatly reduced	

Source: NOAA Storm Prediction Center

The best available data on previous occurrences of thunderstorms in Lynnfield are from the NOAA National Centers for Environmental Information (NCDC) for Essex County. Between the years 2010 and 2023 NCEI records show 62 thunderstorm events in Essex County (Table 24). These storms resulted in a total of $1,894,600 in property damages. There were no injuries or deaths.

Table 20. Essex County Thunderstorm Wind Events, 2010 - 2023

Date	Magnitude-knots	Deaths	Injuries	Damage-$
6/3/2010	50	0	0	71000
6/5/2010	50	0	0	60000
6/6/2010	52	0	0	79500
6/24/2010	50	0	0	65750
7/12/2010	50	0	0	30000
7/19/2010	50	0	0	25000
6/9/2011	50	0	0	111000
7/4/2011	50	0	0	15000
7/4/2011	50	0	0	16000
7/18/2011	39	0	0	20000
8/19/2011	50	0	0	60000
10/4/2011	50	0	0	10000

Date	Magnitude-knots	Deaths	Injuries	Damage-$
6/23/2012	50	0	0	75700
6/25/2012	40	0	0	5000
7/4/2012	50	0	0	5000
6/24/2013	50	0	0	25000
7/1/2013	50	0	0	18000
7/3/2014	50	0	0	100000
7/15/2014	50	0	0	15000
7/28/2014	50	0	0	15000
9/2/2014	45	0	0	5000
9/6/2014	50	0	0	248000
5/28/2015	61	0	0	121000
6/23/2015	60	0	0	5000
7/27/2015	45	0	0	1000
8/4/2015	50	0	0	65000
2/25/2016	45	0	0	21000
6/29/2016	50	0	0	25000
7/1/2016	50	0	0	15000
7/18/2016	70	0	0	105000
7/23/2016	50	0	0	130000
7/23/2016	50	0	0	25000
9/11/2016	50	0	0	10000
5/18/2017	50	0	0	29000
6/23/2017	50	0	0	25500
6/27/2017	50	0	0	10000
6/18/2018	50	0	0	46500
9/18/2018	61	0	0	16000
6/30/2019	40	0	0	6000
7/17/2019	50	0	0	1750
7/31/2019	50	0	0	40000
8/21/2019	50	0	0	3000
6/6/2020	50	0	0	1500
7/5/2020	50	0	0	1300
7/13/2020	50	0	0	1000
7/23/2020	50	0	0	1800
7/30/2020	50	0	0	6000
7/30/2020	50	0	0	500
7/30/2020	50	0	0	2500
8/23/2020	50	0	0	9600
6/8/2021	50	0	0	21300
6/30/2021	50	0	0	6300

Date	Magnitude-knots	Deaths	Injuries	Damage-$
7/6/2021	50	0	0	1000
7/7/2021	50	0	0	800
7/16/2021	50	0	0	4000
8/19/2021	50	0	0	800
9/13/2021	50	0	0	8000
3/7/2022	50	0	0	7100
8/7/2022	50	0	0	1600
8/7/2022	50	0	0	31000
7/24/2023	50	0	0	800
9/8/2023	50	0	0	12000
TOTAL		**0**	**0**	**$1,894,600**

Source: NOAA, National Centers for Environmental Information
Magnitude refers to maximum wind speed in knots.

Severe thunderstorms are a Town-wide hazard for Lynnfield. The Town's vulnerability to severe thunderstorms is similar to that of Nor'easters. High winds can cause falling trees and power outages, as well as obstruction of key routes and emergency access. Heavy precipitation may also cause localized flooding, both riverine and urban drainage related.

GEOLOGICAL HAZARDS

Earthquakes

Damage in an earthquake stems from ground motion, surface faulting, and ground failure in which weak or unstable soils, such as those composed primarily of saturated sand or silts, liquefy. The effects of an earthquake are mitigated by distance and ground materials between the epicenter and a given location. An earthquake in New England affects a much wider area than a similar earthquake in California due to New England's solid bedrock geology (NESEC).

Seismologists use a magnitude scale known as the Richter Scale to express the seismic energy released by each earthquake. The typical effects of earthquakes in various ranges are summarized in Table 21.

Table 21. Richter Scale and Effects

Richter Magnitudes	Earthquake Effects
Less than 3.5	Generally, not felt, but recorded

Richter Magnitudes	Earthquake Effects
3.5- 5.4	Often felt, but rarely causes damage
Under 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 km. across where people live.
7.0- 7.9	Major earthquake. Can cause serious damage over larger areas.
8 or greater	Great earthquake. Can cause serious damage in areas several hundred meters across.

Source: Nevada Seismological Library (NSL), 2005

According to the State Hazard Mitigation Plan, New England experiences an average of five earthquakes per year. From 1668 to 2007, 355 earthquakes were recorded in Massachusetts (NESEC). Most have originated from the La Malbaie fault in Quebec or from the Cape Anne fault located off the coast of Rockport. The region has experienced larger earthquakes, including a magnitude 5.0 earthquake in 1727 and a 6.0 earthquake that struck in 1755 off the coast of Cape Anne. More recently, a pair of damaging earthquakes occurred near Ossipee, NH in 1940, and a 4.0 earthquake centered in Hollis, Maine in October 2012 was felt in the Boston area. Historical records of some of the more significant earthquakes in the region are shown in Table 22.

Table 22. Historic Earthquakes in Massachusetts or Surrounding Area

Location	Date	Magnitude
MA - Cape Ann	11/10/1727	5
MA - Cape Ann	12/29/1727	NA
MA - Cape Ann	2/10/1728	NA
MA - Cape Ann	3/30/1729	NA
MA - Cape Ann	12/9/1729	NA
MA - Cape Ann	2/20/1730	NA
MA - Cape Ann	3/9/1730	NA
MA – Boston	6/24/1741	NA
MA - Cape Ann	6/14/1744	4.7
MA – Salem	7/1/1744	NA
MA - Off Cape Ann	11/18/1755	6
MA - Off Cape Cod	11/23/1755	NA
MA – Boston	3/12/1761	4.6
MA - Off Cape Cod	2/2/1766	NA
MA – Offshore	1/2/1785	5.4
MA - Wareham/Taunton	12/25/1800	NA

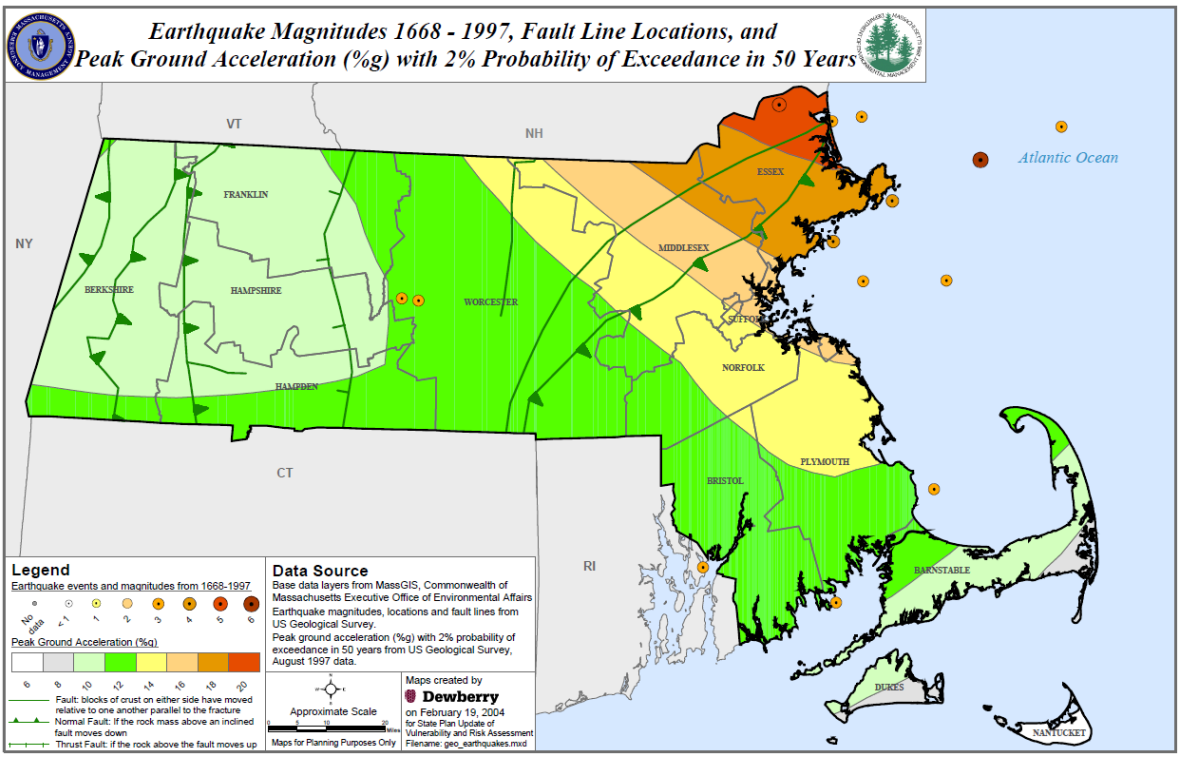
Location	Date	Magnitude
MA – Woburn	10/5/1817	4.3
MA - Marblehead	8/25/1846	4.3
MA – Brewster	8/8/1847	4.2
MA – Boxford	5/12/1880	NA
MA – Newbury	11/7/1907	NA
MA - Wareham	4/25/1924	NA
MA - Cape Ann	1/7/1925	4
MA - Nantucket	10/25/1965	NA
MA – Boston	12/27/74	2.3
MA - Nantucket	4/12/12	4.5
ME – Hollis	10/17/12	4.0

Source: Boston HIRA

One measure of earthquake risk is ground motion, which is measured as maximum peak horizontal acceleration, expressed as a percentage of gravity (1 g). The range of peak ground acceleration in Massachusetts is from 10g to 20g, with a 2% probability of exceedance in 50 years, as shown in Figure xx. Lynnfield is in the higher part of the range for Massachusetts making it a moderately high area of earthquake risk within the state, although the state as a whole is considered to have a low risk of earthquakes compared to the rest of the country.

Although New England has not experienced a damaging earthquake since 1755, seismologists state that a serious earthquake occurrence is possible. There are five seismological faults in Massachusetts, but there is no discernible pattern of previous earthquakes along these fault lines. Earthquakes occur without warning and may be followed by aftershocks. Most older buildings and infrastructure were constructed without specific earthquake resistant design features.

Figure 9. Massachusetts Earthquake Probability Map



Source: 2018 SHMCAP

Earthquakes are a hazard with multiple impacts beyond the obvious building collapse. Buildings may suffer structural damage which may or may not be readily apparent. Earthquakes can cause major damage to roadways, making emergency response difficult. Water lines and gas lines can break, causing flooding and fires. Another potential vulnerability is equipment within structures. For example, a hospital may be structurally engineered to withstand an earthquake, but if the equipment inside the building is not properly secured, the operations at the hospital could be severely impacted during an earthquake. Earthquakes can also trigger landslides.

Earthquakes are a potential Town-wide hazard in Lynnfield. The Town has many older buildings that could be vulnerable in the event of a severe earthquake. Although new construction under the most recent building codes will be built to higher seismic standards, there are many structures in Lynnfield which pre-date the most recent building code.

Landslides

According to the USGS, "The term landslide includes a wide range of ground movement, such as rock falls, deep failure of slopes, and shallow debris flows. Although gravity acting on an over steepened slope is the primary reason for a landslide, there are other contributing factors." Among the contributing factors are erosion by rivers or ocean waves

over steepened slopes; rock and soil slopes weakened through saturation by snowmelt or heavy rains; earthquakes create stresses that make weak slopes fail; and excess weight from accumulation of rain or snow, and stockpiling of rock or ore, from waste piles, or from man-made structures.

Landslides can result from human activities that destabilize an area or can occur as a secondary impact from another natural hazard such as flooding. In addition to structural damage to buildings and the blockage of transportation corridors, landslides can lead to sedimentation of water bodies. Typically, a landslide occurs when the condition of a slope changes from stable to unstable. Natural precipitation such as heavy snow accumulation, torrential rain and run-off may saturate soil creating instability enough to contribute to a landslide. The lack of vegetation and root structure that stabilizes soil can destabilize hilly terrain.

In Massachusetts, according to the SHMCAP, the most common cause of landslides are geologic conditions combined with steep slopes and/or heavy rains. Landslides associated with heavy rains typically occur on steep slopes with permeable soils underlain by till or bedrock.

There is no universally accepted measure of landslide extent, but it has been represented as a measure of destructiveness. The table below summarizes the estimated intensity for a range of landslides. For a given landslide volume, fast moving rock falls have the highest intensity while slow moving landslides have the lowest intensity.

The SHMCAP utilized data from the MA Department of Transportation from 1986 to 2006 to estimate that, on average, roughly one to three known landslides have occurred each year in the state. A slope stability map published by the MA Geological Survey and UMass-Amherst indicates that the most significant risk of landslide is in western Massachusetts.

Estimated Volume	**Expected Landslide Velocity**		
(m^3)	**Fast moving landslide (Rock fall)**	**Rapid moving landslide (Debris flow)**	**Slow moving landslide (Slide)**
<0.001	Slight intensity		
<0.5	Medium intensity		
>0.5	High intensity		
<500	High intensity	Slight intensity	
500-10,000	High intensity	Medium intensity	Slight intensity
10,000 – 50,000	Very high intensity	High intensity	Medium intensity
>500,000		Very high intensity	High intensity
>>500,000			Very high intensity

Source: *A Geomorphological Approach to the Estimation of Landslide Hazards and Risks in Umbria, Central Italy*, M. Cardinali et al, 2002

The entire Town has been classified as having a low incidence risk for landslides, less than 1.5 % of the area is involved in land sliding. (Map 4, Appendix A). The Town does not have records of any damages caused by landslides in Lynnfield.

Should a landslide occur in the future, the type and degree of impacts would be highly localized, and the Town's vulnerabilities could include damage to structures, damage to transportation and other infrastructure, and localized road closures. Injuries and casualties, while possible, would be unlikely given the low extent and impact of landslides in Lynnfield.

DROUGHT HAZARDS

Drought is a temporary irregularity in precipitation and differs from aridity since the latter is restricted to low rainfall regions and is a permanent feature of climate. Drought is a period characterized by long durations of below normal precipitation. Drought conditions occur in virtually all climatic zones, yet its characteristics vary significantly from one region to another, since it is relative to the normal precipitation in that region. Drought can affect agriculture, water supply, aquatic ecology, wildlife, and plant life.

In Massachusetts, droughts are caused by the prevalence of dry northern continental air and a decrease in coastal- and tropical-cyclone activity. During the 1960's, a cool drought occurred because dry air from the north caused lower temperatures in the spring and summer of 1962-65. The northerly winds drove frontal systems to sea along the Southeast Coast and prevented the Northeastern States from receiving moisture (U.S. Geological Survey). This is considered the drought of record in Massachusetts.

Average annual precipitation in Massachusetts is 44 inches per year, with approximately 3-to-4-inch average amounts for each month of the year. Regional monthly precipitation ranges from zero to 17 inches. Statewide annual precipitation ranges from 30 to 61 inches. Thus, in the driest calendar year (1965), the statewide precipitation total of 30 inches was 68 percent of average.

Although Massachusetts is relatively small, it has a number of distinct regions that experience significantly different weather patterns and react differently to the amounts of precipitation they receive. The DCR precipitation index divides the state into seven regions: Western, Central, Connecticut River Valley, Northeast, Southeast, Cape Cod, and Islands. Marlborough is located in the Northeast Region. In Marlborough drought is a potential city-wide hazard.

The Massachusetts Drought Management Plan was revised in 2019 to change the state's classification of droughts by establishing four levels to characterize drought severity beyond normal conditions:

- Level 0-Normal Conditions (no drought)
- Level 1-Mild Drought (formerly Advisory)
- Level 2-Significant Drought (formerly Watch)
- Level 3-Critical Drought (formerly Warning)
- Level 4-Emergency Drought (formerly Emergency)

The Massachusetts drought levels are shown in comparison to the U.S. Drought Monitor levels in Table 29. The two sets of drought indices are similar, but Massachusetts combines the USDM's level D2 and D3 into one category, Critical Droughts.

Table 23. US Drought Monitor Compared to MA Statewide Drought Levels

USDM Names	Recurrence	Percentile Ranges	MA DMP Levels	MA Percentile Ranges	MA DMP Names
D0: Abnormally Dry	once per 3 to 5 years	21 to 30	1	>20 and ≤30%	Mild Drought
D1: Moderate	once per 5 to 10 years	11 to 20	2	>10 and ≤20%	Significant Drought
D2: Severe Drought	once per 10 to 20 years	6 to 10	3	>2 and ≤10%	Critical Drought
D3: Extreme Drought	once per 20 to 50 years	3 to 5			
D4: Exceptional Drought	once per 50 to 100 years	0 to 2	4	≤2%	Emergency

Source: Massachusetts Drought Management Plan, 2019

These levels are based on the conditions of natural resources and provide information on the current status of water resources. As dry conditions can have a range of different impacts, a number of drought indices are available to assess these impacts. Massachusetts uses a multi-index system that takes advantage of several of these indices to determine the severity of a given drought or extended period of dry conditions. Drought level is determined monthly based on the number of indices which have reached a given drought level. Drought levels are declared on a regional basis for each of seven regions in Massachusetts. County by county or watershed-specific determinations may also be made. A determination of drought level is based on seven indices:

1. The Standardized Precipitation Index (SPI) reflects soil moisture and precipitation.
2. Crop Moisture Index: (CMI) reflects soil moisture conditions for agriculture.
3. Keetch Byram Drought Index (KBDI) is designed for fire potential assessment.
4. The Precipitation Index is a comparison of measured precipitation amounts to historic normal precipitation.

5. The Groundwater Level Index is based on the number of consecutive month's groundwater levels are below normal (lowest 25% of period of record).
6. The Stream flow Index is based on the number of consecutive months that stream flow levels are below normal (lowest 25% of period of record).
7. The Reservoir Index is based on the water levels of small, medium and large index reservoirs across the state, relative to normal conditions for each month.

Table 30 shows the range of values for each of the indices associated with the drought levels. Because drought tends to be a regional natural hazard, this plan references state data as the best available data for previous drought occurrences.

Determinations regarding the end of a drought or reduction of a drought level focus on precipitation and groundwater levels. These factors have the greatest long-term impact on stream flow, water supply, reservoir levels, soil moisture, and forest fire potential.

Table 24. Indices Values Corresponding to Drought Index Severity Levels

Index Severity Level	Standardized Precipitation Index	Streamflow	Lakes and Impoundments	Groundwater	Keetch-Byram Drought Index	Crop Moisture Index
0	>30th percentile				< 200	> -1.0
1	≤30 and >20				200-400	≤-1.0 and > -2.0
2	≤20 and >10				400-600	≤-2.0 and < -3.0
3	≤10 and >2				600-700	≤ -3.0 and > -4.0
4	≤2				700-800	≤-4.0

Source: Massachusetts Drought Management Plan, 2019

The drought levels provide a framework from which to take actions to assess, communicate, and respond to drought conditions. Drought levels are used to coordinate both state agency and local response to drought situations. Water restrictions might be appropriate at the significant drought stage, depending on the capacity of each individual water supply system. A critical drought level indicates a severe situation and the possibility that a drought emergency may be necessary. A drought emergency is one in which mandatory water restrictions or use of emergency supplies is necessary.

LAND USE AND DEVELOPMENT TRENDS

Existing Land Use

The most recent land use statistics available from the state are from aerial photography done in 2016. Table 16 shows the acreage and percentage of land in 23 categories. The largest single land use category is Single Family Residential, at 2,766 acres making up 41.39% of the Town. If the four residential categories are combined, residential uses make up about 46.24% of the area. The next largest land use is residential Tax Exempt. The category "Tax Exempt" is mostly made up of open space owned by non-profit organizations.

Table 25. 2016 Land Use in Lynnfield

Land Use	Acres	Proportion (%)
Open Land	359	5.37
Commercial	187	2.80
Industrial	4	2.11
Forest	1	0.01
Recreation	24	0.36
Tax Exempt	1996	29.87
Mixed-Use, primarily residential	4	0.05
Residential – single family	2766	41.39
Residential – multi-family	130	1.94
Mixed use, other	191	2.86
Right-of-way	580	8.68
Water	117	1.76
Unknown	187	2.80

For more information on how the land use statistics were developed and the definitions of the categories, please go to http://www.mass.gov/mgis/lus.htm.

Economic Elements

The Town of Lynnfield is a traditional New England residential community located in the western part of Essex County, in the northeastern part of Massachusetts, known as the North Shore. Lynnfield is bordered by North Reading on the north; Reading on the west; Middleton, Peabody and Lynn on the east; and Saugus and Wakefield on the south. With a total area of 10.22 square miles, Lynnfield is 15 miles north of Boston, 19 miles east of Concord and 28 miles south of Newburyport. Lynnfield's location on the North Shore, with direct access to major highways, makes it easy for residents to commute within Metro Boston, and to access nearby mountains and beaches.

The median household income is about $147,237. About 40% of households include children and about 37% of households include seniors. 52% of households are made up of one or two people (Lynnfield Vision Plan, 2024).

In terms of economy, 39% of jobs based in Lynnfield are in the service industry (Retail Trade, Accommodation & Food Services). The top three industries are car dealerships, clothing store, and restaurants. Most residents (73%) commute by driving alone (Lynnfield Vision Plan, 2024).

Historic, Cultural, and Natural Resource Areas

The first European settlers came to the area known today as Lynnfield in 1634. Prior to 1634, the Saugus Indian Tribe inhabited the area for as many as three thousand years. Native American artifacts have been found at campsites around Lynnfield. These areas include the Kallenberg Quarry, the Sagamore Spring Golf Club, and Partridge Island, located at the edge of Reedy Meadow. The newly settled area was known as Lynn End and was a parish of the town of Lynn for many years. In 1782, Lynnfield was incorporated, and in 1814 became a Town. Lynnfield has an open town meeting form of government, headed by a three-member Board of Selectmen and a Town Administrator.

The Newburyport Turnpike (U.S. Route 1) was completed in 1806. The Lynnfield Hotel, built in 1804 and destroyed by fire in 1894, was the first stagecoach stop from Boston. During the mid-1800s, the railroad began operating in Lynnfield. This access brought many people to the area, particularly in the summer, to use the water resources such as Suntaug Lake and Pillings Pond. Until the beginning of the 19th century, Lynnfield was mostly an agrarian community. During the 1800's, a few industries appeared, including several mills and shoe factories. Additionally, the Town became a source for peat, excavated from Reedy Meadow, and granite, quarried in the Kallenberg Quarry. Both sites are now conservation areas.

