2025

Hazard Mitigation Plan
Douglas, Massachusetts

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Douglas, MA Hazard Mitigation Plan 2025 Update
Douglas, Massachusetts

Acknowledgements

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Formal Adoption Letter
(Board of Selectmen)
Comes after MEMA/FEMA approval of DRAFT

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1.0 INTRODUCTION

1.1 Hazard Mitigation Planning Overview

Natural hazard mitigation planning is the process of determining how to reduce or eliminate the loss of life and property damage resulting from natural hazards such as floods, high winds, winter storms, and hurricanes. Hazard mitigation means to permanently reduce or alleviate the losses of life, injuries and property resulting from natural hazards through long-term strategies. These long-term strategies include planning, policy changes, programs, projects, and other activities.

This update was prepared pursuant to the requirements of the Disaster Mitigation Act (DMA) of 2000 (Public Law 106-390) and the implementing regulations set forth by the Interim Final Rule published in the *Federal Register* on February 26, 2002 (44 CFR §201.6) and finalized on October 31, 2007 (hereafter, these requirements and regulations will be referred to collectively as the Disaster Mitigation Act). While the act emphasized the need for mitigation plans and more coordinated mitigation planning and implementation efforts, the regulations established the requirements that local hazard mitigation plans must meet in order for a local jurisdiction to be eligible for certain federal disaster assistance and hazard mitigation funding under the Robert T. Stafford Disaster Relief and Emergency Act (Public Law 93-288). Because the Town of Douglas is subject to many kinds of hazards, access to these programs is vital.

Information in this 2025 Update will be used to help guide and coordinate mitigation activities and decisions for local land use policy in the future. Proactive mitigation planning will help reduce the cost of disaster response and recovery to the community and its property owners by protecting critical community facilities, reducing liability exposure, and minimizing overall community impacts and disruption. Douglas has been affected by hazards in the past and is thus committed to reducing future disaster impacts and maintaining eligibility for federal funding.

The Town received a FEMA grant to develop a local hazard mitigation plan (HMP) update.

1.2 Plan Purpose

New England weather is renowned for its mercurial and dramatic nature. Late summer hurricanes, major winter blizzards, and summer droughts are all part of climactic atmosphere in Central Massachusetts. These occur frequently enough to be familiar scenes to residents of Douglas. The intersection of these natural hazards with the built environment can transition these routine events into classified natural disasters. Since many towns historically developed along waterways as a corridor for transportation and power, they have evolved into riverine floodplains. The historical development pattern of Central Massachusetts makes the likelihood of a devastating impact of a natural disaster more likely.

This plan identifies the natural hazards facing the Town of Douglas, assesses the vulnerabilities of the area's critical facilities, infrastructure, residents, and businesses, and presents

recommendations on how to mitigate the negative effects of typical natural hazards.

This effort has drawn from the knowledge of local municipal officials and residents, and the recommendations presented are intended to be realistic and effective steps for mitigating natural hazards. Implementation of these actions will translate into savings – fewer lives lost, less property destroyed, and less disruption to essential services.

1.3 Mission Statement

Douglas's population and land use are changing, and climate risks are growing. In that context, the mission of the Douglas Hazard Mitigation Plan is to plan effectively to reduce risks and protect the whole community.

1.4 Goals

The Douglas LHMT identified the following over-arching goals for the 2025 HMP Update:

1. Protect the public's health, safety and welfare.
2. Minimize social distress and economic losses/business disruptions from hazards.
3. Reduce property damage caused by natural hazards and their downstream impacts, including dam failure.
4. Provide an ongoing forum for the education and awareness of natural hazard mitigation issues, programs, policies, projects, and resources.
5. Adapt to/mitigate for the existing and projected impacts of climate change towards a sustainable, resilient community.
6. Protect the community's assets, including the town's cultural, historical, and natural/environmental assets from hazards.

Additionally, Douglas is currently at the beginning of an update to the town master plan. This Hazard Mitigation Plan will inform that effort as well.

