TOWN OF WESTWOOD

NATURAL HAZARD MITIGATION PLAN
2022 UPDATE

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DRAFT PLAN
SEPTEMBER 2022

Adopted by the Westwood Select Board on MONTH, DAY, 2022.

Prepared by:

The Westwood Hazard Mitigation Committee

And

ACKNOWLEDGEMENTS

The Westwood Select Board extends special thanks to the Westwood Hazard Mitigation Committee as follows:

- John Charbonneau, Town Planner
- Brendan Ryan, Assistant Director of Public Works
- Chris Sheehy, Police Lieutenant, Liaison
- Danielle Sutton, Youth and Family Services
- Jared Orsini, Health Director
- John Deckers, Fire Chief, EMA Director
- Karon Skinner Catrone, Conservation Agent
- Lina Arena-DeRosa, Council on Aging
- Elizabeth McGovern, Library Director
- Nora Loughnane, Director of Community & Economic Development
- Tal Zaslavski, GIS Coordinator
- Todd Korchin, Director of Public Works

The Westwood Select Board offers thanks to the Massachusetts Emergency Management Agency (MEMA) for developing the Commonwealth of Massachusetts Natural Hazards Mitigation Plan (www.state.ma.us/dem/programs/mitigate/index.htm) which served as a model for this plan.[1]

[1] Cover page photo credit:.

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1. INTRODUCTION

HAZARD MITIGATION

Natural hazard mitigation planning explores the natural hazards of concern to a given community or region, identifies specific areas within the planning area that are vulnerable to those hazards, and develops strategies to permanently reduce or eliminate the risk to human life and property. The hazard mitigation planning process coordinates available resources and identifies community policies, actions, and tools that will mitigate the impacts of hazards known to affect the community. With an approved and adopted Hazard Mitigation Plan (HMP), a community has a mitigation roadmap with locally appropriate mitigation action recommendations that can be updated and revised to keep the plan current, relevant, and effective. Planning for natural hazards requires an understanding of the projected impacts of climate change, and how a warming of the earth's atmosphere will continue to impact global weather patterns and local severe weather events. These changes have an impact on the urgency and scope of developing mitigation actions.

The Federal Emergency Management Agency (FEMA) provides guidance to local governments regarding the hazard mitigation planning process. FEMA relies on municipal and regional HMPs to help focus its resources to make cost-effective funding decisions on mitigation projects that address locally identified needs. The Disaster Mitigation Act of 2000 (DMA) places high priority on the continuation of the planning process after the initial submittal of a hazard mitigation plan. Westwood's previous plan was approved in 2011.

The impacts of Climate Change are also an impetus for an update to the HMP in Westwood. Climate Change will cause changes in precipitation, severity of weather events, and temperature, all of which have impacts that can already be seen in Massachusetts. Incorporation of Climate Change considerations into local HMPs will help to align the town's goals with those of the State and increase opportunities for funding, as well as better preparing and mitigating impacts of hazards as they grow more dangerous and unpredictable with time.

PLAN PURPOSE AND GOALS

The purpose of the Westwood Hazard Mitigation Plan (HMP) is to review the findings of the 2011 plan, update the risk assessment, and propose a new list of short-term and long-term actions which will reduce the loss of life or property from several categories of natural hazard events. The hazards profiled in this plan include flood-related events, wind-related events, winter-related events, and fire-related events, as well as other natural hazards like invasive species. This plan was constructed using input from a variety of municipal stakeholders, private stakeholders, and the public so that all perspectives were considered in the planning process. This plan serves as the town's guide to help the town reducing losses and vulnerabilities relating to natural hazards for the next five years.

2. COMMUNITY PROFILE

The Town of Westwood sits southwest of Boston within Norfolk County. The neighboring municipalities include Canton, Dedham, Dover, Needham, Norwood, and Walpole. The town has a population of 16,266 as of the 2020 U.S. Census. The town is a member of the Metropolitan Area Planning Council (MAPC), the regional planning agency for cities and towns in the Boston metropolitan area. Westwood is governed by

a Board of Selectmen who are elected for three-year terms and is guided by a Home Rule Charter that also designated the existence of a Town Administrator and Open Town Meeting structure.[2]

HISTORY

The town was incorporated in 1897 after existing as part of Dedham and later becoming West Dedham before its ultimate incorporation as Westwood. Westwood was the last town to split from Dedham and thought there is no official record of the reason for the split, many consider issues with water rights regarding Buckmaster Pond to be a reason for the separation. Later in the town's history (1985) the two towns came back together and formed the Dedham-Westwood Water District, which continues to serve the town today.[3]

Since its separation, the town has continued to grow. Situated just 12 miles from Boston, Routes 95/128 and 93, two commuter lines, and MBTA bus service give the "Established Suburb"[4] access to the city, surrounding towns, and commercial areas. In 2005, CNN ranked Westwood 13th out of the best 100 places to live in the nation because of its services, location, and schools.[5]

DEMOGRAPHICS

With an estimated population of 16,266 from the 2020 Census, Westwood is a growing suburb of Boston with easy access points to the city that make it a diverse and attractive spot for residences and businesses. Table 2.1 below shows a breakdown of some of the key profiles within Westwood's demographics.

Table 2.1 Key Demographic Statistics, Westwood, MA, U.S. Census, 2020

Profile Topic	Statistic, 2020 U.S. Census Data
Population	16,266
Persons under 18 years, percent	25.4%
Persons 65 years and over, percent	18.3%
White alone, percent	84.0%
Black or African American alone, percent	1.2%
Asian alone, percent	10.3%
Hispanic or Latino, percent	3.3%
Median Household income (in 2020 dollars), 2016-2020	$159,646
High school graduate or higher, percent of persons aged 25 years+, 2016-2020	96.6%
Bachelor's degree or higher, percent of persons aged 25 years+, 2016-2020	70.1%
Owner-occupied housing unit rate, 2016-2020	86.2%
Median value of owner-occupied housing units, 2016-2020	$755,400

Source: U.S. Census Data, 2020.

[2] Town of Westwood Website, Form of Government. https://www.townhall.westwood.ma.us/our-town/about-westwood/form-of-government
[3] A History of the Dedham-Westwood Water District. https://www.dwwd.org/history
[4] MAPC Westwood Community Profile, https://datacommon.mapc.org/profile/westwood/demographics
[5] CNN Best Places to Live Top 100 Finalists, https://money.cnn.com/magazines/moneymag/bplive/2005/top100/top100_1.html

ECONOMY

Westwood benefits from its proximity to Boston, several business corridors, and access to the rest of New England through Interstate access and Boston Logan Airport. This location provides connection between job opportunities in the City of Boston, while also helping to encourage the localized commercial economic growth the town has experienced in the past several years in places like University Avenue, Islington Center, and along Providence Highway. The Comprehensive Plan, updated in 2020, reported Westwood's economic status as stable, with a proposed balance of around $3.85 million in the Stabilization Fund as of fiscal year 2023[6] and "excellent" fiscal management because of town processes and communication surrounding financials.[7] The town maintains consistent reviews of special permits for changes in zoning and Environmental Impact & Design Reviews (EIDR) for new developments and projects through the Planning Board, Zoning Division, and Zoning Bylaws that act as a guideline for developmental and economic growth.

Several new developments both residential and commercial have helped Westwood to grow its tax base. Projects like multi-use development at University Avenue, housing by Route 128 Railroad Station, Islington Center redevelopment, car dealerships along Providence highway, a new public library building, and several other municipal building and housing projects have all occurred since the previous Hazard Mitigation Plan. The new Islington Fire Station and Westwood Police Headquarters were completed in 2017. All have adhered to operations and management plans regarding stormwater. These new developments have created new opportunities in Westwood for living, working, and recreation.

LAND USE AND OPEN SPACE

Westwood is in both the Charles River Watershed Basin and Neponset River Watershed. The town has a large area of wetlands and several water bodies in town, including Noanet and Buckmaster Ponds, as well as several brooks. Bodies of water take up 123 acres of the town's area and wetlands take up another 669 acres.[8] The Neponset River area in the east of town is designated by the Massachusetts Secretary of Environmental Affairs as an Area of Critical Environmental Concern (ACEC) because it is a critical rare species habitat, and the town has 13 Scenic Roads designations from Chapter 40 of Massachusetts General Laws (Section 15C) meaning that any repair or construction must be reviewed by the Planning Board so that it protects the surrounding trees and stone walls to preserve the road's scenic character.[9]

The town's Open Space and Recreation Plan (OSRP) and Comprehensive plan from 2019 and 2020 respectively provide data on the current land use mix in Westwood. A majority of town is designated residential land split into Residential Single Family (4,015 acres), Residential Two Family (35 acres), and Residential 3+ Units (140 acres). Protected Open Space takes up 11.2% of the town's total land. Much of the Protected Open Space (nearly 631 acres) is owned by the town under the care of the Conservation Commission and Select Board. Dedham-Westwood Water District, the Westwood Land Trust, and various homeowners own the rest of the Protected Open Space in town. Much of the rest of the Open Space in town is owned and managed by the Hale Reservation which is a private nonprofit that maintains the land in Westwood and Dover as recreation space (1,137 acres). Open Space and Residential uses take up a majority of the town's land as shown in Table 2.2 below.

[6] FY23 Overall Proposed Budget February 8, 2022. Pam Dukeman, Assistant Town Administrator/Finance Director.
[7] Westwood Comprehensive Plan, 2020.
[8] Open Space and Recreation Plan for Westwood, Massachusetts, 2019.
[9] Westwood Comprehensive Plan, 2020. Land Use and Natural Resources Sections.

Table 2.2 Land Use Types and Acreage, Westwood 2019-2020

Land Use Type	Acres	Percentage Total
Commercial	211	3.0%
Schools and Municipal	238	3.3%
Industrial	85	1.2%
Churches and Institutions	31	0.4%
Mixed use	137	1.9%
Open Space (Total)	1,802	25.2%
Protected Open Space	795	11.2%
Residential	4,190	58.6%
Roads	461	6.4%

Source: Westwood Comprehensive Plan, 2020 and Open Space and Recreation Plan for Westwood, Massachusetts, 2019.

The OSRP and Comprehensive Plan both set goals to continue protecting the town's open space by guiding residential developments, acquiring more protects space, and improving maintenance and care in current protected areas.

Critical Facilities and Existing Infrastructure

A comprehensive list of critical facilities identified by the Westwood Hazard Mitigation Committee (WHMC) is located in Appendix A.

3. Planning Process

Overview

The Town of Westwood initiated a hazard mitigation plan update in 2021. The Town's previous HMP was prepared from 2007 – 2011 and was adopted by the Board of Selectmen in March 2011. The Town elected to hire a consultant to support the plan update process, and BETA Group, Inc. was brought on in early 2022 to lead the effort under the guidance of the Westwood Hazard Mitigation Committee (WHMC). This HMP is the result of a dedicated group of individuals working for several months to propose ways to improve and sustain Westwood's resiliency and mitigation practices.

Westwood Hazard Mitigation Committee

The WHMC was organized by the Town Planner and Director of Community & Economic Development with input from BETA Inc. The Committee members are listed in Table 3.1. Team members were asked to participate throughout the planning process by providing local expertise and reviewing consultant work.

Table 3.1 Westwood Hazard Mitigation Committee (WHMC) Members

Name	Representing
John Charbonneau*	Town Planner
Brendan Ryan	Assistant Director of Public Works
Chris Sheehy	Police Lieutenant, Liaison
Danielle Sutton	Youth and Family Services
Jared Orsini	Health Director
John Deckers	Fire Chief, EMA Director
Karon Skinner Catrone	Conservation Agent
Lina Arena-DeRosa	Council on Aging
Elizabeth McGovern	Library Director
Nora Loughnane	Director of Community & Economic Development
Tal Zaslavski	GIS Coordinator
Todd Korchin	Director of Public Works

*Took over for Abigail McCabe in July 2022

THE PLANNING PROCESS

The 2022 HMP planning process consisted of WHMC meetings, public input, WHMC and public review of the plan, and the MEMA and FEMA adoption review process to achieve final adoption of the plan.

The first kickoff meeting between the Town Planner, Director of Community and Economic Development, and BETA Inc. consultant held on January 13, 2022, laid out the timeline and goals for completing the project, as well as described the level of collaboration required by WHMC members, recommendations for the WHMC, and levels of public outreach necessary for the project.

After inviting members of the community to join the WHMC, the first official WHMC meeting was held on February 17, 2022. The meeting discussed the scope of the project, scheduled the following four meetings of the WHMC, discussed methods of public outreach, and formalized the list of hazards to be addressed in the plan. This meeting also introduced the WHMC to their role providing information about the Town's critical facilities, sites of new developments, and local historic hazard events.

The public survey created for the HMP was published on February 23, 2022, with several follow-up reminders to the community on the Town's website, Facebook, local newspaper, and fliers. The public survey received 73 total responses and was closed on May 31, 2022. The results of the public survey are in Appendix C.

The second regular WHMC meeting was held on March 3, 2022. This meeting reviewed the list of Town's previous plans regarding hazard mitigation that would be helpful to record existing conditions, revisited the known hazard areas for the 2011 plan and 2019 Comprehensive Plan updates, and reviewed the existing mitigation measures applied in town.

The third WHMC meeting, held on April 7, 2022, updated further plans to push the public survey to residents because of initially low response rate, reviewed the Town's capabilities assessment, and

reviewed the status of the mitigation actions from the 2011 plan. After this meeting, chapters 1, 2, and 6 were submitted on May 23, 2022, for the WHMC to review and provide feedback.

The fourth WHMC meeting was held on July 11, 2022, where the WHMC discussed the 2022 mitigation goals and strategies developed from the 2011 goals and actions as well as the new relevant actions for the HMP. After this meeting, chapters 3, 4, and 5 were submitted to the WHMC for review.

The fifth WHMC meeting was held August 11, 2022. The WHMC discussed a summary of progress, the comments received from the WHMC on the draft chapters sent for review, scheduling for future meetings and presentations, and a discussion of the plan's maintenance and outline of how the Goals and Strategies would be carried out.

A public visioning session was held on DATE… TBD

After the public visioning session, the HMP draft was finalized and prepared for edits by the WHMC and Planning Board before presentation and submission to the Select Board, MEMA, and FEMA.

The consultant presented the draft plan to the Planning Board on DATE… TBD

The consultant presented the draft plan to the Select Board on DATE… TBD

Table 3.2: Summary of WHMC Activities

Date	Meeting Summary
1/13/2022	Kick-off meeting
2/17/2022	First WHMC meeting, held virtually
2/23/2022	Information about HMP update posted on the Town's website
2/24/2022	First public input request email sent for public survey for responses from Westwood residents
3/3/2022	Second WHMC meeting, held virtually
3/10/2022	Public input request published for public survey in Hometown Weekly newspaper
4/7/2022	Third WHMC meeting, held virtually
5/23/2022	Chapters regarding HMP introduction, Westwood community profile, and local capabilities submitted for review by WHMC
7/11/2022	Fourth WHMC meeting, held virtually
TBD	Chapters regarding hazard profiles and planning process submitted to the WHMC for review
8/11/2022	Fifth WHMC meeting, held virtually
TBD	Draft Plan posted online for public comment
TBD	Public Visioning Session
TBD	Presentation to Planning Board
TBD	Presentation to Board of Selectmen for Adoption
TBD	Draft Plan Submitted to MEMA for review

TBD	Comments received from MEMA and edits made
TBD	Submitted to FEMA for approval
TBD	FEMA issued Approval (or Approval Pending Adoption if SB has not yet signed adoption certificate)

Records of WHMC meetings and the publications for the HMP process and public survey are in Appendix C: Public Engagement and Appendix D: Public Survey Results.

4. Natural Hazards and Risk Assessment

The hazards identified in the 2011 Westwood HMP will be re-assessed for potential risk and damage according to 2022 updates and added history. The events identified in the 2011 plan were:

- Flood
- Dam Failure
- Hurricanes
- Severe Storms (Wind, hail)
- Tornadoes
- Winter Storms
- Earthquakes
- Landslides
- Brushfires

This plan will not address the threat of landslides on the Town because they are no longer considered a threat in Westwood and will amend several of the categories to better align with State hazards. This plan will cover floods, drought, dam failure, hurricanes and tropical storms, severe storms (including thunderstorms and high winds), tornadoes, winter storms, brushfires, earthquakes, extreme temperatures, and invasive species.

Since the 2011 plan, there have been several federally declared emergencies Norfolk County. All are listed in Table 4.1 below. Several undeclared FEMA disasters in Norfolk County but nearby include the Western Massachusetts tornadoes in 2011 (DR-1994-MA), Hurricane Sandy in 2012 (DR-4097-MA), and the COVID-19 Pandemic (DR-4496-MA)

Table 4.1 FEMA Disaster Declarations Including Norfolk County, MA

FEMA Declared Disaster ID	Dates Declared	Counties Declared	Title/Description and Damage Amount (if available)
DR-1895-MA	Mar 12-Apr 26 2010	Bristol, Essex, Middlesex, Norfolk, Plymouth, Suffolk, Worcester	Massachusetts Severe Storm and Flooding, $59 million assistance from FEMA
DR-1959-MA	Jan 11 - Jan 12, 2011	Berkshire, Essex, Hampden, Hampshire, Middlesex, Norfolk, Suffolk	Massachusetts Severe Winter Storm and Snowstorm, $75,000 in property damage
DR-4028-MA (also EM-3330-MA)	Aug 27 - Aug 29, 2011	Barnstable, Berkshire, Bristol, Dukes, Franklin, Hampden, Hampshire, Norfolk, Plymouth	Hurricane and Tropical Storm Irene, $31 million assistance from FEMA

FEMA Declared Disaster ID	Dates Declared	Counties Declared	Title/Description and Damage Amount (if available)
EM-3343-MA	Oct 29 - Oct 30, 2011	Berkshire, Essex, Franklin, Hampden, Hampshire, Middlesex, Norfolk, Worcester	October Nor'easter/Severe Storm
DR-4110-MA	Feb 8 - Feb 9, 2013	All counties	"Blizzard of 2013," Severe winter storm, snowstorm, and flooding, at least 15 deaths in the Northeast, $61 million assistance from FEMA
DR-4214-MA	Jan 26 - Jan 29, 2015	Barnstable, Bristol, Dukes, Essex, Middlesex, Nantucket, Norfolk, Plymouth, Suffolk, Worcester	Severe winter storm, snowstorm, and flooding, $84 million assistance from FEMA
DR-4372-MA	March 2 - March 3, 2018	Barnstable, Bristol, Essex, Nantucket, Norfolk, Plymouth	Severe winter storm, snowstorm, and flooding, two storm-related deaths, $31 million assistance from FEMA.
DR-4379-MA	March 13 - March 14, 2018	Essex, Middlesex, Norfolk, Suffolk, Worcester	Severe winter storm, snowstorm, and flooding, $40 million assistance from FEMA.
DR-4651-MA	Jan 28 - Jan 29, 2022	Bristol, Norfolk, Plymouth, Suffolk	Severe winter storm and snowstorm

Source: FEMA, 2022

This section ranks the risk of hazards that could occur and cause damage in Westwood. To assess overall risk, each hazard is evaluated in terms of history of occurrence and damages, hazard impacts and extent of impacts, and future probability of occurrence. Table 4.2 further explains these terms and associated ranking systems used in this plan. Following this, Table 4.3 summarizes the findings of the 2022 Westwood HMP Risk Assessment.

Table 4.2 State and Westwood Guidelines for Hazard Risk Ranking

Ranking Category	Levels of Risk	Risk Ranking
Probability of Future Occurrence	**Unlikely:** In intervals greater than 50 years **Not Very Likely**: Will occur every 10-50 years **Likely:** Will occur every 5-10 years **Highly Likely:** Will occur every 1-5 years	**Unlikely = 0** **Not Very Likely = 1** **Likely = 2** **Highly Likely = 3**
Frequency	**Low:** 1%- 10% probability within 100 years **Medium:** 10%-100% probability within 10 years **High:** 100% probability within 1 year-5 years	**Low = 1** **Medium = 2** **High = 3**
Severity	**Low:** Some local property damage not town wide, minor injuries or loss of life **Medium:** 50 % of property could be damaged and possible injuries or loss of life **High:** Major town wide property damage, injuries, and loss of life[10]	**Low = 1** **Medium = 2** **High = 3**
History	Unranked, based off previous recorded occurrences	Not Applicable
Overall Priority Ranking	Based on totals in the neighboring column	**Lowest = 2** **Highest = 9**

Table 4.3 Findings of 2022 Westwood Hazard Mitigation Plan Risk Assessment

Type of Hazard	Probability of Future Occurrence	Frequency	Severity/ Magnitude	Priority Ranking
Hurricane	Highly Likely (3)	High (3)	High (3)	9
Winter Storm	Highly Likely (3)	High (3)	High (3)	9
Flooding	Highly Likely (3)	High (3)	Medium (2)	8
Severe Storm	Highly Likely (3)	High (3)	Medium (2)	8
Nor'easter	Highly Likely (3)	High (3)	Medium (2)	8
Extreme Temperatures	Highly Likely (3)	High (3)	Medium (2)	8
Dam Failure	Likely (2)	Medium (2)	Medium (2)	6
Drought	Likely (2)	Medium (2)	Low (1)	5
Invasive Species	Likely (2)	Medium (2)	Low (1)	5
Tornado	Not Very Likely	Low	High	5

[10] Frequency and Severity rankings reworked from 2013 Massachusetts State Hazard Mitigation Plan

	(1)	(1)	(3)	
Brushfire	Not Very Likely (1)	Low (1)	Medium (2)	4
Earthquake	Not Very Likely (1)	Low (1)	Medium (2)	4

1.1.1 Vulnerability Assessment

A vulnerability assessment is an estimation of the exposure of people, buildings, and infrastructure to the impacts of a natural hazard, which helps to assess the scale and severity the hazards may have on the community. Multiple factors of vulnerability are discussed in the natural hazard profiles later in this chapter. The vulnerability assessment within each relevant hazard profile includes qualitative analyses based on community and WHMC input as well as outputs from the National Risk Index (NRI). NRI uses local, state, and federal data at the Census Tract scale to assess Expected Annual Loss from selected natural hazards[11], Social Vulnerability, and Community Resilience resulting in a baseline relative risk measurement for each U.S. County and Census tract.[12]

The NRI measures a community's risk by assigning each hazard with a Risk Index score that is determined by a formula that combines multiple individual scores regarding a hazard. The formula is as follows:

Risk Index = Expected Annual Loss × Social Vulnerability ÷ Community Resilience[13]

In this formula, Expected Annual Loss is Exposure × Annualized Frequency × Historic Loss Ratio. In other words, the potential exposure of building value, populations, and agriculture value to natural hazards multiplied by the expected frequency of a hazard occurring each year multiplied again by the percentage of the exposed building value, population, or agriculture value that can be lost during a natural hazard event.[14] Because Westwood contains three separate Census tracts, each hazard Expected Annual Loss statistic reported in this HMP is a combined statistic, adding the three values from the three separate tracts.

Social Vulnerability in the Risk Index represents the susceptibility of communities to the impacts of natural hazards and Community Resilience represents the ability of a community to adapt and recover from natural hazard events. The Social Vulnerability and Community Resilience scores are determined by tests done through the University of South Carolina's Hazards and Vulnerability Research Institute (HVRI). Westwood contains three Census tracts, each with a Social Vulnerability that is rated "Very Low." The average score between the three is 26.28. Meanwhile, the Community Resilience score for each tract is rated as "Very High" in comparison with the rest of the U.S., with an average score between the three tracts at 58.04. Because each tract may have a slight variance in score, the average of the three scores is taken as a rating for the Town of Westwood as a whole.

[11] The 18 evaluated hazards evaluated under NRI are: avalanche, coastal flooding, cold wave, drought, earthquake, hail, heat wave, hurricane, ice storm, landslide, lightning, riverine flooding, strong wind, tornado, tsunami, volcanic activity, wildfire, and winter weather.

[12] National Risk Index (NRI), FEMA 2022 Census Tracts: 25021412100, 25021412200, 25021412300. https://hazards.fema.gov/nri/report/viewer?dataLOD=Census%20tracts&dataIDs=T25021412100

[13] NRI, Determining Risk, https://hazards.fema.gov/nri/determining-risk

[14] NRI, Expected Annual Loss, https://hazards.fema.gov/nri/expected-annual-loss

The Risk Index rating is measured on a relative scale from 0 to 100 with 0 being the lowest possible risk value. Alongside a numeric score the hazard is also given a rating ranging from "Very Low" to "Very High" which determines a relative rating for a community compared to other communities of the same level.[15]

FLOOD-RELATED HAZARDS

1.1.2 FLOODS

Inland flooding causes more damage than any other weather-related hazard event. Floods are defined by the National Flood Insurance Program (NFIP) as:

> A general and temporary condition of partial or complete inundation of two or more acres of normally dry land area or of two or more properties from: overflow of inland or tidal waters; unusual and rapid accumulation or runoff of surface waters from any source; or a mudflow; or the collapse or subsidence of land along the shore of a lake or similar body of water as a result of erosion or undermining caused by waves or currents of water exceeding anticipated cyclical levels that result in a flood as defined above.[16]

For this plan, flooding related hazards include riverine flooding and urban drainage flooding. Riverine flooding occurs when persistent moderate to heavy rain falls over a period of time causing local rivers and streams to crest their banks and flow into the adjacent floodplain. Severe storms with heavy rain can generate flash floods which strike and end quickly. Urban drainage flooding due to runoff occurs when water runs over the land's impervious surfaces (paved areas, building subdivisions, and highways) either from overbank flooding from rivers or in a flash flood scenario.

The State HMP notes that between 1954 and 2018, Massachusetts had 22 major flood (or flood-related) events, mostly as direct results of weather events like nor'easters or tropical storms.[17] The number of flooding events is only expected to increase as climate change impacts the severity and frequency of precipitation events. Heavy precipitation or overbank flooding could also have a more intense impact on areas where vegetation has been depleted due to increased drought events through climate change.

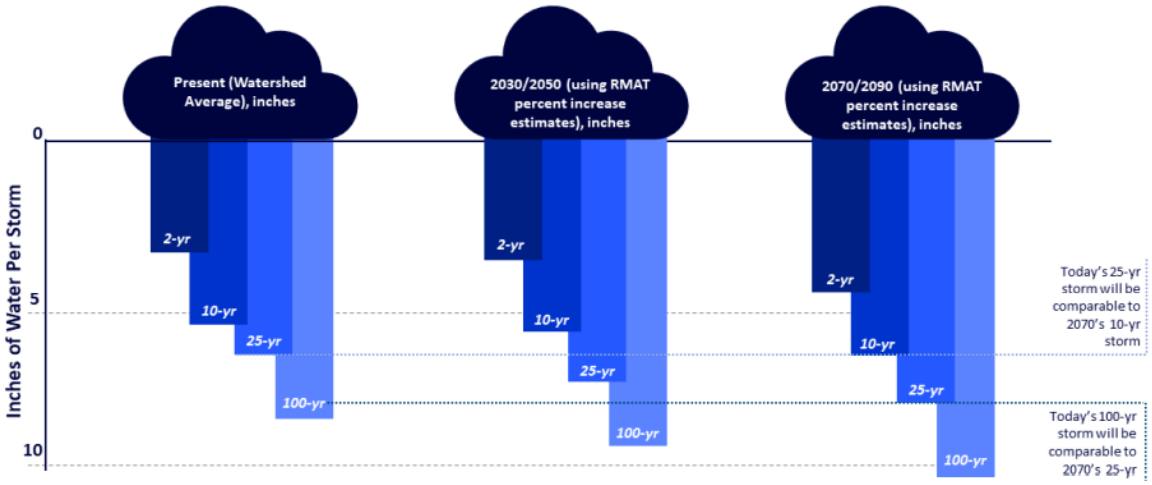
Floods are measured by their probability, most typically the 100-year flood which is a flood that has 1 out of 100 chances of occurring each year, making it a larger and higher risk flood. More frequent floods have a higher chance of occurring (like a 10-year, or 10% chance flood) and are lower risk but more common. The standard for ranking floods for the NFIP is the 100-year or base flood.[18] The base flood is recorded spatially in floodplains as a Special Flood Hazard Area (SFHA) on maps from the NFIP that show where NFIP policies are regulated.

Westwood is located on the Charles River Watershed and Neponset River Watershed. A study regarding the Charles River Watershed analyzed the change in stormwater rainfall depths for significant storm events to account for climate change impacts. The analysis showed that today's 100-year storm (part of the SFHA) will likely be a 25-year storm in the year 2070, meaning that the 100-year storm will see an increase in precipitation and possible damage. Infrastructure will need to be re-addressed to handle the

[15] NRI, Understanding Scores and Ratings, https://hazards.fema.gov/nri/understanding-scores-ratings
[16] National Flood Insurance Program Requirements, 59.1 - Flood Definition, 2020.
[17] Massachusetts Drought Management Plan 2019
[18] National Flood Insurance Program (NFIP) Floodplain Management Requirements, A Study Guide and Desk Reference for Local officials – FEMA 480, 2005

new severity and amount of runoff caused by storms. Figure 4.1, taken directly from the report, shows the changes in each possible storm event.

Figure 4.1 Projected future increase in precipitation scenarios in the Charles River Watershed Model



Source: Charles River Watershed Model, 2021.

1.1.2.1 Westwood Flood History & Impact

Below is a table showing the recorded flooding events from 2010 to 2022 in Westwood. The floods in 2010 are the most notable and damaging of these floods, despite not having the same financial impact as the 2020 flooding in Norfolk County. Statewide the 2010 floods were the most damaging flood event in recent history, causing a state emergency declaration.