Lynnfield is primarily made up of gently rolling countryside and is rich in water resources. The Ipswich River flows along the Town's northern border while the Saugus River makes up part of the southern and western borders. Pillings Pond is a manmade body of water located near the center of Lynnfield and has been the setting for many recreational activities in the community. The City of Peabody receives part of its water supply from Suntaug Lake, which abuts Lynnfield and Peabody. Hawkes Pond is shared with the Town of Saugus and is part of the Lynn water supply. Reedy Meadow is a freshwater marsh and is one of eleven National Natural Landmarks in Massachusetts. The surface water of Reedy Meadow does not belong to Lynnfield even though the land beneath the water is within the confines of the Town. By an act of legislation in 1883, the City of Lynn acquired the right to dam the Saugus River and to use the meadow for water conservation. Lynnfield and Wakefield, both bordering Reedy Meadow, share in their desire to keep the marsh in its natural state and retain its open space qualities. (2006 Lynnfield Housing Production Plan)

Development Trends

Lynnfield remained a rural community until after World War II when the Town experienced significant growth similar to many of its neighboring towns. The population more than doubled during the 1950s and 1960s spurred by the development of new housing (1,654 houses, or 40% of today's housing stock, were built during this 20-year span). The expansion of population resulted in increased public services such as post offices, fire and police stations, new shopping centers and an addition to the library. The once rural community was transformed into a suburb. Prior to 1960, Lynnfield students attended Wakefield or Lynn High Schools. The first class at Lynnfield High School graduated in 1960. Within five years, a new high school was needed and the former

high school became a middle school. During this decade, the Town acquired conservation land and built recreational facilities. (2006 Lynnfield Housing Production Plan).

Today, Lynnfield is an upper-income residential suburban community predominantly composed of single-family homes where most residents work outside of the town. In recent years, Lynnfield has seen an increase in commercial and residential development interest, including the growth of Market Street, as the Greater Boston economy has grown.

Recent and Potential Future Development

MAPC consulted with the Lynnfield Hazard Mitigation Team to determine areas that have been recently developed or may be developed in the future, based on the Town's comprehensive planning efforts and locally identified projects. These development sites are described in Tables 17 and 18 below and their locations are shown on the maps in Appendix A.

Table 26. Developments Completed Since the 2018 Plan

MAP #	DEVELOPMENT	DEVELOPMENT TYPE	STATUS
A	Colonial Golf Course	Mixed-use	Completed
B	Sagamore Golf Course	66 unit senior housing	Not completed
C	Herb Chambers	Commercial	Completed
D	Two Broadway	Apartment	Completed
E	Pyburn Mews	17 unit condos	Completed
F	Lynnfield Crossing (470 Salem Street)	36 condo units	Complete
G	Grandview Estates	20 townhouses	Partially completed (1st phase completed, 2nd phase stalled)
H	Heritage Woods	4o townhouses	Complete
I	Windsor Estates	55 single family	Complete
N	60 Chestnut	2 lot ANR	Complete
M	Residences at Suntaug (160 Moulton Drive)	23 unit rental	Complete
P	914 Salem St	2 lot single family	Complete
O	Sagamore Place	5 lot single family	complete
Q	Zepaj Lane	8 lot single family	Complete

R	267 & 271 Main St	2 lot single family- complete	Complete
S	The Ship Mall (24-38 Broadway)	Commercial redevelopment	Complete

Source: Lynnfield Hazard Mitigation Team

Table 27. Potential New Developments

MAP #	DEVELOPMENT	DEVELOPMENT	STATUS
T	Vallis Way (formerly 109 Lowell St)	4 lot single family	Under Construction
U	Willis Brook (located at 1301 Main- formerly part of Sagamore Golf)	66 unit for people aged over 55+	Under Construction
V	Knights of Columbus	Mixed-use (office and 8 unit residential)	Under Review
M	Violet Circle	2 lot single family	Under Construction
W	Tuttle Lane Map	9 lot single family	Under Construction
X	140 Forest Hill	2 lot ANR	Under Construction
Y	211 Summer (now 8&10 Taylor Terrace)	2 lot ANR	Under Construction

Source: Lynnfield Hazard Mitigation Team

In order to characterize any change in the Town's vulnerability associated with new developments, a GIS mapping analysis was conducted which overlaid the development sites with the FEMA Flood Insurance Rate Map. he analysis shows that three of the development sites are partially located within a flood zone. Two sites have a minor area (<10%) overlapping the flood zone, while the other has about half of their area in the A Zone, 1% annual chance of flooding.

With respect to other categories of natural hazards, all of the development sites are in the areas defined as "Low Landslide Incidence." None of the developments are in locally identified areas at high risk for brush fires. Other hazards are categorized at the same level throughout town, so there is no variation among the development sites for these hazards. One development site was in the hotspots.

Table 28. Relationship of Recent and Potential Development to Hazard Areas

MAP #	Development	FEMA Flood Hazard Area	Landslide	Brush Fire	Hotspots
B	Sagamore Golf Course	4.51% in A: 1% Annual Chance of Flooding, no BFE	Low incidence	None	

V	Knights of Columbus	57.22% in A: 1% Annual Chance of Flooding, no BFE	Low incidence	None	
W	Tuttle Lane	3.51% in AE: 1% Annual Chance of Flooding, with BFE	Low incidence	None	
S	The Ship Mall	None	Low Incidence	None	28.67% in top 5% hottest land surface temperature in MAPC

MAPC GIS Analysis of Development and Flood Risk Areas

CRITICAL FACILITIES

Critical Infrastructure in Hazard Areas

Critical infrastructure includes facilities that are important for disaster response and evacuation (such as emergency operations centers, fire stations, water pump stations, etc.) and facilities where additional assistance might be needed during an emergency (such as nursing homes, elderly housing, day care centers, etc.). There are 45 facilities identified in Essex. These are listed in Table 20 and are shown on the maps in Appendix A.

Explanation of Columns in Table 20

Column 1: ID #: The first column in Table 10 is an ID number which appears on the maps that are part of this plan. See Appendix A.

Column 2: Name: The second column is the name of the site. If no name appears in this column, this information was not provided to MAPC by the community.

***Column 3: Type*:** The third column indicates what type of site it is.

***Column 4: FEMA Flood Zone*:** The fourth column addresses the risk of flooding as delineated on FEMA's Flood Insurance Rate Maps (FIRM). A "No" entry in this column means that the site is not within any of the mapped risk zones on the Flood Insurance Rate Maps (FIRM maps). If there is an entry in this column, it indicates the type of flood zone.

***Column 5: Locally Identified Flood Area*:** Areas identified by the local Hazard Mitigation Team as susceptible to flooding and/or localized drainage issue.

***Column 6: Sea Level Rise-3 Feet*:** Areas potentially subject to inundation from 3 feet of Sea Level Rise according to the Massachusetts Coastal Flood Risk Model (MC-FRM).

***Column 7: Sea Level Rise-10 Feet*:** Areas potentially subject to inundation from 10 feet of Sea Level Rise according to the Massachusetts Coastal Flood Risk Model (MC-FRM).

Column 8: Landslide Risk: The fourth column indicates the degree of landslide risk for that site. This information came from NESEC. The landslide information shows areas with either a low susceptibility or a moderate susceptibility to landslides based on mapping of geological formations. This mapping is highly general in nature. For more information on how landslide susceptibility was mapped, refer to http://pubs.usgs.gov/pp/p1183/pp1183.html.

Column 9: Brush Fires Hazard: -Areas determined by Local Hazard Mitigation Team to be at risk for brush fires.

Table 29. Critical Facilities and Relationship to Hazard Areas

MAP	FACILITY NAME	FACILITY TYPE	FEMA FLOOD HAZARD AREA	LOCAL FLOOD HAZARD AREA	BRUSHFIRE HAZARD AREA	ANNULA SNOW FALL AREA	WITHIN HOT SPOT
1	Lynnfield Town Hall	Municipal	No	No	No	H 48.1 - 72.0	No
2	Lynnfield Police Department	Police Station	No	No	No	H 48.1 - 72.0	No
3	Our Lady Of Assumption	School	No	No	No	G 36.1 - 48.0	No
4	Summer Street	School	No	No	No	H 48.1 - 72.0	No
5	Lynnfield High	School	No	No	No	H 48.1 - 72.0	Yes
6	Huckleberry Hill	School	No	No	No	H 48.1 - 72.0	No
7	Lynnfield Middle School	School	No	Beaver Dam Brook (Reedy Meadow to Chestnut)	No	H 48.1 - 72.0	Yes
8	Lynnfield Fire Department	Fire Station	No	No	No	G 36.1 - 48.0	No
9	Lynnfield Fire Department	Fire Station	No	No	No	H 48.1 - 72.0	No
10	Messiah Lutheran Day School	Child Care	No	No	No	H 48.1 - 72.0	No
11	Tower Day School	Child Care	No	No	No	H 48.1 - 72.0	No
12	Bethlem School - St. Paul's Episcopal	Child Care	No	No	No	H 48.1 - 72.0	No
13	Lynnfield Center Water District	Well Pump Station	No	No	No	H 48.1 - 72.0	No
14	Lynnfield Center Water District	Well Pump Station	No	No	No	H 48.1 - 72.0	No
15	Lynnfield Center Water District Pumping	Well Pump Station	No	No	No	H 48.1 - 72.0	No
16	Lynnfield Center Well Water Pump Station	Well Pump Station	No	No	No	H 48.1 - 72.0	No
17	Verizon Switching Station	Telecommunications	No	No	No	H 48.1 - 72.0	No
18	Center Village	Elder Housing	No	No	No	H 48.1 - 72.0	No
19	Lynnfield Center Substation	Power Substation	No	No	No	H 48.1 - 72.0	No

MAP	FACILITY NAME	FACILITY TYPE	FEMA FLOOD HAZARD AREA	LOCAL FLOOD HAZARD AREA	BRUSHFIRE HAZARD AREA	ANNULA SNOW FALL AREA	WITHIN HOT SPOT
20	Lynnfield Emergency Operations Center	Emergency Operations Center	No	No	No	H 48.1 - 72.0	No
21	DPW Garage	Municipal	No	No	No	H 48.1 - 72.0	No
22	Sunrise Assisted Living of Lynnfield	Elder Housing	No	No	No	H 48.1 - 72.0	No
23	Switching Station for Peabody Municipal	Telecommunications Switching Station	No	No	No	H 48.1 - 72.0	No
24	Keyspan	Smell Additive Station	No	No	No	H 48.1 - 72.0	No
25	Essex Village	Elder Housing	No	No	No	H 48.1 - 72.0	No
26	Seam Collaborative Day Care	Child Care	No	No	No	G 36.1 - 48.0	No
27	Colonial Gardens	Elder Housing	No	No	No	G 36.1 - 48.0	No
28	Heritage Woods	Elder Housing	No	No	No	G 36.1 - 48.0	No
29	Lynnfield Water District	Municipal	No	No	No	G 36.1 - 48.0	No
30	Lynnfield Water District	Well Pump Station	No	No	No	H 48.1 - 72.0	No
31	Willis Brook Senior Living	Senior Housing	No	No	No	H 48.1 - 72.0	No
32	Bridge next to Saugus River	Bridge	AE: Regulatory Floodway	No	No	H 48.1 - 72.0	No

VULNERABILITY ASSESSMENT

Introduction to HAZUS-MH

HAZUS- MH (multiple-hazards) is a computer program developed by FEMA to estimate losses due to a variety of natural hazards. The following overview of HAZUS-MH is taken from the FEMA website. For more information on the HAZUS-MH software, go to http://www.fema.gov/plan/prevent/hazus/index.shtm

> "HAZUS-MH is a nationally applicable standardized methodology and software program that contains models for estimating potential losses from earthquakes, floods, and hurricane winds. HAZUS-MH was developed by the Federal Emergency Management Agency (FEMA) under contract with the National Institute of Building Sciences (NIBS). Loss estimates produced by HAZUS-MH are based on current scientific and engineering knowledge of the effects of hurricane winds, floods and earthquakes. Estimating losses is essential to decision-making at all levels of government, providing a basis for developing and evaluating mitigation plans and policies as well as emergency preparedness, response and recovery planning.
>
> HAZUS-MH uses state-of-the-art geographic information system (GIS) software to map and display hazard data and the results of damage and economic loss estimates for buildings and infrastructure. It also allows users to estimate the impacts of hurricane winds, floods and earthquakes on populations."

There are three modules included with the HAZUS-MH software: hurricane wind, flooding, and earthquakes. There are also three levels at which HAZUS-MH can be run. Level 1 uses national baseline data and is the quickest way to begin the risk assessment process. The analysis that follows was completed using Level 1 data. Level 1 relies upon default data on building types, utilities, transportation, etc. from national databases as well as census data. While the databases include a wealth of information on the Town of Essex, they do not capture all relevant information. In fact, the HAZUS training manual notes that the default data is "subject to a great deal of uncertainty."

However, for the purposes of this plan, the analysis is useful. This plan is attempting to generally indicate the possible extent of damages due to certain types of natural disasters and to allow for a comparison between different types of disasters. Therefore, this analysis should be considered to be a starting point for understanding potential damages from the hazards.

ESTIMATED DAMAGES FROM HURRICANES

The HAZUS-MH software was used to model potential damages to the community from a 100-year and 500-year hurricane event; storms that are 1% and .0.2% likely to happen in a given year, and roughly equivalent to a 100-year and 500-year return frequency hurricane. The damages caused by these hypothetical storms were modeled as if the storm track passed directly through the Town, bringing the strongest winds and greatest damage potential. The results are summarized in Table 30.

Though there are no recorded instances of a hurricane equivalent to a 500-year storm passing through Massachusetts, this model was included in order to present a reasonable "worst case scenario" that would help planners and emergency personnel evaluate the impacts of storms that might be more likely in the future, as we enter into a period of more intense and frequent storms.

Table 30. Estimated Damages from Hurricanes

	100 Year	500 Year
Building Characteristics		
Estimated total number of buildings	4,417	
Estimated total building replacement value	3,321,597	
		Millions of dollars
Building Damages		
# of buildings sustaining no damage	4,184	3,475
# of buildings sustaining minor damage	220	807
# of buildings sustaining moderate damage	12	117
# of buildings sustaining severe damage	0	7
# of buildings completed destructed	0	12
Population Needs		
# of households displaced	0	2
# of people seeking public shelter	0	0
Debris		
Building debris generated (tons)	2,331	6,667
Tree debris generated (tons)	1,463	1,056
# of truckloads to clear building debris	35	156
Value of Damages (Thousands of dollars)		
Total property damage (buildings and content)	28,839.73	90,218.82
Total losses due to business interruption	802.89	4,956.47
Total All Losses	29,642.62	95,175.29

Estimated Damages from Earthquakes

The HAZUSs-MH earthquake module allows users to define an earthquake magnitude and model the potential damages caused by that earthquake as if its epicenter had been at the geographic center of the study area. For the purposes of this plan, two earthquakes were selected: magnitude 5.0 and magnitude 7.0. Historically, major earthquakes are rare in New England, though a magnitude 5 event occurred in 1963. The results are summarized in Table 31.

Table 31. Estimated Damages from Earthquakes

	Magnitude 5.0	Magnitude 7.0
Building Characteristics		
Estimated total number of buildings	4,417	
Estimated total building replacement value	3,321,597	
		Millions of dollars
Building Damages		
# of buildings sustaining no damage	2,238	7
# of buildings sustaining slight damage	1,344	113
# of buildings sustaining moderate damage	666	848
# of buildings sustaining extensive damage	139	1,291
# of buildings completely damaged	29	2,158
Population Needs		
# of households displaced	44	2,612
# of people seeking public shelter	20	1,222
Debris		
Building debris generated (tons)	36,000	419,000
# of truckloads to clear debris (@ 25 tons/truck)	1,440	16,760
Value of Damages		
Total property damage	$4,491,900	$118,582,000
Total losses due to business interruption	$18,235,700	$17,855,200
Total All Losses	$22,730,000	$136,440,000

Estimated Damages from Flooding

The HAZUS-MH flood risk module was used to estimate damages to the municipality at the 100 and 500 return periods. These return periods correspond to flooding events that have a 1% and a 0.2% likelihood of occurring in any given year. The results are summarized in Table 32.

Table 32. Estimated Damages from Flooding

Table to be updated

SECTION5. HAZARD MITIGATION GOALS

The Lynnfield Hazard Mitigation Team reviewed and discussed the goals from the previous 2018 Hazard Mitigation Plan. The Team modified the goals to reflect a more comprehensive approach and to incorporate climate resiliency for this 2024 plan update. Goals 5 through 14 were added by the local team for this updated plan. All of the goals are considered critical for the Town, and they are not listed in order of importance.

1. Prevent and reduce the loss of life, injury, public health impacts and property damages resulting from all identified natural hazards.

2. Build and enhance local mitigation capabilities to ensure individual safety, reduce damage to public and private property and ensure continuity of emergency services.

3. Increase cooperation and coordination among private entities, Town officials and Boards, State agencies and Federal agencies.

4. Increase awareness of the benefits of hazard mitigation through outreach and education.

5. Identify and seek funding for measures to mitigate or eliminate such known significant flood hazard area.

6. Integrate hazard mitigation planning as an integral factor in all relevant municipal departments, committees and boards.

7. Prevent and reduce the damage to public infrastructure resulting from all hazards.

8. Work with surrounding communities, state, regional and federal agencies to ensure regional cooperation and solutions for hazards affecting multiple communities.

9. Ensure that future development meets federal, state and local standards for preventing and reducing the impacts of natural hazards.

10. Take maximum advantage of resources from FEMA and MEMA to educate Town staff and the public about hazard mitigation.

11. Consider the potential impacts of future climate change and incorporate climate sustainability and resiliency in hazard mitigation planning.

12. Partner and work with climate vulnerable populations to reduce disproportionately experienced hazards.

13. Enhance data integrity and establish protocols for the disaster situation.

14. Conduct annual hazard mitigation team updates and make adjustment to planning accordingly.

SECTION6. EXISTING MITIGATION MEASURES

The existing protections in the Town of Lynnfield are a combination of zoning, land use, and environmental regulations, infrastructure maintenance and drainage infrastructure improvement projects. Infrastructure maintenance generally addresses localized drainage clogging problems, while large scale capacity problems may require pipe replacement or invert elevation modifications. These more expensive projects are subject to the capital budget process and lack of funding is one of the biggest obstacles to the completion of some of these.

The Town's existing mitigation measures are listed by hazard type here and are summarized in Table 33 below.

Flooding – Existing Town-wide mitigation

Lynnfield employs a number of practices to help minimize potential flooding and impacts from flooding, and to maintain existing drainage infrastructure. Existing Town-wide mitigation measures include the following:

National Flood Insurance Program (NFIP) – Lynnfield participates in the NFIP with 34 policies in force as of the April 2, 2025. FEMA maintains a database on flood insurance policies and claims. This database can be found on the FEMA website at https://www.fema.gov/policy-claim-statistics-flood-insurance/policy-claim-statistics-flood-insurance/policy-claim-13

The following information is provided for the Town of Lynnfield:

Flood insurance policies in force (as of April 2, 2025)	34
Coverage amount of flood insurance policies	$10,387,000
Total Number of Closed Paid Losses	34
Number of Substantial Damage Closed Paid Losses	0
Closed Paid Losses	$245,876

The Town complies with the NFIP by enforcing floodplain regulations, maintaining up-to-date floodplain maps, and providing information to property owners and builders regarding floodplains and building requirements.

Massachusetts State Building Code – The Massachusetts State Building Code contains many detailed regulations regarding wind loads, earthquake resistant design, flood-proofing, and snow loads. The Town has adopted the state building code.

Street sweeping – Every street gets swept once a year or as needed. Street sweeping is contracted out as part of the services negotiated by the North Reading – Lynnfield – Middleton Consortium.

Catch basin cleaning – All 1,500 catch basins are cleaned out once a year. This service is contracted out.

Roadway treatments – The town uses a mixture of sand and salt with a bit more salt in the mix. This is done to minimize the amount of sand that enters catch basins and streams.

Subdivision Rules and Regulations – The subdivision rules and regulations contain a number of requirements that address flood hazard mitigation. Some of these provisions also relate to other hazards.

> Section 5.4.2(7) regulates preliminary plans submittals. Preliminary plans must show Size and location of existing and proposed storm drains/culverts, water mains, and appurtenances thereto. All existing and proposed structures shall show the rim elevations, sump elevations, and all pipe invert elevations.
>
> Section 6.4.6(4) regulates definitive plan submittals. Definitive plans must show the location, detail drawing, & specifications of controls used during construction to divert stormwater and to mitigate/eliminate sediments, contaminants, or pollutants.
>
> Section 6.6.1 (1) relates to various departments that must approve proposed facilities including the DPW for storm drainage and the Fire Chief for any special water supply facilities.
>
> Section 6.6.3 requires that the applicant for a definitive plan must provide the Board of Health and the Planning Board with a report from a qualified engineer that provides an estimate of the maximum height of the water table, the minimum elevation of the lowest floor in a dwelling to avoid inundation in a 50 year flood, any soil characteristics, such as recent filling, that might preclude a stable foundation. The Planning Board may rule that certain lots may not be approved for building purposes.
>
> Section 7.2 relates to requirements for easements for storm drains and underground utilities. If a subdivision is traversed by a water course, drainage way, channel or stream, the Board may require an easement of adequate width.
>
> Section 8.3 relates to storm drainage. This section regulates the installation of storm drainage to ensure adequate disposal of surface water from all streets within the subdivision and adjacent land Each subdivision, regardless of its size, shall have a stormwater management system compliant with the latest edition of the Department of Environmental Protection's (DEP) Stormwater and the subdivision's stormwater management system shall be designed as to not increase the peak rate of runoff of stormwater in the two, ten, and one-hundred year storm events. Holding ponds, dry wells, or other equivalent permanent means shall be provided to prevent an increase in the rate of rainfall runoff due to the construction of roadways, driveways, and other paved areas, building roofs, and grassed areas during these storm events.

Wetlands Regulations- the Town maintains 100-foot no-disturb zones from any vernal pool and 25-feet no-disturb zones from any wetland resource area. No-build zones are required for a minimum of 100 feet from any vernal pool and 50 feet from any wetland resource area.

The Lynnfield Zoning Bylaw

Establishment and Purpose of Districts -. The town's zoning preamble states that the bylaw is intended to secure safety from fire, flood, panic and other dangers; to facilitate the adequate provision of transportation, water, water supply, drainage, sewerage, schools, parks, open space and other public requirements.

The zoning bylaw establishes one overlay district relevant to hazard mitigation: the Flood Plain District. Section 9.1 of the zoning bylaw states that the purposes of the Floodplain District are:

- that lands in the Town of Lynnfield subject to seasonal or periodic flooding as described herein shall not be used for residence or other purposes in such a manner as to endanger the health or safety of the occupants.

The Floodplain District is established as an overlay district. The Floodplain District includes all special flood hazard areas within the Town of Lynnfield designated as Zone A and AE on the Essex County Flood Insurance Rate Map (FIRM) issued by the Federal Emergency Management Agency (FEMA) for the administration of the National Flood Insurance Program. Certain uses are allowed as of right and others are allowed under a Special Permit from the Zoning Board of Appeals. FEMA updated its Flood Hazard mapping of Lynnfield in 2012 and these maps were adopted at Town Meeting.