1.5 Planning Process

The DMA of 2000 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 evaluation, revision and update process are also a means to create an institutional awareness and involvement in hazard mitigation as part of daily activities.

The Town of Douglas, with the assistance of the Horsley Witten Group, Inc. (HW) developed this 2025 HMP Update. Representatives from various municipal departments in Douglas, in addition to community members, were solicited for participation on the LHMT.

Members of the Douglas LHMT include:

- Matthew Benoit – Director of Community Development (former)
- John Charbonneau – Director of Community development (current)

- Mark Dunleavy – Patrolman/Information Technology
- Ken Frasier – Building Commissioner
- Adam Furno – Superintendent, Highway Department
- John Furno – Fire Chief
- Kristin Harris – Board of Health
- Kelly Manning – Deputy Fire Chief/Project Manager
- Nick Miglionico – Police Chief
- Robert Sullivan – System's Manager Water/Sewer Department
- Matt Wojcik – Town Administrator
- Gabriella Spitzer – Environmental Planner, Horsley Witten Group, Inc.
- Craig Pereira – Project Manager, Horsley Witten Group, Inc.

HW conducted a series of meetings from September 2023 through August 2025 with the Douglas LHMT, municipal officials, the community, and representatives of MEMA. The public workshops were held in an open public forum and in accordance with M.A.G.L. c. 30A, Sections 18 - 25 in complying with the requirements of the Federal DMA of 2000.

A project webpage was designed and hosted on the Town's municipal website to announce the project, inform and engage the community before, during and after plan development, and to serve as a repository of project documents, presentations, and summaries (https://douglas-ma.gov/752/Hazard-Mitigation-Plan). A PDF of the project webpage layout is included in Appendix B.

2017 Plan Report Card

The Town of Douglas has been proactive in implementing mitigation actions included in the 2017 plan. A summary of the status of each is provided below.

STRUCTURE & INFRASTRUCTURE

Tree trimming and tree wire installation needed across town to protect utility wires. Repeat every four years.

- Completed

Identify/Resolve issues causing flooding on Wallis St. on west side of Whitin Reservoir (100-year flood zone).

- Not completed due to lack of funding and municipal personnel capacity
- Carry forward into the 2025 Update…consolidated into one comprehensive roadway flooding action

Identify/Resolve issues causing flooding on Wallis St. near stream between Whitin Reservoir and Bad Luck Lake. Upgrade undersized, old, stone culvert.

- Not completed due to lack of funding and municipal personnel capacity
- Carry forward into the 2025 Update…consolidated into one comprehensive roadway flooding action

Identify/Resolve issues causing flooding on Walnut Street (100-year flood zone).

- Not completed due to lack of funding and municipal personnel capacity
- Carry forward into the 2025 Update…consolidated into one comprehensive roadway flooding action

Identify/Resolve issues causing flooding on Charles St. (100-year flood zone). Upgrade undersized culvert.

- Not completed due to lack of funding and municipal personnel capacity
- Carry forward into the 2025 Update…consolidated into one comprehensive roadway flooding action

Identify/Resolve issues causing flooding on North Street and Gilboa Street (100-year flood zone). Upgrade drainage system.

- Completed

Obtain 60kw generator for Water Booster Station at 102 Main Street.

- Not completed due to lack of funding and municipal personnel capacity
- Carry forward into the 2025 Update…consolidated into one comprehensive infrastructure generator action

Obtain portable generator for: Water Pump Station at 29 West Street for chemical feed and monitoring equipment purposes, and also the Sewer Pump Station at 120 Gilboa Street.

- Partially completed (Sewer pump station permanent standby generator in place). Part of agreement with CRG Warehouse, awaiting occupancy permit to start project (chemical feed/monitoring is needed for backup) and order portable generator.
- Carry forward remaining work into the 2025 Update…consolidated into one comprehensive infrastructure generator action

The Town should investigate the cause of losing pressure in hydrants, and back system up, to ensure adequate fire-fighting capabilities.