Table 4.4 Westwood Historic Flood Events, 2011-2022

Date	Type	Damage (Norfolk County-Wide)	Comments
3/14/2010	Flood	$16,640,000	DR-1895-MA, 6-10 inches of rainfall resulted in major flooding across eastern Massachusetts and Rhode Island, with downed trees and flooded homes, businesses, and roads.
3/29/2010	Flood	$8,320,000	DR-1895-MA, 4-6 inches of rain fell across Norfolk County, resulting in the Charles River the Neponset River rising to major flood. Flooded streets closed in Westwood.
8/23/2011	Flood, Hurricane	$3,500,000	DR-4028-MA, Tropical Storm Irene caused damage through local flooding, downed trees and wires.
9/1/2013	Flash Flood	$80,000	Flash flooding occurred because of showers and thunderstorms.

9/30/2017	Flash Flood, Heavy Rain	$10,000	Downpours due to thunderstorms caused some flash floods in the county.
6/28/2020	Flash flood	$30,000,000	Flash flooding occurred and particularly impacted Norwood Hospital and surrounding areas.
8/23/2020	Flood, Thunderstorm	N/A	In Westwood, Yale St at University Ave was flooded and impassable due to thunderstorm conditions.

Source: NOAA http://www.ncdc.noaa.gov/stormevents

Large, damaging floods may not seem like common events judging only from Table 4.4, but not all flooding events are considered hugely impactful and recorded on a county level. Smaller flash floods may occur and not be recorded officially because of their relative size but are still crucial events for understanding the capabilities of drainage systems and stormwater flow in town.

Several locations are noted as areas where flooding repeatedly occurs. Discussed in the Existing Capabilities and Mitigation Measures section, work on the Conant Road culvert was recommended through a flooding analysis completed on the site. The culvert is too small for the capacity needed on the site, and funding to improve the sewer and culvert infrastructure was requested in the town's 2022 Capital Improvement Plan.

The area around the University Avenue development flooded more often before drainage was completed in the new development there. Since then, some flooding issues occur in the storm drains outside the project limits on State-managed roads. Several other locations have similar outcomes where flooding occurred, and the problem was fixed by better drainage maintenance practices. These areas include several cemetery roads in town, Green Acre Road, Glen Road and Edgewood Road, and Brook Field near Westbrook Lane.[19]

BETA Inc. also previously evaluated specific areas for flooding in recent years. Gay Street was noted to have an undersized sewer trunk line for wastewater with not enough catch basins on Deerfield Avenue. The fire station on High Street, funeral home, and masonic lodge are all completely paved, and stormwater runs down and inundates a catch basin and flows through yards on Hillcrest Place and out to Windsor Road. Finally, Hartford Street at Warwick Drive residences are in low area that get inundated because it is a sizeable drainage area that drains to the sewer trunk line on Hartford Street that discharges to wetlands. Consultant reports showed that the whole main sewer line on Hartford Street needs to be upsized.[20]

[19] Information gathered by WHMC and DPW at Meeting 2
[20] BETA Inc. Reports on Gay St., High St., and Hartford St.

Two privately-owned culverts are both listed in the 2011 plan as contributing to or suffering from drainage issues in their respective areas. The Crystal Hill Terrace culverts and small dam were noted to be causing drainage trouble and had the potential to impact other parts of the Town, while the Purgatory Brook culvert was opened to alleviate drainage problems in the neighborhood.

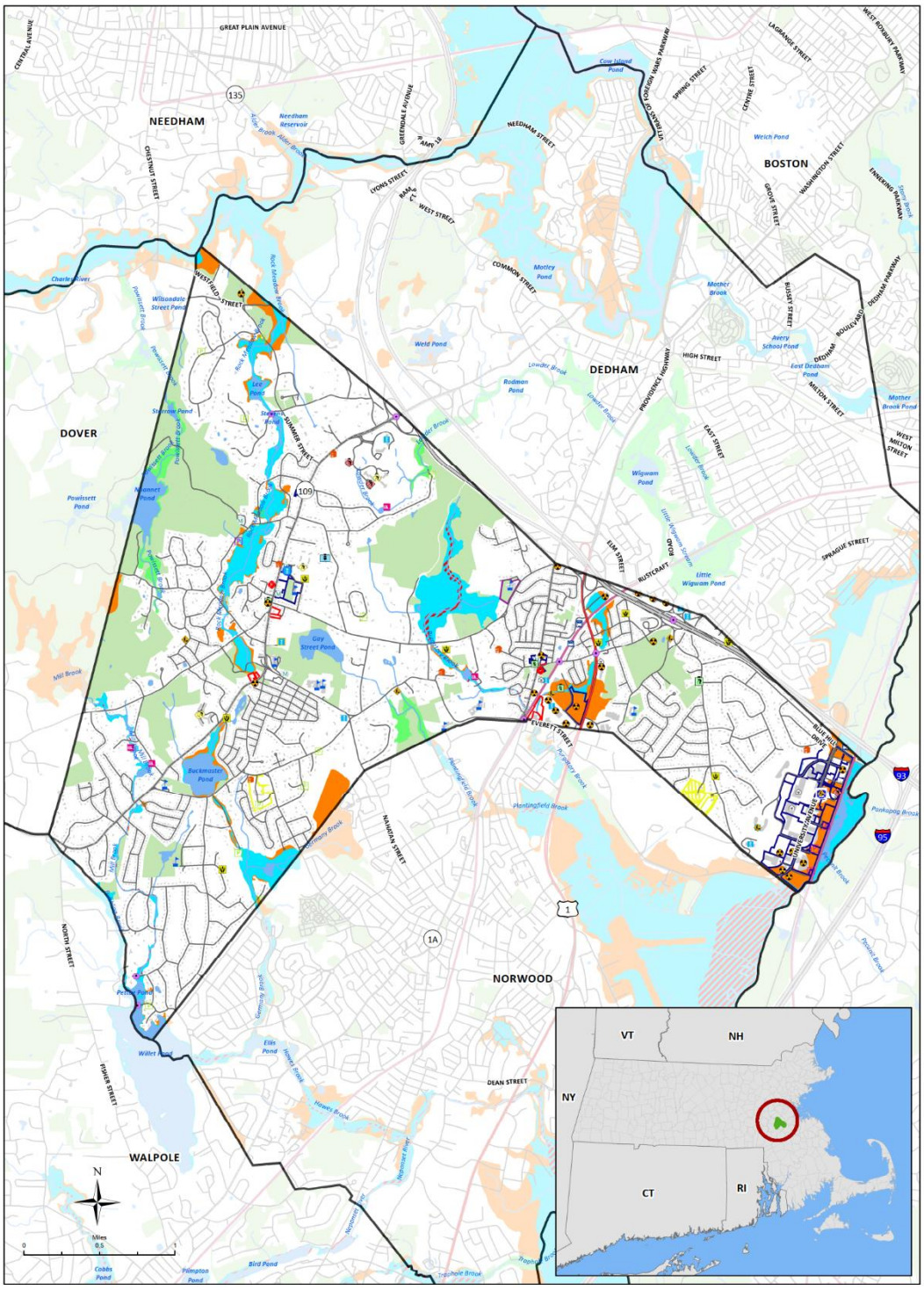
The Crystal Hill Terrace location was brought up again in the Town's Comprehensive Plan update, where members of the public noted in a workshop that the location was vulnerable, and that a risk assessment would be beneficial to the safety of the town but could be difficult to obtain because of the private nature of the structures. Tighe & Bond completed a Stormwater Culvert Assessment for Crystal Hill Terrace in 2017 and noted that the culvert there would not be able to sustain 10, 25, or 100-year flood events. If the culvert failed it would make Crystal Hill Terrace impassible and prevent evacuation routes for 11 residences.[21] The report recommended further evaluation or replacement of the culvert by a professional engineer and recommended that the Town provide the owners with information regarding the risks of culvert and dam failure.

Map 4.1 shows the locations of critical facilities, including dams, roads, and areas of future and current development in Westwood. The map overlays these locations and routes on a depiction of the Westwood FEMA designated flood zones. A larger view of Map 4.1 can be viewed in Appendix D: Public Survey Results.

Image of the Deerfield Avenue Infiltration Basin from an August, 2022 MS4 inspections. This is an example of a Best Management Practice to reduce the pollutants in stormwater runoff, and to reduce localized flooding.

[21] Tighe & Bond Crystal Hill Terrace Stormwater Culvert Assessment, 2017.

Map 4.1 Critical Facilities with FEMA Flood Zones



1.1.2.2 FLOOD RISK: EXTENT, PROBABILITY, AND VULNERABILITY

As climate change increases the number of severe storm events and levels of flood systems as seen in the Charles River Watershed analysis, it becomes increasingly critical to ensure stormwater systems and surfaces can be prepared for larger storm events. The probability of future occurrences of flooding events based on past event occurrences and the impact of climate change is **Highly Likely:** Will occur every 1-5 years. Due to these same factors, the potential frequency for flooding events occurring in Westwood is also **High:** 100% probability within 1 year-5 years.

Westwood has completed work to redesign roads, clean culverts, and maintain flood-prone drainage systems through the work of DPW and participation in the MA Municipal Vulnerability Preparedness (MVP) Planning Program. Town participation in flood-mitigating projects puts the potential severity of impact from flooding events on the town at **Medium:** 50% of property could be damaged and possible injuries or loss of life. Though there are actions to mitigate the impacts of flooding, Westwood is still vulnerable to floods currently and will become more vulnerable as climate change increases the frequency and severity of precipitation and other storm events. The NRI data notes that the total Expected Annual Loss Values of buildings in Westwood is $14,566.

This building number is determined by combining the data for three census tracts for the NRI formula for calculating Expected Annual Loss:[22] Riverine flooding in Westwood for all three Census tracts has an Annualized Frequency of 2.7 events per year, while possible building value exposure to flooding hazard events is $38,050,091, meaning that value could potentially be exposed to flooding damage if an event were to occur. Overall, riverine flooding has a Risk Index rating of 7.67, "Relatively Low."

Insert Repetitive Loss Properties Section here when data is acquired from FEMA.

1.1.3 DAM FAILURE

Dam failures can result from natural events, human-induced events, or a combination of both. Failures due to natural events such as prolonged periods of rainfall and flooding can result in overtopping, which is the most common cause of dam failure. Overtopping happens when a dam's spillway capacity is exceeded and portions of the dam begin to pass water, erode, and ultimately fail. Other causes of dam failure include design flaws, foundation failure, internal soil erosion, inadequate maintenance, or misoperation.

Complete failure can occur if internal erosion or overtopping causes a structural breach, which releases a high-velocity wall of debris-laden water that rushes downstream, damaging or destroying everything in its path. An additional hazard concern is the cascading effect of one dam failure causing multiple dam failures downstream due to the sudden release of flow.

Dams are classified by size and hazard ratings. The size classification provides a relative description of small, medium, or large, based on the storage capacity and height of the impounded water. The hazard classification relates to the probable consequences of failure or misoperation of the dam; however, the categorization does not relate to the current condition of the dam. The hazard classifications are defined by the MA Department of Conservation and Recreation's Office of Dam Safety as follows:

- High – Failure or misoperation will result in a probable loss of human life serious damage to homes, industrial or commercial facilities, important public utilities, main highways or railroads.

[22] NRI, FEMA, 2022

- Significant – Failure or misoperation may result in loss of human life and damage to homes, industrial or commercial facilities, secondary highways or railroads or cause interruption of use or service of relatively important facilities.
- Low – Failure or misoperation results in minimal property damage to others. Loss of life is not expected.[23]

The condition of a dam reflects the state of the dam structure itself. The ratings of dams are satisfactory, poor, unsafe, and emergency. A dam's condition will impact how often it should be inspected or how urgent repairs should take place. For emergency dams, repairs need to occur upon notification of the condition to the Commissioner of the Department of Conservation and Recreation and monitoring of the condition should occur hourly. Meanwhile, poor or unsafe dams "must be inspected and reported at least every three months by a registered professional engineer employed by the owner until the dam safety repairs are completed and the dam is found to be in satisfactory condition."[24]

1.1.3.1 Westwood Dam Failure Impacts

Westwood has five dams recorded by the Office of Dam Safety, only one of which is ranked as significant hazard. These dams are depicted in Map 4.1 alongside other critical facilities and floodplains, and are listed below along with other non-ODS listed dams located in town.

- Noanet Pond Dam – Significant Hazard
- Storrow Pond Dam
- Lee Pond Dam (Summer St. – maintained privately)
- Stevens Pond Dam (Longmeadow Dr. – maintained by DPW)
- Haslam Pond Dam
- Purgatory Brook, private dam – not tracked by the Office of Dam Safety, but mentioned in 2011 HMP under this section
- Mill Brook, Crystal Hill Terrace pair of privately-owned dams – not tracked by the Office of Dam Safety, but mentioned in 2011 HMP under this section

Town DPW keeps an extra list of several dams that they maintain, though the local designation of a dam may mean a culvert or other flood mitigating system that needs maintenance in order to work properly. DPW mentions privately managed dams including three in Hale Reservation. The extra list of DPW maintained dams are listed below:

- Dover Road
- Conant Road
- Buckmaster Pond
- Martha Jones School
- Lymans Pond on Thatcher Street

The Purgatory Brook tracked as a dam in the 2011 HMP is a culvert, but the Mill Brook location contains both a culvert, discussed in the section on Flooding above, and a man-made earthen and rock dam that is not registered with the state because was previously smaller than the State's dam designation of a height of six feet and impounds less than 15 acre-feet.[25]

[23] Dam Hazard Potential Classification Table, MA Department of Conservation and Recreation 302 CMR 10.00.
[24] MA Department of Conservation and Recreation 302 CMR 10.00. Inspection Schedule.
[25] Tighe & Bond Crystal Hill Terrace Stormwater Culvert Assessment, 2017.

Despite the small nature of the dam, Tighe & Bond made recommendations for a qualified engineer to design repairs for the dam or to remove it if the dam is deemed no longer necessary. Because the dam is privately owned, this would fall under the responsibility of the owner after the Town takes the steps to present the dam evaluation and recommends action be taken to repair or remove the dam.

The Noanet Pond Dam, which is the only Westwood dam rated as a significant hazard dam by the MA Department of Conservation and Recreation's Office of Dam Safety has an Emergency Action Plan (EAP) that was last updated in May 2020. This EAP is important because a failure of the dam could inundate residences and roads in Westwood and the neighboring Town of Dover, MA.[26] The dam is currently classified in "poor" condition and has been since 2014 despite several construction projects to try and improve the condition of the dam.[27] The latest condition report recommends that the primary spillway culvert pipe be repaired, and debris be cleared from the dam despite previous clearing efforts. The dam is owned privately by Hale Reservation, and work began in 2021 clean and repair the spillway culvert pipe structure.[28]

1.1.3.2 Dam Failure: Extent, Probability, and Vulnerability

The probability of future occurrences of dam failure impacting Westwood based is **Likely**: Will occur every 5-10 years. Only one of the dams in Westwood is ranked as significant risk, and constant culvert cleaning and dam maintenance completed by Westwood's DPW makes the possibility for dam failure less probable than in other municipalities, but certainly not impossible. As severe storms produce a larger potential for flooding due to climate change, dams are more at risk of overtopping or breaching, so ensuring dams have Emergency Action Plans (EAPs) is a critical protectionary step to mitigating the impacts of dam failure. Taking maintenance measures to privately owned dams and culverts is also important. The two dams listed in the 2011 HMP were not tracked in 2021 by the MA Department of Conservation and Recreation. Either because of their size or official designation as a dam, these pieces of infrastructure are difficult to survey and maintain because of their status as privately-owned structures.

The potential frequency for dam failure occurring in Westwood is **Medium**: 10%-100% probability within 10 years due to increased precipitation and overall age of current dams in Town.

The potential severity for dam failure events is **Medium:** 50 % of property could be damaged and possible injuries or loss of life.

1.1.4 Drought

Drought is characterized as a continuous period in which rainfall is significantly below the normal amount for a particular area. These events are a gradual phenomenon that occur slowly, over a multi-year period. The National Drought Mitigation Center uses five classes of categorization for the impact of drought:

- Meteorological – A measure of departure of precipitation from normal, defined solely on the degree of dryness. Due to climatic differences, what might be considered a drought in one location of the country may not be a drought in another location.
- Hydrological – The effects of periods of precipitation shortfalls on the surface or subsurface water supply. Occurs when these water supplies are below normal.

[26] Emergency Action plan for Noanet Pond Dam, May 2020
[27] Poor Condition Follow-Up Inspection #12 – August 18, 2021, Noanet Pond Dam - National Dam ID No: MA01023; State Dam ID No.: 6-11-335-1 Westwood, MA
[28] Dam Safety Improvements, Notice of Construction Noanet Pond Dam, April 2021.

- Agricultural – It occurs when there is not enough water available for a particular crop to grow at a particular time. Agricultural drought is defined in terms of soil moisture deficiencies relative to the water demands of plant life, primarily crops.
- Socioeconomic – Occurs when the demand for an economic good exceeds the supply as a result of a weather-related shortfall in the water supply.
- Ecological – An episodic deficit in water availability that drives ecosystems beyond thresholds of vulnerability, impacts ecosystem services, and triggers feedbacks in natural and/or human systems (Crausbay et al., 2017).[29]

The U.S. Drought Monitor (USDM) uses the frequency of occurrence of a drought event "relative to all historical measured events expressed as percentiles to gage the severity of a measurement at individual stations and to gage the severity of overall drought."[30] The MA Drought Management Plan takes the USDM percentages of drought and splits them into four categories instead of USDM's usual five. Using local streamflow data instead of national averages, the 2019 Plan specifies the USDM data for Massachusetts conditions and sets local expectations and definitions for drought definitions.

Table 4.5 Comparison of Percentile Ranges for the Massachusetts DMP and the USDM

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

Climate change may be bringing more annual precipitation events and totals, but it will also cause more unpredictable and severe drought periods seasonally. These droughts will impact groundwater and reservoir water supply systems, which will exacerbate dry periods due to reduced evaporation and ground absorption levels. More drought events mean flooding events become more common because of saturation levels, and more brushfire events because of an increase in dry fuels for fire spread.

[29] Wilhite, D.A.; and M.H. Glantz. 1985. Understanding the Drought Phenomenon: The Role of Definitions. Water International 10(3):111–120. Retrieved from the National Drought Mitigation Center, 2022.
[30] U.S. Drought Monitor

1.1.4.1 Westwood Drought History & Impact

Drought events are only expected to increase due to warming temperatures from climate change. USDM keeps records of all drought events, seen in Table 4.6 below.

Table 4.6 Westwood Historic Drought Events, 2011-2022

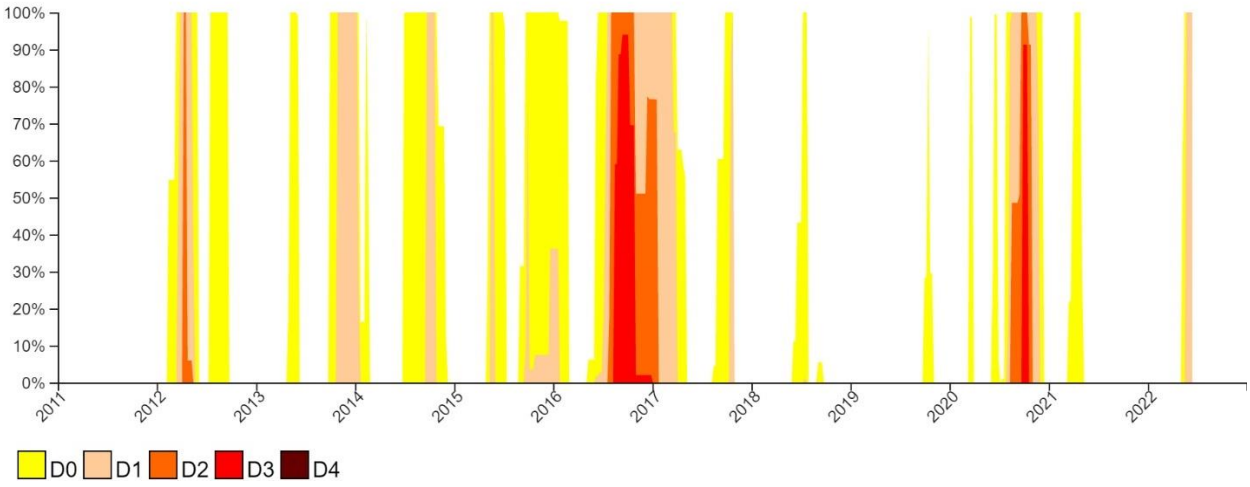
Date	Type	Damage (Norfolk County-Wide)	Comments
4/12/2012 - 5/1/2012	Drought	N/A	U.S. Drought Monitor declared a severe drought across RI, the eastern half of MA, and most of northern CT.
8/31/2016-1/24/2017	Drought	N/A	An extended period of drought that shifted between severe, extreme and moderate in MA.
8/12/2020-11/9/2020	Drought	N/A	An extended period of drought that shifted between severe, extreme and moderate in MA.

Source: NOAA http://www.ncdc.noaa.gov/stormevents, USDM

Drought are widespread events, meaning often more than one municipality is impacted. The 2012 and 2016 droughts affected many eastern and mid-Massachusetts municipalities, and though they caused no traceable damage in Norfolk County, drought conditions also create circumstancess for thunderstorms and major flooding to cause more damage because of dry vegetation and air quality.

USDM visualized the trends of droughts in Massachusetts from 200 onwards, and Figure 4.2 shows a selection of instances where MA was declared in a period of moderate to extreme drought by USDM standards.

Figure 4.2 USDM National Map Data, Massachusetts 2011-2022



Source: USDM, Acquired 2022

1.1.4.2 Drought Risk: Extent, Probability, and Vulnerability

The probability of future occurrences of drought events impacting Westwood based on past event occurrences and the impact of climate change is **Likely**: Will occur every 5-10 years. Though drought

events may not have a notable severe impact on Westwood, they are likely to result in meteorological and hydrological consequences that could make stormwater systems more vulnerable to flood conditions. Due to MA drought trends and climate change, the potential frequency for drought events occurring in Westwood is **Medium**: 10%-100% probability within 10 years.

The potential severity for these increasingly common events is **Low:** Some local property damage not town wide, minor injuries or loss of life. Westwood is more at risk of sustaining damage from flooding events than it is drought events, but prolonged high temperatures and dryness due to climate change may impact this ranking in the future. While the NRI has No Expected Annual Loss data on the possible building or crop damage, drought events are rated at an Annualized Frequency of 4.3 events per year.

WIND-RELATED HAZARDS

1.1.5 HURRICANE (TROPICAL STORM)

Hurricanes that strike the Eastern United States originate in the tropical and subtropical North Atlantic Ocean, the Caribbean Sea, and the Gulf of Mexico. The Atlantic hurricane season spans a six-month period (June 1 through November 30). Storms in this period may hit Massachusetts as tropical depressions, tropical storms, or hurricanes – each a different level of a tropical cyclone, or low-pressure systems that usually form over the tropics. Most of the destruction in a tropical cyclone or hurricane event is caused by very high winds, heavy rain, lightning, tornadoes, and storm surges.

- Tropical Depression – Maximum sustained surface wind speed is less than 39 MPH
- Tropical Storm – Maximum sustained surface wind speed from 39-73 MPH
- Hurricane – Maximum sustained surface wind speed exceeds 73 MPH

Hurricane damage is rated by the Saffir-Simpson Wind Rating Scale. The scale does not consider the other forms of damage that may be cause by hurricane storm surges or tornadoes. Instead, it considers potential property damage cause by the high-sustained winds brought by hurricane forces. Below is a description from each ranking on the scale. Most hurricanes that reach Massachusetts are not as severe as their initial strength at formation, often weakening over landfall and approaching MA as tropical storms.

Table 4.7 Saffir Simpson Hurricane Wind Scale

Category	Sustained Winds	Types of Damage Due to Hurricane Winds
1	74-95 MPH	**Very dangerous winds will produce some damage**: Well-constructed frame homes could have damage to roof, shingles, vinyl siding and gutters. Large branches of trees will snap and shallowly rooted trees may be toppled. Extensive damage to power lines and poles likely will result in power outages that could last a few to several days.
2	96-110 MPH	**Extremely dangerous winds will cause extensive damage**: Well-constructed frame homes could sustain major roof and siding damage. Many shallowly rooted trees will be snapped or uprooted and block numerous roads. Near-total power loss is expected with outages that could last from several days to weeks.
3 (major)	111-129 MPH	**Devastating damage will occur**: Well-built framed homes may incur major damage or removal of roof decking and gable ends. Many trees will be

		snapped or uprooted, blocking numerous roads. Electricity and water will be unavailable for several days to weeks after the storm passes.
4 (major)	130-156 MPH	**Catastrophic damage will occur**: Well-built framed homes can sustain severe damage with loss of most of the roof structure and/or some exterior walls. Most trees will be snapped or uprooted, and power poles downed. Fallen trees and power poles will isolate residential areas. Power outages will last weeks to possibly months. Most of the area will be uninhabitable for weeks or months.
5 (major)	157 MPH or higher	**Catastrophic damage will occur**: A high percentage of framed homes will be destroyed, with total roof failure and wall collapse. Fallen trees and power poles will isolate residential areas. Power outages will last for weeks to possibly months. Most of the area will be uninhabitable for weeks or months.

Source: NOAA, Simpson Hurricane Wind Scale, https://www.nhc.noaa.gov/aboutsshws.php

Due to climate change, the severity of tropical storms is expected to increase because warmer ocean temperatures cause the formation of stronger storms. Paired with increases in precipitation due to climate change, hurricanes will only become more dangerous over time for Westwood.

1.1.5.1 Westwood Hurricane History & Impact

Westwood has experienced the impacts of several hurricanes in the past several years mostly in the form of downed trees and wires, power outages, and some flooding. Table 4.8 shows a list of the more recent hurricanes and tropical storms to hit Westwood. Older but still severe storms for the state of Massachusetts and Westwood like Hurricanes Carole and Edna in 1954 and Bob in 1991 are not listed here, but they had similar impacts as most hurricanes listed, thought their impacts were amplified by the severity of the storms.

Table 4.8 Westwood Historic Hurricane Events, 2011-2022

Date	Type	Damage (Norfolk County-Wide)	Comments
8/28/2011	Hurricane	$3,500,000	DR-4028-MA, Tropical Storm Irene caused damage through local flooding, downed trees and wires.
10/29/2012	Hurricane	$120,000	DR-4097-MA, Hurricane Sandy caused strong winds, coastal flooding and severe thunderstorm conditions.
9/20/2017		$10,000	Storm Jose brought strong wind gusts and heavy downpours to MA.
8/4/2020		$5,000	Tropical Storm Isaias caused widespread wind damage in New England.
8/22/2021		$500	Tropical Storm Henri brought strong wind gusts and flash flooding in New England.

Source: NOAA http://www.ncdc.noaa.gov/stormevents

The most frequent impact of hurricanes are high winds and heavy precipitation. Tropical Storm Irene caused power loss for many homes in Westwood as well as municipal buildings, and the Town opened the high school for hot showers while rolling out an effective emergency response operation to provide power and clear debris.[31]

1.1.5.2 Hurricane Risk: Extent, Probability, and Vulnerability

A major concern of the Town is the status of senior citizens during hurricane events, especially with high chances of lost power. The Council on Aging facility can work as a warming and cooling station, but not as an emergency shelter during storm events. The Town's shelter is located at Westwood High School. Extreme hurricane events can leave residents stranded without power or block roads with fallen trees and debris. These scenarios can impact all Westwood residents but are especially dangerous to residents over 65 and those living with different mobility or health issues because of blocked access to medical care or resources.

The probability of future occurrence for hurricanes and tropical storms in Westwood is **Highly Likely:** Will occur every 1-5 years. Climate change is expected to increase the number of severe storms and precipitation events, including hurricanes. While Westwood may experience one or two hurricane or tropical storm events per year currently, there will need to be more efforts made to mitigate against more severe and frequent hurricane events in the future. The potential frequency for hurricane events occurring in Westwood is **High**: 100% probability within 1 year-5 years. Though the storms that hit Westwood during the hurricane season do not always cause hurricane level damage, tropical storms and hurricanes are annual events in Westwood and most of eastern Massachusetts.

The potential severity for a hurricane event is **High:** Major town wide property damage, injuries, and loss of life. Hurricane event damage is hard to predict depending on the severity of the incoming storm and abrupt or unexpected changes in weather patterns. Around the nation, extreme hurricane events have

[31] Irene wreaks havoc in Westwood (wickedlocal.com)

cause severe damage through flooding and severe storm conditions; this damage is expected to increase with climate change, putting hurricane damage mitigation actions as high priority. The overall hurricane Risk Index rating from the NRI is rated as "Very Low," 4.84) with around $4,926 in Expected Annual Loss Values for buildings within the three Westwood Census tracts. Despite this, hurricanes still pose a risk to Westwood because of climate change impacts. Westwood's low levels of Social Vulnerability and very high Community Resilience rating mean that Westwood is better able to withstand and recover from hurricane or other natural hazard events.[32]

1.1.6 Severe Storms (Thunderstorms and High Winds)

Thunderstorms are formed when the right atmospheric conditions combine to provide moisture, lift, and warm unstable air that can rise rapidly. Thunderstorms occur any time of the day and in all months of the year but are most common during summer afternoons and evenings and in conjunction with frontal boundaries. These events usually bring heavy rains (which can cause flash floods), strong winds, hail, lightning, and tornadoes.[33]

Thunderstorms can be dangerous and destructive for several reasons. Storms can form in less than 30 minutes, giving very little warning; they have the potential to produce lightning, hail, tornadoes, powerful straight-line winds, and heavy rains that produce flash flooding.[34] During a thunderstorm, severe downdrafts may cause microbursts, a rapid column of airflow with the force of tornado able to knock down mature tree that can create wind speeds over 150 MPH. In Massachusetts, thunderstorms generally occur with precipitation, but dry thunderstorm events can also produce the potential to start fires. Table 4.9 shows the levels of wind speed categorized by damage type in severe storm events.