Groundwater Protection District- Section 9.3 establishes a Groundwater Protection District. The GPD exists largely in the Beaver Brook and Wills Brook watersheds, and close to the Ipswich River, Reedy Meadow, Broad Meadows and Pillings Pond areas. Section 9.3.6.3 (2) requires a Special Permit for any use that will render impervious more than 15% or 2,500 square feet of any lot, whichever is greater.

Site Plan Requirements - Section 7.4(11)- The addition of 600 square feet or more of impervious area shall require the applicant to specify a means to prevent an increase in the rate of rainfall runoff for the site resulting from the proposed alteration. No net increase in peak rate runoff is allowed.

Stormwater Management Bylaw and Regulations- Lynnfield adopted a stormwater management bylaw in 2010 that requires an approved stormwater management plan for any development disturbing one acre or more.

Green Belt Zoning- Section 8.4- This allows for the development of open space residential design subdivisions on tracts of land containing at least 25 acres with a minimum of 20% of Green Belt Land left as common open space.

Public Education on Stormwater-The Town DPW maintains a web page on good housekeeping practices and stormwater management frequently asked questions at: http://www.town.lynnfield.ma.us/Pages/LynnfieldMA_DPW/stormwater

Flooding – Existing Site-Specific Mitigation

2018 Plan Flooding Areas of Concern mitigation measures and existing status

The Saugus River/Reedy Meadow–The town would still like to address the flooding issues at Reedy Meadow and the Saugus River. The first step in mitigation would be to complete the draft EIR and submit it to the state for final approval. Completing the EIR would cost approximately $300,000. This project was halted due to high cost. Town submitted the plans for dredging for Saugus River but those plans were tabled for 10 years and revived in 2008. The project will require EIR but it was not completed. Town would like to keep the strategy and revise for 2025 to pursue intermunicipal dam management between Lynn Water and Sewer, Lynnfield, Saugus, Wakefield. Also the Town will consider doing hydrology study.

Beaver Dam Brook (Reedy Meadow to Chestnut Street) Beaver Dam Brook needs to be restored. Beavers are now routinely trapped as a preventive measure against flooding, and several culverts need to be enlarged. As an intermediate step to help address the flooding issues along the Beaver Dam Brook, which is affected by the flooding in Reedy Meadow, the town is proposing to upgrade the culvert underneath the MBTA rail bed, which should alleviate the flooding upstream from this point along Beaver Dam Brook during heavy or prolonged precipitation events. This site will be carried forward in the 2025 plan and updated to include enforcing beaver management program for the whole Reedy Meadow and conducting culvert study at Main St and Chestnut St.

Drainage study at Fletcher Rd to Timberhill was completed and will not move forward in the 2025 plan update.

Summer Street/Route 128 Overpass – The mitigation for flooding in this area involved having Mass Highway clean the pipe out and investigate its condition and structural integrity. Brook running underneath Route 128 had to be restored as well. This measure was completed and therefore will not move forward in the 2025 plan update.

Hawkes Brook at Fletcher Road– The appropriate mitigation measure for flooding in this area would be to restore the brook and upgrade the size of the culverts at Fletcher Road and Timberhill Lane. One of two culverts was upgraded at Fletcher Rd and Timberhill Lane culvert is pending due to budget. This measure will be kept and revised for 2025 plan update.

Drainage ditch restoration– Some of the brooks in town are in need of restoration. This used to be done by the Northeast Massachusetts Mosquito Control Board (NMMC). The brooks need to be cleared of vegetation, sand, sediment, trees and silt. Hawkes Brook is the first priority. So far, minimal action on this issue has been done. Major work will be needed on Hawkes Brook. This measure will move forward for 2025 plan update.

Rourke Lane at Lowell St – Drain needs to be tied into Lowell St from the current infiltration system. This has not been completed and therefore move forward for the 2025 plan update.

30 Longbow Circle – Flooding occurs once per year so the town needs to redo street drainage. The flooding issue was resolved through drainage cleaning. This measure is not moving forward for the 2025 plan update.

Midland Road at Bates Brook – Failed culvert caused water back up during heavy rains affecting residences on Midland Rd. This area was reviewed multiple times for the past two years and no conclusive failure was identified. This measure is not moving forward for the 2025 plan update.

Stormwater flooding issue at Ledge Rd – Town conducted the assessment study and it showed that correction is cost-prohibitive due to ledge. Town will not pursue this measure further for 2025 plan update.

Failed drainage at the intersection of Main St and South Common St – Town resolved this issue when the water main broke and cleaned afterwards. Further engineering study might be needed to add capacity. This measure is moving forward for the 2025 plan update.

Existing Dam Hazard Mitigation Measures

Pilling's Pond Dam–During the May 2006 flood, the abutments to the spillway began to erode and water began to circumvent the dam. The town determined that the dam needed to have two foot wing walls added. Temporary wing walls have been installed since 2008. Town wants to add automated level control to the dam. This measure is moving forward.

Existing Wind Hazard Mitigation Measures

Tree-trimming program – The Town has an outside contract for tree trimming services. Tree-trimming of public street trees is done primarily based on reports from citizens.

Massachusetts State Building Code – The Town enforces the Massachusetts State Building Code whose provisions are generally adequate to protect against most wind damage. The code's provisions are the most cost-effective mitigation measure against tornados given the extremely low probability of occurrence. If a tornado were to occur, the potential for severe damages would be extremely high.

Existing Winter Hazard Mitigation Measures

Roadway treatments –The Town treats its roads with calcium chloride to prevent icing and snow buildup before and during winter storm conditions.

Catch basin Cleaning: The Lynnfield DPW clears snow from clogged catch basins to prevent flooding.

Massachusetts State Building Code: The Town enforces the Massachusetts State Building Code, which contains regulations regarding snow loads on building roofs. The Town has adopted the state building code.

Existing Fire Hazard Mitigation Measures

The Fire Department has a tanker truck, a small pumper for off-road fire-fighting and two "squads" which are 4 wheel drive vehicles. The Fire Department also uses special forestry hoses which are lighter, single layer hoses.

Permits Required for Outdoor Burning – The Fire Department requires a written permit for outdoor burning. The property-owner must come into the Fire Station, fill out a form and pay a $15.00 fee.

Subdivision review - The Fire Department is involved in reviewing subdivision plans from conceptual design through occupancy to ensure that there is adequate access for fire trucks and an adequate water supply.

Existing Geologic Hazard Mitigation Measures

Massachusetts State Building Code – The State Building Code, updated in 2010, contains a section on designing for earthquake loads (780 CMR 1612.0). Section 1612.1 states that the purpose of these provisions is "to minimize the hazard to life to occupants of all buildings and non-building structures, to increase the expected performance of higher occupancy structures as compared to ordinary structures, and to improve the capability of essential facilities to function during and after an earthquake". This section goes on to state that due to the complexity of seismic design, the criteria presented are the minimum considered to be "prudent and economically justified" for the protection of life safety. The code also states that absolute safety and prevention of damage, even in an earthquake event with a reasonable probability of occurrence, cannot be achieved economically for most buildings.

Section 1612.2.5 sets up seismic hazard exposure groups and assigns all buildings to one of these groups according to Table 1612.2.5. Group II includes buildings which have a substantial public hazard due to occupancy or use and Group III are those buildings having essential facilities which are required for post-earthquake recovery, including fire, rescue and police stations, emergency rooms, power-generating facilities, and communications facilities.

Existing Multi Hazard Mitigation

Comprehensive Emergency Management Plan (CEMP)

Every community in Massachusetts is required to have a Comprehensive Emergency Management Plan. These plans address mitigation, preparedness, response and recovery

from a variety of natural and man-made emergencies. These plans contain important information regarding flooding, hurricanes, tornadoes, dam failures, earthquakes, and winter storms. Therefore, the CEMP is a mitigation measure that is relevant to all of the hazards discussed in this plan. The Town of Lynnfield's current CEMP was updated in 2016.

Emergency Management Team (EMT)

Lynnfield is a member of the 16-community Mystic Region Emergency Planning Committee. The Mystic REPC meets 10 times during the year and works to conduct and coordinate emergency exercises and procedures throughout the area encompassed by its members.

Natural Hazards Public Education- Lynnfield's Emergency Management site maintains links to winter safety, flood hazard and hurricane safety at: *http://www.town.lynnfield.ma.us/Pages/LynnfieldMA_Fire/EmerMgt*

The Lynnfield Health Department website (http://www.town.lynnfield.ma.us/Pages/LynnfieldMA_Health/index) also offers a natural hazard emergency preparedness link to MEMA programs and emergency preparedness at http://www.mass.gov/eopss/agencies/mema/.

Table 33. Summary of Existing Hazard Mitigation Measures

Hazard	Area	Mitigation Measure	Update/comments
Flooding	Town-wide	Participation in the National Flood Insurance Program (NFIP)	Effective / 34 policies in force
		Massachusetts Building Code	Effective
		Floodplain District	Updated /Effective
		Stormwater Management Bylaw and Regulations	Effective
		Street sweeping	Effective
		Catch basin cleaning	Effective
		Wetlands Regulations	Effective
		Subdivision and Zoning: Site Plan Review, Green Belt Zoning	Effective
		Town cleans & inspects catch basins every year.	Effective
		Public Education on Stormwater	Effective
		Open Space and Recreation Plan 2022 update	Effective
		Existing Site Specific Flooding Mitigation	Effective
Wind	Town-wide	Town tree-pruning management follows MGL Chapter 87	Effective
		State Building Code addresses wind standards	Effective for new construction

Hazard	Area	Mitigation Measure	Update/comments
Winter-Related	Town-wide	Regular snow removal operations and roadway treatments	Effective
		Catch basin cleaning to maintain drainage	Effective
		State Building Code addresses snow load standards	Effective for new construction
Fire	Town-wide	Outdoor burning permits	Effective
Fire	Town-wide	Subdivision review	Effective
Geologic	Town-wide	State Building Code addresses earthquake standards	Effective for new construction / Town has many older buildings
Multi hazard	Town-wide	Comprehensive Emergency Management Plan (CEMP)	Effective/Up to date
Multi hazard	Town-wide	Emergency Management Team (EMT)	Effective
Multi-hazard	Town-wide	Health Department Emergency Preparedness	Effective to include reference to natural hazards planning and response
		2024 Lynnfield Vision Plan	Climate resilience elements included

Local Capacity for Implementation

Under the Massachusetts system of "Home Rule," the Town of Lynnfield is authorized to adopt and from time to time amend a number of local bylaws and regulations that support the town's capabilities to mitigate natural hazards. These include Zoning Bylaws, Subdivision and Site Plan Review Regulations, Wetlands Bylaws, Health Regulations, Public Works regulations, and local enforcement of the State Building Code. Local Bylaws may be amended each year at the annual Town Meeting to improve the town's capabilities, and changes to most regulations simply require a public hearing and a vote of the authorized board or commission, such as the Community Planning and Development Board or Conservation Commission.

The Town of Lynnfield has recognized several existing mitigation measures that require implementation or improvements, and has the capacity within its local boards and departments to address these. The Lynnfield Department of Public Works and Engineering Department will address the needs for catch basin cleaning, repairs and upgrades to drainage infrastructure. The Planning Board will address the updates to the Master Plan and implementation of the Zoning Ordinance, Floodplain District, and Subdivision Rules and Regulations. The Conservation Commission will oversee implementation of the Wetlands Bylaw and the Open Space Plan. The Department of Public Works together with the Planning Board and Conservation Commission will coordinate implementation and enforcement of the Stormwater Bylaw.

SECTION7. MITIGATION MEASURES FROM THE 2018 PLAN

Implementation Status on the Previous Plan

At a meeting of the Lynnfield Hazard Mitigation Planning Committee, Town staff reviewed the mitigation measures identified in the 2018 Lynnfield Hazard Mitigation Plan and determined whether each measure had been implemented or deferred. Of those measures that had been deferred, the committee evaluated whether the measure should be deleted or carried forward into this Hazard Mitigation Plan 2025 Update. The team also considered the option of retaining but modifying an existing mitigation measure to reflect changing circumstances of a better understanding of the kind of mitigation needed to address vulnerability. The decision on whether to delete, retain, or modify each mitigation measure was based on the local team's assessment of the continued relevance or effectiveness of the measure and whether the deferral of action on the measure was due to the inability of the Town to take action on the measure, lack of funding or other issue. Table 34 summarizes the status of mitigation measures.

As indicated on Table 34, Lynnfield made progress on implementing many mitigation measures identified in the 2018 Hazard Mitigation Plan. Several recommended mitigation measures have been completed, including the following:

Completed Mitigation Projects

- Drainage Study on Fletcher Rd to Timberhill Rd
- Summer St/Route128 Overpass – MassDOT to clean the pipe out and investigate its condition and structural integrity. Restoring the brook that runs underneath Route 128
- 30 Longbow Circle – Flooding was resolved through drainage cleaning
- Midland Rd at Bates Brook – Area was reviewed multiple times for the past two years but no conclusive failure was identified. Further checks might be needed.
- Site Design to increase tree plantings near buildings, increase the percentage of trees used in parking areas, and along public ways.
- Assess placement of cooling centers at schools, senior center and emergency shelters

Partially Completed Mitigation Projects

- Saugus River/Reedy Meadow – Previous project was halted due to high cost; Town submitted the plans for dredging for Saugus River. However, those plans were tabled for 10 years and revived in 2008. The project will require EIR but it was not completed.
- Beaver Dam Brook (Reedy Meadow to Chestnut Street) – A two-town agreement is in place (Lynnfield and Wakefield) to address the area above Audubon Rd between the state policy training facility and the office park. The Town removed

major culverts and opened up the waterway north of Chestnut St then Northeast Mosquito Control Commission dredged and opened the channel.

- Hawkes Brook at Fletcher Road - One of two culverts was upgraded at Fletcher Rd; Timberhill Lane culvert is pending due to budget.
- Drainage ditch restoration - Minimal has been done. Some Beaver Dam Brook work completed; major work needed on Hawkes Brook.
- Failed drainage at the Main St and South Common St intersection - Town resolved issues when the water main broke and cleaned after that. Engineering study might be needed and possibly add capacity.
- Add permanent wing walls for Pilling's Pond Dam
- Incorporate brushfire mitigation in master plan reviews and updates - Town didn't pursue the Master Plan update yet but they have done work on providing access through National Grid owned roads.
- Evaluate public buildings for ability to withstand snow loads; retrofit if needed to greatest degree feasible
- Update the town-owned tree inventory and risk assessment database – Grant application underway for street tree inventory
- Promote drought tolerant landscaping and site design measures - Not codified. But it's integrated into stormwater standards and board practices.
- Promote Green Building and Cool Roof designs - Green Communities grant sought to introduce stretch code; However, Town is not sure since they are not serviced by the Eversource and National Grid.
- Incorporate climate resilience/adaptation components into the next Master Plan update - Town's Vision Plan includes elements; full Master Plan has not been pursued.

Not completed

- Rourke Lane at Lowell Street- Drain needs to be tied into Lowell Street from the current infiltration system.
- Ledge Road: failed drainage floods during heavy rains. Town conducted the assessment study and it showed that correction is cost-prohibitive due to ledge. Town will not pursue this measure further.
- Determine which buildings may be most vulnerable to earthquake damage and conduct a structural assessment if needed.
- Assess the vulnerability of roadways and utilities in high liquefaction susceptibility areas.

Table 34. Mitigation Measures from the 2018 Plan

Mitigation Measure	Priority 2018 Plan	Current Status 1. Completed 2. Partially Completed (Describe why it was partially completed) 3. Not Completed (Describe why it was not completed)	FOR THE 2025 Plan Update 1. Retain as-is in the 2025 Plan? 2. Keep and Revise for 2025? 3. Change Priority for 2025? 4. Delete from the 2025 Plan?
FLOOD-RELATED			
1) Saugus River/Reedy Meadow– The first step in mitigation would be to redraft an EIR and submit it to the state for final approval.	High	**Partially Completed** - Previous project was halted due to high cost; Town submitted the plans for dredging for Saugus River but those plans were tabled for 10 years and revived in 2008. The project will require EIR but it was not completed.	**Keep and Revise for 2025**: Town is pursuing intermunicipal dam management plan between Lynn Water and Sewer, Lynnfield, Saugus, Wakefield. Consider new hydrology study. FEMA maps and rail trail address part of the issue.
2) Beaver Dam Brook (Reedy Meadow to Chestnut Street) - Beaver Dam Brook needs to be restored, beavers will need to be trapped, and several culverts need to be enlarged.	High	**Partially Completed** - Two-town agreement is in place (Lynnfield and Wakefield) to address the area above Audubon Rd between the state policy training facility and the office park. The Town removed major culverts and opened up the waterway north of Chestnut St then Northeast Mosquito Control Commission dredged and opened the channel.	**Keep and Revise for 2025** – Beaver management program for the whole Reedy Meadow area including Wakefield and Lynnfield on the Saugus River above Audubon Rd. Needs a culvert study at Main Street and Chestnut St.
3) Drainage study: Fletcher Rd to Timberhill Rd	High	**Completed**	**Delete for 2025**

Mitigation Measure	Priority 2018 Plan	Current Status 1. Completed 2. Partially Completed (Describe why it was partially completed) 3. Not Completed (Describe why it was not completed)	FOR THE 2025 Plan Update 1. Retain as-is in the 2025 Plan? 2. Keep and Revise for 2025? 3. Change Priority for 2025? 4. Delete from the 2025 Plan?
4) Summer Street/Route 128 Overpass –The mitigation for flooding in this area would involve having Mass Highway clean the pipe out and investigate its condition and structural integrity. There is also a brook that runs underneath Route 128 that may need to be restored.	High	**Completed**	**Delete**
5) Hawkes Brook at Fletcher Road– The appropriate mitigation measure for flooding in this area would be to restore the brook and upgrade the size of the culverts at Fletcher Road and Timberhill Lane.	High	**Partially Completed** - One of two culverts was upgraded at Fletcher Rd; Timberhill Lane culvert is pending due to budget.	**Keep and Revise for 2025** - Maintenance of Hawkes Brook still needed. Culvert at Timberhill Lane needs to be upgraded.
6) Drainage ditch restoration– Many of the brooks in town are in need of restoration. This used to be done by the Northeast Massachusetts Mosquito Control Board (NMMC). The brooks need to be cleared of vegetation, sand, sediment, trees and silt. Hawkes Brook is the first priority	Medium	**Partially Completed** – Minimal has been done. Some Beaver Dam Brook work completed; major work needed on Hawkes Brook.	**Keep for 2025**
7) Rourke Lane at Lowell Street- Drain needs to be tied into Lowell Street from the current infiltration system.	High	**Not Completed**	**Keep and Revise for 2025** – Incorporate drainage improvement as part of the green street project

Mitigation Measure	Priority 2018 Plan	**Current Status** 1. Completed 2. Partially Completed (Describe why it was partially completed) **3.** Not Completed (Describe why it was not completed)	**FOR THE 2025 Plan Update** 1. Retain as-is in the 2025 Plan? 2. Keep and Revise for 2025? 3. Change Priority for 2025? **4.** Delete from the 2025 Plan?
8) 30 Longbow Circle- Flooding occurs once per year due; need to redo street drainage.	High	**Completed** - Flooding resolved through drainage cleaning.	**Delete**
9) Midland Road at Bates Brook- Failed culvert causes water back up during heavy rains; undermining Road; affects 4 houses on Midland Rd.	High	**Completed** - Area was reviewed multiple times for the past two years; no conclusive failure identified. Further checks might be needed.	**Delete**
10) Ledge Road: failed drainage floods during heavy rains	High	**Not Completed** – Town conducted the assessment study and it showed that correction is cost-prohibitive due to ledge. Town will not pursue this measure further.	**Delete**
11) Main Street and South Common Street intersection: failed drainage	Low	**Partially Completed** – Town resolved issues when the water main broke and cleaned after that. Engineering study might be still needed and possibly add capacity.	**Keep and Revise for 2025** – Conduct engineering study
DAM-RELATED			
12) Pilling's Pond Dam -Add permanent wing walls	High	**Partially Completed**	**Keep and Revise for 2025** – Introduce automated level control
FIRE-RELATED			

Mitigation Measure	Priority 2018 Plan	Current Status 1. Completed 2. Partially Completed (Describe why it was partially completed) 3. Not Completed (Describe why it was not completed)	FOR THE 2025 Plan Update 1. Retain as-is in the 2025 Plan? 2. Keep and Revise for 2025? 3. Change Priority for 2025? 4. Delete from the 2025 Plan?
13) Incorporate brushfire mitigation in master plan reviews and updates.	Medium	**Partially Completed** – Town didn't pursue the Master Plan update yet but they have done work on providing access through National Grid owned roads.	**Keep and Revise** – Need a brushfire mitigation plan for North Lynnfield. Regional coordination and specialized equipment (e.g., ATV/UTV) is needed. Consider Cape Ann model. Apply for funding to develop a Wildfire Plan for Lynn, Saugus and Lynnfield.
WINTER-RELATED			
14) Evaluate public buildings for ability to withstand snow loads; retrofit if needed to greatest degree feasible.	Low	**Partially Completed**	**Keep and revise for 2025** – Add tree risk assessment to the snow loads (consider vegetation buffers 6' from utilities 15' above)
WIND-RELATED [Including EXTREME WEATHER HAZARDS (TORNADOS, HURRICANES, NOR'EASTERS, HAIL)]			
15) Update the town-owned tree inventory and risk assessment data base	Medium	**Partially Completed** - Grant application underway for street tree inventory; 80% of Lynnfield's utilities are above the ground and might be vulnerable.	**Keep and Revise** – Peabody Light would like to do the tree risk assessment and coordinate between two departments in Peabody and Lynnfield
DROUGHT-RELATED			
16) Promote drought tolerant landscaping and site design measures	Medium	**Completed** – Not codified. But it's integrated into stormwater standards and board practices.	**Keep and Revise**
EXTREME TEMPERATURE-RELATED			

Mitigation Measure	Priority 2018 Plan	Current Status 1. Completed 2. Partially Completed (Describe why it was partially completed) 3. Not Completed (Describe why it was not completed)	FOR THE 2025 Plan Update 1. Retain as-is in the 2025 Plan? 2. Keep and Revise for 2025? 3. Change Priority for 2025? 4. Delete from the 2025 Plan?
17) Site Design to increase tree plantings near buildings, increase the percentage of trees used in parking areas, and along public ways.	Medium	**Completed** - Addressed via Tree Preservation Bylaw and working on a Street Tree Plan.	**Keep** – Complete a Street Tree Plan
18) Promote Green Building and Cool Roof designs	Medium	**Partially Completed** - Green Communities grant sought to introduce stretch code; However, Town is not sure since they are not serviced by the Eversource and National Grid.	**Keep and Revise for 2025** – Pursue adoption of Stretch Code.
19) Assess placement of cooling centers at schools, senior center and emergency shelters.	High	**Completed** - Public safety buildings now serve this role.	**Delete**
EARTHQUAKE-RELATED			
20) Determine which buildings may be most vulnerable to earthquake damage and conduct a structural assessment if needed.	Low	**Not Completed** – Library and Meeting House may need assessment.	**Keep for 2025**
21) Assess the vulnerability of roadways and utilities in high liquefaction susceptibility areas.	Low	**Not completed** - Risk considered minimal now, but measure retained.	**Keep for 2025**
CLIMATE RESILIENCE/ADAPTATION			
22) Incorporate climate resilience/adaptation components into the next Master Plan update.	High	**Partially Completed** - Town's Vision Plan includes elements; full Master Plan has not been pursued.	**Keep for 2025** – Incorporate climate resilience into full Master Plan

SECTION 8. HAZARD MITIGATION STRATEGY

What is Hazard Mitigation?