- Partially completed (high-hazard areas addressed: Gilboa Street). Other areas (Depot Street, Caswell Court, Upper North Street) in 2025.
- Remove

Establish a private/ham radio frequency to communicate available resources, evacuation, and other pertinent information to residents quickly and effectively if power goes down.

- Not completed due to lack of funding and municipal personnel capacity

- Carry forward into the 2025 Update

PREPAREDNESS, COORDINATION, AND RESPONSE

As Douglas is at the end of National Grid's electric distribution system and therefore takes longer to restore power, create a plan to distribute water to residents in the event of a prolonged power outage.

- Completed

Continue to participate in National Flood Insurance Program (NFIP) or other training offered by the State and/or FEMA that addresses flood hazard planning and management.

- Completed

Investigate Community Rating System (CRS) benefits and requirements and decide whether to participate.

- Not completed due to lack of funding and municipal personnel capacity
- Remove: LHMT determined no longer valid/relevant

Road information coordination and planning for snow removal.

- Completed

Evacuation Plan updates.

- Not completed due to lack of funding and municipal personnel capacity.
- Remove: Evacuation routes to remain fluid based on type of event/time of event/severity of event.

Maintain fire access roads in Douglas Forest and isolated areas.

- Completed

EDUCATION & AWARENESS

Provide information to residents and businesses on severe snowstorms, ice storms, nor'easters, severe thunderstorms, high winds, tornadoes, lightning, and flooding, hurricanes, tropical storms, and microbursts. Information should include evacuation procedures and encourage the acquisition of additional gasoline, water, and other resources should traffic prevent proper evacuation. Incorporate this information into school programs for students to bring home information to parents.

- Completed

Provide information to residents and businesses on droughts and water conservation through low-impact landscaping and other measures (to conserve water for firefighting). Integrate lessons from Mass Audubon. Incorporate into school programs for students to bring home

information to parents.

- Completed

Provide information to residents and businesses, possibly through town-wide mailings, about proper brush and tree clearance, and other firefighting measures.

- Completed

Provide information to residents and businesses on earthquakes, building code construction standards, shelters, and other pertinent information.

- Completed

Provide information to animal-owning residents about Central Mass Disaster Animal Response Team's resources, including evacuation best practices, in case of an emergency.

- Completed

Provide information to residents and businesses on generator safety and usage in the event of a power outage.

- Completed

LOCAL PLAN AND REGULATIONS

Use MA Drought Management Plan as a template for Town's own drought plan and integrate State's recommendations and actions according to Town's needs.

- Not completed due to lack of funding and municipal personnel capacity
- Carry Forward into 2025 Update

Review and update local plans and development review processes (planning, zoning, stormwater management, conservation, etc.) to ensure new construction will not be affected by hazards.

- Completed

Monitor implementation of Hazard Mitigation Plan.

- Completed

Municipal Integration

Since the completion of the 2017 Plan, the Town of Douglas has successfully implemented findings from the 2017 Local Hazard Mitigation Plan into the following policy, programmatic areas and plans:

- Town of Douglas Open Space and Recreation Plan, 2023
- Municipal Vulnerability Preparedness Summary of Findings, May 2020
- Subdivision Rules and Regulations
- Zoning Bylaw, October 2002

- Stormwater Management Program, June 2019
- Douglas Master Plan (2025 update in progress)
- Illicit Discharge Detection and Elimination Plan, June 2019

The Douglas Planning Board is the primary Town agency responsible for regulating development in town. Feedback to the Planning Board was ensured through the participation of the Town Administrator and the Director of Community Development on the LHMT. In addition, the Central Massachusetts Regional Planning Commission (CMRPC), the State-designated regional planning authority for Douglas, works with all agencies that regulate development in its region, including the municipal entities listed above and state agencies, such as the Department of Conservation and Recreation (DCR) and the Massachusetts Department of Transportation (MassDOT). This regular involvement ensured that during the development of the 2025 HMP update, the operational policies and any mitigation strategies or identified hazards from these entities were incorporated.