Table 4.9 Wind Speed Estimates and Descriptions for Thunderstorms

Wind Speed Estimate	Description
25-31 MPH	Large branches in motion; whistling heard in telephone wires
32-38 MPH	Whole trees in motion; inconvenience felt walking against the wind
39-54 MPH	Twigs break off trees; wind generally impedes progress
55-72 MPH	Damage to chimneys and TV antennas; pushes over shallow rooted trees
73-112 MPH	Peels surfaces off roofs; windows broken; light mobile homes pushed or overturned; moving cars pushed off road
113-157 MPH	Roofs torn off houses; cars lifted off ground

Source: National Weather Service

Hail is formed in towering cumulonimbus clouds (thunderheads) when strong updrafts carry water droplets to a height at which they freeze. Eventually, these ice particles become too heavy to hold up and they fall to the ground at speeds of up to 120 MPH. Hail falls along paths called swaths, which can vary from a few square acres to up to 10 miles wide and 100 miles long. Hail larger than ¾ inch in diameter can do great damage to both property and crops, and some storms produce hail over two inches in diameter.

[32] NRI, FEMA, Census tract 25021412300
[33] National Oceanic and Atmospheric Administration, https://www.nssl.noaa.gov/education/svrwx101/thunderstorms/
[34] Massachusetts State Hazard Mitigation and Climate Adaptation Plan, 2018.

Hail causes about $1 billion in damages annually in the U.S.[35] High winds and damaging hail can take down trees, knock out power, and damage infrastructure. The size of hailstones is best determined by measuring their diameter with a ruler. Table 4.10 shows a list of recorded hail sizes and their reference object counterpart.

Table 4.10 Hail Size Chart and Description

Hail Size (in.)	Object Analogue Reported
0.5	Marble, moth ball
0.75	Penny
0.88	Nickel
1	Quarter
1.25	Half dollar
1.5	Walnut, ping pong
1.75	Golf ball
2	Hen egg
2.5	Tennis ball
2.75	Baseball
3	Teacup
4	Softball
4.5	Grapefruit

Source: NOAA Storm Prediction Center

There is no single standard for measuring the strength or magnitude of a lightning storm. Lightning events are often measured by the damage they produce. The charge and temperature of each bolt of lightning is different yet could be lethal or cause damage. June, July, and August are peak months for lightning activity in the United States. In 2021, Massachusetts had a total lightning count of 109,277 which includes cloud-to-ground strokes and cloud-only lightning events.[36]

1.1.6.1 Westwood Severe Storm History & Impact

Severe storm and thunderstorm conditions often occur in Westwood, causing damage like power outages due to downed trees or other wind damage, road blockages and some flooding. Severe winds will occur within or outside of thunderstorm events, which increases the overall frequency of these events in records. Table 4.11 relates the recorded severe storm events: thunderstorms, high winds, and severe storm conditions from the years since the previous HMP.

[35] NOAA National Severe Storms Laboratory, https://www.nssl.noaa.gov/education/svrwx101/hail/
[36] Vaisala 2021 Annual Lightning Report

Table 4.11 Westwood Historic Severe Storm Events, 2011-2022

Date	Type	Damage (Norfolk County-Wide)	Comments
2/18/2011	High Wind	N/A	Wind gusts of 58 MPH recorded in Milton.
8/19/2011	High Wind	$3,000	Thunderstorm produced large hail and damaging winds, causing downed trees.
1/13/2012	High Wind	$10,000	Cold and high damaging winds caused downed trees.
6/23/2012	Thunderstorm Winds	$15,000	Thunderstorm produced large hail and damaging winds, causing downed trees.
9/18/2012	High Wind	$10,000	High winds caused wires downed on Hillcrest Place in Westwood.
10/23/2014	High Wind	$100,000	In Westwood, trees and wires were downed across town, including one onto a house on Fairview St.
2/25/2016	Thunderstorm Winds	$7,000	Wires on Grove Street and a lamp post in Westwood were downed by thunderstorm winds.
5/15/2016	High Wind	$5,000	A tree on Glandore Rd. in Westwood was downed onto a car by strong winds.
12/15/2016	High Wind	$3,000	Wind brought wires down on University Ave. in Westwood.
3/2/2018	Severe Storm	$35,000	DR-4372-MA, A severe storm caused 2 deaths and 450,000 customers to be without power due to strong winds and heavy snow (also technically a Winter Storm)
9/6/2018	Thunderstorm Winds	$1,000	Strong thunderstorm wind brought a tree down on School St. in Westwood.
10/27/2018	High Wind	$5,000	High wind gusts brought a large tree was down on wires on Highview St.
1/12/2020	High Wind	$500	High winter winds brought a tree down on Hartford St in Westwood.
6/28/2020	Thunderstorm Winds	$1,000	In Westwood, a large tree was down on Oak St.
7/2/2020	Thunderstorm Winds	$500	In Westwood, a tree was down on High St. (Route 109) at Dover Rd.
8/23/2020	Thunderstorm Winds	$3,000	In Westwood, a large tree and wires were down on Hawktree Dr and Magaletta Dr. Multiple trees and wires were down on Strasser Ave and Fearing Dr.

Source: NOAA http://www.ncdc.noaa.gov/stormevents

Table 4.11 best showcases the patterns of impact from severe storms, specifically regarding downed trees and power lines because of wind events. Power outages have been reported to occur often at the Martha

Jones School affecting critical functions and across town. The outages emphasized the importance for backup generators and accessible shelter options at the high school.[37]

The 2012 extreme weather cause flooding at University Ave., where new development and stormwater practices have relieved the flooding issue somewhat. Though the June 2020 storm did not impact Westwood severely with the intense rainfall and wind, the neighboring Norwood Hospital experienced extreme damage and flooding. Norwood hospital services Westwood patients, so the impact spread across town lines.

1.1.6.2 Severe Storm Risk: Extent, Probability, and Vulnerability

The probability of future occurrences of severe storm or thunderstorm events impacting Westwood based on past event occurrences and the impact of climate change is **Highly Likely**: Will occur every 1-5 years. Climate change is expected to increase the frequency and severity of severe storms and warming global temperatures will make storm conditions more likely. The potential frequency for severe storm events occurring in Westwood is **High**: 100% probability within 1 year-5 years. Severe storm conditions including high winds occur frequently in Westwood, meaning protection against wind damage is key to mitigating severe storm damage.

The NRI rates the Annualized Frequency Values of strong winds at 0.7 per year, hail at 2.4 events per year, and lightning at an average of 17.1 across the three Census tracts. It is difficult to fully determine Westwood's vulnerability to severe storm events because of the wide variety of severe storm characteristics. The combined total Expected Annual Loss Values for buildings for lightning, strong wind, and hail events between all three tracts is $5,048.

The potential severity for severe storms is **Medium**: 50% of property could be damaged and injuries or loss of life are possible. The combined Risk Index rating for strong winds is "Very Low," 4.59, hail is "Very Low," 2.38, and lightning events is "Relatively Low," 15.4.[38]

1.1.7 Tornado

A tornado is a violent windstorm with a twisting, funnel-shaped cloud. Winds in most tornadoes are less than 100 MPH, but in the most violent, and least frequent tornadoes, wind speeds can exceed 250 MPH. Tornadoes typically track along the ground for a few miles or less and are less than 100 yards wide, though some can remain in contact with the earth for well over fifty miles and exceed one mile in width. They are often spawned by thunderstorms or hurricanes. Tornadoes are produced when cool air overrides a layer of warm air, forcing the warm air to rise rapidly. The damage from a tornado is a result of high wind velocity and wind-blown debris.

Tornadoes are ranked by severity on the Enhanced Fujita Scale (EF Scale) from F0, weak with light damage, to F5 violent with incredible damage. Each rating on the scale increases in wind speed and damage inflicted.[39] The speed of a tornado is difficult to safely calculate and isn't necessarily a reflection of the storm's strength. Severity is measured by the amount of damage inflicted on an area. The EF Scale, adapted from the National Weather Service's depiction, is shown in Table 4.12.

[37] MVP Community Resilience Program, Westwood, 2019.
[38] NRI, FEMA, 2022
[39] National Weather Service, The Enhanced Fujita Scale (EF Scale), https://www.weather.gov/oun/efscale

Table 4.12 Enhanced Fujita Scale with Descriptions

EF Rating	3 Second Gust (MPH)	Description
0	65-85	Light Damage. Some damage to chimneys; branches broken off trees, shallow-rooted trees uprooted, sign boards damaged.
1	86-110	Moderate damage. Roof surfaces peeled off; mobile homes pushed foundations or overturned; moving autos pushed off road.
2	111-135	Considerable damage. Roofs torn from frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light objects become projectiles.
3	136-165	Severe damage. Roofs and some walls torn from well-constructed houses; trains overturned; most trees in forested area uprooted; heavy cars lifted and thrown.
4	166-200	Devastating damage. Well- constructed houses leveled; structures with weak foundation blown some distance; cars thrown; large missiles generated.
5	Over 200	Incredible damage. Strong frame houses lifted off foundations, carried considerable distances, and disintegrated; auto-sized missiles airborne for several hundred feet or more; trees debarked.

Source: National Weather Service

Tornadoes may cause infrastructure damage, storm drainage issues, dangerous debris and loss of electricity depending on their strength.

1.1.7.1 Westwood Tornado History and Impacts, Extent and Probability

Westwood itself has no history of tornadoes occurring, though some have appeared in Norfolk and neighboring counties, which are listed below. Westwood DPW does have experience in cleaning up after tornado events due to their assistance in a mutual aid project on Cape Cod in 2019 after an EF1 tornado caused damage there.[40]

[40] Amelia Tarallo, Hometown Weekly Staff, 2019.

Table 4.13 Westwood Historic Tornado Events, 2011-2022

Date	Type	Damage (Norfolk County-Wide)	Comments
6/1/2011	Tornado	N/A	DR-1994-MA, A supercell in western MA eventually produced an EF3 tornado that caused $227 million of damage to Hampden and Worcester counties.
5/9/2013	Tornado	N/A	F0 tornado recorded in Stoughton
6/23/2015	Tornado	N/A	F0 tornado recorded in Wrentham
10/7/2020	Tornado	N/A	F0 tornado recorded in Millis

Source: NOAA http://www.ncdc.noaa.gov/stormevents

1.1.7.2 TORNADO: PROBABILITY AND VULNERABILITY

The probability of future occurrences of tornado events impacting Westwood based on past event occurrences and the impact of climate change is **Not Very Likely:** Will occur every 10-50 years. Tornadoes have appeared more frequently in neighboring counties to Westwood but are not likely to occur in Town. If a tornado were to occur in Westwood, the terrain and climate would make the chance of a high-ranked tornado smaller. The potential frequency for tornado events occurring in Westwood is **Low:** 1%- 10% probability within 100 years.

Because of the unlikeliness of a tornado occurrence and possibility for a severe tornado to wreak havoc on a town not used to tornado events, the potential severity for tornadoes is **High**: Major town wide property damage, injuries, and loss of life. Though DPW may be experienced in tornado clean-up, tornado preparation is considered less often because of the low likelihood of occurrence.

Despite having an Annualized Frequency Value of 0 for all three of Westwood's Census tracts, tornadoes have a Relatively Moderate rating for Expected Annual Loss at $28,633 for building loss alone. The combined total building and population equivalence loss if a tornado event were to occur is $92,913.[41] Low historic occurrences and losses and the unlikelihood for extreme tornado events to occur is the only thing keeping Westwood's risk of damage low, but Westwood is vulnerable to tornado events because of the unexpected nature of a tornado event occurring. The overall Risk Index rating for tornadoes in Westwood is "Relatively Low," 19.17.

WINTER-RELATED HAZARDS

1.1.8 NOR'EASTER

An extra-tropical coastal storm, known as a nor'easter, is typically a large, counterclockwise wind circulation around a low-pressure center that forms along the east coast of the United States. The storm radius is often as large as 1,000 miles, traveling up the coast at speeds of around 25 MPH. Sustained wind speeds of 20-40 MPH are common during a nor'easter, with short term wind speeds gusting up to 70 MPH. Unlike hurricanes and tropical storms, nor'easters can sit offshore and wreak damage for days, making

[41] NRI, FEMA 2022

them some of the most damaging winter-related hazard events. They often involve heavy snow, rain, and oversized waves.

Though not as strong as hurricanes, nor'easters are known to cause more damage in Massachusetts simply because of yearly frequency. They often occur one to two times per year.[42] Most of the damages from these storms are from the heavy snow loads and heavy winds they produce. These dangerous circumstances can cause downed trees that cause power outages, blocked roadways, and flooding with the pairing of potential heavy rainfall.

Nor'easter conditions can be particularly dangerous and isolating for populations over 65 or those with mobility differences because the impacts can block access to medical care or emergency services. Increases in the frequency and intensity of nor'easters due to climate change will further affect vulnerable populations.

1.1.8.1 Westwood Nor'easter History and Impact

Below is a list of past damaging Nor'easters that have had an impact on Westwood or Norfolk County. There are more Nor'easters than appear on this list, some of them are tracked as winter storms, which will be discussed in the next section.

Table 4.14 Westwood Historic Nor'easter Events, 2011-2022

Date	Type	Damage (Norfolk County-Wide)	Comments
1/12/2011	Nor'easter	N/A	14-20 inches of snow fell across eastern Norfolk County. Heavy snow and wind caused nearly 100,000 to be without power.
10/30/2011	Nor'easter	$20,000	October Nor'easter dropped heavy snow on the county, causing downed trees and wires.
3/2/2018	Severe Storm	$35,000	DR-4372-MA, A severe storm caused 2 deaths and 450,000 customers to be without power due to strong winds and heavy snow (also recorded in High winds).
3/13/2018	Winter Storm	$47,000	DR-4379-MA, 15-24 inches of snow recorded in the county, trees and wires were down on Webster St and Tamarack Rd.
11/15/2018	Nor'easter	N/A	An early-season nor'easter dropped 8-10 inches of heavy snow on the county.

Source: NOAA http://www.ncdc.noaa.gov/stormevents

Similar to most forms of severe storms in Westwood, Nor'easter's main impacts are downed trees and wires due to heavy winds and the added condition of heavy snow loads. Heavy snow loads can be dangerous to roofs and roads. The March 2018 nor'easter events effected much of the state of

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

Massachusetts with heavy snow and high winds causing widespread power outages as three consecutive nor'easter and winter storm events hit the state.

1.1.8.2 Nor'easter Risk: Extent, Probability, and Vulnerability

The probability of future occurrences of nor'easter events impacting Westwood based on past event occurrences and the impact of climate change is **Highly Likely**: Will occur every 1-5 years. Coastal towns are more susceptible to nor'easters, but due to the increase in severe storm conditions and frequency, Westwood will only become more at risk of nor'easters causing damage in town. The potential frequency for nor'easters occurring in Westwood is **High**: 100% probability within 1 year-5 years. These types of storms already occur frequently, and climate change will exacerbate that frequency.

The potential severity for Nor'easters is **Medium**: 50 % of property could be damaged and possible injuries or loss of life. Heavy snow, high winds, or extreme precipitation events are common of the different natural hazards that impact Westwood, so often the town is more prepared for the damage that these events can cause. Still, downed trees, collapsed roofs, and power outages occur during and after these events and can be dangerous for people and infrastructure.

Like Severe Storms, the variable nature of Nor'easter events makes them hard to associate with a specific NRI risk type. Measures like high winds and flooding have been recorded in the Flooding and Severe Storm profiles previously, and the NRI ratings for Ice Storms will be recorded under the Winter Storm profile following this one.

1.1.9 Winter Storms

Winter storms are categorized by heavy amounts of snow, ice, and extreme cold, all of which may occur independently or at the same time. Winter storms vary in size and strength and can be accompanied by strong winds that create blizzard conditions and dangerous wind chill. There are three categories of winter storms:

- A blizzard is the most dangerous of the winter storms; it consists of low temperatures, heavy snowfall, and winds of at least 35 miles per hour.
- Snow squalls are brief, intense snow showers accompanied by strong, gusty winds where accumulation may be significant.[43]
- Ice storms occur when moisture falls and freezes immediately upon impact.

Ice storms result from the accumulation of freezing rain, which is rain that becomes super-cooled and freezes upon impact with cold surfaces.[44] The Sperry–Piltz Ice Accumulation (SPIA) Index is a scale for rating ice storm intensity, based on the expected storm size, ice accumulation, and damages on structures, especially exposed overhead utility systems.[45] The SPIA Index uses forecast information to rate an upcoming ice storm's impact from zero (little impact) to five (catastrophic damage to exposed utility systems) measured by radial ice accumulation, wind speeds, and temperatures during the storm event. Because the SPIA Index includes measures for wind speeds and temperature in its rating system, damages from the Index can be applied to other winter storm events that accumulate ice and include high winds.

[43] NOAA National Severe Storms Laboratory, https://www.nssl.noaa.gov/education/svrwx101/winter/types/
[44] NOAA National Severe Storms Laboratory, https://www.nssl.noaa.gov/education/svrwx101/winter/types/
[45] Source: SPIA Index, https://www.spia-index.com/

Table 4.15 Sperry-Piltz Ice Accumulation (SPIA) Index

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

Source: SPIA® Index

1.1.9.1 WESTWOOD WINTER STORM HISTORY & IMPACT

Winter storms are often categorized by their characteristics similarly to nor'easters. Below is a list of recorded winter storms that have impacted Norfolk County.

Table 4.16 Westwood Historic Winter Storm Events, 2011-2022

Date	Type	Damage (Norfolk County-Wide)	Comments
2/8/2013	Winter Storm	$8,000	DR-4110-MA, Blizzard conditions observed to cause 22-26 inches of snow to fall across Norfolk County.
1/26/2015	Winter Storm	N/A	DR-4214-MA, Blizzard conditions observed to cause 16-31 inches of snow to fall across Norfolk County.
2/5/2016	Winter Storm	$100,000	Heavy snow on a low-pressure front caused two fatalities and left 107,000 households without power in Eastern MA.
3/14/2017	Winter Storm	N/A	9.8 inches of snow recorded in Westwood; thunder snow also occurred in this event.
12/23/2017	Winter Storm, Ice	$10,000	Snow and freezing rain brought icy roads and downed trees and wires.
3/2/2018	Severe Storm	$35,000	DR-4372-MA, A severe storm caused 2 deaths and 450,000 customers to be without power due to strong winds and heavy snow (also recorded in High winds)
3/13/2018	Winter Storm	$47,000	DR-4379-MA, 15-24 inches of snow recorded in the county, trees and wires were down on Webster St. and Tamarack Rd.
10/30/2020	Winter Storm	$1,000	5.2 inches of snow recorded in Westwood, power line damage.
2/1/2021	Winter Storm	$5,000	Around 8-10 inches of snow recorded in the region, trees and wires downed due to snow and high winds.

Source: NOAA http://www.ncdc.noaa.gov/stormevents

Most winter storm events with heavy snow caused school closings and dangerous road conditions – as well as widespread power outages due to heavy snow and high winds toppling trees and power lines. Blizzard Juno, recorded by FEMA as DR-4214 in January of 2015 was the beginning of a series of high snowfall events for Norfolk County. So much snow was left after these events that the Town successfully applied for and received disaster relief funding for clearing. Before receiving the money, the Town told the Massachusetts Department of Environmental Protection (MassDEP) that they may need to begin dumping remaining snow into a local cemetery, near a wetland buffer zone. MassDEP generally does not allow snow dumping in or near designated wetlands because of possible contamination from road salts or debris, but the sheer amount of snowfall from 2015 caused municipalities to push snow clearing locations to their limits.[46]

[46] Betancourt, Sarah. What to do with all that snow? Boston cleanup a brutal chore and it's not over https://www.theguardian.com/us-news/2015/mar/01/snow-boston-cleanup-storm-juno

Another winter weather event series of March 2018, also categorized as nor'easters, brought heavy snow that provided enough work for Westwood to apply for several disaster assistance grants from FEMA to reimburse for snow clearing after the events.

1.1.9.2 Winter Storm Risk: Extent, Probability, and Vulnerability

The probability of future occurrences of winter storm events impacting Westwood based on past event occurrences and the impact of climate change is **Highly Likely**: Will occur every 1-5 years. Even as winters are globally becoming warmer, blizzard and severe storm conditions are increasing due to climate change. The potential frequency for winter weather events occurring in Westwood is **High**: 100% probability within 1 year-5 years. These types of storms already occur frequently, and climate change will exacerbate that frequency and severity, putting more focus on higher damage preparations.

The potential severity for winter storms is **High:** Major town wide property damage, injuries, and loss of life. The combined impacts of winter storm events come from high winds, heavy snow, icy conditions, and possible extremely cold temperatures. For Westwood, this means power outages, blocked roads and damaged infrastructure as well as potential loss of human life from a multitude of secondary impacts like vehicular accidents or hypothermia. Despite being frequent events in Massachusetts, winter storms are still very dangerous to people and infrastructure.

Ice Storms have the highest Risk Index rating for all natural hazard events recorded by the NRI in the three Westwood Census tracts "Relatively Moderate," at an average of 19.23. Similar to Nor'easters and extreme temperature events, the most vulnerable populations in Winter Storm events are residents over 65 and those with limited mobility, including children. Power outages and the other potential impact of Winter Storms can isolate populations in need along with causing damage to buildings and other infrastructure. At an Annualized Frequency of 2.3 events per year, the Expected Annual Loss Value for buildings from Ice Storms for all three Census tracts in Westwood is $36,452.[47]

Fire-Related Hazards

1.1.10 Brushfire

A fire that burns through vegetation that is predominantly shrubs, brush, and scrub growth is known as a brushfire. Favorable fire conditions arise from extended periods of hot, dry weather and accumulated vegetation. While wildfires are generally associated with thousands of acres of trees burning, brushfires tend to be smaller, confined to the understory, and manageable. Both wildfires and brushfire spread faster in hot, dry conditions where fuels like shrubs, trees, and dry grasses are available.

Brushfires can be caused by human interference (i.e., campfires or auto accidents) or by various natural (i.e., lightning) actions. The wildfire season in MA lasts from March to June, with April being the month that fires are most likely to occur. Factors like yearly snowpack, droughts, and weather conditions like wind can all impact the start, strength, and spread of brushfires in the area. Yearly snowpack is expected to decrease because of climate change, meaning that there will be fewer water sources resulting from snow melt and drier spring and summer groundwater conditions – causing more ample opportunity for the spread of brushfires on dried vegetation and ground.

[47] NRI, FEMA, 2022

1.1.10.1 Westwood Brushfire History

The one recorded instance of brushfire near Westwood occurred in 2012, shown below. With increased drought events making drier fuels more prevalent, the frequency of brushfire possibilities in Westwood could increase due to climate change.

Table 4.17 Westwood Historic Brushfire Events, 2011-2022

Date	Type	Damage (Norfolk County-Wide)	Comments
4/20/2012	Brushfire	N/A	Around 100 acres of meadow land burned on the Dedham-Boston line due to dry grasses.

Source: NOAA http://www.ncdc.noaa.gov/stormevents

1.1.10.2 Brushfire Extent, Probability, and Vulnerability

The probability of future occurrence of brushfires in Westwood is **Not Very Likely**: Will occur every 10-50 years. The potential frequency for brushfire events occurring in Westwood may currently be low, but is only growing due to the impacts of climate change. Frequency is rated at **Low**: 1%- 10% probability within 100 years. Since brushfires are expected to be more possible, the next plan may rate this hazard event at a higher rating.

The potential severity for a brushfire event is **Medium:** 50% of property could be damaged and possible injuries or loss of life. Only 25% of Westwood is considered open space. Developed land is less susceptible to the spread of brushfires, but areas on the wildland-urban interface are at risk to damage.

The NRI Risk Index Rating for brushfires is Very Low, at an average of 1.6 for the three Westwood Census tracts. The low history of damage is what keeps this Risk rating so low, but the possible Exposure Value in Westwood at risk of damage in a wildfire event is $32,439,622 of the building stock.

Geologic Hazards

1.1.11 Earthquake

An earthquake is the result of a sudden release of energy in the Earth's crust that creates seismic waves. The felt motion is the result of several kinds of seismic vibrations. The primary, secondary, and surface waves cause different vibrations that may impact structure. Primary waves are the first waves to cause the vibrations of a building and secondary waves can cause structures to vibrate from side to side. Surface waves arrive last and may cause low-frequency vibrations and are more likely to cause tall buildings to vibrate. Surface waves decline less rapidly than body waves, so as the distance from the fault increases, tall buildings located at farther distances from the epicenter can still be damaged. Damaging earthquakes can cause soil liquification, ground displacement, flooding, and increase fire risks.[48]

Earthquakes are measured on the Mercalli scale, shown on Table 4.18 in a modified version that's commonly used in news stories and public communication.

[48] Michigan Technological University, Geological and Mining Engineering and Sciences: Earthquakes.

Table 4.18 Modified Mercalli Scale

Earthquake Magnitude Scale

Magnitude	Earthquake Effects	Estimated Number Each Year
2.5 or less	Usually not felt, but can be recorded by seismograph.	Millions
2.5 to 5.4	Often felt, but only causes minor damage.	500,000
5.5 to 6.0	Slight damage to buildings and other structures.	350
6.1 to 6.9	May cause a lot of damage in very populated areas.	100
7.0 to 7.9	Major earthquake. Serious damage.	10-15
8.0 or greater	Great earthquake. Can totally destroy communities near the epicenter.	One every year or two

Source: Michigan Technological University

Damaging earthquakes are not common occurrences in Westwood, though they do have the potential to occur. Westwood may experience several earthquakes throughout the year that are low on the Mercalli Scale and cause minimal to no damage.

1.1.11.1 Earthquake Extent, Probability, and Vulnerability

Major earthquakes' probability of future occurrence in Westwood are **Not Very Likely:** Will occur every 10-50 years. While minor earthquake events may occur more often, they rarely cause damage, to this ranking is based on the possibility of more damaging events. The potential frequency for major earthquake events occurring in Westwood is **Low:** 1%- 10% probability within 100 years.

The potential severity for a major earthquake event is **Medium:** 50 % of property could be damaged and possible injuries or loss of life. All buildings in Westwood are held to the MA State standards for structural design that are based on the 2015 International Building Code from the International Code Council (ICC). The standards use an equation to determine the seismic loads for foundation and retaining walls that must be examined by a design professional for approval.[49] While new buildings uphold international standard, the buildings most at risk during an earthquake are historic structures. Earthquakes could also cause severe damage to dams and other infrastructure.

The Risk Index rating for earthquakes is "Relatively Low," at 8.58 on average for the three Westwood Census tracts). The Expected Annual Loss Value for buildings is $52,686 if an earthquake event were to occur in Westwood, meaning though unlikely, there is still a risk of damage to the town.[50]

Other Hazards

1.1.12 Extreme Temperatures

The State HMP states that an average of two extreme heat and 1.5 extreme cold weather events per year have occurred in the last two decades, and the number of these events is only expected to rise as climate change impacts global temperatures and weather patterns.[51] Extreme cold or heat are dangerous to human life, livestock, crops, and infrastructure. Heat stroke, hypothermia, freezing and bursting pipes, and utility failure are some of the common impacts of extreme temperatures.

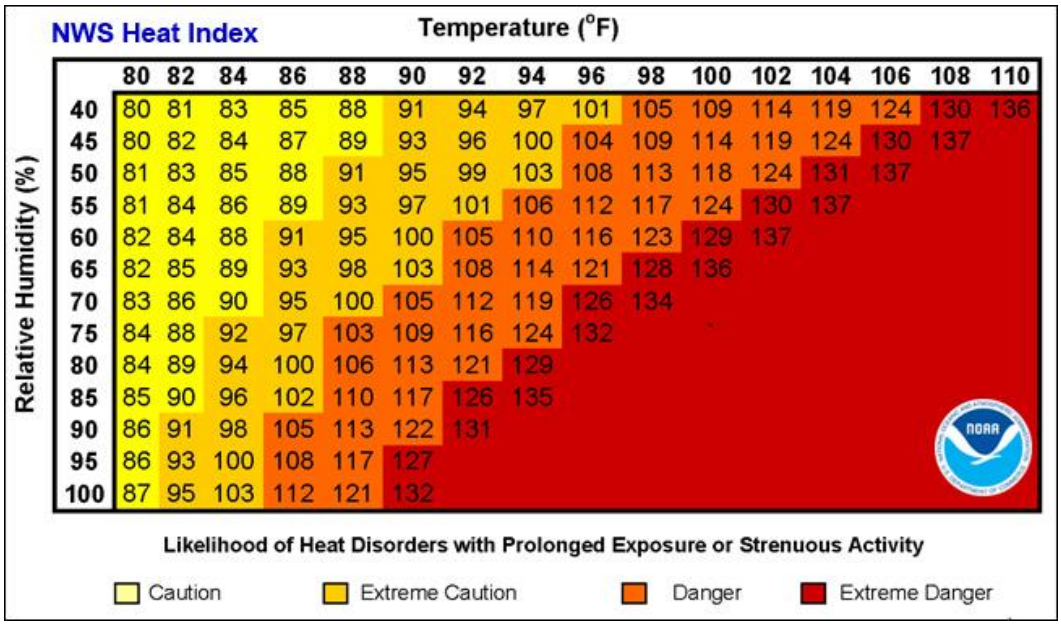
[49] 780 CMR: Massachusetts Amendments to the International Building Code 2015
[50] NRI, FEMA, 2022
[51] Massachusetts State Hazard Mitigation and Climate Adaptation Plan, 2018.