Hazard mitigation means to permanently reduce or alleviate the losses of life, injuries and property resulting from natural hazards through long-term strategies. These long-term strategies include planning, policy changes, education programs, infrastructure projects and other activities. FEMA currently has three mitigation grant programs: Building Resilient Infrastructure and Communities (BRIC), the Hazards Mitigation Grant Program (HGMP), and the Flood Mitigation Assistance (FMA) program. The three links below provide additional information on these programs.

https://www.fema.gov/grants/mitigation/building-resilient-infrastructure-communities
https://www.fema.gov/hazard-mitigation-grant-program
https://www.fema.gov/flood-mitigation-assistance-grant-program

Hazard Mitigation Measures can generally be sorted into the following groups:

- **Prevention:** Government administrative or regulatory actions or processes that influence the way land and buildings are developed and built. These actions also include public activities to reduce hazard losses. Examples include planning and zoning, building codes, capital improvement programs, open space preservation, and stormwater management regulations.
- **Property Protection:** Actions that involve the modification of existing buildings or infrastructure to protect them from a hazard or removal from the hazard area. Examples include acquisition, elevation, relocation, structural retrofits, flood proofing, storm shutters, and shatter resistant glass.
- **Public Education & Awareness:** Actions to inform and educate citizens, elected officials, and property owners about the potential risks from hazards and potential ways to mitigate them. Such actions include outreach projects, real estate disclosure, hazard information centers, and school-age and adult education programs.
- **Natural Resource Protection:** Actions that, in addition to minimizing hazard losses, also preserve or restore the functions of natural systems. These actions include sediment and erosion control, stream corridor restoration, watershed management, forest and vegetation management, and wetland restoration and preservation.
- **Structural Projects:** Actions that involve the construction of structures to reduce the impact of a hazard. Such structures include storm water controls (e.g., culverts), floodwalls, seawalls, retaining walls, and safe rooms.
- **Emergency Services Protection:** Actions that will protect emergency services before, during, and immediately after an occurrence. Examples of these actions include protection of warning system capability, protection of critical facilities, and protection of emergency response infrastructure.
  (Source: FEMA Local Multi-Hazard Mitigation Planning Guidance)

Regional and Inter-Community Considerations

Some hazard mitigation issues are strictly local. The problem originates primarily within the municipality and can be solved at the municipal level. Other issues are inter-community and require cooperation between two or more municipalities. There is a third level of mitigation which is regional and may involve a state, regional or federal agency or three or more municipalities.

Regional Partners

In the densely developed communities of the study area, mitigating natural hazards, particularly flooding, is more than a local issue. The drainage systems that serve these communities are a complex system of storm drains, roadway drainage structures, pump stations and other facilities owned and operated by a wide array of agencies including but not limited to the City of Lynn, Reading and Peabody Municipal Light, Northeast Massachusetts Mosquito Control Board, the Department of Conservation and Recreation (DCR), Coastal Zone Management (CZM), the Boston Metropolitan Planning Organization (MPO), and the Massachusetts Department of Transportation (MassDOT). These agencies must be considered the communities regional partners in hazard mitigation. These agencies also operate under the same constraints as communities do, including budgetary and staffing constraints and numerous competing priorities. In the sections that follow, the plan includes recommendations for activities to be undertaken by these other agencies. Implementation of these recommendations will require that all parties work together to develop solutions.

New Development and Infrastructure

As part of the process of developing recommendations for new mitigation measures for this plan update, the Town considered the issues related to new development, redevelopment, and infrastructure needs in order limit future risks. Taking into consideration the Zoning and By-law changes adopted in recent years, the Wetlands Act enforced by the Conservation Commission, the Stormwater Management bylaw enforced for new development, the Subdivision Rules and Regulations enforced for new development, and the Open Space and Recreation Plan, the town determined that existing regulatory measures are taking good advantage of local Home Rule land use regulatory authority to minimize natural hazard impacts of development.

Process for Setting Priorities for Mitigation Measures

The last step in developing Lynnfield's mitigation strategy is to assign a level of priority to each mitigation measure so as to guide the focus of the Town's limited resources towards those actions with the greatest potential benefit. At this stage in the process, the Local Hazard Mitigation Planning Team had limited access to detailed analyses of the cost and benefits of any given mitigation measure, so prioritization is based on the local team members' understanding of existing and potential hazard impacts and an approximate sense of the costs associated with pursuing any given mitigation measure.

Priority setting was based on local knowledge of the hazard areas, including impacts of hazard events, the extent of the area impacted, and the relation of a given mitigation measure to the Town's goals. In addition, the local Hazard Mitigation Planning Team also took into consideration factors such as the number of homes and businesses affected, whether or not road closures occurred and what impact closures had on delivery of emergency services and the local economy, anticipated project costs, whether any environmental constraints existed, and whether the Town would be able to justify the costs relative to the anticipated benefits. The prioritization criteria are summarized below:

Estimated Benefits	
High	Action will result in a significant reduction of hazard risk to people and/or property from a hazard event
Medium	Action will likely result in a moderate reduction of hazard risk to people and/or property from a hazard event
Low	Action will result in a low reduction of hazard risk to people and/or property from a hazard event
Estimated Costs	
High	Estimated costs greater than $100,000
Medium	Estimated costs between $10,000 to $100,000
Low	Estimated costs less than $10,000 and/or staff time
Overall Priority	
High	Action very likely to have political and public support and necessary maintenance can occur following the project, and the costs seem reasonable considering likely benefits from the measure
Medium	Action may have political and public support and necessary maintenance has potential to occur following the project
Low	Not clear if action has political and public support and not certain that necessary maintenance can occur following the project

Introduction to Potential Mitigation Measures Table

Description of the Mitigation Measure – The description of each mitigation measure and cost information is given if cost data were already available from the community. The cost data represents a point in time and would need to be adjusted for inflation and for any changes or refinements in the design of a particular mitigation measure.

Priority – As described above and summarized in Table 35, the designation of high, medium, or low priority was done considering potential benefits and estimated project costs, as well as other factors in the STAPLEE analysis.

Implementation Responsibility – The designation of implementation responsibility was done based on a general knowledge of what each municipal department is responsible for. It is likely that most mitigation measures will require that several departments work together and assigning staff is the sole responsibility of the governing body of each community.

Time Frame – The time frame was based on a combination of the priority for that measure, the complexity of the measure and whether or not the measure is conceptual, in

design, or already designed and awaiting funding. Because the time frame for this plan is five years, the timing for all mitigation measures has been kept within this framework. The identification of a likely time frame is not meant to constrain a community from taking advantage of funding opportunities as they arise.

Potential Funding Sources – This column attempts to identify the most likely sources of funding for a specific measure. The information on potential funding sources in this table is preliminary and varies depending on a number of factors. These factors include whether or not a mitigation measure has been studied, evaluated or designed, or if it is still in the conceptual stages. MEMA and DCR assisted MAPC in reviewing the potential eligibility for hazard mitigation funding. Each grant program and agency have specific eligibility requirements that would need to be taken into consideration. In most instances, the measure will require a number of different funding sources. Identification of a potential funding source in this table does not guarantee that a project will be eligible for or selected for funding. Upon adoption of this plan, the local team responsible for its implementation should begin to explore the funding sources in more detail.

Abbreviations Used in Table 27

FEMA Mitigation Grants includes:
- FMA = Flood Mitigation Assistance Program.
- HMGP = Hazard Mitigation Grant Program.
- BRIC = Building Resilient Infrastructure and Communities

ACOE = Army Corps of Engineers.
DHS/EOPS = Department of Homeland Security/Emergency Operations
DEP (SRF) = Department of Environmental Protection (State Revolving Fund)
USDA = United States Department of Agriculture
MA DOT = Massachusetts Department of Transportation
DCR = MA Department of Conservation and Recreation
CIP= Capital Improvement Plan
MVP= MA Municipal Vulnerability Preparedness Program
NCRF= National Coastal Resilience Fund
MA CRG= MA Coastal Resilience Grants
CRMAG= MA Dept. of Environmental Restoration Culvert Replacement Municipal Assistance

Table 35. Recommended Mitigation Measures for 2025

Mitigation Measure	Priority	Lead Agency	Time Frame	Estimated Cost	Potential Funding Sources
FLOODING					
1) **Saugus River/Reedy Meadow** – Pursue intermunicipal dam management plan between Lynn Water and Sewer, Lynnfield, Saugus, and Wakefield. Consider new hydrology study. FEMA maps and rail trail address part of the issue.	High	DPW/ Engineering	Long Term 2025-2030	High $100,000	Lynnfield Capital Improvement Plan/Town Bond (CIP)
2) **Beaver Dam Brook (Reedy Meadow to Chestnut St)** – Enforce beaver management program for the Reedy Meadow area including Wakefield and Lynnfield on the Saugus River above Audubon Rd. Conduct a culvert study at Main St and Chestnut St.	High	Public Works/ Engineering	Medium Term 2026-2027	High $100,000	Lynnfield Capital Improvement Plan/Town Bond (CIP)
3) **Hawkes Brook at Fletcher Road** – Continue maintenance of Hawkes Brook. Upgrade a culvert at Timberhill Lane.	High	Public Works/ Engineering	Short Term 2025-2026	High $100,000	Lynnfield Capital Improvement Plan/Town Bond (CIP)
4) **Drainage Ditch Restoration**– Some of the Beaver Dam Brook work was completed; major work is needed on Hawkes Brook.	Medium	Public Works/ Engineering	Long Term/Ongoing 2025-2030	Low <$10,000	Northeast Mosquito Control Board
5) **Rourke Land at Lowell Street** – Incorporate the drainage improvement as part of the green street project.	High	Public Works/ Engineering	Short Term 2025-2026	High $120,000	Lynnfield CIP/Town Bond/HMGP

Mitigation Measure	Priority	Lead Agency	Time Frame	Estimated Cost	Potential Funding Sources
6) **Main Street and South Common Street Intersection** – Conduct engineering study	Low	Public Works/ Engineering	Medium Term 2026-2027	High > $100,000	Lynnfield CIP/ and Northeast Mosquito Control Board
7) **Lynn Brook Road, Ledge Road, and Nells Pond Area** – Inadequate infrastructure management leading to intermunicipal flooding. Either fix the pipe through Cedar Brook or restore the bridge to open the brook.	High	Public Works/ Engineering	Long Term	High > $100,000	Lynnfield CIP/ Town Bond / HMGP
FIRE-RELATED HAZARD					
8) Incorporate brushfire mitigation in master plan reviews and updates – Need a brushfire mitigation plan for North Lynnfield. Apply for funding to develop a Wildfire Plan for Lynn, Saugus, and Lynnfield.	Low	Fire/ Engineering	Long Term 2025-2030	Low Estimated costs less than $5,000 per year staff time	Staff time / Town general operating budget (Fire/Engineering)
9) Convene regional collaboration on fire hazard mitigation such as Cape Ann Plan	Medium	Fire	Long Term	Medium	Staff time/ Town general operating budget (Fire) / Other municipalities' fund
10) Obtaining special equipment for off-road firefighting (e.g., ATV/UTV) for Lynn woods and Willis Brook.	Medium	Fire	Medium Term	High	Lynnfield CIP/Bond
DAM RELATED HAZARD					

Mitigation Measure	Priority	Lead Agency	Time Frame	Estimated Cost	Potential Funding Sources
11) Pilling's Pond Dam – Add automated water level system control	High	Public Works/ Engineering	Long Term 2025-2028	Medium $40,000	Lynnfield CIP/Town Bond and HMGP
WINTER RELATED HAZARD					
12) Evaluate public buildings for ability to withstand snow loads; retrofit if needed to greatest degree feasible. Conduct tree risk assessment to the snow loads (consider vegetation buffers 6' from utilities 15' above)	Medium	Facilities/ Engineering	Long Term	Medium	Town General Operating Budget (Facilities/Engineering)
EXTREME TEMPERATURE RELATED HAZARD					
13) Promote Green Building and Cool Roof designs – Pursue adoption of stretch code	Low	Building/ Planning	Long Term 2025-2030	Low Estimated costs less than $10,000 and or staff time	Staff Time/ Town general operating budget
14) Increase street tree canopies to reduce temperature, complete a Street Tree Plan	Medium	Planning Board / Tree Warden	Long Term	Medium	Town general operating budget (Planning)
WIND-RELATED HAZARD [including Extreme Weather Hazard (Tornados, Hurricanes, Nor'easters, Hail)]					
15) Update the town-owned tree inventory and risk assessment database – Coordinate with Peabody Light Department to conduct tree risk assessment	Medium	Tree Committee/ Tree Warden	Long Term 2025-2030	Low Staff Time	Lynnfield DPW Budget
DROUGHT-RELATED HAZARD					

Mitigation Measure	Priority	Lead Agency	Time Frame	Estimated Cost	Potential Funding Sources
16) Collaborate with other communities on the North Shore Water Resilience Task Force to develop a regional alternative water supply options to implement water connections to MWRA.	High	Lynnfield Water District	Medium	Early state: Staff time Implementation : High Cost	Lynnfield CIP/Bond
17) Codify drought tolerant landscaping and site design measures into development regulations	Medium	Lynnfield Planning Department	Medium	Staff time	Town general operating budget (planning)
EARTHQUAKE RELATED HAZARD					
18) Determine which buildings may be most vulnerable to earthquake damage and conduct a structural assessment – Prioritize assessing library and Meeting House	Low	Building/HMPT	Long Term TBD	Low Estimated costs less than $10,000 and/or staff time	Staff time/Town general operating budget
19) Assess the vulnerability of roadways and utilities in high liquefaction susceptibility areas.	Low	Public Works/HMPT	Long Term 2025-2030	Low estimated costs less than $10,000 and/or staff time	Staff time/Town general operating budget
CLIMATE RESILIENCE AND ADAPTATION					
20) Incorporate climate resilience/adaptation components into the next Master Plan update.	High	HMPT/Planning /Conservation/ Public Works/Public Health	Long Term 2025-2030	Medium Estimated costs between $10,000 to $100,000	Town general operating funds/staff time
21) Add resiliency back up power during the emergency. Collaborate with the Reading Municipal Light.	Medium	Reading Municipal Light	Long Term	High Cost	Reading Municipal Light

Mitigation Measure	Priority	Lead Agency	Time Frame	Estimated Cost	Potential Funding Sources
Invasive Species					
22) Ready Meadow – Fire hazard due to Phragmites. A long-term plan is to do a conservation trail project. In the interim, they do restoration demonstration project.	Medium	Conservation Commission	Medium to Long Term	High Cost	Town general operating funds (conservation) /CIP/Bond

SECTION 9. PLAN ADOPTION AND MAINTENANCE

Plan Adoption

The Lynnfield Hazard Mitigation Plan 2025 Update was adopted by the Lynnfield Select Board on [ADD DATE]. See Appendix E for documentation. The plan was approved by FEMA on [ADD DATE] for a five-year period that will expire on [ADD DATE].

Plan Maintenance

MAPC worked with the Lynnfield Hazard Mitigation Planning Team to prepare this plan. After approval of the plan by FEMA, this group will meet on a regular basis, at least annually, to function as the Hazard Mitigation Team, with the [ADD THE RESPONSIBLE PERSON/DEPARTMENT] designated as the coordinator. Additional members could be added to the local implementation team from businesses, non-profits and institutions. The Town will encourage public participation during the next 5-year planning cycle. As updates and a review of the plan are conducted by the Hazard Mitigation Implementation Team, these will be placed on the Town's web site, and any meetings of the Hazard Mitigation Implementation Team will be publicly noticed in accordance with Town and state open meeting laws.

Implementation and Evaluation Schedule

Mid-Term Survey on Progress– The coordinator of the Hazard Mitigation Team will prepare and distribute a survey in year three of the plan. The survey will be distributed to all of the local implementation group members and other interested local stakeholders. The survey will poll the members on any changes or revisions to the plan that may be needed, progress and accomplishments for implementation, and any new hazards or problem areas that have been identified.

This information will be used to prepare a report or addendum to the local hazard mitigation plan in order to evaluate its effectiveness in meeting the plan's goals and identify areas that need to be updated in the next plan. The Hazard Mitigation Implementation Team, coordinated by the Director of Public Works, will have primary responsibility for tracking progress and updating the plan.

Begin to prepare for the next Plan Update - Given the lead time needed to secure funding and conduct the planning process, the Hazard Mitigation Implementation Team will begin to prepare for an update of the plan in year three. The team will use the information from the Mid-Term progress review to identify the needs and priorities for the plan update and seek funding for the plan update process. Potential sources of funding may include FEMA Pre-Disaster Mitigation grants and the Hazard Mitigation Grant Program. Both grant programs can pay for 75% of a planning project, with a 25% local cost share required.

Prepare and Adopt an Updated Local Hazard Mitigation Plan – FEMA's approval of this plan is valid for five years, by which time an updated plan must be approved by FEMA in

order to maintain the Town's approved plan status and its eligibility for FEMA mitigation grants. Once the resources have been secured to update the plan, the Hazard Mitigation Implementation Team may decide to undertake the update themselves, contract with the Metropolitan Area Planning Council to update the plan or hire another consultant. However the Hazard Mitigation Implementation Team decides to update the plan, the group will need to review the current FEMA hazard mitigation plan guidelines for any changes. The Lynnfield Hazard Mitigation Plan Update will be forwarded to MEMA and DCR for review and to FEMA for approval.

Integration of the Plans with Other Planning Initiatives

This Hazard Mitigation Strategy is intended to provide the Town with a "roadmap" to key actions that will improve its resilience to natural hazards. The previous plan was incorporated into the Town's Strategic Plan and this updated plan will be incorporated into other related plans and policies, such as the Open Space and Recreation Plan, the Capital Investment Plan, and the Municipal Vulnerability Preparedness 2.0.

Upon approval of the Lynnfield Hazard Mitigation Plan 2025 Update by FEMA, the Local Hazard Mitigation Team coordinator will provide all interested parties and implementing departments with a copy of the plan and will initiate a discussion regarding how the plan can be integrated into that department's ongoing work. The plan will be reviewed and discussed with the following departments during the first six (6) months following plan adoption. During updates of any town department's plans or policies, the relevant portions of this mitigation strategy will be incorporated.

- Fire Department
- Emergency Management
- Police Department
- Public Works Department
- Engineering
- Building
- Planning Board/Planning and Community Development
- Conservation Commission
- Parks and Recreation
- Public Health

Other groups that will be coordinated with include large institutions, Chambers of Commerce, land conservation organizations and watershed groups. The plans will also be posted on a community's website with the caveat that local team coordinator will review the plan for sensitive information that would be inappropriate for public posting. The posting of the plan on a web site will include a mechanism for citizen feedback such as an e-mail address to send comments.

The Hazard Mitigation Plan will be integrated into other Town plans and policies as they are updated and renewed, including the Open Space Plan, Town Zoning and Subdivision Control Regulations, Strategic Plan, Comprehensive Emergency Management Plan, and Capital Investment Program.

SECTION 10. LIST OF REFERENCES

Lynnfield Vision Plan, 2024
Lynnfield Open Space and Recreation Plan, 2022
Lynnfield Hazard Mitigation Plan Update, 2018
Lynnfield Municipal Vulnerability Preparedness Report, 2020
Lynnfield Housing Production Plan, 2006
Lynnfield Master Plan, 2002
Lynnfield Town By-Laws
Lynnfield Zoning By-Law
Lynnfield Subdivision Rules and Regulations
Blue Hills Observatory
Environment America Research and Policy Center, When It Rains It Pours – Global Warming and the Increase in Extreme Precipitation, July 2012
FEMA, Disaster Declarations for States and Counties, 2023
FEMA, Flood Insurance Study, Plymouth County, 2016
FEMA Flood Insurance Rate Maps for Essex County, MA, 2012
FEMA, HAZUS-MH, 2023
FEMA, Local Mitigation Planning Policy Guide, 2022
Great Marsh Coastal Adaptation Plan 2017
Massachusetts Climate Change Assessment, 2022
MA Geographic Information System, *McConnell Land Use Statistics*
MA Office of Coastal Zone Management, Sea Level Rise: Understanding and Applying Trends and Future Scenarios for Analysis and Planning, December 2013.
MA Office of Dam Safety, Inventory of Massachusetts Dams
Massachusetts State Hazard Mitigation and Climate Adaptation Plan, 2018, 2023
Massachusetts State Hazard Mitigation Plan, 2013
Metropolitan Area Planning Council, GIS Lab, Regional Plans and Data.
New England Seismic Network, Boston College Weston Observatory
NOAA Centers for Environmental Information
Northeast States Emergency Consortium
Tornado History Project
US Census, 2020, American Community Survey
USDA Forest Service, Wildfire Risk to Communities
USGS, National Water Information System,
U.S. Global Change Research Program, Fourth National Climate Assessment, 2018

APPENDIX A. HAZARD MAPPING

The MAPC GIS (Geographic Information Systems) Lab produced a series of maps for each community. Some of the data came from the Northeast States Emergency Consortium (NESEC). More information on NESEC can be found at http://www.serve.com/NESEC/. Due to the various sources for the data and varying levels of accuracy, the identification of an area as being in one of the hazard categories must be considered as a general classification that should always be supplemented with more local knowledge.

The map series consists of eight maps as described below. The maps in this appendix are necessarily reduced scale versions for general reference.

Map 1.	Population Density
Map 2.	Potential Development
Map 3.	Flood Zones
Map 4.	Earthquakes and Landslides
Map 5.	Hurricanes and Tornadoes
Map 6.	Average Snowfall
Map 7.	Composite Natural Hazards
Map 8.	Hazard Areas
Map 9	Extreme Heat
Map 10	Sea Level Rise
Map 11	Wildfires

Map 1: Population Density – This map uses the US Census block data for 2020 and shows population density as the number of people per acre in seven categories with 60 or more people per acre representing the highest density areas.

Map 1b: Environmental Justice – This map shows Environmental Justice (EJ) populations using 2020 data. EJ designations from the State include English isolation, income, and minority residents.

Map 2: Land Use – This map shows land cover and land use from MassGIS' 2016 Land Cover/Land Use dataset.

Map 3: Flood Zones – The map of flood zones used the FEMA NFIP Flood Zones for Middlesex County as its source. For more information, refer to the FEMA Map Service Center website http://www.msc.fema.gov. The definitions of the flood zones are described in detail on this site as well. The flood zone map for each community also shows critical infrastructure and municipally owned and protected open space.