The Douglas LHMT first met on September 20, 2023, to kick off the HMP update. At this meeting, the LHMT confirmed its membership, reviewed the project scope and schedule, discussed project coordination, reviewed the list of hazards to be profiled, identified data needs, and initiated completion of the hazard index and 2017 plan report card. A complete set of meeting materials is included in Appendix B.

The Douglas LHMT met for a second time on April 10, 2024. At this meeting, the LHMT continued to work on the completion of the 2017 Plan report card, ranked the hazards to be profiled, discussed resolution of the critical facilities/vulnerable populations data set, and discussed data needs for dams located in the community. A complete set of meeting materials is included in Appendix B.

The first Public Workshop was held on February 12, 2025, at the Douglas Municipal Center. To ensure participation from underserved and vulnerable populations, announcements were posted on the Town's website, project webpage, and emailed to all Douglas departments, boards, commissions, and interested citizens. Targeted emails also went out to area stakeholders including:

- Paul Caouette – Whitin Reservoir Watershed District
- Tony Berthod and residents - Hayward Landing Apartments
- Chief Roy Liard – District 7 Fire Warden
- Jenna Gould – Blackstone Valley Partnership for Public Health
- Jim Hallihan – 3 Cook Street Apartment Building
- Agnieszka Podstawka – Public Health Nurse
- Tyler Desautels – Fire Patrolman, MA Bureau of Forest Fire Control – District 7

The presentation included an overview of the mitigation process and Hazard Index followed by a

review of the 2017 Plan Report Card, and next steps. The Workshop flyer, PowerPoint Presentation and Sign-In Sheet are included in Appendix B.

The Douglas LHMT met for a third time on May 20, 2025, to conduct a follow up to content needed for the 2025 Update, review the updated risk maps and economic vulnerability analyses, discuss preliminary mitigation actions for consideration, and understand the prioritization/scoring approach utilized in the 2017 plan. A complete set of meeting materials is included in Appendix B.

The Douglas LHMT met for a fourth time on June 24, 2025, to discuss outstanding data needs, reviewed FEMA's STAPLEE Score Sheet, and conducted an abbreviated Benefit Cost Analysis (prioritizing mitigation actions). The LHMT also discussed next steps regarding the internal/external review process, the second and final workshop/hearing, and posting/public notice requirements. A complete set of meeting materials is included in Appendix B.

The second Public Workshop was held on _____, at the Douglas Municipal Center. To ensure participation from underserved and vulnerable populations, announcements were posted on the Town's website, project webpage, and emailed to all Douglas departments, boards, commissions, and interested citizens. Targeted emails also went out to area stakeholders including:

- ……

The presentation included a summary of the 2025 Update to date and an overview of the mitigation actions for inclusion in the 2025 Update, followed by questions from the audience and identification of next steps towards completion. A complete set of meeting materials is included in Appendix B.

Stakeholder Interviews

The Consultant for the 2025 Update conducted several interviews with stakeholders to better understand the impacts experienced from the range of hazards and to discuss future needs/preliminary mitigation actions for consideration. Interviews were conducted with the following organizations/individuals:

- National Grid (Jean Tinlin, Community Engagement Office/Robert Moran, Community Engagement Manager)
- Whitin Reservoir Watershed District (Paul Caouette)
- Hayward Landing Apartments (Tony Berthod, Hayward Landing Apartments – Area Manager/Stefanie Covino, Blackstone Watershed Collaborative – Executive Director/Kris Houle, Tighe & Bond – Senior Project Manager)

Online Survey

The survey link was opened and available from May 2024 through April 2025 and included a total

of 47 responses. A brief summary of responses collected is included below. The full Survey Summary is included in Appendix B.