The risk of extreme heat is increasing due to climate change. A heat wave is defined as 3 or more days of temperatures of 90° Fahrenheit or above. By the end of the century the number of days in Massachusetts's summers above 90° Fahrenheit could increase to 13-56 days per summer. Like the measurements for extreme cold, extreme heat is rated on a scale that includes more than just temperature. The measurement instead also includes relative humidity to rate the physical feeling of heat for humans. The scale is also based on low-wind and shady conditions since conditions with full sun can increase overall temperatures.[52] The measure of extreme heat also depends on levels of development; areas with more asphalt and less greenery or fewer trees can also be measured at much hotter temperatures. Extreme heat can cause heat stroke or other heat-related illnesses and occur alongside or exacerbate drought and brushfire conditions.

Extreme cold is regionally defined. In Massachusetts, it involves temperatures below 0° Fahrenheit.[53] Extreme cold is measured through the wind chill index. The index attempts to quantify the cooling effect of wind with the actual outside air temperature to determine a wind chill temperature, which is often colder than the base temperature. The wind chill temperature represents how cold it feels to humans and animals, based on the rate of heat loss from exposed skin. Extreme cold conditions may occur during, after, or without any connection to a winter storm. Dangerous or icy road conditions, power outages, and chances of hypothermia are a real threat to Massachusetts citizens, especially vulnerable populations like people over 65 or children.

The two figures below show the National Weather Service's indices for windchill and extreme heat – both are coded to give a sense of what temperatures are extremely dangerous to exist in based off temperature and humidity for the Heat Index and temperature and wind speed for the Windchill Chart.

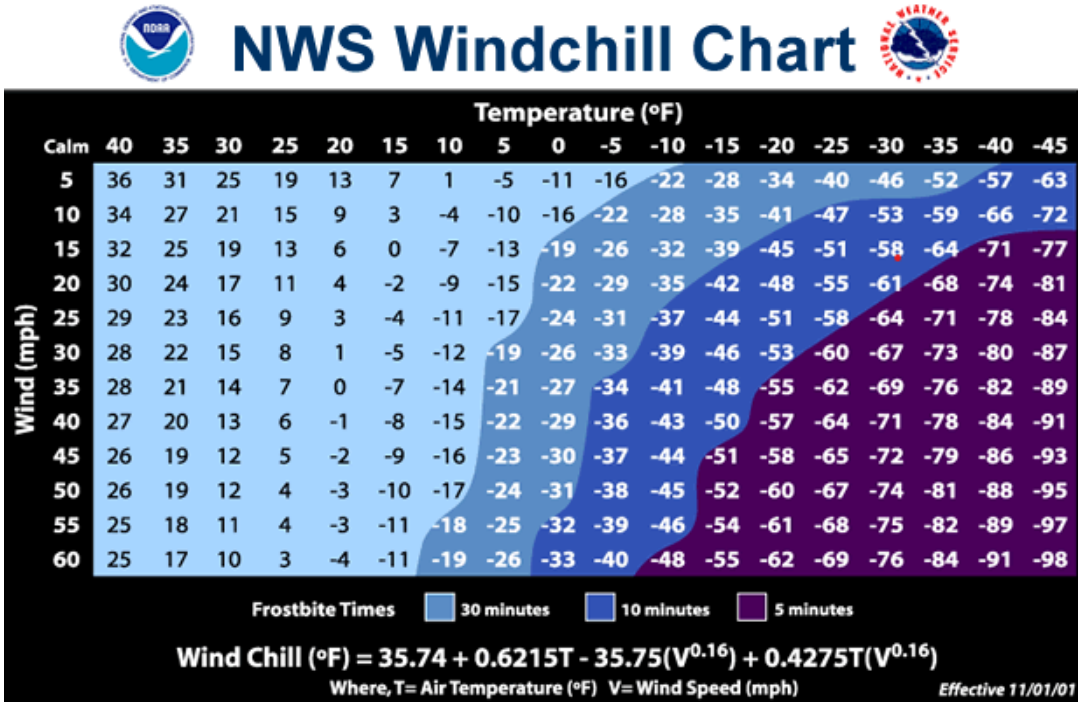
Figure 4.3 Heat Index Chart



Source: NOAA National Weather Service

[52] Ibid.
[53] Ibid.

Figure 4.4 Windchill Chart



Source: NOAA National Weather Service

1.1.12.1 Westwood Extreme Temperatures History and Impact

Though no damage is recorded for any of the events listed in Table 4.19 below for Westwood or Norfolk County, these extreme temperature events still cause extremely dangerous conditions. Extreme cold often occurs alongside other extreme winter weather events like blizzard conditions – which cause much of the damage associated with extreme cold events.

Table 4.19 Westwood Historic Brushfire Events, 2011-2022

Date	Type	Damage (Norfolk County-Wide)	Comments
7/22/2011	Extreme Heat	N/A	The Automated Surface Observing System at Norwood Memorial Airport (KOWD) recorded heat indexes of 105 to 107.
2/16/2015	Extreme Cold/Wind Chill	N/A	KOWD recorded wind chills as low as 29 below zero.
2/16/2015	Extreme Cold/Wind Chill	N/A	KOWD recorded wind chills as low as 29 below zero.
2/13/2016	Extreme Cold/Wind Chill	N/A	Wind chills as low as 40 below zero were reported atop Blue Hill in Milton.

Date	Type	Damage (Norfolk County-Wide)	Comments
2/14/2016	Extreme Cold/Wind Chill	N/A	Wind chills as low as 32 below zero were reported in Norwood.
7/1/2018	Extreme Heat	N/A	KOWD observed a heat index of 107.
7/3/2018	Extreme Heat	N/A	KOWD reported a Heat Index of 108.
8/28/2018	Extreme Heat	N/A	KOWD reported heat index values in the mid-100s.

Source : NOAA http ://www.ncdc.noaa.gov/stormevents

Despite the lack of damage, extreme temperature events are still dangers, especially to populations like those above the age of 65 or people who live more rurally, because of impacts like heat stroke and hypothermia. Extreme heat can cause more significant damage in urban areas because of landscape design that absorbs and reflects more heat, so areas of higher development are more of a risk to people.

1.1.12.2 Extreme Temperatures Risk: Extent, Probability, and Vulnerability

The probability of future occurrences of extreme temperature events impacting Westwood based on past event occurrences and the impact of climate change is **Highly Likely**: Will occur every 1-5 years. The potential frequency for extreme temperature events occurring in Westwood is **High**: 100% probability within 1 year-5 years. This ranking is specifically for extreme heat events, which are expected to become more common as global temperatures rise, while extreme cold events are expected to decrease in number even though winter storm severity is predicted to worsen.

The potential severity for extreme temperature is **Medium**: 50 % of property could be damaged and possible injuries or loss of life. Though infrastructural damage may be less common, the highest risk for extreme temperature events Is the potential for loss of life.

The NRI tracks risk for both Cold Waves and Heat Waves. The Annualized Frequency Values for Cold Waves is 0.2 events per year and Heat Waves is 0.6 events per year, with extreme heat events becoming more common.[54] Despite both having "Relatively Low" Risk Index ratings (3.87 for cold wave and 6.73 for heat wave), Extreme Cold and Heat are both dangerous natural hazard events for vulnerable populations, especially when they coincide with other hazard events like winter storms or droughts.

1.1.13 Invasive Species

The Massachusetts Invasive Plant Advisory Group (MIPAG) defines invasive species as "non-native species that have spread into native or minimally managed plant systems in Massachusetts, causing economic or environmental harm by developing self-sustaining populations and becoming dominant and/or disruptive to those systems."[55] These invasive species can come in the form of plants, insects, disease, or other wildlife, and often harm or even overtake the species that are natural to the area.

MIPAG defines invasive species for Massachusetts as "invasive," "likely invasive," and "potentially invasive" through meeting a number of criteria. "Invasive" plants are non-native species that cause

[54] NRI, FEMA, 2022
[55] MIPAG, https://www.massnrc.org/mipag/

economic or environmental harm, "likely invasive" are those that do not fully meet the "invasive" qualities of harm, and "potentially invasive" species are non-native and not yet naturalized in the state but have the potential to become more invasive. To come to a complete definition the criterion must be met in specific groupings and order. The criteria are:

1. Be nonindigenous to Massachusetts.
2. Have the biologic potential for rapid and widespread dispersion and establishment in minimally managed habitats.
3. Have the biologic potential for dispersing over spatial gaps away from site of introduction.
4. Have the biologic potential for existing in high numbers away from intensively managed artificial habitats.
5. Be naturalized in Massachusetts (persists without cultivation in Massachusetts).
6. Be widespread in Massachusetts, or at least common in a region or habitat type(s) in the state.
7. Have many occurrences of numerous individuals in Massachusetts that have high numbers of individuals forming dense stands in minimally managed habitats.
8. Be able to out-compete other species in the same natural plant community.
9. Have the potential for rapid growth, high seed or propagule production and dissemination, and establishment in natural plant communities.
10. Have at least one occurrence in Massachusetts that has high numbers of individuals forming dense stands in minimally managed habitats.
11. Have the potential, based on its biology and its colonization history in the northeast or elsewhere, to become invasive in Massachusetts.
12. Be acknowledged to be invasive in nearby states but its status in Massachusetts is unknown or unclear. This may result from lack of field experience with the species or from difficulty in species determination or taxonomy.
13. The species, if it becomes naturalized in Massachusetts, based on its biology and biological potential, would pose an imminent threat to the biodiversity of Massachusetts **and**
14. Its naturalization in Massachusetts is anticipated, **and**
15. The species has a documented history of invasiveness in other areas of the Northeast.[56]

1.1.13.1 Westwood Invasive Species Impacts and Extent

Several invasive species are recorded in Westwood from Conservation Commission reports, national invasive species trackers, and notices of intent to clear invasives from sites. These species include oriental bittersweet (*Celastrus orbiculatus Thunb.*), European buckthorn (*Rhamnus cathartica L.*), European water chestnuts (*Trapa natans L.*), purple loosestrife (*Lythrum salicaria*), and Eurasian watermilfoil (*Myriophyllum spicatum L.*).

In 2017 a Solitude Biologist noted watermilfoil on Willett Pond that was intensifying the algae blooms there and impacting the growth of native species in the area. This report prompted work to begin an application for clearing and managing the "invasive" and "potentially invasive" species around the pond in a multi-year system using herbicides and other chemicals. The Notice of Intent for this project noted that dredging, hydroraking, and other solutions to clear invasive species were not recommended due to the sensitivity of the pond's shoreline and impacts on the other flora and fauna in the habitat.[57]

[56] "The Evaluation of Non-Native Plant Species for Invasiveness in Massachusetts" Massachusetts Invasive Plant Advisory Group, February 28, 2005
[57] Notice of Intent Application Willett Pond Aquatic Management Program, Solitude Lake Management, 2018

The Conservation Commission reviews new landscaping projects to ensure only native species are used, and often discusses smaller invasive species removal projects for DPW to complete Islington Village, the Town's ponds, and any new developments are the frequently discussed areas for maintenance and prevention of invasive species. The Town's Open Space and Recreation Plan discourages the use of invasive vegetation for property owners and sets a goal to create policies regarding invasive species and pest control.[58]

1.1.13.2 Westwood Invasive Species Probability and Vulnerability

The probability of future occurrences of invasive species impacting Westwood based on past growth and the impact of climate change is **Likely**: Will occur every 5-10 years. Warming temperatures due to climate change may weaken native species and give way to the opportunity for invasive warmer-climate species. The potential frequency for invasive species to appear or spread in Westwood is **Medium**: 10%-100% probability within 10 years.

The potential severity for invasive species encroachment is **Low**: Some local property damage not town wide, minor injuries or loss of life. The largest impact that invasive species have is on the health of the natural habitat of the area – which could have secondary effects on crops and water supply over time, raising the severity to medium or even high depending on how long an invasive species goes unchecked.

5. Existing Capabilities and Mitigation Measures

Purpose

The purpose of this section to identify the relevant assets, policies, and tools that Westwood has at its disposal to address any needs related to hazard mitigation, and to identify any gaps and areas for improvement. This review of existing capabilities includes an analysis of any mitigation actions identified in previous versions of Westwood's HMP and is an important step in in developing an updated strategy for the town to pursue during the next planning cycle. This section will discuss Westwood's participation in local, state, and federal programs, identify town facilities and assets, and outline the policies, codes, and regulations in place to mitigate the natural hazards of concern described in the Natural Hazards Section.

Local Administrative and Technical Capabilities

Many mitigation capabilities that exist currently in Westwood are instituted by local departments, boards, and divisions of local government. This section summarizes those departments, and discusses the locally guided plans, policies, and regulations that support hazard mitigation in Westwood.

1.1.14 Community and Economic Department

The Community and Economic Department includes a variety of Westwood's natural hazard mitigation implementing bodies. This department focuses on town community and economic planning policies and programs, and its sub-divisions and committees are comprised of local professionals and residents who contribute to local planning efforts.

1.1.14.1 Planning Division & Board

The Planning Division resides within the Community and Economic Department's umbrella, with the goal to predict, plan, and implement land use for the town. The Planning Division notes its duties as

[58] Open Space and Recreation Plan, Westwood. 2019.

comprehensive planning, implementing the Subdivision Control and Zoning Bylaw, and conducting Zoning Map review.[59] This division helped form the committees and adopt the documents created by the 2020 Comprehensive Plan Steering Committee and the Open Space & Recreation Plan Steering Committee. It also manages the town's EIDR process, Stormwater Management Regulations process, and the Subdivision Rules and Regulations process.

The Westwood Comprehensive Plan 2020, an update of the previous 2000 Comprehensive Plan, was completed through a process led by a Comprehensive Plan Steering Committee and ultimately adopted by the Planning Board. The Steering Committee was appointed by the Westwood Board of Selectmen after recommendations from the Planning Board. The Comprehensive Plan goals from the Natural and Cultural Resources, Open Space and Recreation, and Sustainability and Resiliency sections are particularly relevant to the HMP. More specifically, the Comprehensive Plan sets goals to upgrade several school facilities, upgrade fire and emergency facilities, repurpose municipally owned property for energy and the community, and prioritize compact and multi-use design. It also calls for the development of a street tree replacement program and more programs to incorporate environmentally conscious building practices, local cooperation with departments, schools, and municipalities on climate education and habitat conservation, work with Dedham-Westwood Water District to protect supply and quality of groundwater, protection of cultural and environmental resources by not developing in sensitive areas, requiring stormwater improvements, open space preservation, and low impact design. Finally, the Comprehensive Plan reviews and evaluates best practices for these actions, assigning departmental roles and timelines for task completion.[60]

The Open Space and Recreation Plan (OSRP) was completed almost concurrently with the 2020 Comprehensive Plan. It was approved in 2019 and revised through 2020 by the Open Space and Recreation Planning Committee. Alongside maps, inventories, and analysis on open space parcels and protected land in Westwood, the OSRP set goals to improve local management of open space areas, increase access to the areas, protect conservation lands, and improve recreational access and programming.

The Planning Division reviews special permits and Environmental Impact & Design Reviews (EIDR) as outlined in the *Westwood Zoning Bylaws.* The Board also examines amendment recommendations and hosts the public hearings for proposed changes to the bylaws before advising actions to the Select board. The bylaws include several requirements that address flood hazard mitigation and some zoning provisions also relate to other hazards. The zoning bylaw includes provisions for Flood Hazard Areas, Ground Water Protection Districts, Site Plan Requirements, and Open Space Requirements. Though more of a response than a mitigation capability, the Zoning Bylaw also contains Special Provisions for Reconstruction after a disaster. In addition, the town has a Wetlands Protection regulation, Subdivision Rules and Regulations, and EIDR Rules and Regulations.

1.1.14.2 Conservation & Stormwater Management Division

The Westwood Conservation and Stormwater Management Division is responsible for implementing the Massachusetts Wetlands Act (which regulates local management of stormwater) and Westwood Wetlands Bylaws, as well as acquiring, maintaining, and more broadly protecting natural resources in Westwood. It contains the Conservation Commission, which serves to conserve natural resources and wetlands and serves as Westwood's Stormwater Management Authority. Westwood's wetlands regulations currently rely on rainfall data from 1961 to size stormwater infrastructure. **The 10-year 24-**

[59] Town of Westwood Planning Division Website, https://www.townhall.westwood.ma.us/departments/community-economic-development/planning-division
[60] Westwood Comprehensive Plan, 2020.

hour rainstorm has increased by nearly 20% since 1961. MA DEP is currently considering updating rainfall rates under the Massachusetts Wetlands Act but has not yet done so. Many other MA communities have already updated their Wetlands Bylaws to require stormwater calculations based on rainfall data from the Northeast Regional Climate Center (Cornell) or from NOAA Atlas 14, which better account for the increases in precipitation our region is experiencing due to climate change.

The town also maintains both a Stormwater Management Bylaw and a Stormwater Management Plan.

The Stormwater Management Bylaw was adopted in May 2015 and regulations were revised in June 2021. The Bylaw and regulations are used to protect public health and safety and to avoid contamination, flooding, and construction site runoff in the stormwater system in accordance with state and federal regulations. The WHMC noted that these regulations have been effective, and any stormwater issues have been minor, mostly developing from problems developing during construction. The Conservation Commission follows the review process detailed in the regulations and acts as the Stormwater Authority for Westwood. The Conservation Commission and town Conservation Agent review even the smallest applications before they are approved, which makes a difference in the effectiveness of the Bylaw and regulations. An Administrative Land Disturbance Review requirement for smaller disturbances (between 5,000 square feet and one-half acre) started around 2016 to differ from the regular Land Disturbance Permit (one-half acre or more). All permits and applications moved to an online system for applications for review in 2018.[61] The 2021 updates to the bylaw required NOAA Atlas 14 rainfall data and compliance with MS4 requirements to better account for climate change.

The Stormwater Management Program (SWMP) was adopted in 2019 through the National Pollutant Discharge Elimination System (NPDES) Phase II Small MS4 General Permit. This plan has four parts: the Stormwater Management Plan, the Illicit Discharge Detection and Elimination (IDDE), Good Housekeeping and Pollution Prevention, and Annual Reporting. The introduction to the plan describes the town's resources (cultural, historic, and natural), stormwater regulations, and implementation control measures. The following sections describe the towns actions to eliminate non-stormwater discharge and prevent pollutant runoff from town operations. The Annual Reports task the town with maintaining an annual review of the stormwater system environment and status.[62] Maintenance actions needed in the plan are designated to multiple town officials across departments, including Public Works and the Planning, Conservation and Building Divisions.

1.1.14.3 ZONING DIVISION

The Zoning Division reviews and holds hearings regarding any permits in need of approval of proposed developments or zoning changes. The thorough process of applications and application review ensures the town can better protect its natural resources from negative impacts of new development. The hearing process for zoning appeals and special permits has time constraints under Massachusetts General Laws and is guided by the Westwood Zoning Bylaw and Official Zoning Map.

The Westwood Flood Area Overlay District (FAOD), part of the Zoning Bylaw, currently references Norfolk County Flood Insurance Rate Maps from 2012. Preliminary maps were updated by FEMA in 2020. The Westwood FAOD will need to be updated in the near term to meet requirements of MA floodplain management standard, and to adopt new maps once preliminary maps and Flood Insurance Study (FIS) are adopted as "Effective."

[61] Town of Westwood Stormwater Management Bylaw and Regulations. Town Conservation Agent.
[62] Stormwater Management Program, Vol. 1, 2, 3. 2019.

1.1.14.4 BUILDING DIVISION

The Building Division is responsible for the review and approval of permits for new construction and for conducting inspections for state Building Code compliance. Westwood adheres to Massachusetts State Building Codes as well as its own Zoning Bylaws.

1.1.15 WESTWOOD ENVIRONMENTAL ACTION COMMITTEE (WEAC)

The Westwood Environmental Action Committee (WEAC) is a stand-alone body that reports directly to the Board of Selectmen – it is not a part of the Community and Economic Department. The Committee promotes clean energy and building practices and provides environmental education to Westwood residents. WEAC sponsors town-wide cleanup projects for an April Earth campaign and other volunteer and clean energy education efforts throughout the year.[63]

1.1.16 INFORMATION TECHNOLOGY

The Information Technology (IT) department manages and maintains the town's Geographic Information Systems (GIS) and aides in the technological capacities of other town departments. Westwood has a comprehensive GIS Map catalog hosted through ArcGIS that catalogues voting and school districts, hiking trails, trash collection, zoning and assessor's maps, and FEMA flood zones.[64]

The town's GIS Department also participated in the 2022 HMP update by providing maps about new developments and the critical facility inventory to support the vulnerability analysis for Westwood.

1.1.17 PUBLIC WORKS

The Public Works Department (DPW) maintains town infrastructure, programs, and facilities. It has several sub-departments, including the Sewer, Engineering and Facilities Departments and partnerships with the Dedham Westwood Water District.

The Department runs several maintenance and cleanup programs on culverts, publicly owned dams, and catch basins. The town also works with a contractor annually to manage the various beaver dams throughout town. Helping to mitigate the impact of wind-related events, the department has a tree-maintenance and removal program, and the town works with Eversource to respond quickly to wind-related outages. Public Works keeps yearly notes about winter damages and repairs to keep track of hazard events and impacted areas.

Westwood's Public Works Department participates in the Neponset Stormwater Partnership (NSP)[65], a regional partnership that aims to reduce stormwater-related costs, improve stormwater management, and protect the Neponset Watershed from stormwater impacts. The program, run by the Neponset River Watershed Association (NepRWA) aids with local financing, provides education and leads cleanup efforts for stormwater as well as helps towns to fill out EPA permitting documents and model and review local

[63] Westwood Environmental Action Committee (WEAC), https://www.townhall.westwood.ma.us/government/boards-committees/westwood-environmental-action-committee

[64] Westwood GIS, Town of Westwood (arcgis.com)

[65] Neponset Stormwater Partnership, Neponset Stormwater Partnership – Working together to protect our water resources and reduce flooding (yourcleanwater.org)

stormwater bylaws. The program's work in Westwood in mid-2020 to mid-2021 included mostly public outreach and education regarding pet waste, runoff and septic systems.[66]

DPW often hires outside consultants to assist with infrastructure assessments and design. In 2017, DPW hired a contractor to assess the condition of the Crystal Hill Terrace Stormwater Culvert. The resulting document examined the state of the culvert, dam, and potential impacts surrounding area in case of a breach. The analysis set forth a series of recommendations for next steps the town should take to keep local residents safe and educate the Crystal Hill Terrace's private owners about maintenance and repair processes.[67] Select recommendations from that assessment are included in this HMP.

In 2019, the town contracted a company to complete the Conant Road Preliminary Flooding Analysis to better understand some increased areas of flooding impacting private properties on Conant Road and provide recommendations about next steps to address the issues, including engaging in further studies.[68] Select recommendations from that study are included in this HMP.

1.1.18 Police Department

The Westwood Police Department's mission is to enforce the law and protect life and property to foster a better quality of life for the town. The Department focuses on preventing crime and has a hand in public education and communication about hazard events.

The town uses the ALERT Westwood system to relay emergency and non-emergency information to residents over multiple methos of contact. The Police Department also routinely updates its social media accounts in case of emergency or hazard events.

1.1.19 Fire Department

The Westwood Fire Department's main duties regard fire response and prevention, Emergency Management operations, search and rescue, and emergency medical service at the paramedic level. The Department follows State rules for open burning permits. The State allows open burning in most areas of Massachusetts, including Westwood, and burning must be done between 10:00 a.m. and 4:00 p.m. from January 15 to May 1. Regulations require that a burn pile be at least 75 feet from all dwellings, and only when air quality is acceptable for burning. The State also lists acceptable burning materials, including Brush, cane, driftwood and forestry debris from non-industrial sites, and several other items. [69]

The Westwood Fire Department sponsors many programs related to their emergency and fire response and protection services. They manage the Student Awareness of Fire Education (S.A.F.E.) program for fire education for students, and lead and complete fire code and response inspections. The Fire Department has an active social media presence and puts out timely information on storm preparation, how to prepare to shelter in place, and shares information publicly before predicted storms arrive.

The Department routinely maintains municipal fire alarm systems in municipal and commercial buildings for a quicker response time in case of fire alarm activation. It also keeps track of fuel storage tanks in town, and permits them yearly. The Department also has the capacity to perform damage assessments, provide Advanced Life Support Assessment (ALS) Ambulance Services, Emergency Medical Services (EMS), and Hazardous Materials Incident Response.

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[66] Neponset Stormwater Partnership: Annual Progress Report, July 1, 2020 through June 30, 2021. NSP-2020-21-Annual-Report.pdf (yourcleanwater.org)
[67] Crystal Hill Terrace Stormwater Culvert Assessment. Tighe & Bond. 2017.
[68] Conant Road Preliminary Flooding Analysis Westwood, MA. Environmental partners. 2019.
[69] Mass.gov Open Burning Safety https://www.mass.gov/service-details/open-burning-safety

The Department also has a hand in emergency management planning, response, and mitigation. As of 2022 the Fire Chief is the acting Deputy Emergency Management Director.[70] The Fire Department and the Council on Aging maintain a "worry list" for seniors in the community who have been preidentified as requiring follow-up if power goes out or the town experiences temperature related emergencies. The Council on Aging Director updates this list monthly, working with their outreach coordinator. The Fire Department is also tying this information into the NEXGEN system so dispatchers know if a resident is on the worry list.

1.1.20 Fiscal Capabilities

The town has several sources of fiscal support to develop plans and maintain departments and facilities in preparation for hazard events.

1.1.20.1 Capital Improvement Plan

The town adopts a new Five-Year Capital Improvement plan annually, with detailed descriptions of expenditures for the coming year as well as projections for the next five years' expenditures.[71] The Plan identifies funds for capital improvements and forecasts public spending. The Plan also details the funding sources available to the town, including tax revenue streams, Sewer Enterprise Funds, and other available funding opportunities.

1.1.20.2 Capital Improvement Stabilization Fund

Funding for annual capital expenditures may come from the Capital Improvement Stabilization Fund upon vote of Town Meeting. This fund, established at the 2005 Annual Town Meeting, is the town's main reserve account, currently has a $1.58M balance, and was last used to fund the replacement of the high school turf field in the summer of 2016. The fund helps ensure the town has financial capabilities in case of emergencies, maintains the town's credit rating, and can mitigate budget disruptions.[72]

1.1.20.3 Sewer Enterprise Funds

The Sewer Enterprise Fund is sourced from sewer user revenues and connection fees of residents on town sewer. It retained $4,504,306 in earnings in fiscal year 2022 through interest and user fees that can be used to fund capital items for the sewer operations specifically. Fund earnings are often geared towards stormwater compliance, inflow and infiltration assessment, and a pump station facility maintenance program.[73]

State

1.1.21 Municipal Vulnerability Preparedness (MVP) Program

Westwood conducted a Community Resilience Building (CRB) workshop under the MA Municipal Vulnerability Preparedness (MVP) Planning Program in 2019 to address the growing vulnerabilities associated with climate change. The actions identified in the workshop are in Section 6.5.1. All actions are in different stages of completion and should be discussed in an annual meeting regarding the MVP

[70] This position is subject to change because the charter review process includes adding information about the designation of emergency management officials to be the most appropriate actors at the time for staffing the positions.
[71] Town of Westwood, Massachusetts: Five Year Capital Improvement Plan Fiscal Years 2023-2027.
[72] FY23 Overall Proposed Budget February 8, 2022.
[73] May 2022 Town Meeting Book Finance Section, FY23 Overall Budget Summary book.

priorities. A number of the priority MVP actions identified in the 2019 Summary of Findings Report have been incorporated into this HMP as mitigation actions.

1.1.22 State Building Code

The Town of Westwood adheres to the Massachusetts State Building Code and the requirements therein for wind, snow, and earthquake loads and for flood-resistant design.

Federal

1.1.23 National Flood Insurance Program

Westwood is an active participant in the NFIP. There are a total of 45 policies in town with a total coverage amount of $14,479,000 as of January 2022. There are 8 policies in Westwood in 2022 than were reported in the 2011 Westwood HMP. As shown in the table below, most of the policies in force in 2022 are residential properties. There have been 36 paid losses as of January 2022, totaling $104,398.

Table 5.1 NFIP Policies Data January 1, 2022

Occupancy Type	Policies in Force (January 1, 2022)	Premium and Policy Fee	Total Coverage Amount	Total Losses	Total Net Payments
Single Family Dwelling	40	$34,056	$12,229,000	36	$104,398
Other Non-Residential	1	$2,193	$600,000	N/A	N/A
Non-Residential Business	4	$7,057	$1,650,000	N/A	N/A
Total	45	$43,306	$14,479,000	36	$104,398

Source: Flood Hazard Management Program, MA Department of Conservation & Recreation; FEMA.

The town's involvement in floodplain management includes upkeep of floodplain mapping from the GIS Department, catch-basin and culvert upkeep and maintenance through DPW, adherence to the Stormwater Bylaw and Stormwater Management Program, membership to the NSP, and oversight of 631 acres of protected open space.

6. Mitigation Strategy

Whereas the two preceding Chapters identify risks from natural hazards and programmatic capabilities, this chapter defines a broad mission for the Town in mitigating these risks and establishes a series of hazard mitigation goals and specific implementation actions.

Goals

The WHMC endorsed the following eight hazard mitigation goals at the July 11, 2022, committee meeting:

1. Mitigate or prevent when possible the impacts of and reduce the loss of life, injury, public health impacts and property damages resulting from all major natural hazards.
2. Identify and seek funding for measures to mitigate impacts of flooding events in each known significant flood hazard area.

3. Integrate hazard mitigation planning into the operations plans in all relevant municipal departments, committees and boards.
4. Mitigate or prevent when possible the impacts to and reduce the damage to public infrastructure resulting from all natural hazards.
5. Encourage the business community, major institutions and non-profits to work with the Town to develop, review and implement the hazard mitigation plan.
6. Work with surrounding communities, state, regional and federal agencies to ensure regional cooperation and solutions for hazards affecting multiple communities.
7. Ensure that future development or redevelopment meets federal, state and local standards for preventing and reducing the impacts of natural hazards.
8. Take maximum advantage of resources from FEMA and MEMA to educate Town staff and the public about hazard mitigation.