Map3b: Flood Claims – This map shows flood insurance and disaster claim records from March 2010. The March 29, 2010 federal disaster declaration associated with severe rainfall and flooding triggered the launch of the Federal Emergency Management Agency's (FEMA's) Individual Assistance Program through which residential property

owners, businesses, and institutions without flood insurance were eligible to apply for relief to pay for storm-related expenditures and repairs. Across the seven counties, over 27,000 individual claims were approved for nearly $59 million in disaster assistance, while reimbursements to state and local governments totaled $25 million. In the MAPC region, 18,400 claims were approved for $30 million dollars in disaster assistance.

Map 4: Earthquakes and Landslides (Regional) – This map depicts landslide risk and recorded earthquake epicenters in the community and surrounding region. This information came from NESEC. For most communities, there was no data for earthquakes because only the epicenters of an earthquake are mapped.

The landslide information shows areas with either a low susceptibility or a moderate susceptibility to landslides based on mapping of geological formations. This mapping is highly general in nature. For more information on how landslide susceptibility was mapped, refer to http://pubs.usgs.gov/pp/p1183/pp1183.html.

Map 5: Hurricanes and Tornadoes (Regional) – This map shows the spatial characteristics of several different meteorological properties and past events in the community and surrounding region. The map includes the storm tracks for both hurricanes and tropical storms. This information must be viewed in context. A storm track only shows where the eye of the storm passed through. In most cases, the effects of the wind and rain from these storms were felt in other communities even if the track was not within that community. This map also shows the location of tornadoes with a classification as to the level of damages. What appears on the map varies by community since not all communities experience the same wind-related events. These maps also show the 100-year wind speed and areas that could be inundated by storm surge during a hurricane, if any.

Map 6: Average Snowfall (Regional) - This map shows the average snowfall in the community and the surrounding region.

Map 7: Composite Natural Hazards (Regional) - This map shows four categories of composite natural hazards for areas of existing development. The hazards included in this map are 100-year wind speeds of 110 mph or higher, low and moderate landslide risk, FEMA Q3 flood zones (100 year and 500 year) and hurricane surge inundation areas. Areas with only one hazard were considered to be low hazard areas. Moderate areas have two hazards present. High hazard areas have three hazards present and severe hazard areas have four hazards present.

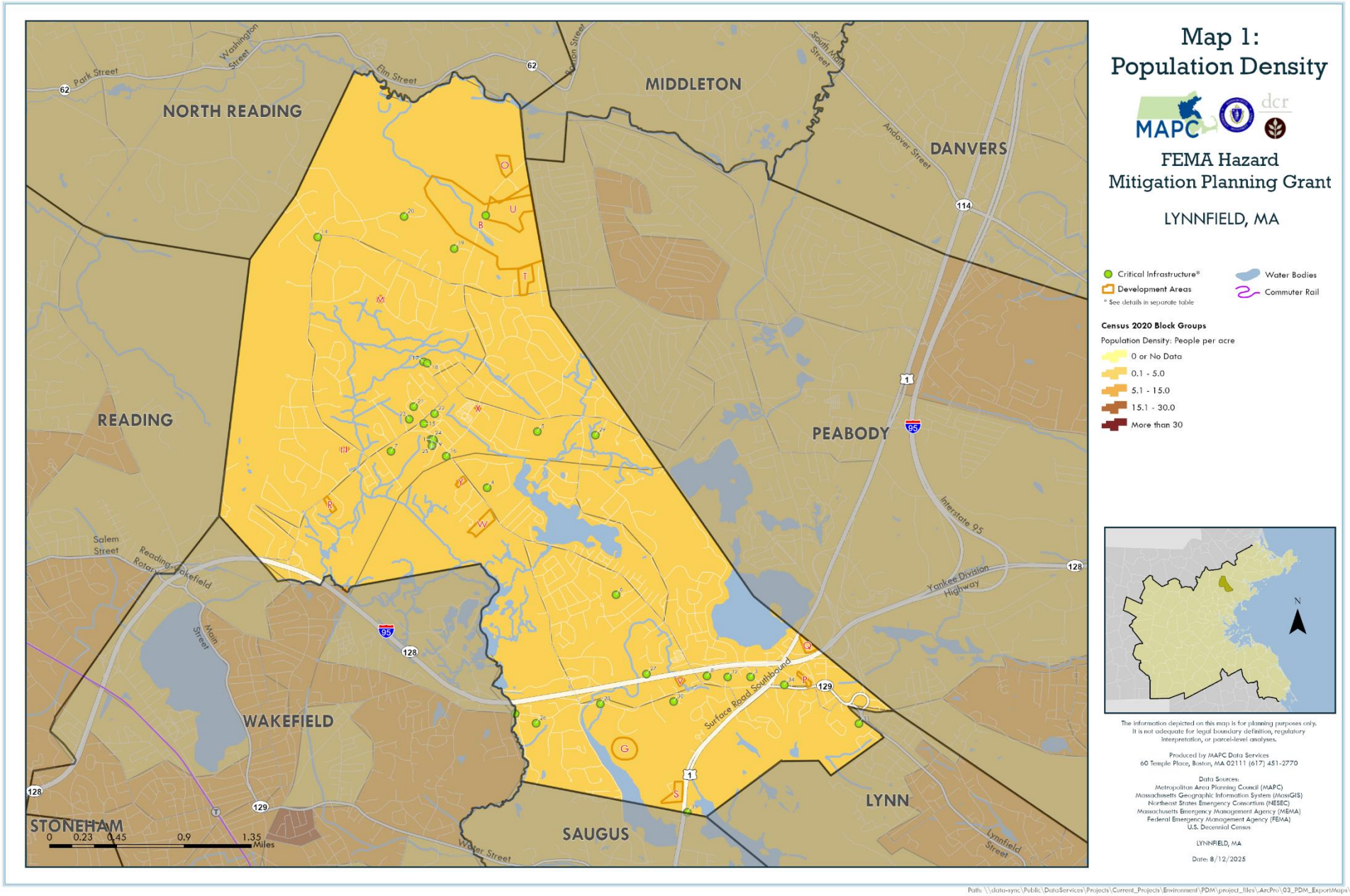
Map 8: Local Hazard Areas – For each community, locally identified hazard areas are overlaid on an aerial photograph/ The critical infrastructure sites and planned development areas are also shown. The source of the aerial photograph is Mass GIS.

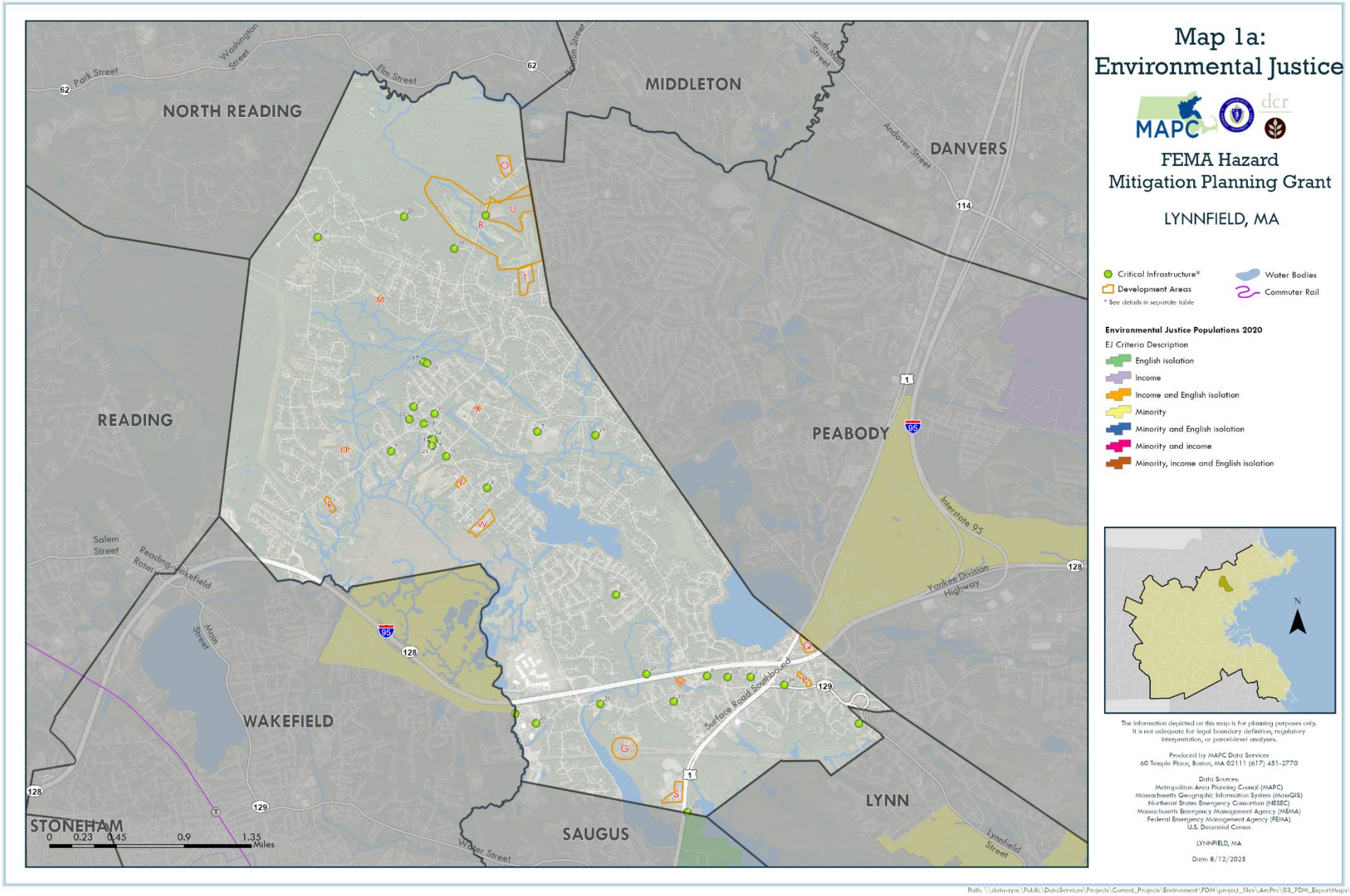
Map 9: Extreme Heat – MAPC's Statewide Land Surface Temperature (LST) Index was created by combining estimates of surface temperature from days in 2018, 2019, and 2020 where the daily air temperature maximum exceeded 70 degrees Fahrenheit. The Statewide LST Index "Hot Spots" data depicts the 5% highest LST index areas in each Regional Planning Agency (RPA) region. The data was generated by identifying pixels whose LST index values are equal to or greater than 95% of LST index values in the

region, and then delineating cohesive regions where pixels meet this criterion as polygons. Map 9 represents the "Hot Spots" relative to the MAPC region, mapped on top of the National Land Cover Database's 2016 30-m tree canopy data.

Map 10: Wildfires – This map shows wildfire risk to the community using USDA data. Wildfire risk is classified as very low, low, moderate, high, and very high.

Map 11: Sea Level Rise – This map presents projections for three future sea level rise scenarios developed for the Massachusetts Coastal Flood Risk Model (MC-FRM) by the Wood Hole Group. The map shows the extent of flood inundation for a 1% annual chance storm for projected sea level rise scenarios of 1.2 feet, 2.4 feet, and 4.2 feet. These scenarios are approximately equivalent to the levels of sea level rise projected for the years 2030, 2050, and 2070, respectively.


Map 1:
Population Density
MAPC
dcr
FEMA Hazard
Mitigation Planning Grant
LYNNFIELD, MA
Critical Infrastructure*
Development Areas
* See details in separate table
Water Bodies
Commuter Rail
Census 2020 Block Groups
Population Density: People per acre
0 or No Data
0.1 - 5.0
5.1 - 15.0
15.1 - 30.0
More than 30
NORTH READING
MIDDLETON
DANVERS
READING
PEABODY
WAKEFIELD
STONEHAM
SAUGUS
LYNN
Park Street
Washington Street
Elm Street
South Main Street
Andover Street
Salem Street
Reading-Lakefield Rotary
Main Street
Interstate 95
Yankee Division Highway
Surface Road Southbound
Water Street
Lynnfield Street
0 0.23 0.45 0.9 1.35 Miles
The information depicted on this map is for planning purposes only. It is not adequate for legal boundary definition, regulatory interpretation, or parcel-level analyses.
Produced by MAPC Data Services
60 Temple Place, Boston, MA 02111 (617) 451-2770
Data Sources:
Metropolitan Area Planning Council (MAPC)
Massachusetts Geographic Information System (MassGIS)
Northeast States Emergency Consortium (NESEC)
Massachusetts Emergency Management Agency (MEMA)
Federal Emergency Management Agency (FEMA)
U.S. Decennial Census
LYNNFIELD, MA
Date: 8/12/2025


Map 1a:
Environmental Justice
MAPC
dcr
FEMA Hazard
Mitigation Planning Grant
LYNNFIELD, MA
Critical Infrastructure*
Development Areas
* See details in separate table
Water Bodies
Commuter Rail
Environmental Justice Populations 2020
EJ Criteria Description
English isolation
Income
Income and English isolation
Minority
Minority and English isolation
Minority and income
Minority, income and English isolation
NORTH READING
MIDDLETON
DANVERS
READING
PEABODY
WAKEFIELD
STONEHAM
SAUGUS
LYNN
Park Street
Washington Street
Elm Street
Salem Street
Main Street
Water Street
Lynnfield Street
Interstate 95
Yankee Division Highway
Surface Road Southbound
0 0.23 0.45 0.9 1.35 Miles
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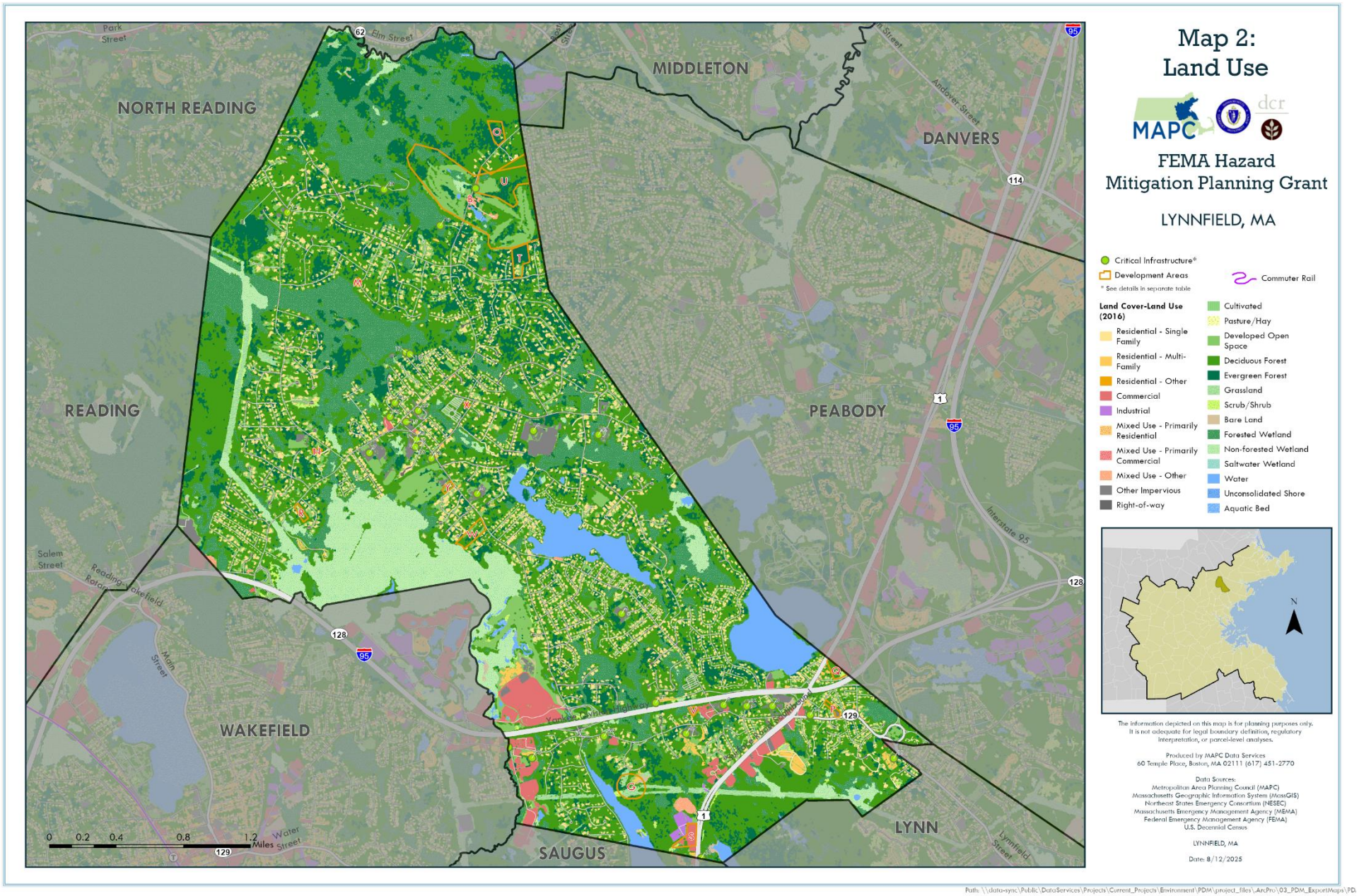
LYNNFIELD, MA
Date: 8/12/2025


Map 2:
Land Use
MAPC
dcr
FEMA Hazard
Mitigation Planning Grant
LYNNFIELD, MA
Critical Infrastructure*
Development Areas
* See details in separate table
Commuter Rail
Land Cover-Land Use (2016)
Residential - Single Family
Residential - Multi-Family
Residential - Other
Commercial
Industrial
Mixed Use - Primarily Residential
Mixed Use - Primarily Commercial
Mixed Use - Other
Other Impervious
Right-of-way
Cultivated
Pasture/Hay
Developed Open Space
Deciduous Forest
Evergreen Forest
Grassland
Scrub/Shrub
Bare Land
Forested Wetland
Non-forested Wetland
Saltwater Wetland
Water
Unconsolidated Shore
Aquatic Bed
NORTH READING
MIDDLETON
DANVERS
READING
PEABODY
WAKEFIELD
SAUGUS
LYNN
Park Street
Elm Street
Andover Street
Salem Street
Reading-Lakefield Rotary
Main Street
Water Street
Lynnfield Street
Interstate 95
0 0.2 0.4 0.8 1.2 Miles
The information depicted on this map is for planning purposes only. It is not adequate for legal boundary definition, regulatory interpretation, or parcel-level analyses.
Produced by MAPC Data Services
60 Temple Place, Boston, MA 02111 (617) 451-2770
Data Sources:
Metropolitan Area Planning Council (MAPC)
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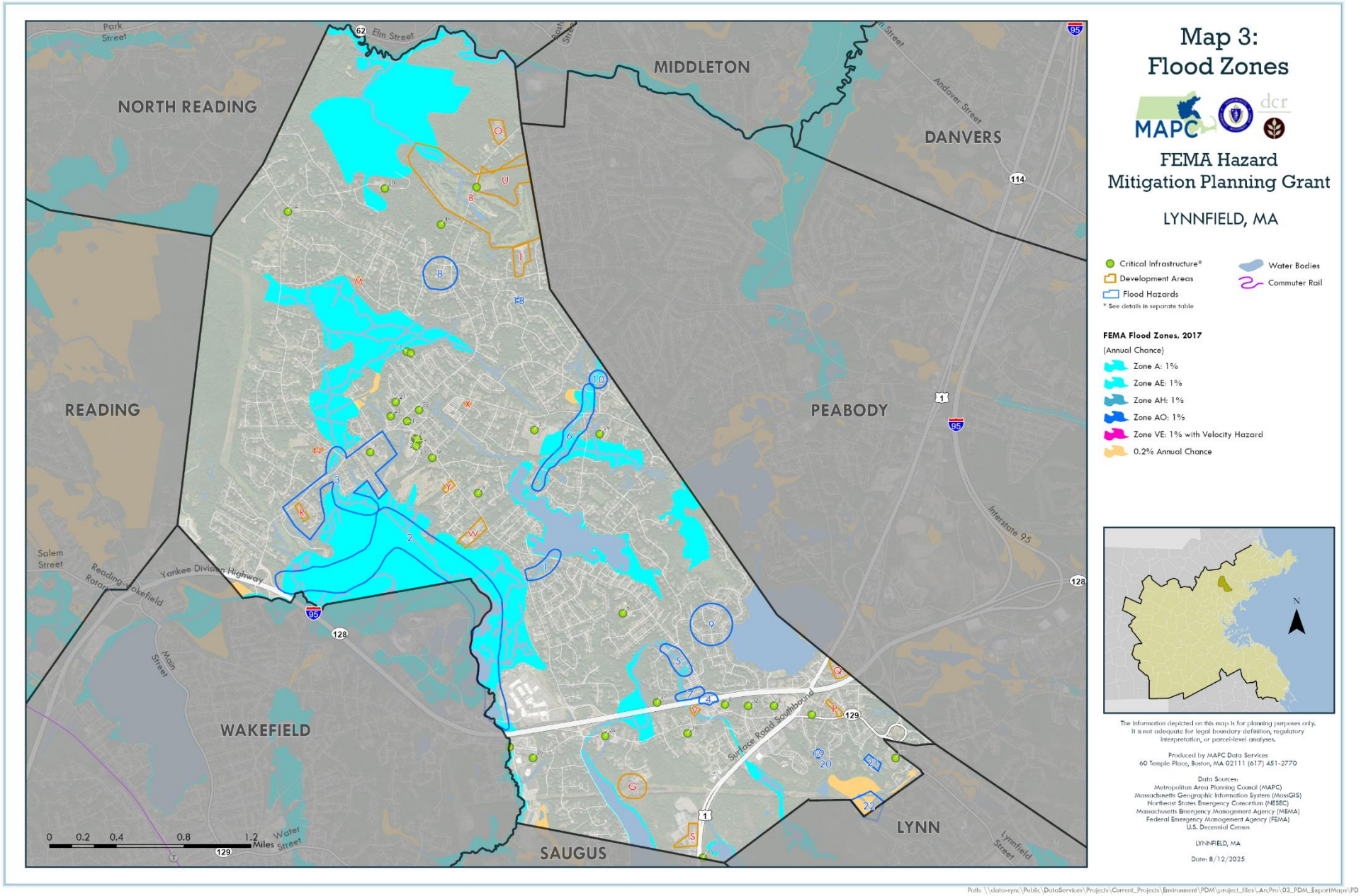
LYNNFIELD, MA
Date: 8/12/2025