REVIEW OF 2011 ACTIONS

The WHMC and project consultant reviewed the 2011 Mitigation Actions to determine which actions were completed, ongoing, or no longer relevant. The action review included questions regarding what was accomplished for this project during the reporting period; what obstacles, problems, or delays did the project encounter; and if uncompleted, is the project still relevant and should it be changed or revised? Actions were then categorized as either completed, ongoing (initially addressed but requiring ongoing maintenance or attention and carried forward from the 2011 plan), or not started/partially addressed (revised from the 2011 plan or removed because were no longer relevant). The results of this review are included in Appendix B: Review of 2011 Mitigation Actions.

1.1.24 OTHER MITIGATION ACCOMPLISHMENTS

The town has also completed a number of mitigation actions over the past decade that were not proposed in the 2011 plan. Below are several completed, in-progress, proposed, or potential mitigation projects and activities that are not included in the table above. The projects associated with the six MVP actions are marked.

Mitigation Action
(MVP) Hydrologic Study - This would include a catch basin cleaning and maintenance plan, as well as a drainage study and floodplain analysis. A full-scale analysis of all the related facets of hydrology is important to be able to best understand and develop solutions to the flooding, and drainage issues in town. The Town Engineer has completed evaluation of three local flooding issues and developed schematic design to estimate costs for improvement. The town has had discussions on the development of a stormwater master plan.
(MVP) Tree Trimming - Tree trimming is extremely important preventative maintenance which the town would like to encourage Eversource to continue to keep up with, as many of these trees are not maintained by the town.
(MVP) Investigate and Develop Beaver Management Plan - The town has contracted Beaver Solutions as part of a Beaver Management Plan. The current plan ensures placement of beaver deceiver devices, yearly inspections, and any necessary repairs. Devices are monitored yearly by DPW staff and checked bi-annually in conjunction with Beaver Solutions.

Mitigation Action
(MVP) Dam study – A dam study could look at the necessity or effectiveness of dams and whether to release, repair or remove them. Noanet Pond Dam (owned by Hale Reservation) submitted a Dam Safety Permit Application in 2020 and an EAP was produced in May 2020. Sanborn Head issued a Poor Condition Inspection in August 2020, and a follow-up inspection report in August 2021. Sanborn Head reported on Noanet Pond Dam repairs (2021) and as a part of Noanet Pond Dam Repair Plan.
(MVP) Conant Road Culvert – The culvert is undersized and nearing the end of its useful life. Environmental Partners completed the Conant Road Preliminary Flooding Analysis in May 2019. The 2023-2027 Capital Requests included $200,000 for Conant Road Culvert Design in 2022. More broadly, the town has funded road improvements and drainage and sewer infrastructure needs through a combination of bond financing and state and federal grants. The bond financing has been both within and outside of Proposition 2 ½ and sewer infrastructure borrowings have been funded through sewer user fees; outside funding includes state Chapter 90 annual funds, state MA Water Resources funds and federal PWED funding.
(MVP) Engage Student Population in Resiliency Efforts – Many of the MVP participants expressed the desire to engage the student population in a water management, recycling, or other resilience education programs. Many participants felt that engaging the student population would not only teach the next generation but, will also encourage their families to consider conservation as well. This is a proposed/potential action.
The town's Stormwater Bylaw was updated last year – it now requires NOAA Atlas 14 rainfall data and compliance to MS4 requirements.
The town updated its Comprehensive Plan in 2020 to address risks related to climate change and their impact on natural environment, human health, and public safety.
DPW meets with the Westwood Environmental Action Committee every few months to discuss mutual interests in trash and recycling, resiliency, climate change.
DPW included $375k over 5 years in capital budget requests for I&I reduction to decrease sewer treatment costs.

2022 IDENTIFIED ACTIONS

Removing and precluding development from hazardous areas is the best method of mitigation. However, for areas where development has already occurred, or for vulnerabilities that are less geographically specific, additional mitigation measures must be pursued. After reviewing the Town's identified risks and vulnerabilities to natural hazards, the input and feedback from the public workshop and survey, recommendations from the Town, and the local Capability Assessment, the WHMC selected mitigation actions to incorporate into the 2022 Update.

The Committee has identified a comprehensive range of actions that would reduce Westwood's vulnerability to the identified hazards. The 2022 actions align with one or more of the following mitigation categories:

- Public Education and Awareness
- Property Protection
- Natural Resource Protection

- Structural Projects
- Emergency Services
- Planning and Prevention

The WHMC reviewed and re-prioritized the 2011 Risk Assessment Table and the associated actions based on historical damage, safety of the population, property protection and consistency with town-wide goals and objectives. The RHMC has worked to develop actions that are bounded by a time frame and are compatible and consistent with state hazard mitigation goals outlined in the 2018 MA State Hazard Mitigation and Climate Adaptation Plan.

Table 6.1 below outlines the 2022 Westwood Hazard Mitigation Strategy. The strategy consists of a series of pre-disaster mitigation actions. Each action presented below includes a summary of the specific problem and proposed possible solution, details of the primary tasks to be undertaken, an appropriate lead for action implementation, and anticipated costs and financing options. Each of the prospective project leads identified in the following mitigation action descriptions were given an opportunity to review and provide input on the draft plan. Other relevant departments or agencies that can offer support to the project are also listed.

The time frames used for this strategy are as follows:

Short Term: within 1-3 years
Medium Term: within 3-5 years
Long Term: greater than 5 years

If known, the actions include cost estimations and assign responsible parties to lead the efforts to complete the action. The cost ranges used for this strategy are as follows:

- Staff Time – municipal personnel time
- Minimal – less than $5,000
- Moderate – more than $5,000, but less than $25,000
- Significant – over $25,000

WHMC members were asked to rank the priority and feasibility of each of the 2022 Mitigation Strategy actions in categories to guide the focus of the Town's resources towards actions with the greatest potential benefit. At this stage in the process, the WHMC has limited access to detailed analyses of the cost and benefits of any given mitigation measure, so prioritization is based on the members' understanding of existing and potential hazard impacts and an approximate sense of the costs associated with pursuing any given mitigation measure.

The WHMC employed a mitigation strategy prioritization process that considers potential benefits and estimated project costs, as well as other factors in FEMA's STAPLEE (Social, Technical, Administrative, Legal, Economic, and Environmental) analysis. The method used for this HMP focuses on four key themes as follows:

Benefits: Determine whether the proposed mitigation measure will improve property protection, natural resource protection, technical capacity, public awareness, or post-hazard emergency response;

Feasibility: Determine whether the proposed mitigation measure is feasible in terms of Town staffing, public and Town support, and whether it is technically feasible;

Economic: Evaluate each mitigation measure in terms of estimated cost and potential funding sources; and

Regulatory: Evaluate each mitigation measure for consistency with local, state, and federal permitting/ regulatory requirements and goals.

Each proposed mitigation action presented in this section was given a score based on 13 subcategories within these four larger categories documented above (i.e., Benefits, Feasibility, Economic, Regulatory). For each of these subcategories, the proposed action was given a score of 3 if the action was thought to be the "best" fit with a particular category (likely to provide the benefit under consideration, required little additional training or funding, feasible, most true or beneficial, etc.), 2 if it was "average" and "somewhat true," or 1 if it was "poor" (did not provide the benefit under consideration, difficult to permit, costly, not true, etc.). The comprehensive result of this priority ranking is showcased in Appendix F: Mitigation Action Priority Ranking and the final total scoring for each action is also included in Table 6.1 2022 Westwood Hazard Mitigation Strategy.

The total results of each final ranking were close in range, and final ranking was decided between Low, Medium, and High. Low being less than or equal to 27, Medium being between greater than 27 and less than or equal to 29, and High being greater than 29. These results are showcased visually in Appendix F: Mitigation Action Priority Ranking.

Table 6.1 2022 Westwood Hazard Mitigation Strategy

2022 Action	New Proposed Action	Action Type	Vulnerability Addressed	Responsible Agency	Support	Cost	Time Frame	Priority
All hazards								
1	Update the Westwood Comprehensive Emergency Management Plan to include sections on disaster/storm debris management, hazardous materials response, and more.	PI	Populations and natural resources at risk, as well as continuity of municipal operations during a natural disaster response	Fire Department, Public Works	REPC (Regional EPC), Board of Health	$15,000	1 yr	Medium
2	Institutionalize HMP implementation into ongoing town operations	PI	Infrastructure, people, natural resources, and property at risk	Planning, Fire Department	All town departments	Staff time	1-5 years	Low
Include HMP maintenance and updates in HR job descriptions, especially for the Town Planner position. Emergency management **may take over** maintenance of this plan, but implementation and future planning requires other department involvement to be effective.								
3	Conduct an annual review of mitigation and resilience progress	PI	Infrastructure, people, natural resources, and property at risk	Planning, Fire Department	All town departments	Staff time	Annual	Medium

2022 Action	New Proposed Action	Action Type	Vulnerability Addressed	Responsible Agency	Support	Cost	Time Frame	Priority
Conduct an annual review of progress towards HMP mitigation strategy and MVP priority recommendations and submit all required documentation to applicable state agencies (MVP to EOEEA) to ensure continued compliance with the respective programs.								
4	Continue annual 5-year capital improvement planning process and incorporate high priority mitigation actions from this HMP.	PI	Critical infrastructure	DPW		Staff time	Summer -fall, annually	Medium
Brushfire								
5	Expand community risk reduction program (Neighbors Helping Neighbors) to provide information on brushfires.	ES	Fire risk on private property	Fire Department		Staff time	In process, continue to add programs as they are built out	High
6	Hydrant system evaluation	ES	Water availability during emergency response	Fire Department, Dedham Westwood Water		Prelim staff time – implementation could be millions to build out water system. (i.e. $3M in	Preliminary risk evaluation in process, next steps in the coming years	Medium

2022 Action	New Proposed Action	Action Type	Vulnerability Addressed	Responsible Agency	Support	Cost	Time Frame	Priority
						Hartford Rd area)		
Investigate the hydrant system in Town to ensure proper coverage and develop a plan to add hydrants in areas that do not have proper coverage. This would provide a reliable water source in the areas of all our fire access roads.								
Dam failure								
7	Revitalize 2017 efforts related to Town outreach to local dam owners	ES	Infrastructure, people, natural resources, and property at risk from dam failure.	Planning department, MA DCR	Town legal department	Staff time	Initiate in year 1	Medium
The purpose of this action is to help ensure private owners are conducting inspections and improvements for continued structural integrity, and to discuss opportunities for dam removal where appropriate. The first priority should be outreach to owner of 138 Mill St/Crystal Hill Terrace Dam, following up from 2017 efforts.								
Drought								
8	Encourage drought tolerant landscape design for all new development and redevelopment by requiring or providing incentives for xeriscaping (using drought-tolerant practices)	PE	Future reductions in groundwater recharge due to climate change, future drinking water shortages	Planning and Water District	DPW	Staff time	Initiate in year 1	High
Flood-related hazards								

2022 Action	New Proposed Action	Action Type	Vulnerability Addressed	Responsible Agency	Support	Cost	Time Frame	Priority
9	Continue to broaden public education around stormwater to broaden awareness and build community support for municipal investment in stormwater infrastructure improvements.	PI	Local water quality, and increasing demand on local infrastructure and town operations in maintaining stormwater system	DPW	Conservation Commission, Neponset River Watershed Association	Staff time	Ongoing, annual	High
Education should include how stormwater impacts flooding and pollution, what homeowners can do to reduce impacts, how climate change affects stormwater, and what the town does/how much the town spends to address these problems. Also include information about stormwater utilities, and how they have worked in other communities.								
10	Update local floodplain management regulations.	PI	Flood-vulnerable development	Town Planner	Conservation Agent	Staff time, some consultant time ($2k)	1-2 yrs	Medium
Westwood Flood Area Overlay District (FAOD) currently references Norfolk County Maps from 2012. Preliminary maps were updated in 2020. Westwood bylaw will need to be updated to meet requirements of MA floodplain management standard, and to adopt new maps once preliminary maps and FIS are adopted as "Effective." This action includes two steps: a) adopt new maps, and b) Update Westwood Flood Area Overlay District (FAOD) bylaw in accordance with 2021 MA Model Floodplain Bylaw. Review MAPC's Climate Resilient Land Use Strategies tool for regulatory language and policy examples of climate resilient floodplain overlay districts in other MA communities that may be relevant to Westwood.								
11	Develop and disseminate public educational materials about	PI		DPW	Cons. Com, BoH	Staff time	Annual	High

2022 Action	New Proposed Action	Action Type	Vulnerability Addressed	Responsible Agency	Support	Cost	Time Frame	Priority
	managing beaver dams.							
The Town has contracted Beaver Solutions as part of our Beaver Management Plan. The current plan ensures placement of beaver deceiver devices, yearly inspections, and any necessary repairs. Devices are monitored yearly by DPW staff and checked bi-annually in conjunction with Beaver Solutions. This action is meant to help homeowners understand how the town is addressing beaver dams in town, and what homeowner actions help and hurt those efforts.								
12	Create a local Climate Action Plan (as recommended in the Westwood Comprehensive Plan) to develop climate mitigation policies and programs, not just adaptation responses, to reduce GHG emissions across town.	PI	Worsening impacts from global warming	Planning	All departments	Staff time	1-3 yrs	High
13	Continuation of Open Space Protection and Land Acquisition as specified in the 2019 Westwood OSRP.	NR, PI	Flood-prone areas, and loss of open space and natural features	Planning, Conservation, Recreation, Public Works	Private land trust	Currently no budget for this, hope to adopt CPA. Cost TBD.	Annual, ongoing	Medium

2022 Action	New Proposed Action	Action Type	Vulnerability Addressed	Responsible Agency	Support	Cost	Time Frame	Priority
This action will ensure future updates of the OSRP target areas that are vulnerable to natural hazards for acquisition and preservation. Preserving natural areas and vegetation benefits natural resources while also mitigating potential flood losses.								
14	Develop a tree planting policy to maintain and enhance the town's tree canopy.	NR, PI	Stormwater flooding, erosion, vulnerable populations exposed to extreme heat, power outages	Conservation, Planning	Public Works	Currently no tree budget – staff time	1-3 yrs	High
Elements of this action may include: a. New bylaw to require developers and property owners who remove trees to replant replacements of a certain size/age in place of the removed tree or donate the same to the town to be planted in an alternate location. b. Explore opportunities for a public private partnership to develop a municipal or intermunicipal nursery program to provide healthy adolescent trees for replanting, and to provide education to residents about climate resilient species. Conduct a town-wide tree canopy assessment to identify unhealthy or dangerous trees and establish a baseline for future improvements.								
15	Revise Westwood Wetlands bylaw and regulations used to enforce the bylaw to apply updated rainfall requirements and require all development plans be designed to NOAA Atlas 14.	PI	Increased stormwater flooding due to climate change	Planning, Conservation		Staff time, RPA support	1-2 yr	High

2022 Action	New Proposed Action	Action Type	Vulnerability Addressed	Responsible Agency	Support	Cost	Time Frame	Priority
The Town's stormwater bylaw was just revised last year to require NOAA Atlas 14 rainfall data and compliance to MS4 requirements. However, wetlands regs could be updated to better account for climate change. This action will help protect and enhance wetlands' natural mitigation features of preventing flooding in other areas.								
16	Continue and complete the town-wide stormwater drainage master plan (currently underway) and prioritize implementation of recommended solutions.	PI	Stormwater flooding	DPW	Planning, Conservation	$75,000	Annual	Medium
The Town Engineer has completed evaluation of three local flooding issues and developed schematic designs to estimate costs for improvement. Plan recommendations may include expanding the capacity of catch basins as the next step in preventing flooding from occurring.								
Severe weather								
17	Coordinate with Eversource to protect power lines and infrastructure and reduce incidences of power outages during storm events.	PI	Vulnerable populations reliant on electrical power for health and safety	Conservation, DPW, Eversource (they're good about submitting tree management plans)		Staff time	Annual	Low
a. Encourage Eversource to take measures including conducting routine non-emergency assessment of electrical equipment and utility poles to ensure they meet specifications and are in good condition, installing redundancy and loop-feeds in areas of high need to allow lines to fail in smaller sections and enable faster restoration.								

2022 Action	New Proposed Action	Action Type	Vulnerability Addressed	Responsible Agency	Support	Cost	Time Frame	Priority
b. Continue discussions with Eversource about partnerships to bury existing powerlines during future utility or road resurfacing projects (current policy is to bury all lines on new and redeveloped property, so this effort would be for existing lines). c. Incorporate inspection and management of hazardous trees into the town's overall asset management program.								
18	Assess municipal buildings (including schools) for susceptibly to snow loads to prevent roof collapse during winter storms.	PP	Aging municipal buildings	Public Works / Building (Jimmy McCarthy, facilities director), School department (Tom Cary, director of buildings and operations)		TBD – in discussions with facilities director	1-2 yrs	Medium

Acronyms

Action Type

ES	Emergency Services and Protection	PE	Public Education and Awareness	PP	Property Protection
NR	Natural Resource Protection	PL	Planning and Prevention	SP	Structural Projects

Agency/Department/Organization/Funding Source

ARPA	American Rescue Plan Act of 2021	HMGP	FEMA Hazard Mitigation Grant Program (Section 404)
BLM	U.S. Bureau of Land Management	NEIWPCC	New England Interstate Water Pollution Control Commission
BRIC	Building Resilient Infrastructure and Communities	NRCS	USDA Natural Resources Conservation Service
CDBG	HUD Community Development Block Grant	PA	FEMA Public Assistance Grant Program (Section 406)[74]
Con Com	Conservation Commission	SNEP	Southeast New England Program (SNEP)
DPW	Department of Public Works	SWIG	SNEP Watershed Implementation Grants
EM	Emergency Management	TNC	The Nature Conservancy
EMPG	FEMA Emergency Management Performance Grant	USDA	U.S. Department of Agriculture
FEMA	Federal Emergency Management Agency	USFWS	US. Fish and Wildlife Service
FMA	FEMA Flood Mitigation Assistance Program	USFS	U.S. Forest Service
FPSG	FEMA Fire Prevention and Safety Grants		

[74] Recipients must have a FEMA-approved Hazard Mitigation Plan before FEMA can provide PA funding for any Permanent Work

7. Plan Evaluation and Maintenance

FEMA requires HMPs to outline a maintenance process to ensure the Plan remains active and relevant to the current and future conditions of the Town. The process must identify the following items:

- Plan Monitoring, Evaluation and Updates – Method and schedule for monitoring, evaluating and updating the plan once every five years;
- Incorporation of Mitigation Strategies – Explanation of how local governments will incorporate mitigation strategies into existing mechanisms; and
- Continued Public Involvement – Requirements that public participation continue throughout the plan maintenance process.

This section details how Westwood will meet these Plan maintenance requirements.

Plan Monitoring, Evaluation and Updates

As required by FEMA, the written plan will be evaluated and updated at least once every five years; evaluation will be coordinated by the Town Planner, with the support of the Emergency Management Director, and involve all relevant authorities having jurisdiction. In the interim, the Town Planner and Emergency Management Director will conduct annual reviews of the progress of mitigation actions and update as necessary. If a major natural disaster occurs before the next 5-year HMP update, the Town may wish to reconvene the WHMC to discuss how effective the proposed mitigation actions were in mitigating the impact of the event, and the WHMC may choose to update the Plan if it is determined that imminent changes are required to address new conditions and better mitigate future events. As necessary, WHMC members and/or departments may be added or removed from the committee to obtain the most accurate and applicable information possible.

Evaluations and updates will take place in much the same way this updated plan was developed. The process will include meetings of the WHMC, review of goals and objectives, updating the community profile, review and modification of potential hazards and hazard related data, review of existing hazard-prone areas and the addition of any new areas, updating existing and planned hazard mitigation measures, and an evaluation as to the effectiveness of the plan to date. The next update will begin in year 4 of this plan, to ensure that the subsequent update is ready within the required 5-year window.

Incorporation of Mitigation Strategies

Mitigation strategies outlined in this Plan will be incorporated into existing municipal plans, bylaws and regulations as feasible. During future HMP updates, existing and proposed mitigation actions will be evaluated for effectiveness, level of completion, and continued appropriateness. Upon approval of this HMP, the WHMC 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. At a minimum, the plan will be reviewed and discussed with the following town staff and departments, many of whom were part of the WHMC:

- Fire / Emergency Management
- Police
- Public Works / Highway
- Engineering
- Planning and Community Development
- Conservation

- Department of Human Services
- Health
- Building

Other groups that will be coordinated with include large institutions, Chambers of Commerce, land conservation organizations and watershed groups.

After this plan has been approved by both FEMA and the Westwood Select Board, links to the final plan will be emailed to all Town staff, boards, and committees, with a reminder to review the plan periodically and work to incorporate its contents, especially the proposed mitigation actions presented in Chapter 6 Mitigation Strategy, into other planning processes, documents, and plans. In addition, during annual review meetings for the HMP implementation process, the WHMC will review whether any other relevant municipal plans are in the process of being updated. If so, the committee will remind staff working on these plans, policies, etc., of the HMP, and urge them to incorporate the HMP data, findings, and actions into their respective efforts.

CONTINUED PUBLIC INVOLVEMENT

During the periodic five-year update process, the WHMC will hold at least one public workshop or similar meeting to solicit feedback from the general public on the progress made to date. Concerned citizens will also be invited to review the revised Plan and submit any additional comments or recommendations for improving the Plan. All events will be publicly advertised in the local newspaper and town website, at a minimum. Copies of the Plan will be provided in public places such as the Town Hall (Clerk's office) and both public libraries. The Plan will also be made available to the general public via the Town's website.

PLAN ADOPTION

At the conclusion of planning efforts conducted by the WHMC, the draft of the Westwood HMP was reviewed by the WHMC, stakeholders and the general public, and informally approved by all applicable Town departments, boards, and other agencies identified as members of the WHMC. The plan was then submitted to the Massachusetts Emergency Management Agency (MEMA) and the Federal Emergency Management Agency (FEMA) for review and approval. If approved by MEMA and FEMA, the plan will be brought before the Westwood Select Board for adoption, and the Plan will enter the five year "maintenance" phase. The certificate of adoption is provided in Appendix D – Plan Adoption (Certificate of Adoption Template).

8. REFERENCES

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Fourth National Climate Assessment, 2018

Massachusetts Flood Hazard Management Program

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Massachusetts State Hazard Mitigation Plan, 2013

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National Weather Service (NWS)

New England Seismic Network, Boston College Weston Observatory, http://aki.bc.edu/index.htm

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Northeast Climate Adaptation Science Center

Northeast States Emergency Consortium, http://www.nesec.org/

Tighe & Bond, 2017, Crystal Hill Terrace Stormwater Culvert Assessment

Tornado History Project

Town of Westwood, 2022, Pending Zoning By-Law

Town of Westwood, 2021, Five Year Capital Improvement Plan, Fiscal Years 2023-2027

Town of Westwood, 2021, Stormwater Management Regulations

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Town of Westwood, 2020, Community Resilience Building Workshop Summary of Findings

Town of Westwood, 2020, Comprehensive Plan

Town of Westwood, 2019, Housing Production Plan

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Town of Westwood, 2015, Stormwater Management Bylaw, Chapter 350

Town of Westwood, 2011, Hazard Mitigation Plan

Westwood, MA

Town of Westwood, 1989, Wetlands Protection Bylaw, Chapter 392

US Census, 2010 and American Community Survey 2018 5-Year Estimates

USGS, Earthquake Hazards Program, https://earthquake.usgs.gov/earthquakes/eventpage/usp0001jbp/executive

USGS, Landslide Inventory Web App, https://usgs.maps.arcgis.com/apps/webappviewer/index.html?id=ae120962f459434b8c904b456c82669d

USGS, National Water Information System, http://nwis.waterdata.usgs.gov/usa/nwis

APPENDIX A: CRITICAL FACILITIES

	NAME	ADDRESS	TYPE	SHELTER	GENERATOR
1	Westwood Police Station & EOC	588 High St	Police Station	No	Yes
2	Westwood Fire Department - Sta. #1	637 High St	Fire Station	No	Yes
3	Westwood Fire Department - Sta. #2	300 Washington St	Fire Station	No	Yes
4	Westwood Town Hall	580 High St	Municipal Facility	No	No
5	Carby St. Municipal Office Building	50 Carby St	Municipal Facility	No	Yes
6	Westwood Senior Center	60 Nahatan St	Municipal Facility	No	Yes
7	Westwood Library	660 High St	Municipal Facility	No	No
8	Wentworth Hall (Library, Y&FS)	273 Washington St	Municipal Facility	No	No
9	Westwood High School	200 Nahatan St	School	Yes	Yes
10	Thurston Middle School	850 High St	School	No	No
11	Deerfield Elem School	72 Deerfield Ave	School	No	No
12	Downey Elem School	250 Downey St	School	No	No
13	Hanlon Elem School	790 Gay St	School	No	No
14	Martha Jones Elem School	80 Martha Jones Rd	School	No	No
15	Sheehan Elem School	549 Pond St	School	No	No
16	Westwood Integrated Preschool	200 Nahatan St	School	No	No
17	Xaverian Brothers HS	800 Clapboardtree St	School	No	No
17	Lifeworks Educational Facility	789 Clapboardtree St	School	No	Yes/No?
18	Westwood Nursery School	808 High St (Baptist Church)	Childcare Facility	No	No
19	St. John's Nursery School	95 Deerfield Ave	Childcare Facility	No	No

	NAME	ADDRESS	TYPE	SHELTER	GENERATOR
20	Westwood Children's School	808 High St (Baptist Church)	Childcare Facility	No	No
21	Tobin School	1054 High St	Childcare Facility	No	No
22	Westwood Knowledge Beginnings	200 Providence Highway	Childcare Facility	No	No
23	Barnyard Child Care Center	474 Canton St	Childcare Facility	No	No
24	Zeynep Istekli-Lai Family Day Care	19 Overlook Ave	Childcare Facility	No	No
25	Debra Marchard Family Day Care	77 Elm St	Childcare Facility	No	No
26	Roya Rostamnezhad Family Day Care	493 Gay St	Childcare Facility	No	No
27	Julie Harrington Family Day Care	58 Locust Dr	Childcare Facility	No	No
28	Julia Ruth House	199 Canton St	Adult Daycare Facility	No	No
29	Highland Glen Apartments	1055 Highland Glen Rd	Senior Housing	No	No
30	Residences at Highland Glen	4100 Highland Glen Rd	Senior Housing	No	No
31	Westwood Glen Commons	21 Westwood Glen Rd	Senior Housing	No	No
32	Fox Hill Village-Elder Housing	10 Longwood Dr	Senior Housing	No	No
33	Birch Grove Assisted Living	8 Longwood Dr	Assisted Living Facility	No	Yes/No?
34	White Oaks Cottages	2-6 Longwood Dr	Assisted Living Facility	No	Yes/No?
35	Bridges by Epoch	140 University Ave	Assisted Living Facility	No	Yes
36	Charles River ARC Group Home	68 Pine Ln.	Group Home	No	No
37	Lifeworks Group Home	15 Clapboardtree St	Group Home	No	No
38	Lifeworks Group Home	183 Whitewood Rd	Group Home	No	No
39	Lifeworks Group Home	575 High St	Group Home	No	No
40	MAB Group Home	32 Meadowbrook Ln	Group Home	No	No
41	TILL Group Home	230 High St	Group Home	No	No

	NAME	ADDRESS	TYPE	SHELTER	GENERATOR
42	CSX Bridge	over Providence Hwy	Bridge	No	No
43	CSX Bridge	over East St	Bridge	No	No
44	CSX Bridge	over Everett St	Bridge	No	No
45	Mass Highway Bridge	over I-95 (East St Rotary)	Bridge	No	No
46	Mass Highway Bridge	over I-95 (High St - Dedham border)	Bridge	No	No
47	Winslow Rd	Winslow Rd	Bridge	No	No
48	Brook St	Brook St	Bridge	No	No
49	Steven's Farm	Longmeadow Dr	Bridge	No	No
50	Crystal Hill Dam	Crystal Hill Rd	Dam	No	No
51	Gay Farm Way Dam	Gay Farm Way	Dam	No	No
52	Mill St Dam	42 Mill St	Dam	No	No
53	Haslam Pond Dam	near 186 Farm Ln	Dam	No	No
54	DWWD Water Storage Tanks	213 Fox Hill St	Water Storage Tank	No	No
55	Communication Tower	588 High St (Police Headquarters)	Communication Tower	No	Yes
56	Communication Tower	808 High St (Baptist Church)	Communication Tower	No	Yes
57	Communication Tower	470-480 East St (Morrison Park)	Communication Tower	No	Yes
58	Communication Tower	100 Lowder Brook Dr	Communication Tower	No	Yes
59	Communication Tower	60-90 Glacier Dr	Communication Tower	No	Yes
60	Communication Tower	213 Fox Hill St (Water Storage Tank)	Communication Tower	No	Yes
61	Communication Tower	3 Allied Dr (antenna on roof)	Communication Tower	No	Yes

	NAME	ADDRESS	TYPE	SHELTER	GENERATOR
62	Communication Tower	247 Station Dr (antenna on roof)	Communication Tower	No	Yes
63	Communication Tower	690 Canton St (antenna on roof)	Communication Tower	No	Yes
64	Communication Tower	20 East St (antenna on roof)	Communication Tower	No	Yes
65	Communication Tower	340 Clapboardtree St (First Parish)	Communication Tower	No	Yes
66	DWWD Water Treatment Facility	154 University Ave	Water Operations	No	Yes
67	DWWD Water Storage Tanks	213 Fox Hill St	Water Storage Tank	No	No
68	DWWD Water Pump Station	46 Dartmouth St	Water Pump Station	No	Yes
69	DWWD Water Pump Station	34 Yale St	Water Pump Station	No	Yes
70	DWWD Water Pump Station	346A University Ave	Water Pump Station	No	Yes
71	DWWD Water Pump Station	200 Dover Rd	Water Pump Station	No	Yes
72	Sewer Pump Station	7A Foxmeadow Dr	Sewer Pump Station	No	Yes
73	Sewer Pump Station	161 Sycamore Dr	Sewer Pump Station	No	No
74	Sewer Pump Station	Dela Park Rd	Sewer Pump Station	No	Yes
75	Sewer Pump Station	Far Reach Rd	Sewer Pump Station	No	Yes
76	Sewer Pump Station	Stonemeadow Dr	Sewer Pump Station	No	Yes
77	Sewer Pump Station	Clapboardtree St	Sewer Pump Station	No	Yes
78	Sewer Pump Station	190 Arcadia Rd	Sewer Pump Station	No	Yes
79	Sewer Pump Station	235 Conant Rd	Sewer Pump Station	No	Yes
80	Sewer Pump Station	86 Brook St	Sewer Pump Station	No	Yes
81	Sewer Pump Station	Farm Ln	Sewer Pump Station	No	No
82	Sewer Pump Station	Summer St	Sewer Pump Station	No	Yes

	NAME	ADDRESS	TYPE	SHELTER	GENERATOR
83	Sewer Pump Station	Abbey Rd	Sewer Pump Station	No	Yes
84	Dedham/Westwood Water District	154 University Ave	Utility Operations	No	No
85	Eversource Gas & Electric	247 Station Dr	Utility Operations	No	Yes
86	Algonquin Gas	8 Wilson Way	Utility Operations	No	No
87	Eversource Electric Substation	Clapboardtree St	Utility Operations	No	No
88	Eversource Gas Metering Station	7 Downey Ter	Utility Operations	No	Yes/No?
89	Eversource Gas Metering Station	141 Woodland Rd	Utility Operations	No	Yes
90	Roche Bros Supermarket	338 Washington St	Grocery Store	No	Yes/No?
91	Wegmans Supermarket	169 University Ave	Grocery Store	No	Yes
92	Target Supermarket	221 University Ave	Grocery Store	No	Yes
93	Lamberts Grocery Store	220 Providence Hwy	Grocery Store	No	Yes/No?
94	CVS # 1888	299 Washington St	Pharmacy	No	No
95	Walgreens	683 High St	Pharmacy	No	No
96	Specialty Pharmacy at BIDMC	80 Wilson Way	Pharmacy	No	Yes
97	Mass General BWH Medical Center	100 Brigham Way	Hazardous Material Site	No	Yes
98	New England Baptist Medical Center	40 Allied Dr	Hazardous Material Site	No	Yes
99	Westwood Dialysis	90 Glacier Dr	Hazardous Material Site	No	No
100	Regeneris Medical Center	315 University Ave	Hazardous Material Site	No	No
101	Nano C	33 Southwest Park	Hazardous Material Site	No	Yes/No?
102	Westwood Porsche, Audi, Acura	375-411 Providence Hwy	Hazardous Material Site	No	Yes/No?
103	Ira Mazda	420 Providence Hwy	Hazardous Material Site	No	Yes/No?
104	Mercedes Benz of Westwood	425 Providence Hwy	Hazardous Material Site	No	Yes/No?

	NAME	ADDRESS	TYPE	SHELTER	GENERATOR
105	Romanow Container	346 University Ave	Hazardous Material Site	No	No
106	Distributor Corporation of New Eng.	384 University Ave	Hazardous Material Site	No	No
107	Hogan Tire	14 Washington St	Hazardous Material Site	No	No
108	West Marine	120 Allied Dr	Hazardous Material Site	No	No
109	Cummins North East	100 Allied Dr	Hazardous Material Site	No	No
110	KLA - Tencor ADE Division	60 Glacier Dr	Hazardous Material Site	No	No
111	Audio Video Designs	385 University Ave	Hazardous Material Site	No	No
112	Superior Cleaners	922 High St	Hazardous Material Site	No	No
113	KNK Cleaners	689 High St	Hazardous Material Site	No	No
114	Crown Cleaners	266 Washington St	Hazardous Material Site	No	No
115	AB Dry Cleaners	244 Providence Hwy	Hazardous Material Site	No	No
116	Lapels Dry Cleaning	372 Washington St	Hazardous Material Site	No	No
117	Dedham Country and Polo Club	77 Westfield St	Hazardous Material Site	No	No
118	Norfolk Golf Club	166 East St	Hazardous Material Site	No	No
119	Life Time Fitness	44 Harvard St	Hazardous Material Site	No	No
120	MBTA/Amtrack Station	50 University Ave	Transportation	No	No
121	MBTA Station Facility	Station St	Transportation	No	No
122	MassDOT Facility	121 Providence Hwy	Transportation	No	No

APPENDIX B: REVIEW OF 2011 MITIGATION ACTIONS

2011 Action	Action/Project Title and Description	2011 Priority	Project Status	Status Description
1	Expand drainage of culverts and pipes impacting Willard Circle area	High	Completed - Ongoing Capability	Dredging of culvert behind that development in Wilson way area, did happen in past 10 yrs., removed sediment buildup and other debris
2	Dredging Mill Brook near Stanford Drive	Medium	Completed - Ongoing Capability	Similar action as above, not to the extent of Willard Circle, but this was completed
3	Culvert Maintenance at Brookfield near Westbrook Lane	Medium	Completed - Ongoing Capability	This is part of routine culvert maintenance checks. Used to be a problematic area, but this is where they pulled out an exercise ball. Avoided $500,000 investment.
4	Dam management and maintenance plan for private local dams (also (MVP) Dam study – look at the necessity or effectiveness of dams and, whether to release, repair or deconstruct them)	Medium	Not completed. Revise action, carry forward.	DPW did work with a firm in 2017 to do some initial communication with homeowners. Had the firm assess the 138 Mill St/Crystal Hill Terrace dam, communicate with homeowners about their responsibility, etc. **Revise action to**: Revitalize 2017 efforts related to Town outreach to local dam owners to help ensure private owners are conducting inspections and improvements for continued structural integrity, and to discuss opportunities for dam removal where appropriate. First priority should be outreach to owner of 138 Mill St/Crystal Hill Terrace Dam.
5	Update Hazardous Material Response Plan	None	Not completed. Revise action, carry forward as part of CEMP action.	No progress due to lack of champion **Revise action to**: Update the Westwood Comprehensive Emergency Management Plan to include sections on disaster/storm debris management, hazardous materials response, and more.

2011 Action	Action/Project Title and Description	2011 Priority	Project Status	Status Description
6	Assessment of Historic Structure Natural Hazard Vulnerability	None	Not completed. Revise action, carry forward	No comprehensive analysis of historic structures done in 10 years. Westwood historical commission is limited, they review properties for demo delay bylaw, and review properties for state approval (this is considered to be a capability.) This 2011 action may have been focused on the Colburn School Building. Since 2011, the Colburn School Building has been sold, moved, and rehabbed. The town also owned Obed Baker House, but in the process of selling to be rehabbed. Blue Heart Tavern was deteriorating, was sold and demolished. Fisher School is owned by private, but on town owned land, but not apparently at risk. **Revise action to**: Map all historic structures in Town and overlay those structures with the HMP natural hazard layer to determine vulnerability and mitigation needs.
7	Continuation of Open Space Protection and Land Acquisition	None	Ongoing Capability/ Integration Action	Ongoing - Town's OSRP was updated in 2019. **Revise action to**: Continuation of Open Space Protection and Land Acquisition as specified in the Westwood OSRP. Ensure future updates of the OSRP target areas that are vulnerable to natural hazards for acquisition and preservation. Preserving natural areas and vegetation benefits natural resources while also mitigating potential flood losses.
8	Regulatory Revisions for Stormwater Management	None	Ongoing Capability/ Integration Action	Stormwater bylaw was just revised last year. Requires NOAA Atlas 14 rainfall data and compliance to MS4 requirements. However, wetlands regs could be updated to better account for climate change. State regulation of stormwater is addressed through the Wetlands Protection Act. Current wetlands regulations rely on rainfall data from 1961 to size stormwater

2011 Action	Action/Project Title and Description	2011 Priority	Project Status	Status Description
				infrastructure. **The 10-year 24 hour rainstorm has increased by nearly 20% since 1961.** MA DEP is currently considering updating rainfall rates. Many communities have already updated their requirements for rainfall records using data from the Northeast Regional Climate Center (Cornell) or from NOAA Atlas 14. **Revise action to**: Review Westwood Wetlands bylaw and regulations used to enforce the bylaw to apply updated rainfall requirements to help protect and enhance wetlands' natural mitigation features or preventing flooding in other areas. Require all development plans be designed to NOAA Atlas 14.
9	Maintenance of Existing Infrastructure	None	Ongoing capability/ Integration Action	Ongoing. Discontinue action - change to operational capability.
10	Assessment of Municipal Structures for Susceptibly to Snow Loads	None	No progress.	No progress due to lack of municipal champion. Carry action forward to 2022 HMP under leadership of Emergency Manager and Building Official.

APPENDIX C: PUBLIC ENGAGEMENT

WESTWOOD HAZARD MITIGATION COMMITTEE MEETINGS

The following are copies of all meeting agendas and notes for the committee meetings held by the WHMC.

MEETING 1

Date: February 17, 2022

Subject: **Westwood, MA Hazard Mitigation Plan Update**
Committee Meeting #1

Attendees:
Abby McCabe, Town Planner
Nora Loughnane, Director of Community & Economic Development
Brendan Ryan, Assistant Director of Public Works
John Deckers, Fire Chief
Tal Zaslavski, GIS coordinator
Jared Orsini, Health Director
Karon Catrone, Conservation Agent
Lina DeRosa, Council on Aging
Lizzy McGovern, Library Director
Chris Sheehy, Police Liaison
Danielle Sutton, Youth and Family Services
Emily Slotnick, BETA Group, Inc. Project Manager
Emily Farmer, BETA Group Inc.

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1. Welcome and Introductions
2. Review Scope
3. Confirm Hazard Mitigation Planning Committee (WHMC) information
    - 5 scheduled meetings plus a final presentation meeting
4. Public Outreach
    - Local Paper (Hometown Weekly), tri-annual newsletter, and Westwood Wire e-newsletter
    - Use social media accounts – and screenshot when you share about the project publicly for FEMA records.
5. Review hazards of concern
    - Flood-Related Hazards
    - Wind-Related Hazards – tropical storm, tornado, thunderstorm
    - Winter-Related Hazards – nor'easter, severe winter storm, ice storm
    - Fire-Related Hazards – brush fire, wildfire
    - Geologic Hazards – landslide, earthquake
    - Other Hazards
        - These hazards will be re-aligned according to the MA state hazard mitigation plan
        - We've noted several invasive species (bittersweet, algae-blooms, etc.) to add
6. Review draft public survey
    - BETA will create a version on SurveyMonkey
7. Review critical facilities list and local hazard areas list

8. New development sites
9. Next steps/To-do
    - Fill out provided worksheet 1. Events and Losses
        - Provide any information you can on historic events and their impact on Westwood either town-wide or personal, both are helpful!
    - Update Critical Facilities list and Flooding Risk areas list – also to be updated on Tal's map
    - Provide any updates regarding new developments (see worksheet #6)
    - Next meeting 3/3 to discuss:
        - Summary of progress since last meeting
        - Outstanding items from last meeting
        - Review past plans and reports
        - Review Capabilities Assessment
        - Next steps

MEETING 2

Date: March 3, 2022

Subject: **Westwood, MA Hazard Mitigation Plan Update**
Committee Meeting #2

Attendees:
Nora Loughnane, Director of Community & Economic Development
Todd Korchin, DPW Director
Brendan Ryan, Assistant Director of Public Works
Tal Zaslavski, GIS coordinator
Jared Orsini, Health Director
Karon Catrone, Conservation Agent
Lina Derosa, Council on Aging
Lizzy McGovern, Library Director
Chris Sheehy, Liaison
Danielle Sutton, Youth and Family Services
Emily Farmer, BETA Group
Andy Dennehy, BETA Group

1. Summary of progress since last meeting
2. Confirm Meeting Dates: 4/7; 5/19; 6/16
3. Outstanding items from last meeting
    a. Awaiting info on recent and planned development
    b. Awaiting info on snow events, FEMA/MEMA event reports, crossings and roadways at risk of flooding, reports on dam upgrades since 2011, and reports from Beaver Solutions
    c. Critical facilities list still being updated. Tal will cross-reference MassGIS Dam listings with Brendan
4. Review past plans and reports
    a. MVP report
    b. 2019 OSRP
    c. 2019 Housing Production Plan
    d. 2019 updates to the Westwood Comprehensive Plan
    e. Annual MS4 reports and 2019 SWMP
    f. New flood studies (other than the 3 sites BETA has evaluated)
        i. I&I sewer evaluations – Bob Rafferty will provide
        ii. Conant Rd Drainage (Environmental Partners will provide)
        iii. BETA HMP team coordinated with Phil Paradis to get info on Hartford St, Hillcrest, Deerfield at Gay St.
5. Revisit known hazard areas
    a. Discussed additions to the critical facilities list, walked through known hazard areas list and mitigation measures matrix
        i. Additions to known hazard areas: Conant Rd. and Whitewood Rd.
        ii. Discussion on privately owned dams and possible issues
        iii. Routine Brook Field, Winter St. maintenance, several projects completed to aid with previous flooding issues

6. Review Table 14: Existing Natural Hazard Mitigation Measures in Westwood (at end of agenda)
    a. Discussed mitigation measures from 2011 plan and previous meeting notes
        i. No longer issues: University station flooding, Winter St. culvert, Green Acre Rd., Webster St., cemetery roads
        ii. Continuing dam discussion, some clarification needed on actual location of dams and where issues occur
        iii. Town conducts continued maintenance and catch basin cleaning for St. Dennis Dr. and Willard Circle, Stanford Dr., Brookfield, Crystal Hill Terrace – will need more in-depth details on maintenance practices and any persistent flood concerns
        iv. 5-yr Capital Improvement Plan 2022 and drainage master plan in the works
        v. Discussion of town's Code Red communication system for emergency messaging, announcing street-parking bans during catch-basin maintenance, and trash/recycling
        vi. Senior center maintains a "worry list", and questions if current emergency shelter is accommodating for seniors

7. Next steps/To-Do
    a. Continue collecting survey responses (currently at 33 responses)
    b. Complete the Critical Facilities update with items discussed in meeting (gas station, childcare, etc.)
    c. Continue responding to Events and Losses worksheet from the first committee meeting
        i. BETA – Follow-up with Chief Deckers on Emergency Management and wildfire questions, prepare capabilities worksheet for next WHMC meeting
        ii. Provide and previous plans/work discussed on dams/culverts
        iii. Brendan – Check on Saint Dennis Dr. and Willard Circle issues (if any), provide events and losses information
        iv. Karon – Check on Noanet Pond Dam work in 2021 on Carby St. (DONE)
        v. Jared – Look into Hazmat permits to ensure all are accounted for in critical facilities list
        vi. Tal – Provide critical facilities map and cross reference MassGIS listed dams with Brendan
        vii. Todd – Provide info on the Conant Rd. pump station and EP study, events and losses information (DONE); Get I&I study info from Bob Rafferty
        viii. Nora – Provide critical facilities list with updates/additions (DONE)
    d. Next committee meeting Thursday April 7, 9-11am

MEETING 3

Date: April 7, 2022

Subject: **Westwood, MA Hazard Mitigation Plan Update**
Committee Meeting #3

Attendees:
Nora Loughnane, Director of Community & Economic Development
Todd Korchin, DPW Director
Brendan Ryan, Assistant Director of Public Works
Tal Zaslavski, GIS coordinator
Jared Orsini, Health Director
Karon Catrone, Conservation Agent
Lina Derosa, Council on Aging
Lizzy McGovern, Library Director
Chris Sheehy, Liaison
John Deckers, Fire Department
Danielle Sutton, Youth and Family Services
Emily Slotnick, BETA Group
Emily Farmer, BETA Group

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1. Summary of progress and outstanding items from last meeting
    a. Survey discussion: Currently only 33 responses plus several paper copies
    b. Critical facilities list is up to date
    c. List of recent developments is up to date - Tal to input on map
    d. BETA received Conant Road flood study from Env Partners. Still waiting on the I/I information
    e. BETA received info on the CEMP and wildfire risk from Chief Deckers
2. Confirm Future Committee Meeting Dates
    a. June 23, August 11
3. Discuss public survey
    a. https://www.surveymonkey.com/r/N9RWM7Q
    b. Discussed potential to put reminder announcement in Westwood Wire (goes out at the end of each month), or maybe a special edition?
    c. Have QR code or physical copies at the elections in the schools happening in two weeks
4. Review Capabilities Assessment
    a. Stormwater management plans are much more effective than they were in 2011 - Stormwater bylaw was adopted by Town Meeting 5/4/15, the stormwater regulations were revised on 6/23/21.
    b. Debris management – no regional or local plan or agreements. Town can get additional support from neighboring municipalities in more extreme hazard events
    c. Town participates in MEMA mutual aid program across all municipal sectors

d. MVP yearly reports are required to maintain eligibility for Action Grants. Westwood is not aware of any updates on record, one may need to be scheduled.
e. No official buildable land inventory – something similar was completed through GIS analysis during former Comprehensive Planning process
    i. Several areas in town could be redeveloped or subdivided, but no specific action is being taken by the town to protect these privately-owned sites
    ii. Westwood Land Trust is best positioned to work with private landowners on future land conservation
f. Emergency Management may take over maintenance of HMP after completion, but will need inter-departmental help
    i. Opportunity to include HMP duties into the job description for town planner or other positions
g. Westwood Environmental Action Committee (WEAC) – trash and recycling, climate change, field treatments for fertilization
h. Westwood Media Center will be helping with the social media for the Town and each department, Melinda Garfield, Executive Director – Facebook, Twitter, Recycle Coach App
i. SAFE program on the fire website for fire education, Westwood itself is working on expanding this program locally

5. Review of Action Review worksheet from 2011 plan

a. Historic Structure vulnerability – not completed or necessary to carry over
b. Assessing Municipal facilities for snow loads – Check in with Jimmy
c. Willard circle project did take place, dredged culvert behind development in Wilson Way area
d. Mill brook near Stanford Dr, similar actions to Willard circle though not to same extent, completed
e. Culvert maintenance - Brookfield is on routine maintenance list (medicine ball removed)
f. Dam maintenance for private dams – Town is not interested in taking on maintenance of private dams, but can increase communication about resources for private owners (outreach based)
g. Stormwater management – Bylaw just revised last year
h. Maintenance of infrastructure moved into capabilities assessment, but any changes in what maintenance should occur could go into 2022 mitigation actions

6. Next steps

a. BETA to reach out to:
    i. Cindy Barenthaler for FEMA grants and other grant writing (IN PROGRESS)
    ii. Joe Doyle for BCEGS (DONE)
    iii. Check in with Jimmy regarding municipal facility snow-load policies (IN PROGRESS)
    iv. Tom Carey regarding school emergency response policies (IN PROGRESS)
    v. Pam Dukeman about financing for HMP action (IN PROGRESS)
b. BETA to draft parts of the plan, rework mitigation actions
c. John – Follow-up on CEMP details/new title
d. Brendan/Todd – Possibly share private dam outreach plan (large physical pdf)
    i. Check in on I/I request for the flood study
e. **Everybody** – Please promote the still open survey on social media (BETA to send out flyer)

MEETING 4

Date: July 11, 2022

Subject: **Westwood, MA Hazard Mitigation Plan Update Committee Meeting #4**

Attendees:
Nora Loughnane, Director of Community & Economic Development
Todd Korchin, DPW Director
Brendan Ryan, Assistant Director of Public Works
Tal Zaslavski, GIS coordinator
Jared Orsini, Health Director
Karon Catrone, Conservation Agent
Lizzy McGovern, Library Director
Chris Sheehy, Liaison
Danielle Sutton, Youth and Family Services
John Charbonneau, Town Planner
Emily Slotnick, BETA Group
Emily Farmer, BETA Group

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1. Summary of progress and outstanding items from last meeting
    a. Submittal of next chapters for review mid-July
2. Confirm and schedule meeting dates
    a. Aug. 11 Committee Meeting
    b. Public Visioning Meeting (Doodle poll)
    c. Planning Board and Select Board meetings during public review proves in September/October
3. Develop and discuss 2022 Mitigation Goals and Strategies
    a. Review critical facilities, new development, and flood hazards map
    b. Review 2011 HMP Goals – reworded and updated the goals written in 2008 (changing prevention of natural hazards to mitigation of impacts)
    c. Review strategies carried over from 2011 plan, MVP, and HMP Capabilities Assessment
    d. Discuss new strategies (see FEMA and FEMA R1 Mitigation Ideas attachments)
        i. Consideration of scenic road designation impacts on a comprehensive tree removal program
        ii. Changing wording to incorporate new HMP actions into already occurring Capital Improvement Plan reviews
        iii. Discussion of Town tree nursery feasibility: public private partnerships, use of Conservation Commission land
        iv. Specific information about drainage master plan
        v. Power line burial and discussions with Eversource – new developments are required to bury lines, but no action has been taken regarding reburial since the redevelopment of High and Washington Streets
4. **Next steps**:

a. **All** – Doodle poll response for best date for public visioning session
b. **All** – Review incoming chapters submitted to the committee
c. BETA to reach out to Chief Deckers about mitigation action regarding fire roads.

Draft Plan presentation

MEETING 5

Date: August 11, 2022

Subject: **Westwood, MA Hazard Mitigation Plan Update**
Committee Meeting #5

Attendees:
Nora Loughnane, Director of Community & Economic Development
Todd Korchin, DPW Director
Brendan Ryan, Assistant Director of Public Works
Tal Zaslavski, GIS coordinator
Jared Orsini, Health Director
Karon Catrone, Conservation Agent
Chris Sheehy, Liaison
Danielle Sutton, Youth and Family Services
John Charbonneau, Town Planner
Emily Slotnick, BETA Group

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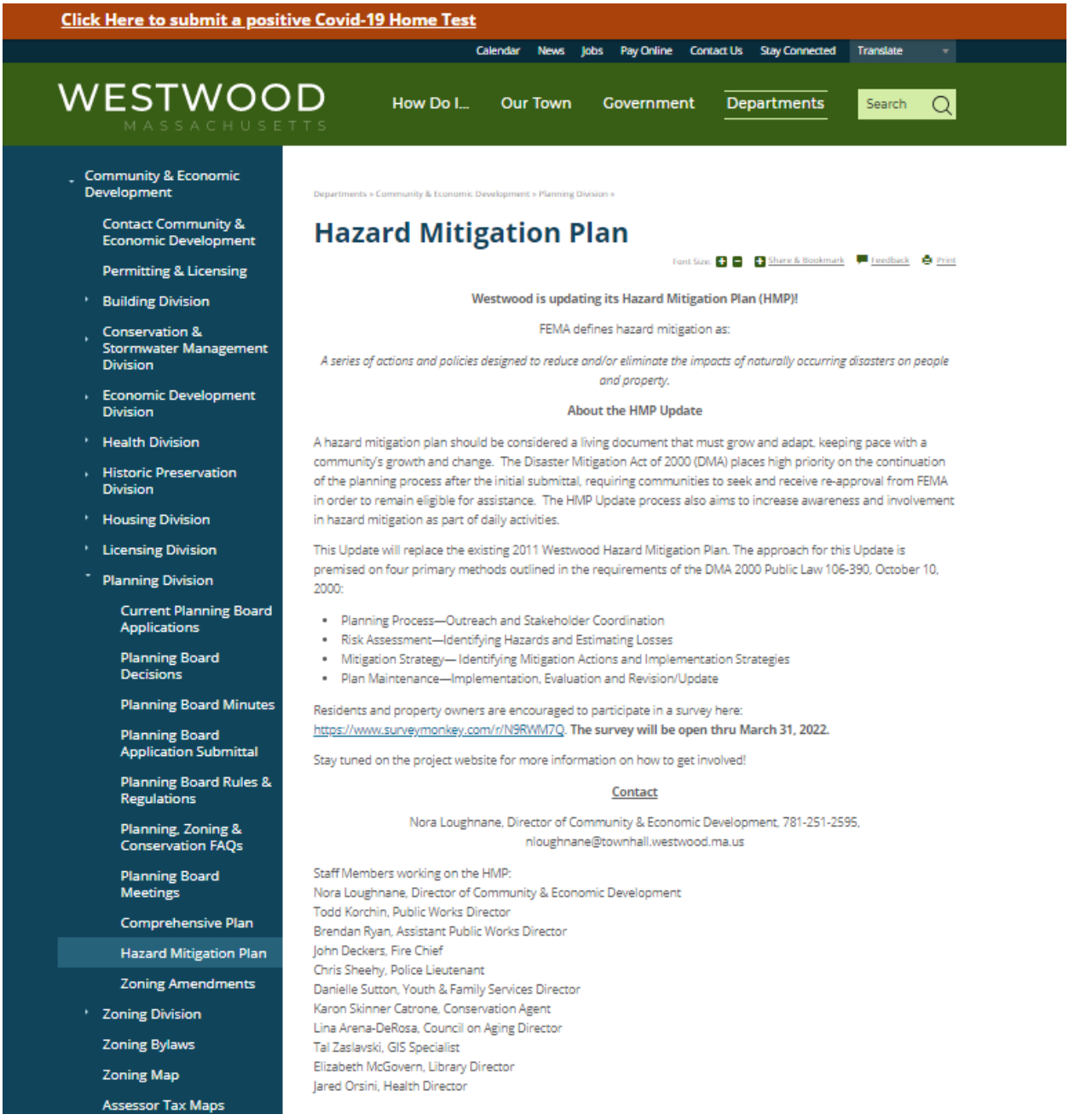
1. Summary of progress and outstanding items from last meeting
    a. (Emily sent out Ch 1-7 and appendices) No comments on draft plan sections, except for Jared Orsini. Chief Deckers circled back on a few items.
    b. Next chapters to review:
        i. Ch6 – mitigation strategy – need input on responsible agency, support, cost, and timeframe
        ii. Ch7 – plan evaluation and maintenance
2. Confirm and schedule meeting dates
    a. September 15 (Thursday), 7-9 for public meeting
    b. Revise draft after public meeting, post draft plan for public review by beginning of September
    c. Present to planning board first meeting in October 10/18, 7pm virtual, coordinate with John about what I should bring to that.
    d. Present to Select board Oct 24. Coordinate with Patricia Healy (Tish) – get adoption certificate ready to be signed at this meeting
3. Review plan evaluation and maintenance section
    a. Put annual MVP/HMP reviews on the annual on-call contract. At least as a reminder. Talk to Christine and Phil.
4. Discuss 2022 Mitigation Goals and Strategies
    a. Added responsible agency, support, cost, and timeframe
5. Discuss public meeting
    a. People will come to talk about infrastructure needs, and climate change
6. Next steps
    a. Complete prioritization matrix – es will send worksheet to committee next week
    b. Public meeting, post draft plan, PB presentation, council presentation
    c. Submit to MEMA/FEMA for review, deliver final approved adopted plan (estimated time mid-November 2022)

PUBLIC ENGAGEMENT AND SURVEY

Below is a record of the publications regarding the HMP process and the requests for input regarding the HMP public survey.

Westwood Town website HMP page, uploaded February 23, 2022:



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WESTWOOD MASSACHUSETTS

How Do I... Our Town Government Departments Search

- Community & Economic Development
  - Contact Community & Economic Development
  - Permitting & Licensing
  - Building Division
  - Conservation & Stormwater Management Division
  - Economic Development Division
  - Health Division
  - Historic Preservation Division
  - Housing Division
  - Licensing Division
  - Planning Division
    - Current Planning Board Applications
    - Planning Board Decisions
    - Planning Board Minutes
    - Planning Board Application Submittal
    - Planning Board Rules & Regulations
    - Planning, Zoning & Conservation FAQs
    - Planning Board Meetings
    - Comprehensive Plan
    - Hazard Mitigation Plan
    - Zoning Amendments
  - Zoning Division
  - Zoning Bylaws
  - Zoning Map
  - Assessor Tax Maps

Departments » Community & Economic Development » Planning Division »

Hazard Mitigation Plan

Font Size: Share & Bookmark Feedback Print

Westwood is updating its Hazard Mitigation Plan (HMP)!

FEMA defines hazard mitigation as:

A series of actions and policies designed to reduce and/or eliminate the impacts of naturally occurring disasters on people and property.

About the HMP Update

A hazard mitigation plan should be considered a living document that must grow and adapt, keeping pace with a community's growth and change. The Disaster Mitigation Act of 2000 (DMA) places high priority on the continuation of the planning process after the initial submittal, requiring communities to seek and receive re-approval from FEMA in order to remain eligible for assistance. The HMP Update process also aims to increase awareness and involvement in hazard mitigation as part of daily activities.