Map 3:
Flood Zones
MAPC
dcr
FEMA Hazard
Mitigation Planning Grant
LYNNFIELD, MA
Critical Infrastructure*
Development Areas
Flood Hazards
* See details in separate table
Water Bodies
Commuter Rail
FEMA Flood Zones, 2017
(Annual Chance)
Zone A: 1%
Zone AE: 1%
Zone AH: 1%
Zone AO: 1%
Zone VE: 1% with Velocity Hazard
0.2% Annual Chance
NORTH READING
MIDDLETON
DANVERS
READING
PEABODY
WAKEFIELD
SAUGUS
LYNN
Park Street
Elm Street
Andover Street
Salem Street
Yankee Division Highway
Reading-Wakefield Rotary
Main Street
Surface Road Southbound
Interstate 95
Water Street
Lynnfield Street
0 0.2 0.4 0.8 1.2 Miles
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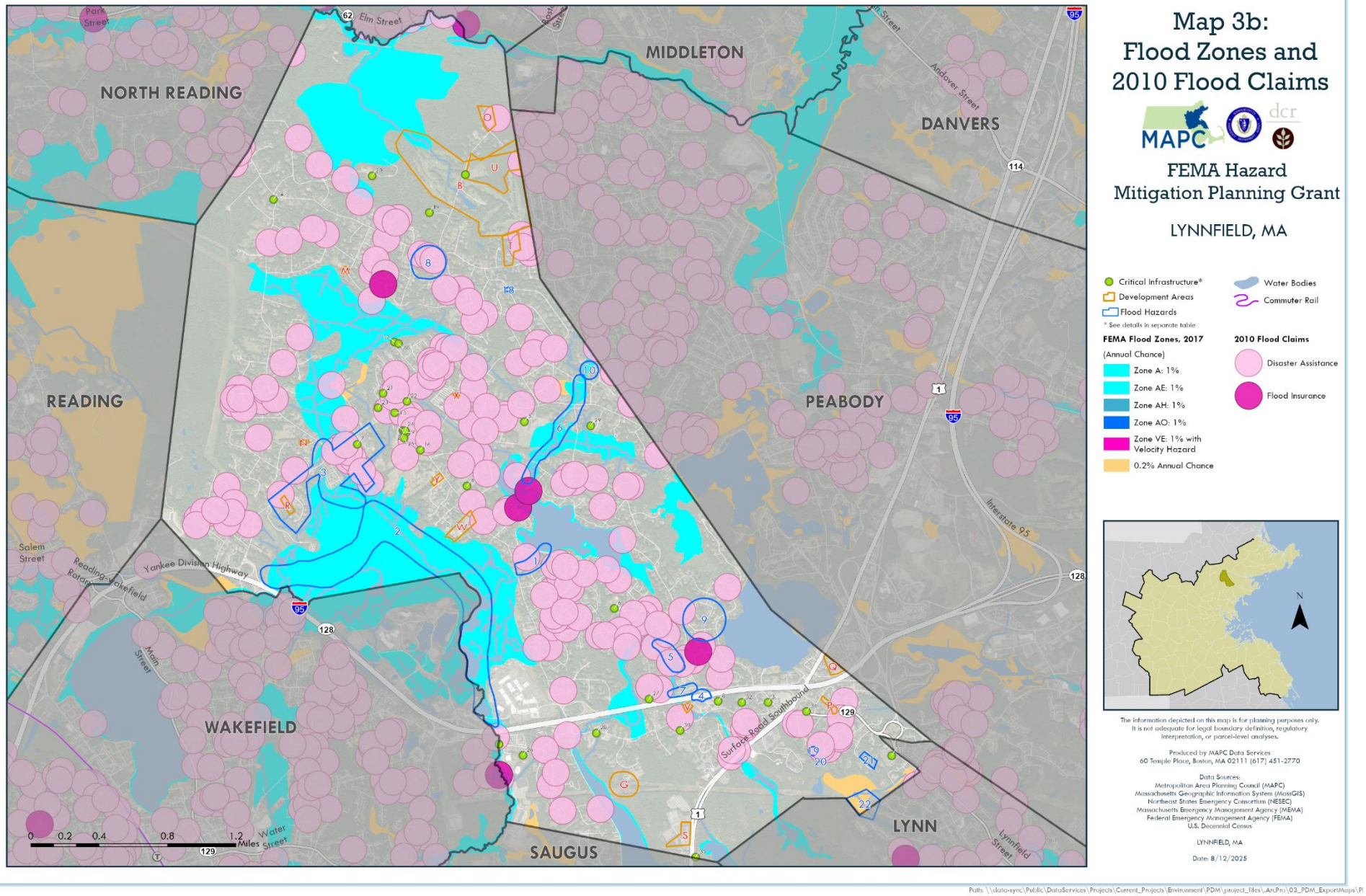
60 Temple Place, Boston, MA 02111 (617) 451-2770
Data Sources:
Metropolitan Area Planning Council (MAPC)
Massachusetts Geographic Information System (MassGIS)
Northeast States Emergency Consortium (NESEC)
Massachusetts Emergency Management Agency (MEMA)
Federal Emergency Management Agency (FEMA)
U.S. Decennial Census
LYNNFIELD, MA
Date: 8/12/2025


Map 3b:
Flood Zones and
2010 Flood Claims
MAPC
dcr
FEMA Hazard
Mitigation Planning Grant
LYNNFIELD, MA
NORTH READING
MIDDLETON
DANVERS
READING
PEABODY
WAKEFIELD
SAUGUS
LYNN
Critical Infrastructure*
Development Areas
Flood Hazards
* See details in separate table
Water Bodies
Commuter Rail
FEMA Flood Zones, 2017
(Annual Chance)
Zone A: 1%
Zone AE: 1%
Zone AH: 1%
Zone AO: 1%
Zone VE: 1% with Velocity Hazard
0.2% Annual Chance
2010 Flood Claims
Disaster Assistance
Flood Insurance
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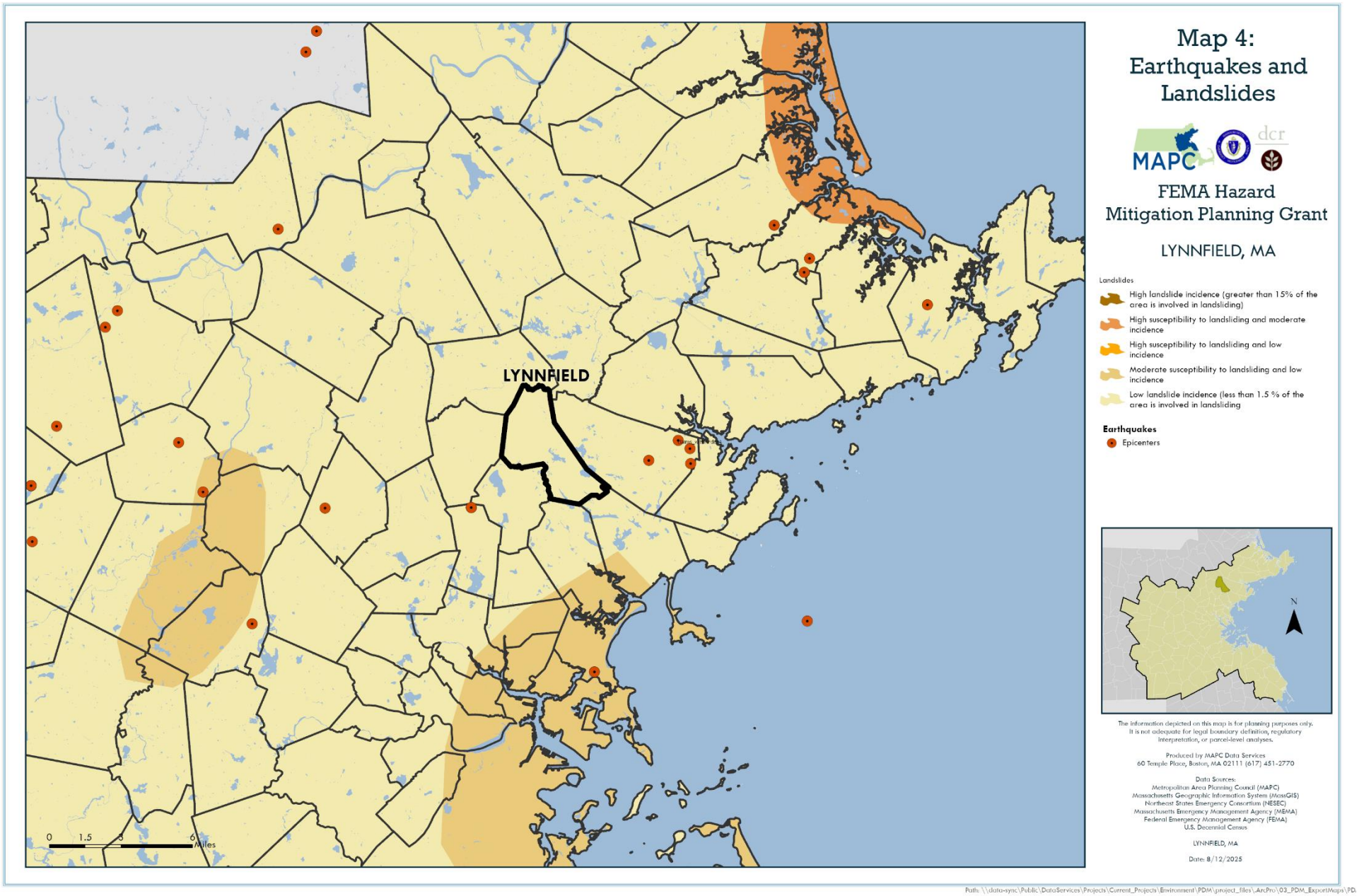
Massachusetts Emergency Management Agency (MEMA)
Federal Emergency Management Agency (FEMA)
U.S. Decennial Census
LYNNFIELD, MA
Date: 8/12/2025
0 0.2 0.4 0.8 1.2 Miles


LYNNFIELD
0 1.5 3 6 Miles
Map 4:
Earthquakes and
Landslides
MAPC
dcr
FEMA Hazard
Mitigation Planning Grant
LYNNFIELD, MA
Landslides
High landslide incidence (greater than 15% of the area is involved in landsliding)
High susceptibility to landsliding and moderate incidence
High susceptibility to landsliding and low incidence
Moderate susceptibility to landsliding and low incidence
Low landslide incidence (less than 1.5 % of the area is involved in landsliding
Earthquakes
Epicenters
N
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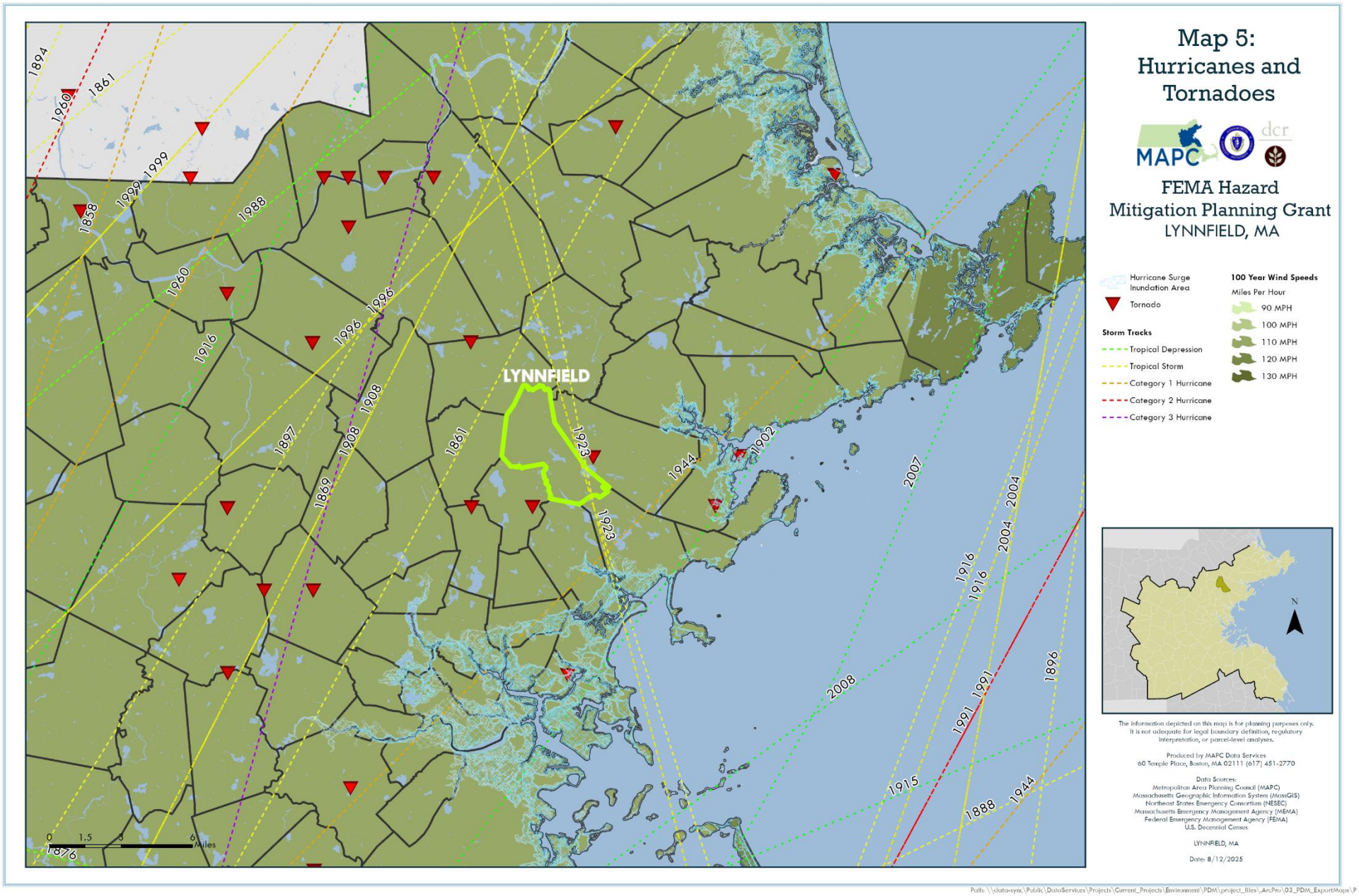
Massachusetts Emergency Management Agency (MEMA)
Federal Emergency Management Agency (FEMA)
U.S. Decennial Census
LYNNFIELD, MA
Date: 8/12/2025


Map 5:
Hurricanes and Tornadoes
MAPC
dcr
FEMA Hazard Mitigation Planning Grant
LYNNFIELD, MA
Hurricane Surge Inundation Area
Tornado
Storm Tracks
Tropical Depression
Tropical Storm
Category 1 Hurricane
Category 2 Hurricane
Category 3 Hurricane
100 Year Wind Speeds
Miles Per Hour
90 MPH
100 MPH
110 MPH
120 MPH
130 MPH
LYNNFIELD
1894
1960
1861
1999
1999
1858
1988
1960
1996
1996
1916
1908
1897
1908
1861
1869
1923
1923
1944
1902
2007
2004
2004
1916
1916
1896
2008
1991
1991
1915
1888
1944
1876
0 1.5 3 6 Miles
N
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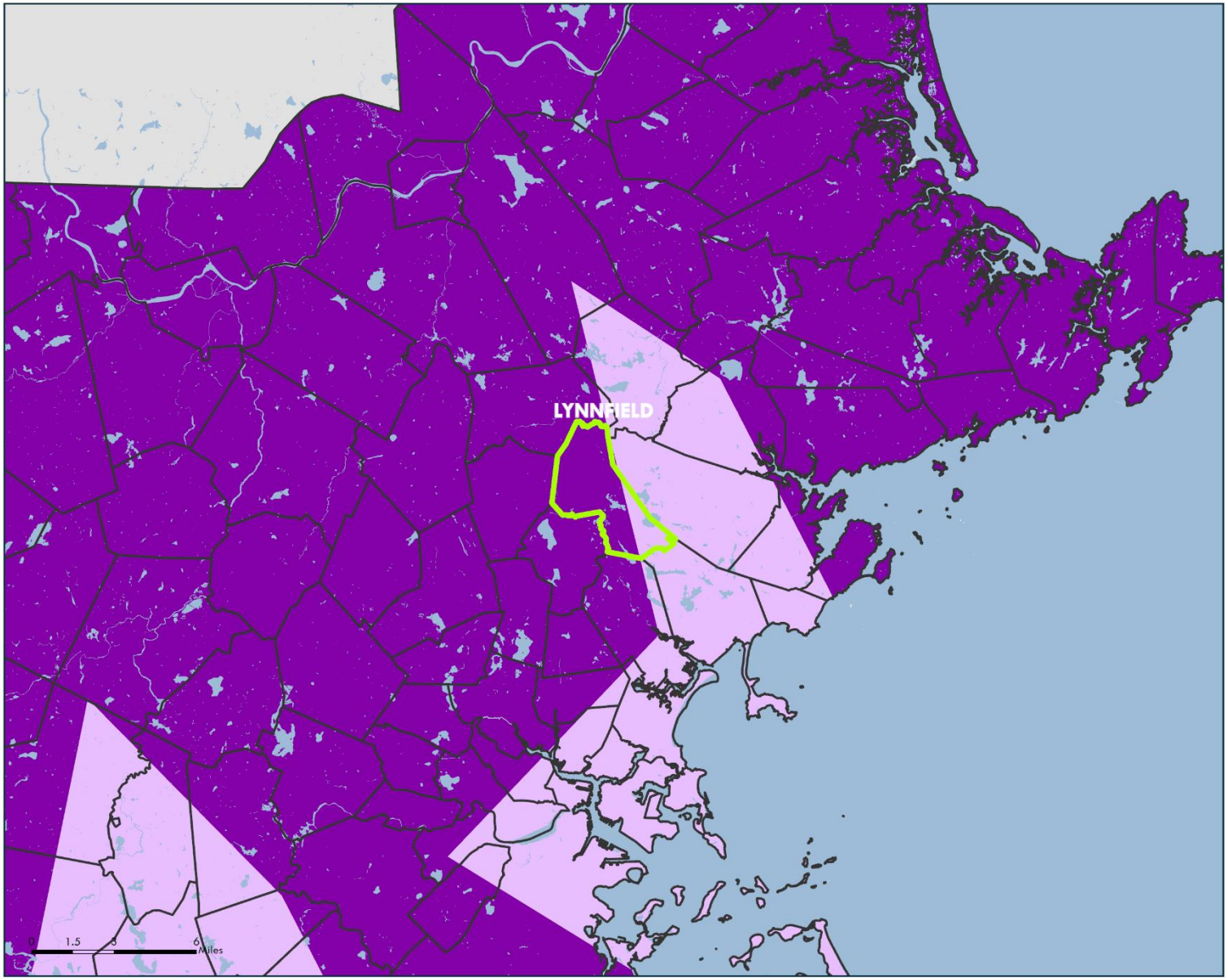
Massachusetts Emergency Management Agency (MEMA)
Federal Emergency Management Agency (FEMA)
U.S. Decennial Census
LYNNFIELD, MA
Date: 8/12/2025



Map 6: Average Snowfall

FEMA Hazard Mitigation Planning Grant

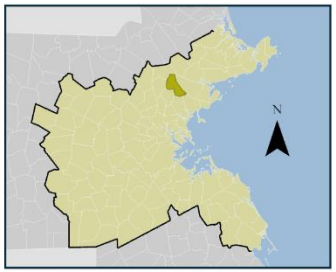
LYNNFIELD, MA

Average Annual Snowfall

Inches

G 36.1 - 48.0

H 48.1 - 72.0



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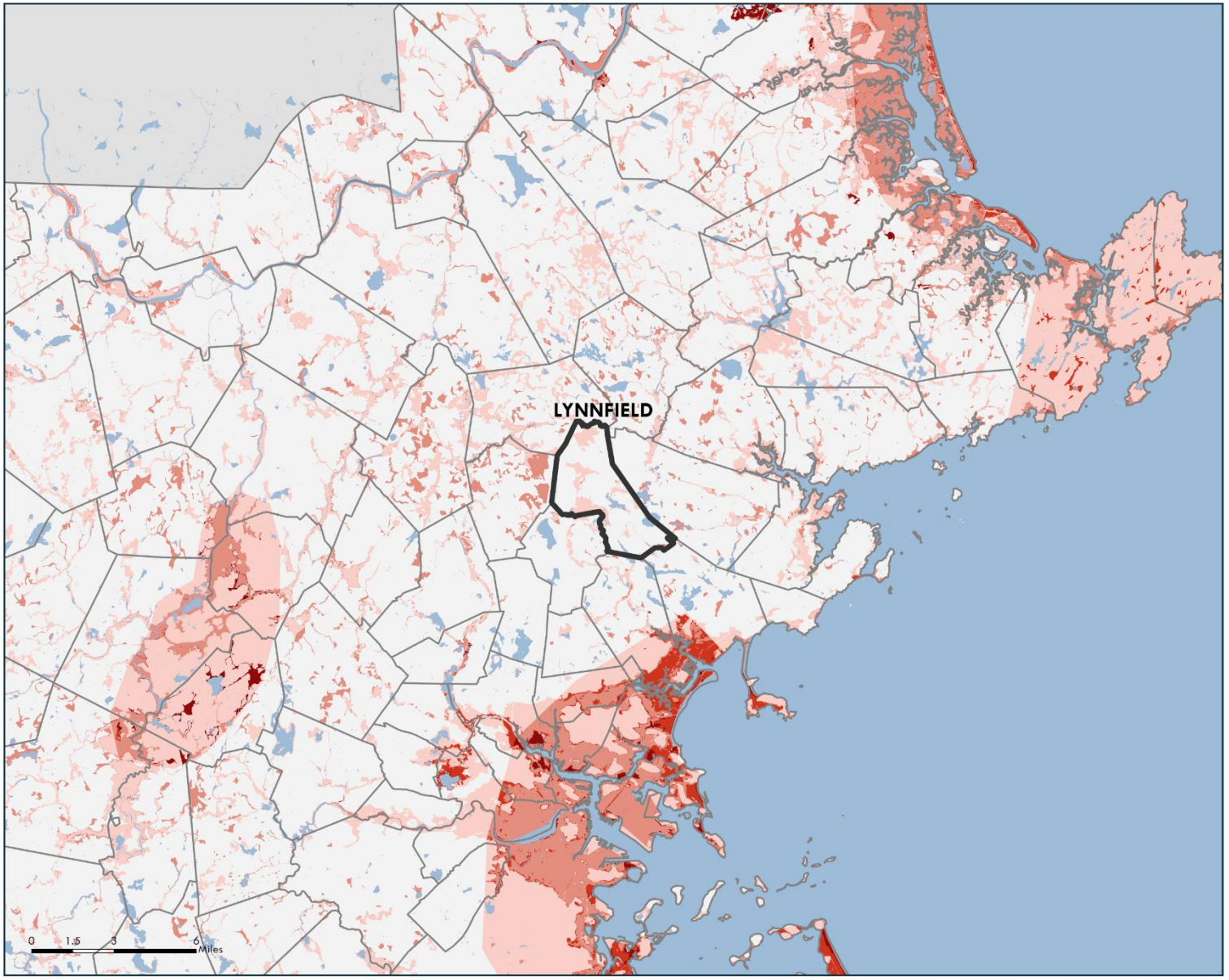
Massachusetts Emergency Management Agency (MEMA)
Federal Emergency Management Agency (FEMA)
U.S. Decennial Census

LYNNFIELD, MA

Date: 8/12/2025

Path: \\data-sync\Public\DataServices\Projects\Current_Projects\Environment\PDM\project_files\ArcPro\03_PDM_ExportMaps\



Map 7: Composite Natural Hazards

FEMA Hazard Mitigation Planning Grant

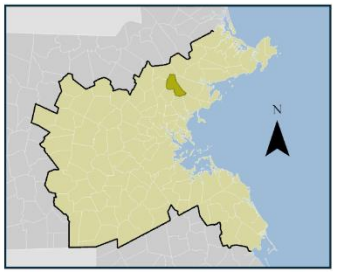
LYNNFIELD, MA

Composite Natural Hazards

- Low (2 Hazards)
- Moderate (3 Hazards)
- High (4 Hazards)
- Very High (5 Hazards)

Composite natural hazards shown for areas of existing development. Hazards include:

- 100 year wind speed of 110 MPH or higher
- Moderate landslide risk
- FEMA flood zones (100 year and 500 year)
- Average snowfall of 36.1" or more
- Hurricane surge inundation areas



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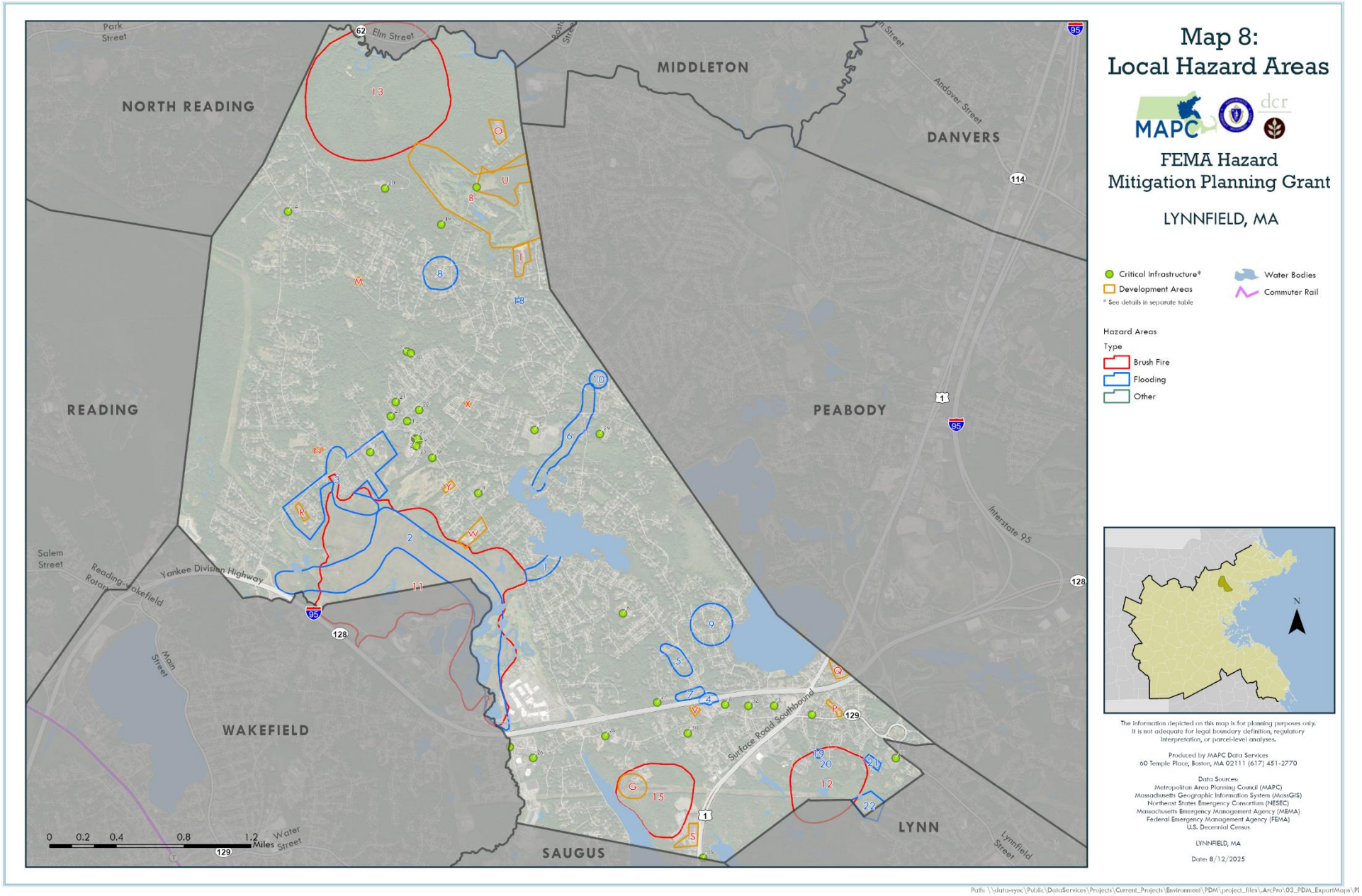
Federal Emergency Management Agency (FEMA)
U.S. Decennial Census

LYNNFIELD, MA

Date: 8/12/2025

Path: \\data-sync\Public\DataServices\Projects\Current_Projects\Environment\PDM\project_files\ArcPro\03_PDM_ExportMaps\


Map 8:
Local Hazard Areas
MAPC
dcr
FEMA Hazard
Mitigation Planning Grant
LYNNFIELD, MA
Critical Infrastructure*
Development Areas
* See details in separate table
Water Bodies
Commuter Rail
Hazard Areas
Type
Brush Fire
Flooding
Other
NORTH READING
MIDDLETON
DANVERS
READING
PEABODY
WAKEFIELD
SAUGUS
LYNN
Park Street
Elm Street
Boston Street
North Street
Andover Street
Salem Street
Reading-Wakefield Rotary
Yankee Division Highway
Main Street
Surface Road Southbound
Interstate 95
Water Street
Lynnfield Street
0 0.2 0.4 0.8 1.2 Miles
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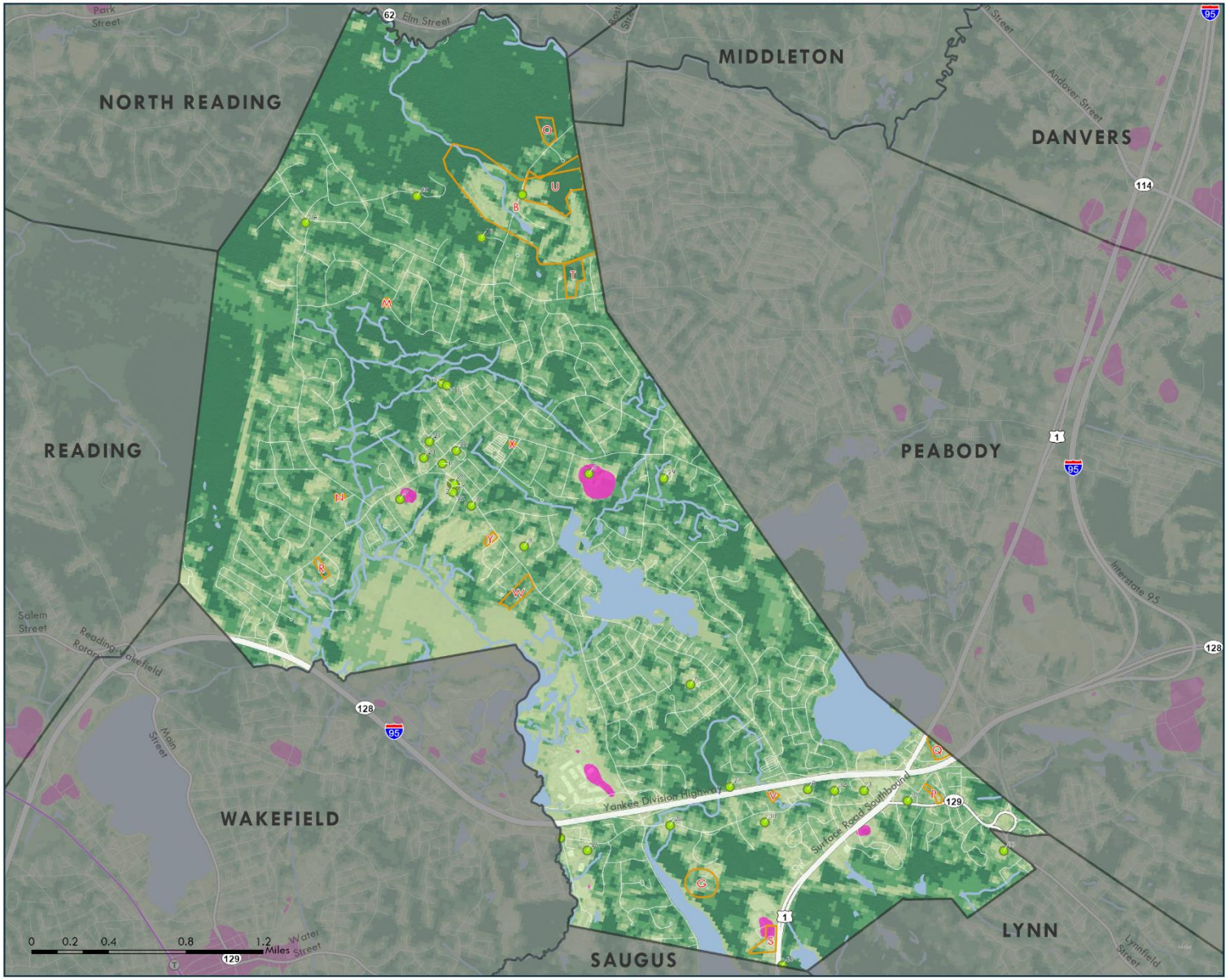
U.S. Decennial Census
LYNNFIELD, MA
Date: 8/12/2025



Map 9: Land Surface Temperature

FEMA Hazard Mitigation Planning Grant
LYNNFIELD, MA

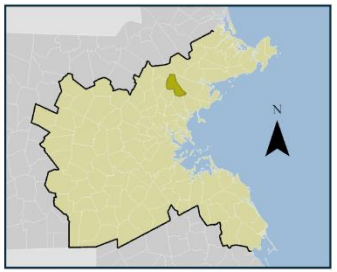
- Critical Infrastructure*
- Development Areas
- * See details in separate table
- Water Bodies
- Commuter Rail

Tree Canopy Coverage (2016 - 30m)

- Hottest 5% of region's land area

% Canopy Coverage

- 0 - 25%
- 25 - 50%
- 50 - 75%
- 75 - 100%



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Federal Emergency Management Agency (FEMA)
U.S. Decennial Census

LYNNFIELD, MA

Date: 8/12/2025

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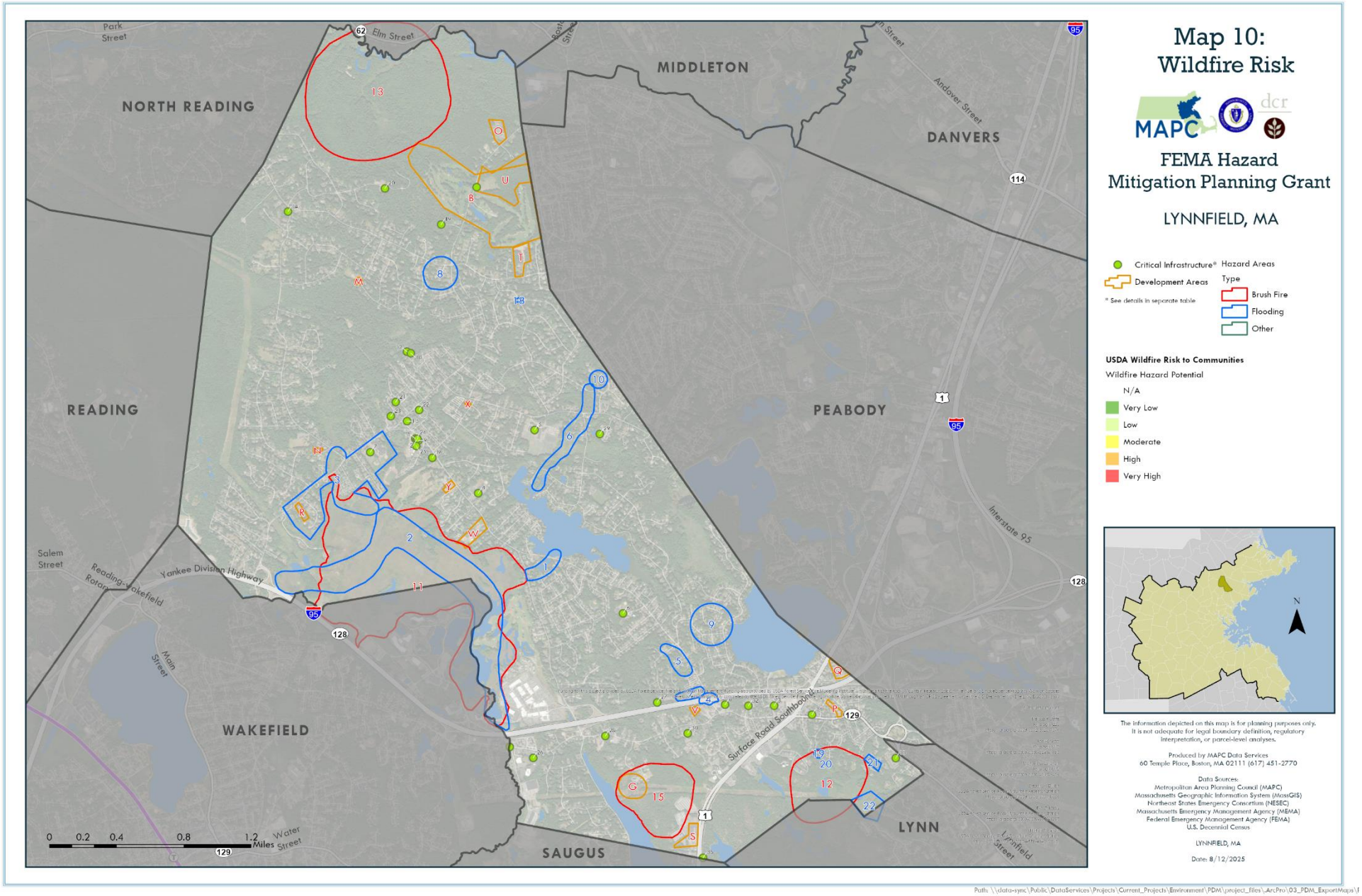
Map 10:
Wildfire Risk
MAPC
dcr
FEMA Hazard
Mitigation Planning Grant
LYNNFIELD, MA
Critical Infrastructure*
Development Areas
* See details in separate table
Hazard Areas
Type
Brush Fire
Flooding
Other
USDA Wildfire Risk to Communities
Wildfire Hazard Potential
N/A
Very Low
Low
Moderate
High
Very High
NORTH READING
MIDDLETON
DANVERS
READING
PEABODY
WAKEFIELD
SAUGUS
LYNN
Park Street
Elm Street
Boston Street
North Street
Andover Street
Salem Street
Reading-Wakefield Rotary
Yankee Division Highway
Main Street
Surface Road Southbound
Interstate 95
Water Street
Lynnfield Street
0 0.2 0.4 0.8 1.2 Miles
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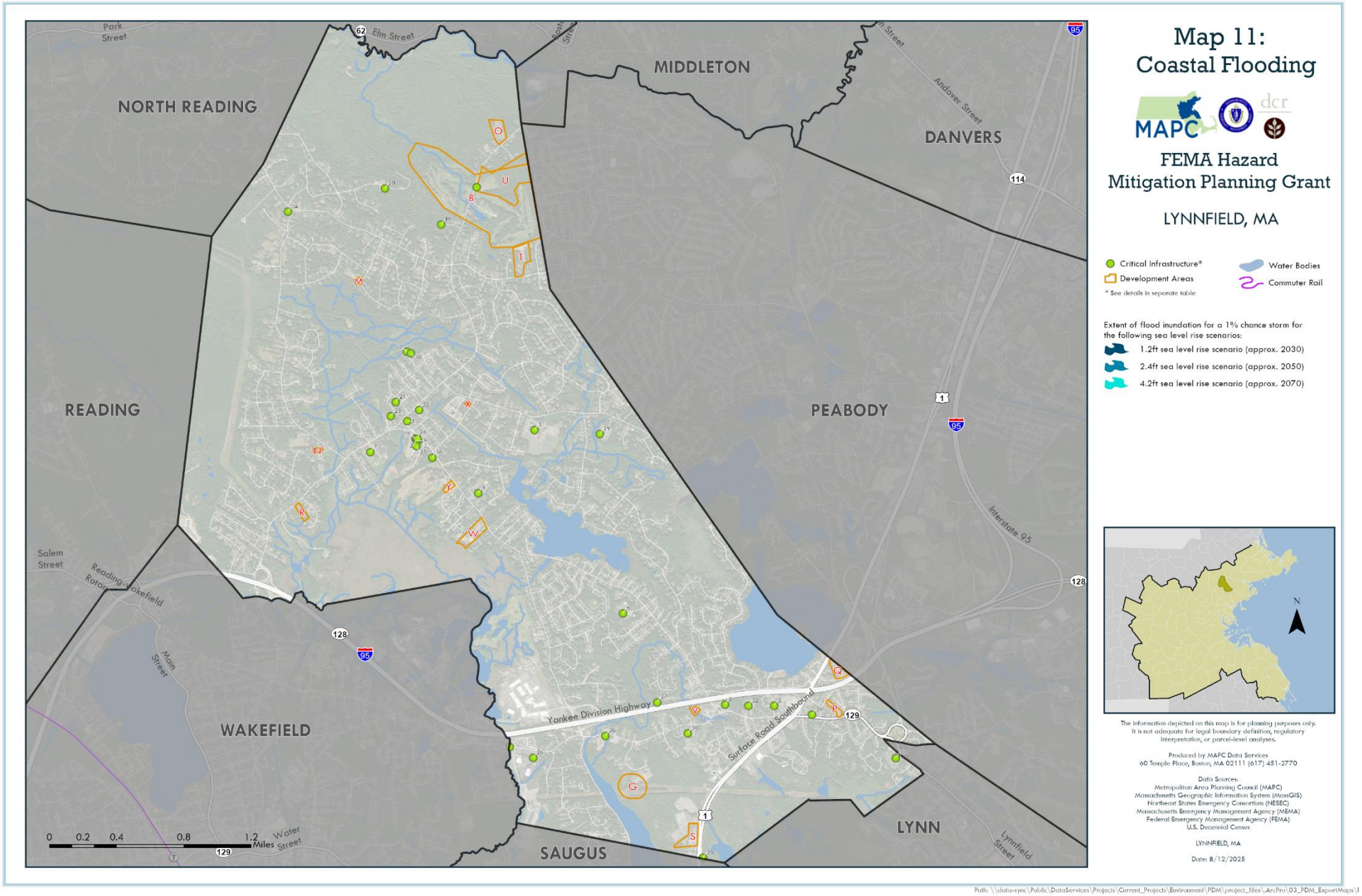
U.S. Decennial Census
LYNNFIELD, MA
Date: 8/12/2025


Map 11:
Coastal Flooding
MAPC
dcr
FEMA Hazard
Mitigation Planning Grant
LYNNFIELD, MA
Critical Infrastructure*
Development Areas
* See details in separate table
Water Bodies
Commuter Rail
Extent of flood inundation for a 1% chance storm for the following sea level rise scenarios:
1.2ft sea level rise scenario (approx. 2030)
2.4ft sea level rise scenario (approx. 2050)
4.2ft sea level rise scenario (approx. 2070)
NORTH READING
MIDDLETON
DANVERS
READING
PEABODY
WAKEFIELD
SAUGUS
LYNN
Park Street
Elm Street
Andover Street
Salem Street
Reading-Wakefield Rotary
Main Street
Yankee Division Highway
Surface Road Southbound
Interstate 95
Water Street
Lynnfield Street
0 0.2 0.4 0.8 1.2 Miles
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Massachusetts Emergency Management Agency (MEMA)
Federal Emergency Management Agency (FEMA)
U.S. Decennial Census
LYNNFIELD, MA
Date: 8/12/2025

Lynnfield Hazard Mitigation Plan Update

Team Meeting #1

Monday, July 15, 2024
10:30 AM – 12:00 PM

Merritt Center Media Room
600 Market Street

AGENDA

---

1. Welcome and Introductions

2. Review of HMP Project and Schedule (see attached timeline)

3. Getting Started: Local Data Updates from the 2018 Plan

- *The Team will update 3 types of local data from the 2018 plan* ***(see attached worksheets):***

  1. **Local Hazard Areas** (Flooding, Wildfire, etc.)
  2. **Critical Facilities**
  3. **New Development sites**

- *MAPC's GIS Planner Alexa DeRosa will join via Zoom to map new or revised local sites using the online platform Google MyMaps*

4. Next steps: Preparing for Public Meetings and Outreach

- **We will hold 2 Public Meetings during development of the plan:**
  1st public meeting during the planning process (Fall 2024)
  2nd public meeting on the draft plan and seek comments (Spring 2025)

- The HMP Team to identify local stakeholders to invite

- Next HMP Team meeting in October

Lynnfield Hazard Mitigation Plan Update

Timeline / Summary of the Planning Process

---

1) Lynnfield Team Meeting #1: Overview / Data & Map Update — July 2024

- Review project tasks and timeline
- Update: **Critical Facilities**: Inventory and Map
- Update: **Local Hazard Areas** and Map
- Update: **Development Sites** and Map

2) Lynnfield Team Meeting #2: Update of Existing Mitigation — Oct. 2024

- Update: **Hazard Mitigation Goals** for the Plan
- Update: **Existing Mitigation Measures**
- Prepare for **Public Meeting #1**

3) Lynnfield Public Meeting #1: Plan Overview/Public Input — Nov. 2024

4) Lynnfield Team Meeting #3: Develop Mitigation Strategy — Jan. 2025

- Review status of **Recommended Mitigation Strategies** from the Previous Plan
- Discuss possible changes to mitigation strategies and need for new strategies

5) Lynnfield Team Meeting #4: Develop Mitigation Strategy — April 2025

- Develop Recommended Mitigation Measures and Prioritize
- Designate Implementing agencies, Timeframes, Estimated Costs, Funding Sources
- Prepare for 2nd Public Meeting and outreach to stakeholders

6) Lynnfield Public Meeting #2: Presentation of Draft HMP — May 2025

7) Draft HMP submitted to MEMA & FEMA — June 2025

Lynnfield Hazard Mitigation Plan Update

Team Meeting #2

Thursday, October 24, 2024
10:00 – 11:30 AM

Merritt Center
600 Market Street, Lynnfield

AGENDA

---

1. Welcome and Introductions

2. Review and Update of Mitigation Goals for the Plan
   - *See Worksheet #4 – Goals from the 2018 Plan*
   - We will review and update the goals and add new goals as appropriate.