This Update will replace the existing 2011 Westwood Hazard Mitigation Plan. The approach for this Update is premised on four primary methods outlined in the requirements of the DMA 2000 Public Law 106-390, October 10, 2000:

- Planning Process—Outreach and Stakeholder Coordination
- Risk Assessment—Identifying Hazards and Estimating Losses
- Mitigation Strategy— Identifying Mitigation Actions and Implementation Strategies
- Plan Maintenance—Implementation, Evaluation and Revision/Update

Residents and property owners are encouraged to participate in a survey here: https://www.surveymonkey.com/r/N9RWM7Q. **The survey will be open thru March 31, 2022.**

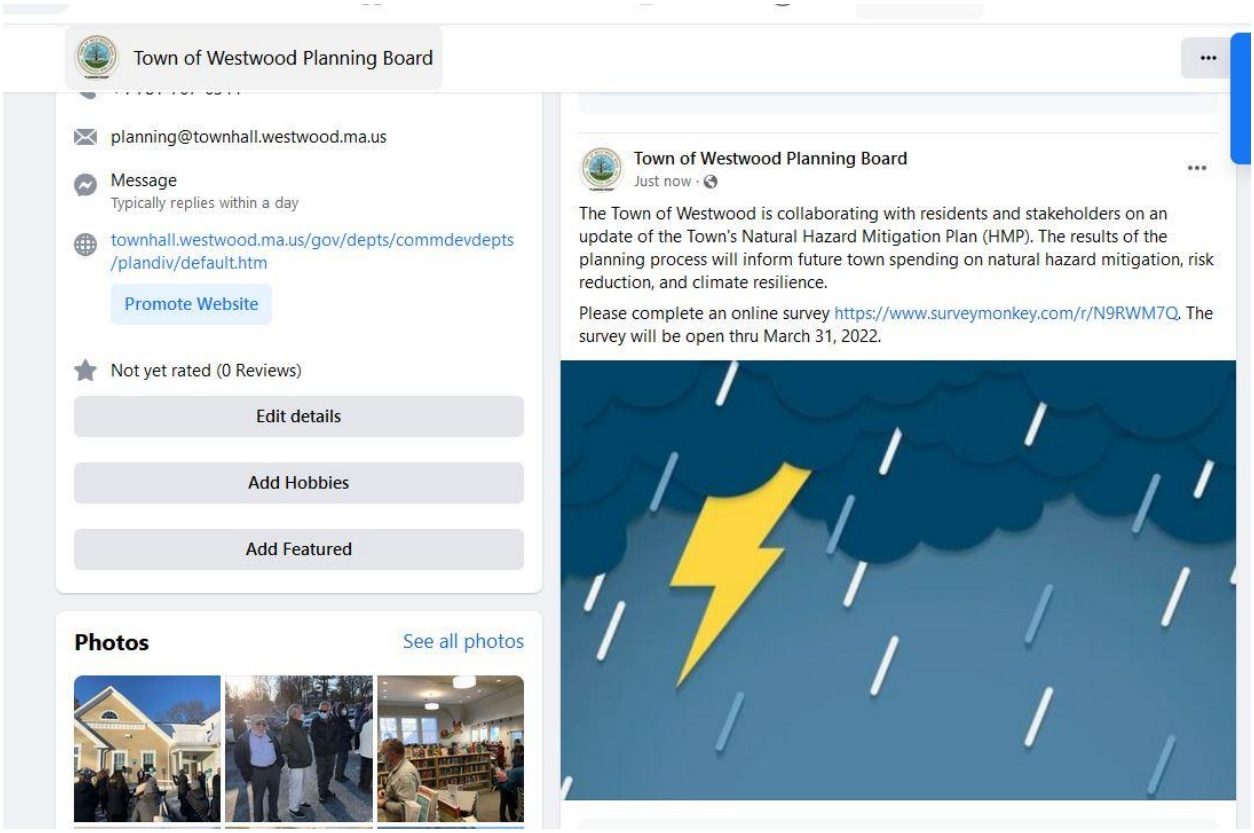
Stay tuned on the project website for more information on how to get involved!

Contact

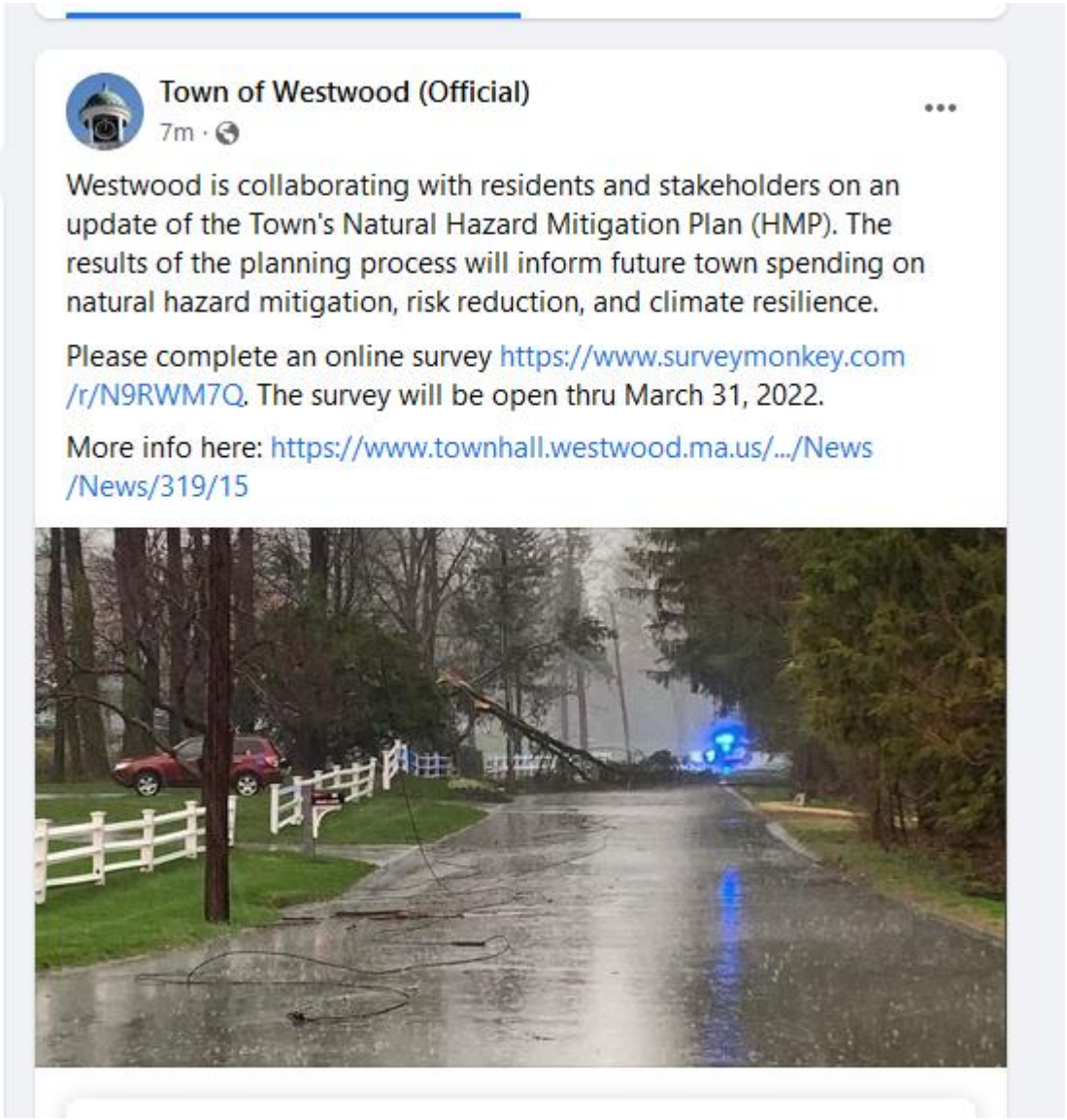
Nora Loughnane, Director of Community & Economic Development, 781-251-2595, nloughnane@townhall.westwood.ma.us

Staff Members working on the HMP:
Nora Loughnane, Director of Community & Economic Development
Todd Korchin, Public Works Director
Brendan Ryan, Assistant Public Works Director
John Deckers, Fire Chief
Chris Sheehy, Police Lieutenant
Danielle Sutton, Youth & Family Services Director
Karon Skinner Catrone, Conservation Agent
Lina Arena-DeRosa, Council on Aging Director
Tal Zaslavski, GIS Specialist
Elizabeth McGovern, Library Director
Jared Orsini, Health Director

Facebook post on the Town of Westwood Planning Board's page on February 23, 2022:



Town of Westwood Official Facebook post regarding the HMP and public survey, February 24, 2022:



Email sent to town regarding the opening of the public survey, February 23, 2022:

Abigail McCabe

From: Abigail McCabe
Sent: Thursday, February 24, 2022 11:27 AM
To: Abigail McCabe
Subject: Westwood Hazard Mitigation Plan Update & Public Survey

Hazard Mitigation Plan Update
Public Survey
PUBLIC INPUT IN PURSUIT OF MORE RESILIENT COMMUNITY

Post Date: 02/23/2022 3:15 PM

WESTWOOD SEEKS PUBLIC INPUT IN PURSUIT OF MORE RESILIENT COMMUNI

The Town of Westwood is collaborating with residents and stakeholders on an update of the T
Natural **Hazard Mitigation Plan** (**HMP**).

This effort relies on stakeholder and public input to develop strategies that will be most effecti
to mitigate natural hazards, reduce vulnerability and adapt to our changing climate.

The results of the planning process will inform future town spending on natural hazard mitigat
reduction, and climate resilience.

As part of a public outreach process, residents are asked to complete an online survey
https://www.surveymonkey.com/r/N9RWM7Q. This survey is one opportunity for you have yc
about why natural hazard mitigation and climate change adaptation matter, what actions you
reduce personal risk, and what you think the Town should do to increase preparedness and re
vulnerability to natural hazards and the impacts of climate change. **The survey will be open th
2022.**

Following tabulation of the survey results, a public workshop will we held (time and date TBD).
workshop will focus on a review of the project team's preliminary recommendations for hazar
strategies.

Survey info and workshop details will be posted to the project webpage here:

https://www.townhall.westwood.ma.us/departments/community-economic-development/hazard-mitigation-plan.

For more information, please contact:

Nora Loughnane, Director of Community & Economic Development, 781-251-2595,
nloughnane@townhall.westwood.ma.us

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The Attorney General has determined that email correspondences are public records unless the content of the email falls with one of the stated exemptions under the Public Records Laws

The Attorney General has determined that email correspondences are public records unless the content of the email falls with one of the stated exemptions under the Public Records Laws

Publication in the Hometown Weekly newspaper regarding the HMP and public survey, published March 10, 2022:

COA releases

8:00 a.m. – Wonder Workout – 9:00 a.m. – 1:00 p.m. – AARP Tax Help – By Appointment Only

Comcast – Channel 8 & 12 – Verizon – Channel 21 & 42

LUNCH -Turkey With Gravy 1:00 p.m. – Knitting – With Louise 1:00 p.m. _ BINGO 1:00 p.m. – Mah Jongg – With Cynthia

NOTICE OF PUBLIC HEARING

TOWN OF WESTWOOD
Commonwealth of Massachusetts

WESTWOOD PLANNING BOARD
Station Dr. (Assessor's Map 33, 014)
University Station – Master Development Plan

The Westwood Planning Board will hold a remote public hearing on **Tuesday, April 12, 2022 at 7:00 PM via at Zoom**, regarding an application filed by 200 Station Owner LLC for a Special Permit pursuant to Section 9.7.12.14 [Master Development Plan Special Permit] and 10.3 [Special Permits] of the Westwood Zoning Bylaw. Proposal is to affect ~2.74 acres located along the southern side of Station Drive, shown within Development Area A on the Modified Master Development Plan, including modifications for the configuration of one of the two office buildings, parking, and landscaping.

The modification proposes to substitute the approved three-story 40,000 SF office building currently shown on the plan, with a five-story ~75,000 SF hotel. Proposal also includes associated parking area and landscaping. The subject property is known as Development Area A of the Modified Master Development Plan for University Station, Westwood, MA 02090 also known as Assessor's Map 33, Lot 14.

The subject property is presently an undeveloped 2.74-acre parcel next to Citizens at 200 Station Drive and located in the UAMUD (University Avenue Mixed Use Overlay) zoning district.

The meeting will be filmed live by Westwood Media Center (WMC) available for viewing on Comcast channel 12 and Verizon channel 42 and on WMC's YouTube. Those wishing to participate are encouraged to use Zoom by following the instructions below or going to https://zoom.us/ clicking on 'join meeting' and entering the webinar ID.

Zoom Link: https://us02web.zoom.us/j/84115713172?pwd=eTJ5cTVjUzZjLzJ4U3R4dFVEUGxKUT09

Enter your Email, Full Name, and Passcode: 388003
Or Toll Free Telephone: 877 853 5257 or 888 475 4499

Webinar ID: 841 1571 3172

The plans and application are available for viewing on the Town's website under "Current Applications Link" for the Planning Board at www.westwoodpermit.org. Interested persons are encouraged to attend the public hearing via Zoom by computer or calling in and make their views known to the Planning Board. You may also submit comments in writing to the Planning Office by email to kflynn@townhall.westwood.ma.us preferably at least three business days in advance to allow time for Board distribution.

Westwood Planning Board

3-10-22

NOTICE OF PUBLIC HEARING

TOWN OF WESTWOOD
Commonwealth of Massachusetts

WESTWOOD CONSERVATION COMMISSION
154 University Avenue, 346A University Avenue, 34 Yale Street, 46 Dartmouth Street

The Westwood Conservation Commission will hold a public hearing on **Wednesday, March 23, 2022 at 7:00 PM.** This will be a remote meeting through Zoom due to the COVID-19 state of emergency and in compliance with the Governor's March 12, 2020 Order suspending certain provisions of the Open Meeting Law MGL C. 30A, §18 and the Governor's March 23, 2020 Emergency Order imposing limitations on the number of people that may gather in one place. Those wishing to participate are encouraged to use Zoom.

Please click the link below to join the webinar:
https://us02web.zoom.us/j/85488574496?pwd=YnU5TTZ0cmdrQlozaDV6RWhKOGw4dz09
Passcode: 902822

Or One tap mobile: US: +13126266799,,85488574496# or +19292056099,,85488574496#
Or Telephone:US: +1 312 626 6799 or +1 929 205 6099

An application has been filed by Dedham-Westwood Water Division for a Determination of Applicability under the Mass. Wetland Protection Act and Westwood Wetland Bylaw. The applicant is proposing the redevelopment and cleaning of four (4) wells owned and operated by Dedham-Westwood Water District. The work is within a wetland recourse area. The properties are located at 154 University Avenue, 346A University Avenue, 34 Yale Street and 46 Dartmouth Street, Westwood, also known as Assessor's Map 33/ Lot 007, Map38/ Lot 011, Map 38/Lot 009 and Map38/Lot 004.

The plans and application are available for viewing on the Town's website under "Current Applications Link" for the Conservation Commission at www.westwoodpermit.org and click on "Conservation Commission Applications".

Individuals wishing to send comments in writing please email the Conservation Commission at kcatrone amccabe@townhall.westwood.ma.us preferably three business days in advance to ensure receipt by all board members.

Westwood Conservation Commission

3-10-22

Westwood updating Natural Hazard Mitigation Plan

The Town of Westwood is collaborating with residents and stakeholders on an update of the Town's Natural Hazard Mitigation Plan (HMP).

This effort relies on stakeholder and public input to develop strategies that will be most effective in Westwood to mitigate natural hazards, reduce vulnerability and adapt to the changing climate.

The results of the planning process will inform future town spending on natural hazard mitigation, risk reduction, and climate resilience.

As part of a public outreach process, residents are asked to complete an online survey at www.tinyurl.com/wwhmpsurvey. This survey is one opportunity for you have your voice heard about why natural hazard mitigation and climate change adaptation matter, what actions you are taking to reduce personal risk, and what you think the town should do to increase preparedness and reduce vulnerability to natural hazards and the impacts of climate change. The survey will be open through March 31, 2022.

Following tabulation of the survey results, a public workshop will we held (time and date TBD). The public workshop will focus on a review of the project team's preliminary recommendations for hazard mitigation strategies.

Survey info and workshop details will be posted to the project webpage at https://www.townhall.westwood.ma.us/departments/community-economic-development/hazard-mitigation-plan.

For more information contact Director of Community & Economic Development Nora Loughnane (781-251-2595, nloughnane@townhall.westwood.ma.us).

Westwood Dems to meet March 10

The Westwood Democratic Town Committee (WDTC) will be conducting its 2022 caucus on Thursday, March 10, for the purpose of electing delegates to the Democratic Convention at the Tsongas Center in Lowell on June 4 – 5.

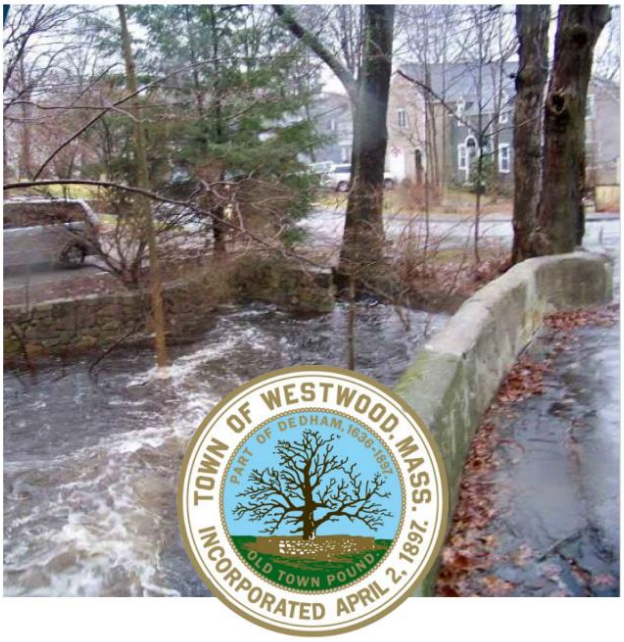
The caucus will begin at 7:15 p.m. and is open to the public. Delegate nominations and voting for delegates is restricted to registered or pre-registered Democratic voters residing in the town of Westwood. Due to the ongoing COVID-19 pandemic, the 2022 WDTC Caucus will be virtual. Registration and delegate nomination forms will be provided at the event. Voting for delegates will be held using ElectionRunner online polling.

As this will be a nominating convention in June, candidates for statewide office will be given an opportunity to speak to the caucus at the beginning of the event.

For details about the caucus and online registration information, email dtcwestwood@gmail.com.

CHECK OUT ANNA'S ATTIC PAGE 18

Flier posted at local election events and on Facebook regarding the public survey, April 11, 2022:



CALLING ALL WESTWOOD RESIDENTS AND PROPERTY OWNERS

We need YOUR input for the Hazard Mitigation Plan (HMP)!

A **hazard mitigation plan** is a living document that must grow and adapt, keeping pace with the community to protect and mitigate against natural hazards. The Westwood HMP Committee is updating Westwood's 2011 HMP to maintain eligibility for FEMA grants and to increase awareness and involvement in hazard mitigation as part of daily activities. A successful HMP update relies on public input, and the Westwood HMP Committee needs your help! Please complete the HMP survey at the link below to make sure your voice is heard!

PLEASE PARTICIPATE IN OUR PUBLIC SURVEY!

https://www.surveymonkey.com/r/N9RWM7Q

Stay tuned on the project website for more information on how to get involved!
https://www.townhall.westwood.ma.us/departments/community-economic-development/hazard-mitigation-plan

Contact

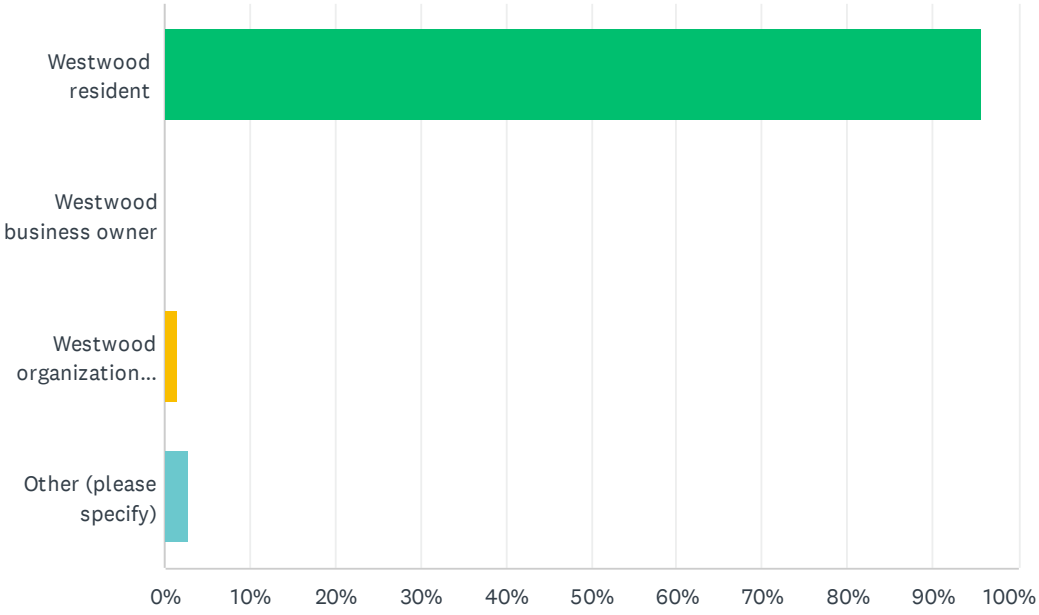
Nora Loughnane, Director of Community & Economic Development, 781-251-2595,
nloughnane@townhall.westwood.ma.us

APPENDIX D: PUBLIC SURVEY RESULTS

Attached is the full summary of the Westwood HMP public survey results. (ATTACHED IN PDF FORM)

Q1 Tell us about yourself. You are a (choose one):

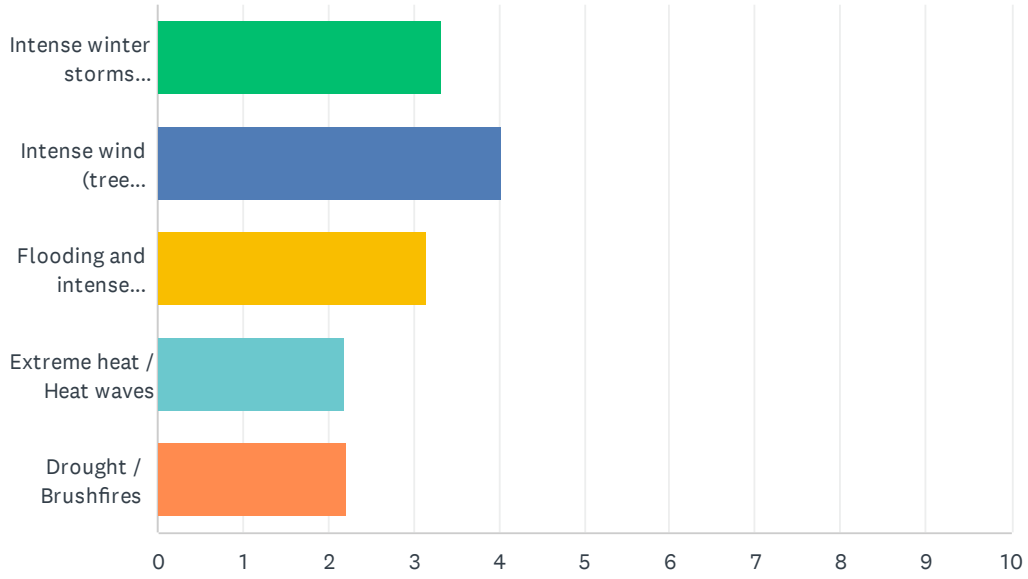
Answered: 72 Skipped: 1



ANSWER CHOICES	RESPONSES	
Westwood resident	95.83%	69
Westwood business owner	0.00%	0
Westwood organization (school, church, non-profit, etc.)	1.39%	1
Other (please specify)	2.78%	2
TOTAL		72

Q2 Many natural hazards may affect Westwood, as listed below. Which of these is most concerning to you? Rank these hazards on a scale of 1 to 5, where 1 is the most concerning and 5 is the least concerning.

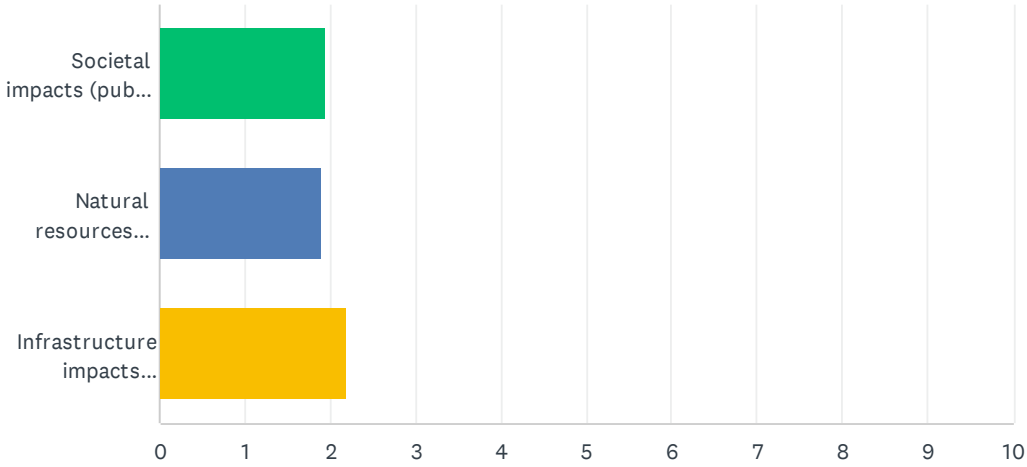
Answered: 72 Skipped: 1



	1	2	3	4	5	TOTAL	SCORE
Intense winter storms (blizzards/ice storms)	22.86% 16	31.43% 22	15.71% 11	15.71% 11	14.29% 10	70	3.33
Intense wind (tree damage/power outages)	42.86% 30	30.00% 21	18.57% 13	4.29% 3	4.29% 3	70	4.03
Flooding and intense rainstorms	17.65% 12	19.12% 13	36.76% 25	13.24% 9	13.24% 9	68	3.15
Extreme heat / Heat waves	7.25% 5	8.70% 6	13.04% 9	39.13% 27	31.88% 22	69	2.20
Drought / Brushfires	7.35% 5	11.76% 8	14.71% 10	27.94% 19	38.24% 26	68	2.22

Q3 Natural hazards can negatively impact the town's infrastructure, its people, and its natural resources. Which category of impacts you are most concerned about? Rank these impacts on a scale of 1 to 3, where 1 is the most concerning and 3 is the least concerning.

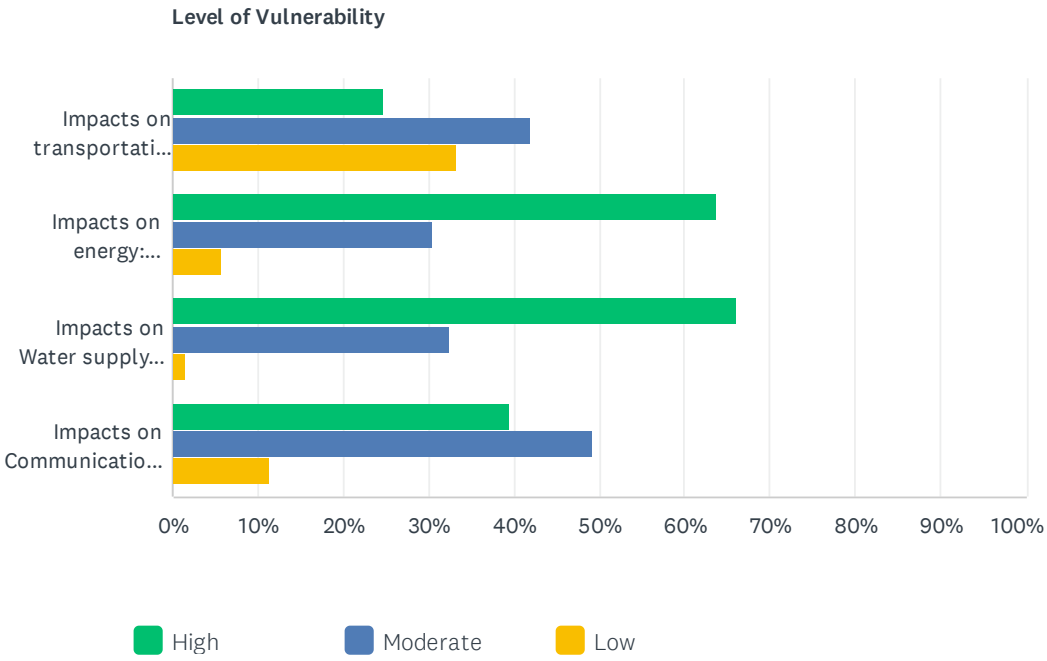
Answered: 72 Skipped: 1



	1	2	3	TOTAL	SCORE
Societal impacts (public health, vulnerable populations, social resilience)	31.94% 23	30.56% 22	37.50% 27	72	1.94
Natural resources impacts (wetlands, rivers, streams, urban trees, wildlife)	26.09% 18	37.68% 26	36.23% 25	69	1.90
Infrastructure impacts (transportation, energy, communications, water)	43.48% 30	31.88% 22	24.64% 17	69	2.19

Q4 Which of the following infrastructural assets and services in Westwood are most vulnerable to natural hazards? Please choose High, Moderate, or Low vulnerability for each.