3. Review Status of Existing Mitigation Measures
   - *See Worksheet #5 – Existing Mitigation from the 2018 Plan*
   - We will review c**hanges to mitigation measures**
   - Add any **new mitigation measures** adopted since the 2018 plan
   - Note **Effectiveness** and **Improvements Needed** to mitigation measures

4. Prepare for First Public Meeting
   - Set date and host board or commission (target: late Nov/early Dec)
   - ***HMP Team to identify local stakeholders to invite:***
     - Businesses, Community groups, NGO's, etc.
     - Focus on vulnerable populations/EJ
     - Refer to MVP Workshop invitees
     - Public outreach on Town website, social media

5. Next HMP Team Meeting: January 2025

Lynnfield Hazard Mitigation Plan Update

Local Team Meeting #3

Tuesday, February 25, 2025
1:30 – 3:00 PM

In-Person Meeting
AI Merritt Center, 600 Market Street

AGENDA

---

1. Welcome and Project Update

- Check-In: Distributing Survey (22 responses so far)
  - Contact list for the public meeting
  - Potential press release

2. Review Status of Mitigation Strategies from the 2018 Plan

The Team will review the recommended mitigation measures from the 2018 plan and note those that have been implemented, are in progress, or have not been implemented.

See the attached worksheet to note the status of mitigation recommendations.

3. Next Steps

- Final Team Meeting — April 2025
  - Finalize mitigation recommendations for the 2025 plan

- Second Public Meeting — May 2025
  - To be Scheduled and Confirmed in April
  - Presentation of the draft plan and public questions/comments
  - Draft plan to be posted on the Town's website for public review

- Draft Plan to be submitted for MEMA & FEMA review
  - Revisions to the draft plan if required by MEMA or FEMA
  - FEMA will issue "Approval Pending Adoption" notice

- Adoption of the Final Plan by the Town
  - FEMA will issue "Approval Pending Adoption" notice

- FEMA will issue a formal Letter of Plan Approval
  - The new plan will be in effect for 5 years, until 2030
  - The Town will be eligible to apply for BRIC grants for mitigation projects

Lynnfield Hazard Mitigation Plan Update

Team Meeting #4 (Final Meeting)

Thursday, June 26, 2025

1:30 to 3:00 PM

In-Person Meeting

Al Merritt Center, 600 Market Street

AGENDA

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1. Welcome and Project Update

2. Finalize the Mitigation Strategies for 2025 Plan

- Review the draft mitigation strategies for the 2025 plan, ***Worksheet #5***
- We will confirm the recommendations, priorities, lead agencies, timeframes, and costs

---

3. Next Steps for Lynnfield

- **Final Public Meeting / Public Review of Draft Plan**
  - Confirm the date with the Select Board
  - Presentation of the draft plan by MAPC
  - Outreach to local stakeholders and organizations; social media; press
  - Draft plan to be posted online for public review after the meeting
  - Team to review public comments received and decide if any edits to plan

4. FEMA Review and Approval

- **Draft Plan will be submitted for MEMA & FEMA review**
  - Revise plan if required by MEMA or FEMA comments
- **Adoption of the Final Plan by the Town**
  - FEMA will issue notice of "Approvable Pending Adoption"
  - Vote of plan adoption by the Select Board
- **FEMA formal Letter of Plan Approval**
  - The new plan will be in effect for 5 years, until 2030

APPENDIX C. DOCUMENTATION OF PUBLIC MEETINGS

To be updated after the second public meeting

APPENDIX D. COMMUNITY SUMMARY RESULTS

Overview

The survey was open between January 27, 2025 till April 30, 2025. Total 85 people participated in the survey through the Qualtrics survey link. The survey was promoted through the project website (https://www.lynnfieldma.gov/636/Hazard-Mitigation-Planning-2025) as well as the first public meeting presentation.

Summary of findings

The top three natural hazards that concern Lynnfield residents the most appear to be flooding, drought, and extreme heat. Survey responses to question "how have these hazards impacted you?" showed a more detailed picture of how people experienced these natural hazards in Lynnfield. Below is a brief summary of the survey responses by hazard types:

- Flooding: Concerns around chronic flooding issues in the Wirthmore Lane Neighborhood (neighborhoods off Wirthmore Lane and Perry Ave), basement flooding issues due to the proximity to the Reedy Meadow, storm drains being clogged and not properly managed, excess water issues from the Beaver Dam Brook side of Main Street into the meadow
- Wind: Experiencing trees falling down and power outages during the wind storms, the need for better tree management especially as it interferes with the power lines
- Drought: Annual water bans are causing inconvenience in managing gardens, and drought is causing more frequent brushfire
- Extreme heat: Heat waves have been a public health concern, especially for children and the older population.

While Lynnfield residents think that all of the mitigation strategies are fairly equally important, the mitigation strategy that got the most votes was "Designing resilient infrastructure such as roads, bridges, and buildings." Survey respondents submitted many great ideas for the question asking, "if there is anything else that people want to share". Those included but not limited to: properly regulating all development so that it has less environmental impact, fixing road infrastructure near Pillings Pond, developing better ways to deal with the water shortage exacerbated by drought beyond annual water bans, better tree management, better emergency management including robust communication system, addressing chronic flooding issues in the neighborhoods, and providing education and assessment for residents. All detailed responses are recorded below.

One thing to note is that this survey results may not represent lived experience of all Lynnfield residents. For instance, a significant number of the survey participants reported that they own a home in Lynnfield (82.2%) and there were no survey respondents who said they rent in Lynnfield. Only 6% of the survey participants were younger than 35 years old, 60% of the survey participants' household income was $150,000 or more, and 86% of the survey participants' household income was higher than $100,000. Overall it shows that the demographic of the survey participants tend to be older and affluent homeowners.

Survey Results

1. **What's your connection to the Town? Please select all that apply.** *(78 responses)*

Field	Choice Count	%
I own a home in Lynnfield.	74	82.2
I rent an apartment in Lynnfield.	0	0

I work in Lynnfield.	12	13.3
I own a business in Lynnfield.	2	2.2
I often visit Lynnfield.	0	0
Other (please specify below)	2	2.2
Total	**90**	**99.9**

Other (please specify below): Watershed Association

2. **What brought you to this survey?** *(77 responses)*

Field	Choice Count	%
I heard about the survey during the public meeting in January.	4	5.2
I read about the survey on the Town website.	22	28.6
I learned about the survey in an email.	24	31.2
Other (please specify below)	27	35.1
Total	**77**	**100**

Other (please specify below): USPS mail; library newsletter (3); Facebook post with link (7); Instagram post (2); Social media (2); Word of mouth; Neighbor.

3. **What natural hazards are you most concerned about? Please rank the following options from most concerning (top of the list) to least concerning (bottom of the list).** (75 responses)

	1	2	3	4	5	6
Drought	19	18	8	8	17	5
Extreme heat	0	9	18	13	15	20
Extreme wind events	12	17	9	19	13	5
Fire	13	11	15	13	7	16
Flooding	28	11	14	11	5	6
Winter weather	3	9	11	11	18	23
SUM	**75**	**75**	**75**	**75**	**75**	**75**

4. **How have these hazards impacted you? Stories might include flooding near your home events that downed trees.** (55 Responses)[1]

Hazard Types	Description
Wind	Tree limbs falling from wind
Flooding	The Wirthmore Lane neighborhood was built near Reedy Meadow in the 1950s and has experienced chronic flooding issues ever since. The original drainage system has been neglected, and the Saugus River, which runs under Main St. behind Meadow Lane, has become so overgrown that water can no longer flow out to Reedy Meadow as it once did. As a result, water has backed up and spread out, drowning hundreds of 10–30-foot-tall trees that had grown on dry

[1] Responses were rephrased to correct grammatical errors and to ensure that tone and language were appropriate for public disclosure. Subsequently, the responses were manually categorized according to hazard type.

	ground until the river backed up and killed them. The river needs to be cleaned, widened, and maintained to facilitate the free flow of water.
Drought; Wind	The lack of rainfall in the summer has impacted Lynnfield's water supply for decades; Two homes in my neighborhood have been damaged by falling trees during wind storms over the past two years.
Flooding	We have lived on Dale Rd for 53 years. The water in the river that runs by our house and behind Meadow Lane has not appeared to be moving for quite some time. We do not recall it being like this in the past. The river is so overgrown with vegetation that the water has no place to go, causing an increased risk of flooding as well as mosquito infestation. There is standing water in the drainage pipe from Dale Rd that flows into Reedy Meadow because the area where the pipe empties is also overgrown with vegetation. Several houses in our neighborhood, including ours, have experienced flooding despite having multiple sump pumps. With so-called "100-year storms" happening more frequently, the neighborhoods off Wirthmore Lane and Perry Ave are at significantly higher risk of catastrophic flooding. The river that runs under Main Street into Reedy Meadow needs to be cleared, dredged, and maintained to ensure that the water can flow properly and mitigate the flooding risk.
Flooding	My home has experienced flooding for the past 40 years. We installed drains around our house, which controlled the problem from 2011 to 2022. However, after the town reconfigured Beaver Brook, the flooding returned. Every home on Perry Avenue now relies on pumps, either discharging onto the street or into the backyards. This has been a major problem since we moved here in 1986. We have spent thousands of dollars trying to address the issue and currently operate two sump pumps at all times. With the new Ford Avenue entrance to the Rail Trail, we no longer have anywhere to pump the water. This situation must be resolved properly on both Perry Avenue and Wirthmore Lane. The flooding problem needs to be addressed before any further development of the Rail Trail proceeds.
Flooding	Our basement has flooded a few times.
Flooding; Extreme Heat	Basement flooding is a major concern in our neighborhood because of our proximity to the meadow, which frequently overflows. In addition, extreme heat has become a serious issue for our children at school. During heat waves, students are still in session, yet most classrooms are not air-conditioned, creating unhealthy and unsafe learning conditions.
Wind; Flooding	We have experienced the loss of large branches and even entire trees. In addition, we rely on a sump pump because our basement floods during heavy rains.
Flooding	Yes, our property abuts the conservation land, and we experience severe flooding.
Flooding	We have experienced basement flooding, as well as downed trees blocking the street and bringing down power lines.
Wind	Wind events with power outages
Flooding	Our basement and garage have flooded several times.
Flooding	My home on Wirthmore Lane has experienced basement flooding.

Flooding	I have lived in Lynnfield since 2018, in the Wirthmore neighborhood. Prior to moving here, I lived in seven different towns across Massachusetts and experienced many types of intense weather, including heavy rain. However, since moving to Lynnfield, I have faced severe flooding on more than three occasions. Each time, several inches of water filled my entire finished basement, causing enormous stress and disruption to my life. I now live with constant anxiety whenever it rains for more than a day or two. Despite investing in sump pumps, drop pumps, and French drains, nothing prevents the flooding because the neighborhood drainage system is so inadequate. After a short period of rainfall, the ground becomes oversaturated and water rises directly from the soil with nowhere to go. The river and wetlands behind Lee and Meadow are severely overgrown and need to be dredged and cleared. In addition, the entire drainage system must be assessed and improved to address the root of this problem. Unfortunately, new development continues to be built around this neighborhood, which only worsens the flooding issues.
Flooding	We consistently have water in our basement whenever it rains, even though we have a sump pump. Water does not drain properly from our yards and instead flows back into our homes.
Flooding	Stormwater infrastructure maintenance has not kept pace with the increasing intensity of storms, and the lack of upkeep is exacerbating flooding issues.
Brushfire	I live adjacent to woodland and am concerned that a forest fire could threaten or destroy my home.
Infrastructure	I am always concerned about the risk of a power outage.
Flooding	During rain and snow events, water runs down our driveway and seeps into the cellar and foundation. Street flooding during these storms also creates hazardous road conditions that are difficult to navigate and pose a risk of vehicle damage.
Drought	Annual water bans
Flooding; Wind; Extreme Heat; Drought	Our internet line has been severed from the house due to storm damage. Poor air quality during the summer often prevents us from going on walks. One of our healthy oak trees was knocked down by high winds, and it has become increasingly difficult to grow our vegetable garden because of extreme heat and drought.
Wind	We have lost two trees in our yard because of extreme winds/weather.
Drought	Every summer, we are unable to water our gardens and lawns due to restrictions. In some areas of town, the water table is very high, contributing to drainage and flooding issues. In addition, high winds pose a safety risk, as there are trees along main roads that should be removed before they fall onto cars.
Drought	We are impacted by water usage bans every summer and are increasingly concerned about the long-term rise in insurance costs.
Extreme Heat	We have outdoor animals that become stressed during drought and extreme heat, requiring significant amounts of water to keep them hydrated and cool in the summer months. We are also unable to grow grass for them due to these conditions. In addition, we have experienced downed trees that damaged our fencing, though we have managed to address the issue so far.
Flooding	We experience seasonal flooding at the edge of our backyard, which has led to the formation of a wetland area.
Flooding	Flooded basements, downed trees
Wind	There are aging wetlands and trees behind my house. One tree fell on a section of our fence, which had to be removed and replaced. While a few trees have

	been trimmed by the town, we remain concerned about several others that could still fall onto our home.
Wind; Brushfire	We have experienced downed trees, as well as major house reconstruction following a fire.
Flooding	Flooding on my street has changed the landscape of my yard, with rock and gravel washing into my driveway. There is erosion along the newly paved road, and giant rocks are being displaced along the road edge by both snowplows and floodwaters.
Drought	We have lost mature landscaping due to watering restrictions during periods of drought.
Wind	In the winter of 2023, a downed tree nearly struck me and my three children.
Drought	Because of drought, I have been unable to water my garden.
Flooding	Flooding and downed trees
Flooding	I live at the bottom of a hill. When the storm drains became clogged, a river of water flowed through my yard into the backyard. I called the DPW, but my call went straight to voicemail.
Wind; Brushfire	We have experienced power outages caused by downed trees, as well as brush fires during periods of drought, which were made worse by high winds.
Infrastructure	Due to a lack of sidewalk maintenance in the winter, I fell earlier this year.
Wind	Downed trees leading to power outages
Flooding	Flooding has made roads temporarily impassable, which is especially concerning given the recent unexpected school dismissals over the last two years and the difficulty of reaching my children. Before we installed a new drainage system, our basement flooded several times in the past few years. For many of our neighbors, however, the problem has continued—particularly because storm drains are not consistently cleared.
Flooding	For decades, the passage of excess water from the Beaver Dam Brook side of Main Street into the meadow has been blocked. The outdated stormwater design cannot handle the additional burden placed on already oversaturated ground from snowmelt and residential irrigation systems. I have lost count of the number of trees that have fallen in this area. Although the Essex County Mosquito Control Department has cleared part of the area with machinery and field crews, the problem persists beyond the point where they stopped. The impacts include flooding, standing water, trees rotting at the base, and the spread of invasive weeds.
Drought; Wind	Drought has strained the water supply, while extreme heat has affected our health and significantly increased our electric bills. In addition, we have experienced downed trees caused by high winds.
Wind	I have many large trees surrounding my home, and I have lost power numerous times due to downed trees and branches.
Wind	High winds brought down several enormous tree limbs, one of which destroyed a section of our fence.
Wind	I have not been personally impacted, but I am concerned when I hear reports of power outages caused by downed trees or of trees falling onto homes and causing injuries.
Flooding	Many of our residential trees are showing signs of age and decline. Street flooding has also become common during heavy rains, and it now takes much longer to drain. My concern is that, in the event of a significant and extended storm, the flooding could back up and reach nearby properties. This issue did not exist when we first moved here 35 years ago.

	Additionally, along Pine Street, which abuts the National Guard camp, I have noticed that rainwater no longer drains as effectively since the deforestation that took place when Camp Curtis Guild was converted into a vehicle maintenance facility.
Flooding	We have had downed trees fall on our fencing, and flooding has occurred in the paddock where we keep our animals.
Drought; Wind; Extreme Heat	Drought affects residents in the Lynnfield Center Water District every year, making it difficult to maintain gardens. At the same time, I see many residents in the King James Grant neighborhood continuing to use lawn irrigation during drought conditions, which is very frustrating. Extreme winds have also brought down massive tree branches—some weighing multiple tons—into my neighbor's yard, which have impacted my property as well. In addition, extreme heat has driven up my air conditioning bills and made it very uncomfortable to spend time outdoors.
Wind	Downed trees
Flooding	There is chronic flooding in the Wirthmore Lane neighborhood.
Drought; Wind	Drought has highlighted the Town's inability to meet water demand through its current system. Extreme winds also pose a risk, as many of the tall trees near my home are aging and vulnerable.

5. **Which hazard mitigation strategies are most important to you? Please select your top three priorities.** (75 responses)

Field	Count	%
Modelling and data analysis to project future conditions in Lynnfield	26	14%
Public outreach, education, and engagement related to natural hazards	28	15%
Updating bylaws and regulations to incorporate resiliency considerations	27	15%
Designing resilient infrastructure such as roads, bridges, and buildings	35	19%
Designing resilient green infrastructure, nature-based solutions, and public open spaces	28	15%
Strategies that promote community resilience and support the Town's most vulnerable residents	29	15%
Other (please specify below)	9	5%

6. **Is there anything else you want to share to help inform the Hazard Mitigation Plan update?** (24 responses)[2]

- Communication needs improvement.
- Keep up the good work; it is important to have a strong plan.
- The Town's Tree Preservation By-Law is a step in the right direction, but I wish the option of paying into the tree fund instead of replanting didn't exist. We've lost so many trees that once bordered our beautiful streets.

[2] Responses were rephrased to correct grammatical errors and to ensure that tone and language were appropriate for public disclosure. Subsequently, the responses were manually categorized according to hazard type.

- It would be helpful if the Town provided free education and free property assessments so residents could verify they are following recommendations to mitigate the risk of natural hazards.
- Water restrictions should also apply to people with private wells and should be enforced so that everyone follows them.
- Lynnfield has long had neighborhoods dealing with oversaturated, often flooded land. French drains and sump pumps have become the accepted norm, but these only push the problem onto the next neighborhood.
- Adequate projection and planning are key. In the most recent high winds, power, phone, and internet went out, limiting our ability to communicate. (The LFD kindly came to the school where I teach to check in and my students loved that.) Having a reliable communication system and a clear townwide/district plan for these events is critical. I know we have a collaborative team in place, but these unusual events keep raising the stakes beyond what people expect.
- Drivers need to slow down, especially during icy, windy, and rainy conditions.
- Plans should be guided by people with experience in All Hazards training and emergency response, including evacuations, mutual aid agreements, and disaster response.
- The backroads need to be plowed much better for safety. On Summer Street, there are many hanging branches and unstable trees that should be cut before they cause a tragedy. The Town should be proactive, not reactive.
- Be diligent about addressing hazards, but keep in mind the budget. Town officials have a history of overspending taxpayers' money.
- Every summer we face water bans. We need infrastructure improvements to support the growing population and the many new homes being built.
- The road infrastructure near Pillings Pond is inadequate. Even newly paved roads have water flow and flooding issues, which are causing erosion more quickly. This changes property layouts and leaves gravel and rock in people's driveways.
- Don't make this solely about climate change. Focus on recurring local events.
- Is our water supply robust enough to fight a major wildfire?
- I would like to see planners and landscape architects engaged to design better public spaces that also serve as hazard mitigation.
- Limit commercial development. Market Street should never have happened, nor should the bike trail. Asphalt paths should not be built in wetlands, nor should humans have unrestricted access to all natural lands.
- Regarding "updating bylaws" from the previous question: improvements should follow regulations without exceptions - no special permits or mitigation agreements that undermine the purpose of strategic plans.

Optional Demographics Questions

7. **What is your age?** (72 responses)

Age	%
18 or under	0
19-34	6
35-49	40
50-64	24
65-74	24
75 or older	7

8. **What is your household income?** (65 responses)

Household Income	%
Under $15,000	0
$15,000-$34,999	2
$35,000-$74,999	9
$75,000-$99,999	3
$100,000-149,999	26
$150,000 or more	60

9. **What race or ethnicity do you identify as?** (68 responses)

Race/ethnicity	%
White	87
Asian	6
Black or African American	0
Hispanic or Latino	0
Native American or Alaska Native	0
Native Hawaiian or Other Pacific Islander	0
Middle Eastern, Arab, or North African	0
Other	7

Others: American; will not disclose; prefer not to answer

Limitations of the Survey

This survey results may not represent lived experience of all Lynnfield residents. For instance, a significant number of the survey participants reported that they own a home in Lynnfield (82.2%) and there were no survey respondents who said they rent in Lynnfield. Only 6% of the survey participants were younger than 35 years old, 60% of the survey participants' household income was $150,000 or more, and 86% of the survey participants' household income was higher than $100,000. Overall it shows that the demographic of the survey participants tend to be older and affluent homeowners.

[Appendix] Survey Questions

1. What's your connection to the Town? Please select all that apply.
    a. I own home in Lynnfield.
    b. I rent an apartment in Lynnfield.
    c. I work in Lynnfield.
    d. I own a business in Lynnfield.
    e. I often visit Lynnfield.
    f. Other (please specify below)
2. What brought you to this survey?
    a. I heard about the survey during the public meeting in January.
    b. I read about the survey on the Town website.
    c. I learned about the survey in an email.
    d. Other (please specify below)
3. What natural hazards are you most concerned about? Please rank the following options from most concerning (top of the list) to lease concerning (bottom of the list).
    a. Flooding
    b. Drought
    c. Extreme heat

d. Extreme wind events
e. Winter weather
f. Fire

4. How have these hazards impact you? Stories might include flooding near your home events that downed trees.

   [Open text response]

5. Which hazard mitigation strategies are most important to you? Please select your top three priorities.
   a. Modelling and data analysis to project future conditions in Lynnfield
   b. Public outreach, education, and engagement related to natural hazards
   c. Updating Bylaws and regulations to incorporate resiliency considerations
   d. Designing resilient infrastructure such as roads, bridges, and buildings
   e. Designing resilient green infrastructure, nature-based solutions, and public open spaces
   f. Strategies that promote community resilience and support the Town's most vulnerable residents
   g. Other (please specify below)
6. Is there anything else you want to share to help inform the Hazard Mitigation Plan update?

   [Open text response]

[**Demographics Questions**]

7. What is your age?
8. What race or ethnicity do you identify as?
9. What is your household income?

APPENDIX E. DOCUMENTATION OF PLAN ADOPTION

<PRINT ON TOWN LETTERHEAD>

CERTIFICATE OF ADOPTION
SELECT BOARD

TOWN OF LYNNFIELD, MASSACHUSETTS

A RESOLUTION ADOPTING THE
TOWN OF LYNNFIELD HAZARD MITIGATION PLAN 2025 UPDATE

WHEREAS, the Town of Lynnfield established a Local Hazard Mitigation Planning Team to prepare the *Town of Lynnfield Hazard Mitigation Plan 2025 Update*; and

WHEREAS, the *Town of Lynnfield Hazard Mitigation Plan 2025 Update* contains several potential future projects to mitigate potential impacts from natural hazards in the Town of Lynnfield, and

WHEREAS, duly-noticed public meetings were held by the Lynnfield Select Board on xxxx and xxxx and

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

NOW, THEREFORE BE IT RESOLVED that the Town of Lynnfield Select Board adopts the *Town of Lynnfield Hazard Mitigation Plan 2025 Update*, in accordance with M.G.L. 40 §4 or the charter and bylaws of the Town of Essex.

ADOPTED AND SIGNED this Date. _____

Name(s)

Title(s)

Signature(s)

ATTEST