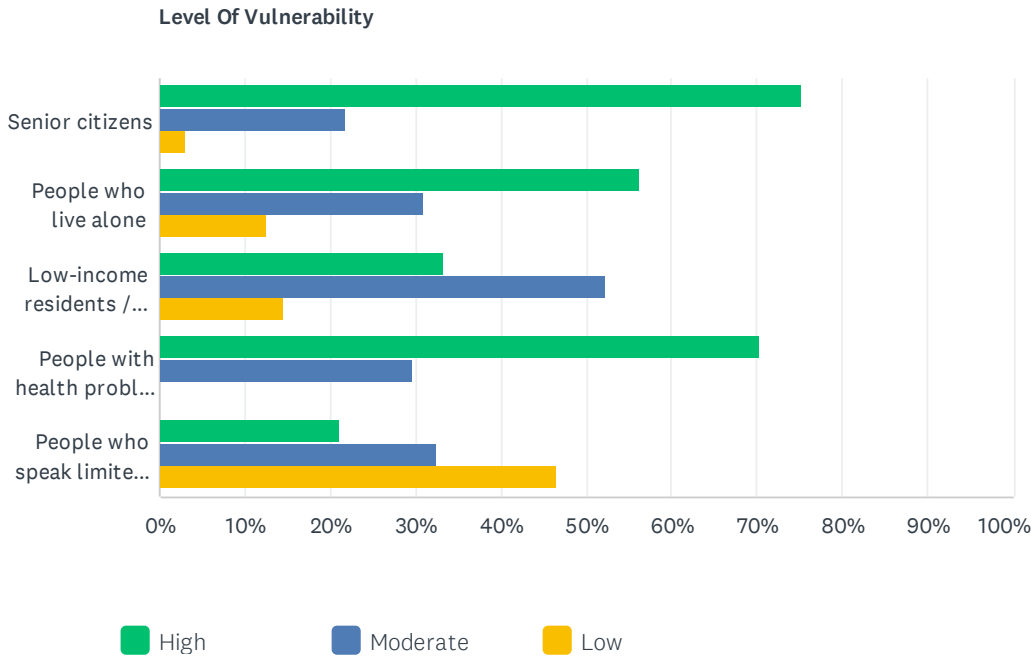
Answered: 71 Skipped: 2



Level of Vulnerability	HIGH	MODERATE	LOW	TOTAL
Impacts on transportation: roads, transit system, sidewalk, pedestrian, bicycle facilities	24.64% 17	42.03% 29	33.33% 23	69
Impacts on energy: electric power outages, delivery of heating oil, natural gas distribution	63.77% 44	30.43% 21	5.80% 4	69
Impacts on Water supply and wastewater services: shortages, pollution, sewer overflows	66.20% 47	32.39% 23	1.41% 1	71
Impacts on Communications: cell phone service, internet connection, cable, telephone	39.44% 28	49.30% 35	11.27% 8	71

Q5 Which of the following groups of people in Westwood are most vulnerable to natural hazards? Please choose High, Moderate, or Low vulnerability for each.

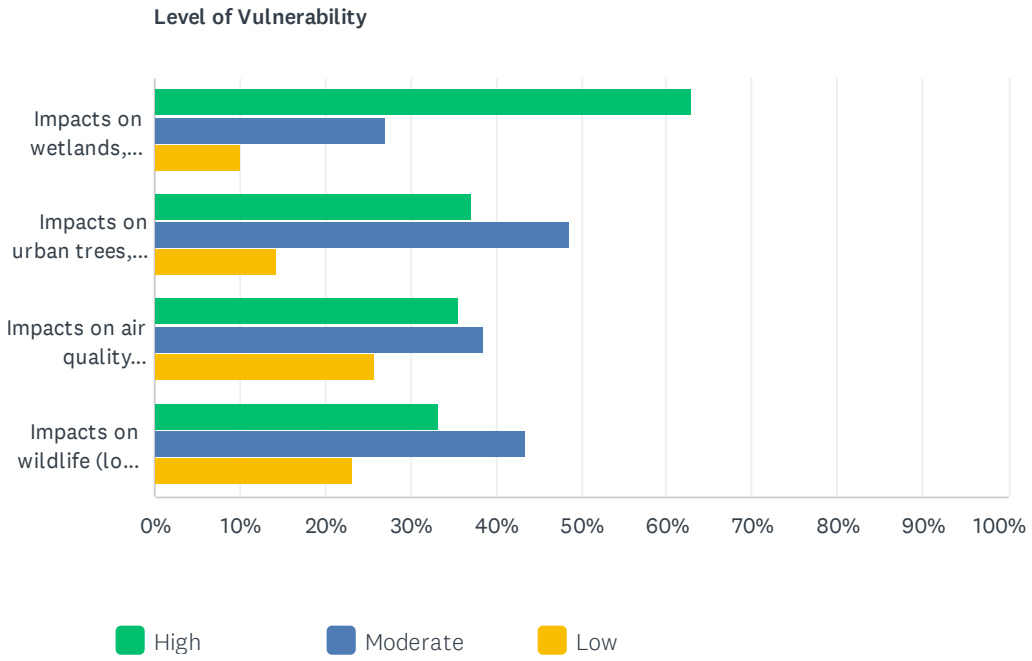
Answered: 71 Skipped: 2



Level Of Vulnerability	HIGH	MODERATE	LOW	TOTAL
Senior citizens	75.36% 52	21.74% 15	2.90% 2	69
People who live alone	56.34% 40	30.99% 22	12.68% 9	71
Low-income residents / public housing residents	33.33% 23	52.17% 36	14.49% 10	69
People with health problems (asthma, reliance on medical devices)	70.42% 50	29.58% 21	0.00% 0	71
People who speak limited English	21.13% 15	32.39% 23	46.48% 33	71

Q6 Which of the following natural resources in Westwood are most vulnerable to natural hazards? Please choose High, Moderate, or Low vulnerability for each.

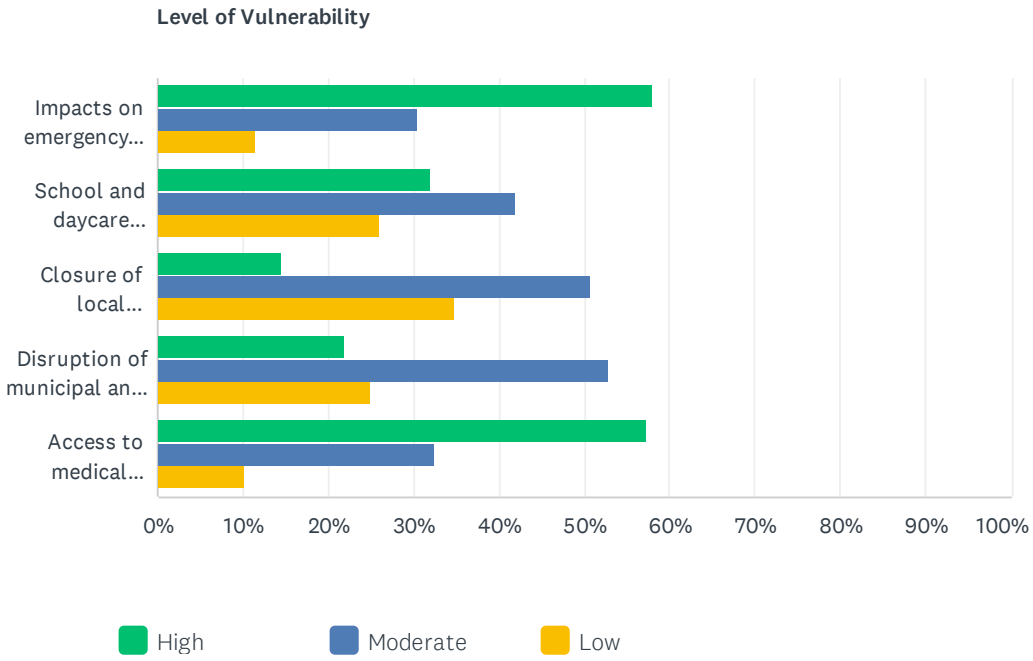
Answered: 70 Skipped: 3



Level of Vulnerability	HIGH	MODERATE	LOW	TOTAL
Impacts on wetlands, rivers and streams (floods, droughts, pollution, recreation areas)	62.86% 44	27.14% 19	10.00% 7	70
Impacts on urban trees, parks and open space (tree diseases, pests, invasive species)	37.14% 26	48.57% 34	14.29% 10	70
Impacts on air quality (pollution, unhealthy air quality, asthma)	35.71% 25	38.57% 27	25.71% 18	70
Impacts on wildlife (loss of wildlife habitat, reduced wildlife diversity and populations)	33.33% 23	43.48% 30	23.19% 16	69

Q7 Which of the following services, businesses, and municipal operations in Westwood are most vulnerable to natural hazards? Please choose High, Moderate, or Low vulnerability for each.

Answered: 69 Skipped: 4



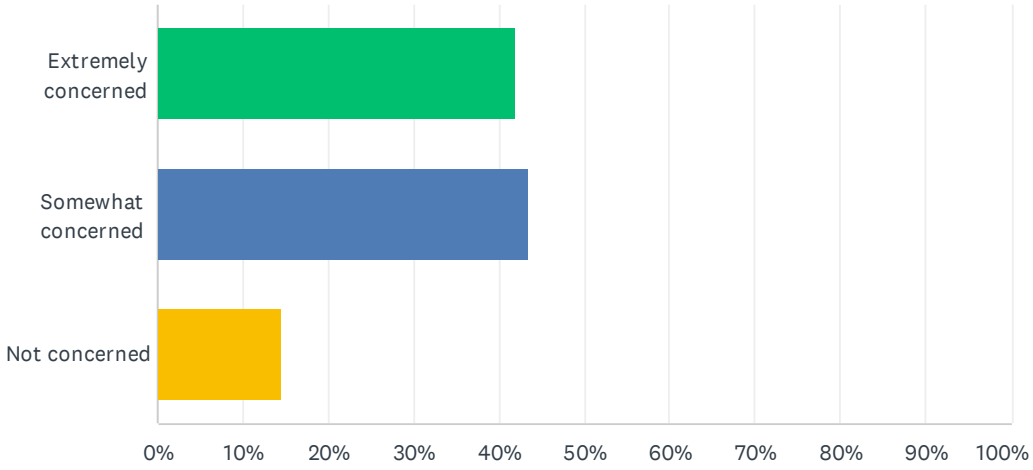
Level of Vulnerability	HIGH	MODERATE	LOW	TOTAL
Impacts on emergency services	57.97% 40	30.43% 21	11.59% 8	69
School and daycare closures	31.88% 22	42.03% 29	26.09% 18	69
Closure of local businesses	14.49% 10	50.72% 35	34.78% 24	69
Disruption of municipal and social services	22.06% 15	52.94% 36	25.00% 17	68
Access to medical services	57.35% 39	32.35% 22	10.29% 7	68

Q8 Are there any specific locations, facilities, or resources in Westwood that you are most concerned about being impacted by natural hazards? Please write your answer in the space below.

Answered: 50 Skipped: 23

Q9 How concerned are you about the impacts of climate change for Westwood as a whole? Please choose one.

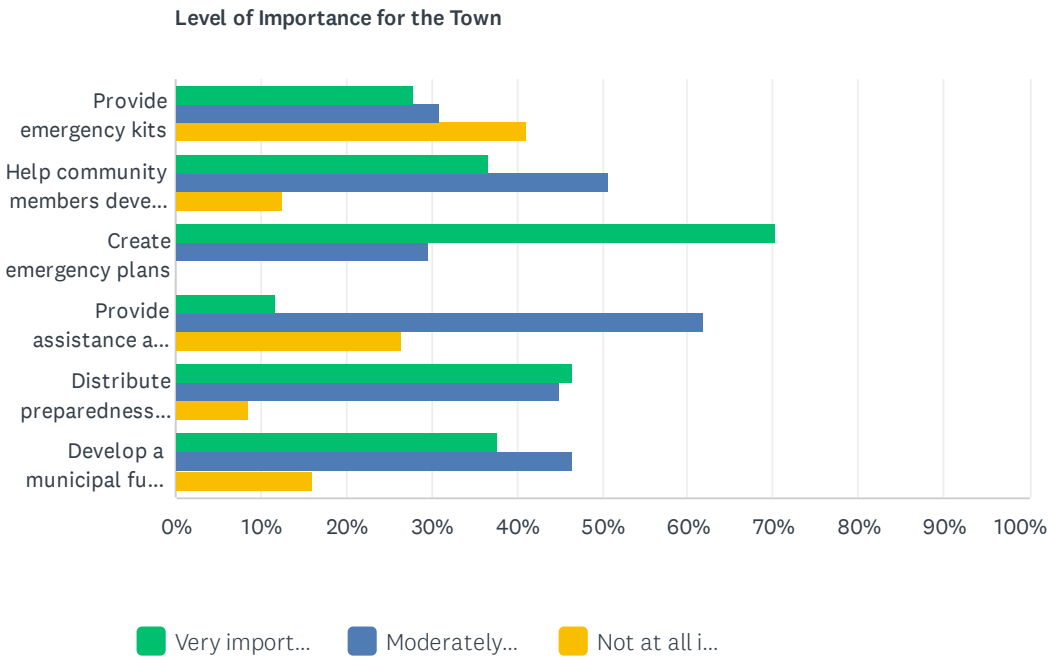
Answered: 69 Skipped: 4



ANSWER CHOICES	RESPONSES	
Extremely concerned	42.03%	29
Somewhat concerned	43.48%	30
Not concerned	14.49%	10
TOTAL		69

Q10 What do you think the most important thing the Town should do to help residents and businesses prepare for and reduce vulnerabilities to natural hazards and the impacts of climate change? Under “Level of Importance,” please choose Very important, Moderately important, or Not at all important.

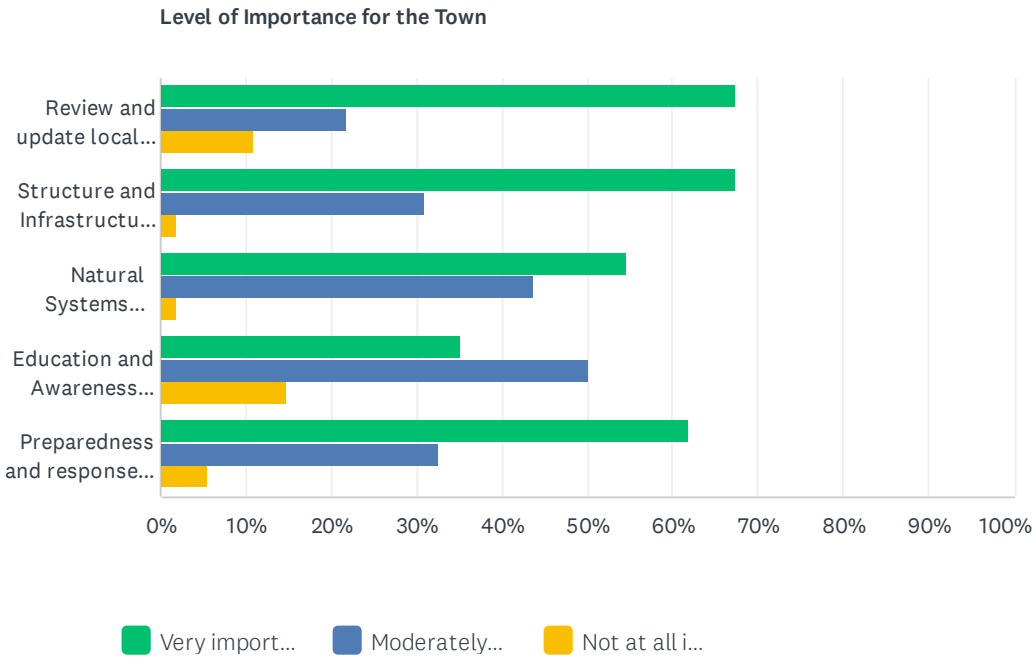
Answered: 71 Skipped: 2



Level of Importance for the Town				
	VERY IMPORTANT	MODERATELY IMPORTANT	NOT AT ALL IMPORTANT	TOTAL
Provide emergency kits	27.94% 19	30.88% 21	41.18% 28	68
Help community members develop personal emergency plans	36.62% 26	50.70% 36	12.68% 9	71
Create emergency plans	70.42% 50	29.58% 21	0.00% 0	71
Provide assistance and information to residents and businesses about flood insurance	11.76% 8	61.76% 42	26.47% 18	68
Distribute preparedness information	46.48% 33	45.07% 32	8.45% 6	71
Develop a municipal fund specifically for natural hazard mitigation	37.68% 26	46.38% 32	15.94% 11	69

Q11 What types of mitigation actions do you think are most important for the Town to pursue to reduce vulnerabilities to natural hazards and the impacts of climate change? Under “Level of Importance,” please choose Very important, Moderately important, or Not at all important.

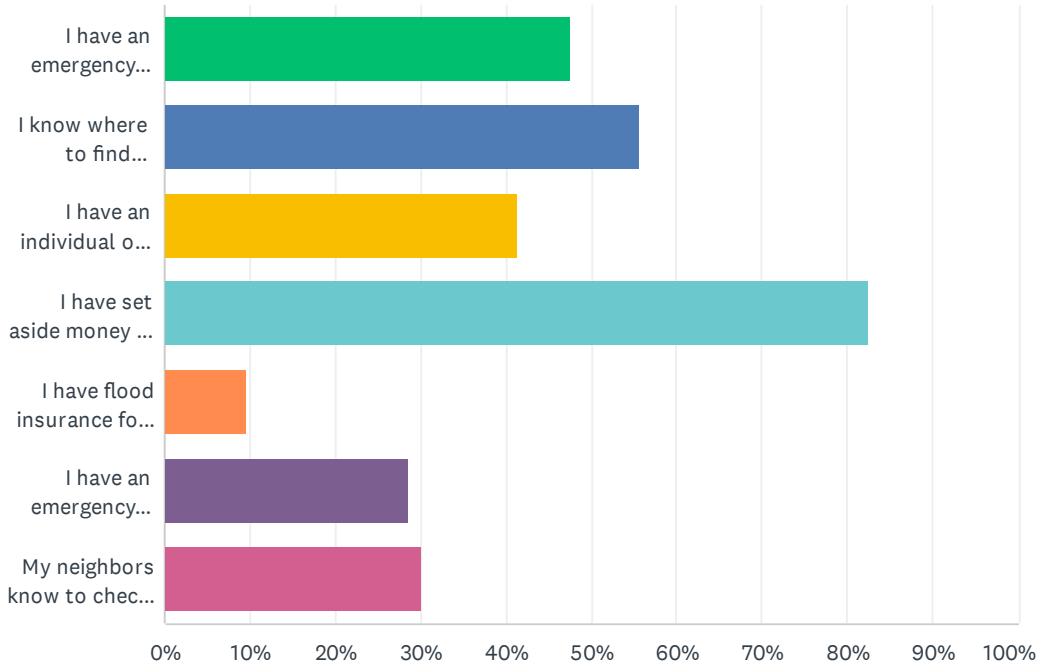
Answered: 55 Skipped: 18



Level of Importance for the Town	VERY IMPORTANT	MODERATELY IMPORTANT	NOT AT ALL IMPORTANT	TOTAL
Review and update local plans and regulations (eg. Subdivision regulations, Capital improvement programs, Open space preservation, Stormwater management regulations, etc.)	67.27% 37	21.82% 12	10.91% 6	55
Structure and Infrastructure Projects (eg. Acquisitions and elevations of structures in flood prone areas, Utility undergrounding, Structural retrofits, Floodwalls and retaining walls, Detention and retention structures, Culverts, etc.)	67.27% 37	30.91% 17	1.82% 1	55
Natural Systems Protection (eg. Sediment and erosion control, Stream corridor restoration, Forest management, Conservation easements, Wetland restoration and preservation, etc.)	54.55% 30	43.64% 24	1.82% 1	55
Education and Awareness Programs (eg. Radio or television spots, Websites with maps and information, Real estate disclosure, Presentations to school groups or neighborhood organizations, Mailings to residents in hazard-prone area, etc.)	35.19% 19	50.00% 27	14.81% 8	54
Preparedness and response actions (eg. Creating mutual aid agreements with neighboring communities to meet emergency response needs, Purchasing radio communications equipment for the Fire Department, Developing procedures for notifying citizens of available shelter locations during and following an event)	61.82% 34	32.73% 18	5.45% 3	55

Q12 Which of the following natural hazard preparedness measures have you taken for your home or business? Please check any that apply.

Answered: 63 Skipped: 10

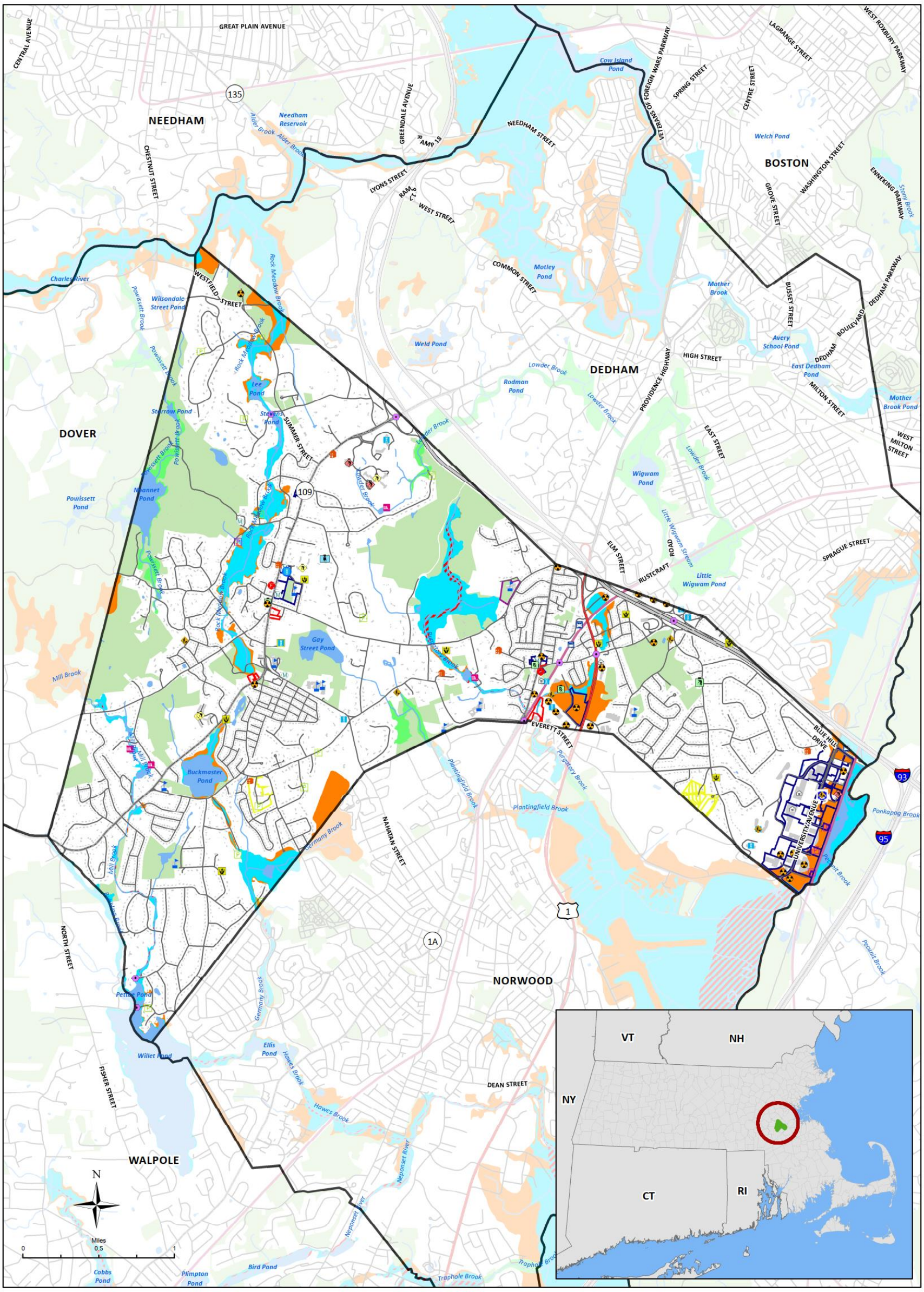


ANSWER CHOICES	RESPONSES	
I have an emergency supply kit	47.62%	30
I know where to find preparedness information	55.56%	35
I have an individual or family emergency plan	41.27%	26
I have set aside money for emergencies	82.54%	52
I have flood insurance for my home or business	9.52%	6
I have an emergency generator for my home or business	28.57%	18
My neighbors know to check on me	30.16%	19
Total Respondents: 63		

Q13 What do you think the most important thing the Town should do to reduce future damages from natural hazards? Please write your answer in the space below.

Answered: 57 Skipped: 16

APPENDIX E: NATURAL HAZARD AND VULNERABILITY MAP



WESTWOOD, MA
Hazard Mitigation Plan

Critical Facilities w. FEMA Flood Zones

Source:
MassGIS, 2017. National Flood Hazard, FEMA.
MassGIS, 2022. Roads, MassDOT.
MassGIS, 2022. Trains, CTPS.
MassGIS, 2022. Protected & Recreational Open Space, EOEEA.
Town of Westwood, 2022. Development Areas, Manual Input.
Town of Westwood, 2022. Critical Facility, Manual Input.
*Critical Facilities Explained in Text Document

This map is intended for planning purposes only
Date: 6/20/2022

Legend

Critical Facility
- Adult Daycare Facility
- Assisted Living Facility
- Bridge
- Childcare Facility
- Communication Tower
- Dam
- Fire Station
- Grocery Store
- Group Home
- Hazardous Material Site
- Municipal Facility
- Pharmacy
- Police Station
- School
- Senior Housing
- Sewer Pump Station
- Transportation
- Utility Operations
- Water Operations
- Water Pump Station
- Water Storage Tank

Road Type
- Interstate
- U.S. Route
- State Route
- Street
- Railroads

Development Area Status
- Existing
- Future
- Potential
- Under construction

FEMA Flood Zone
- A: no BFE
- AE: with BFE
- AE: Regulatory Floodway
- X: 0.2%
- MassGIS Protected and Recreational Open Space

APPENDIX F: MITIGATION ACTION PRIORITY RANKING

Please see attached PDF.

Westwood, MA Hazard Mitigation Action Prioritization		Benefits					Feasibility				Economic		Regulatory		
	Enter 1, 2, or 3 in each empty cell responding to each column header **3=Very true/Best/Most Benefit/Least Cost/Easy or no permitting;** **2=Somewhat true/Some benefit/Moderate Cost/Potential permitting complications;** **1=Not true/Little to no benefit/Expensive**	Protects Properties and Structures	Protects Natural Resources	Improves Technical Capacity (eg. Training, Evaluations, Regulations, etc.)	Improves Public Awareness	Improves Emergency Response or Public Protection After an Emergency	Appropriate Staffing Available	Technically Feasible	Has Public Support	Has Town/ Political Support	Cost	Funding Available / Attainable	Permitting/ Regulatory Feasibility	Consistent with Local, State, & Federal Goals	
	Action														**Final Total Ranking**
1	Update the Westwood Comprehensive Emergency Management Plan to include sections on disaster/storm debris management, hazardous materials response, and more.	2	2.25	2.5	2	2.25	2.25	2.5	2	2	2	2	2	2.25	28
2	Institutionalize HMP implementation into ongoing town operations	2	2	2	1.5	2	2	2	2	2	2	2	2	2	25.5
3	Conduct an annual review of mitigation and resilience progress	2.75	2.75	2.75	1.25	2.75	2	2.5	2	2	2	2	2	2	28.75
4	Continue annual 5-year capital improvement planning process and incorporate high priority mitigation actions from this HMP.	2.75	2.25	2.25	2.25	2.75	2	2	2	2	2	2	2	2	28.25
5	Expand community risk reduction program (Neighbors Helping Neighbors) to provide information on brushfires.	2.75	2.75	2.75	2.75	2.75	2	2.5	2	2	2	2	2	2	30.25
6	Hydrant system evaluation	2.75	2.25	2.25	1.75	2.75	2.25	2	2	2	2	2	2.25	2	28.25
7	Revitalize 2017 efforts related to Town outreach to local dam owners	3	3	1.75	2.5	2.5	1.75	2.25	2	2.25	1.75	1.75	2.25	1.75	28.5
8	Encourage drought tolerant landscape design for all new development and redevelopment by requiring or providing incentives for xeriscaping (using drought-tolerant practices)	3	3	2	2.5	2.25	2.25	2.25	2.25	2.25	2.25	1.75	2	2	29.75
9	Continue to broaden public education around stormwater to broaden awareness and build community support for municipal investment in stormwater infrastructure improvements.	3	3	2.25	3	3	2.25	2.25	2.25	2.25	2.25	2	2	2	31.5
10	Update local floodplain management regulations.	2.5	2.5	2.5	2	2.5	2.25	2.25	2.25	2.25	2	1.75	2	2	28.75
11	Develop and disseminate public educational materials about managing beaver dams.	3	3	2.25	2.75	2.5	2	2.25	2.25	2.25	2.25	2.25	2	2	30.75

12	Create a local Climate Action Plan (as recommended in the Westwood Comprehensive Plan) to develop climate mitigation policies and programs, not just adaptation responses, to reduce GHG emissions across town.	3	3	2.75	2.5	2	2.25	1.75	2.25	2.25	2.25	2.25	2	2	30.25
13	Continuation of Open Space Protection and Land Acquisition as specified in the 2019 Westwood OSRP.	2.5	2.5	2.5	2.5	2	1.75	2	2	2	2	2	2.25	2	28
14	Develop a tree planting policy to maintain and enhance the town's tree canopy.	2.5	3	2.5	2.5	1.5	2	2.25	2.25	2.25	2.25	2	2.25	2.25	29.5
15	Revise Westwood Wetlands bylaw and regulations used to enforce the bylaw to apply updated rainfall requirements and require all development plans be designed to NOAA Atlas 14.	2.5	2.5	2.5	2.5	2.5	2.5	2.25	2	2.25	2.25	1.75	2	2	29.5
16	Continue and complete the town-wide stormwater drainage master plan (currently underway) and prioritize implementation of recommended solutions.	2.75	2.75	2.25	1.75	2.75	2	2.5	2	2	2	2	2	2	28.75
17	Coordinate with Eversource to protect power lines and infrastructure and reduce incidences of power outages during storm events.	2.75	1.5	1.75	1.25	2.75	2.25	2.5	2	2	2	2	2	2	26.75
18	Assess municipal buildings (including schools) for susceptibly to snow loads to prevent roof collapse during winter storms.	2.75	1.5	2.25	1.25	2.75	2.25	2.75	2	2.25	2	2	2.25	2	28