- Most residents/businesses have experienced winter- (87%) and wind-related (74%) hazard events in the past 20 years.
- Just about 47% of respondents feel they are adequately to very well prepared to deal with a natural hazard event, with most getting their information from the social media (77%), the internet (72%), Fire/Rescue Departments (70%), and auto-dial information/municipal website (38%).
- Most respondents are 'Very Concerned' with brushfire/wildfire-related hazards (28%), changes to groundwater-related hazards (24%), and invasive species-related hazards (19%).
- 72% of respondents know for sure whether or not their property is located in/near a FEMA –designated floodplain.
- Over half (64%) of respondents are interested in making their home, business or neighborhood more resilient, with 45% willing to spend their own money to do so;
- The top four choices to reduce damage/disruption of natural hazards in Douglas include:
    - Work to improve utility resilience: electric; communications; water/wastewater facilities (74%)
    - Retrofit public infrastructure, such as elevating roadways and improving drainage systems (64%)
    - Replace inadequate/vulnerable bridges (60%)
    - Inform property owners of ways they can reduce the damage caused by natural events (55%)
- Almost two-thirds (72%) of respondents are unsure if the Town has done enough to prepare for the projected impacts of climate change.

With this information, the project consultant prepared the draft 2025 Update which was available for public comment from _____, through _____, on the Town's website/Project webpage (see Appendix C for Notice of Availability of draft) with _____ comments returned and incorporated into the plan update.

This 2025 Update was also forwarded to the neighboring communities of: Oxford, MA Laurent McDonald – Fire/EMS Chief and Emergency Management Director; Sutton, MA Jennifer Hager – Community Development Director; Webster, MA Ann V. Morgan – Director of Planning & Economic Development; Uxbridge, MA Steve Sette – Town Manager; Thompson, CT Tyra Penn-Gesek – Director of Planning & Development; and Burrillville, RI Ray Goff – Director of Planning and Economic Development who received notice of the draft 2025 Update availability on the Town of Douglas's website, with _____ comments returned (and incorporated into the plan). The draft was then submitted to MEMA for consideration. It is the intention of the

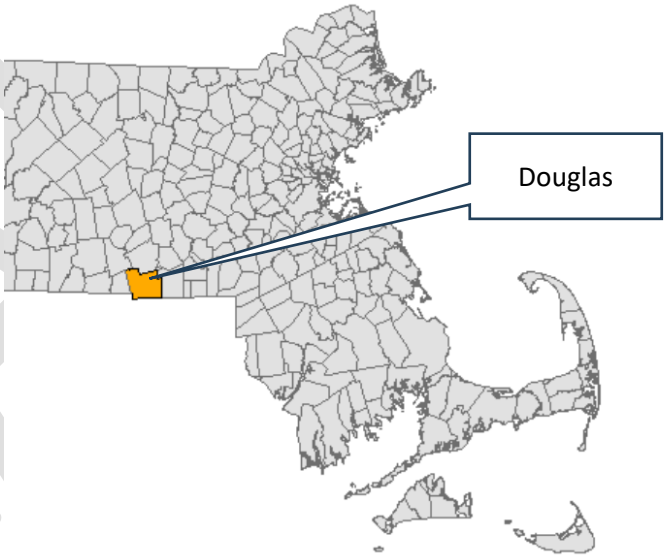
Douglas LHMT that the Hazard Mitigation Plan update be an available and pertinent source of information to a wide variety of individuals and interests. The plan update also has a specific and pragmatic function: by identifying and prioritizing local mitigation needs, the plan update has already served and will continue to serve as a basis for amendments to local policies and regulations.

State authorities will incorporate information compiled in this document into the State Hazard Mitigation Plan, to strengthen the statewide knowledge and idea-base for mitigation planning. A well-prepared and locally adopted plan can demonstrate understanding and commitment, two important variables when vying for limited, high-demand resources.

1.6 Community Profile

Setting, Land Use, and Climate

The Town of Douglas lies at the border of Massachusetts, Rhode Island, and Connecticut. It is the only Massachusetts town that borders both Rhode Island (to the southeast) and Connecticut (to the west and southwest); the Douglas State Forest lies on that border. The Town of Webster lies to the west, Oxford to the northwest, Sutton to the north, and Uxbridge to the east. The Town is located within Worcester County.



Douglas is located in the Blackstone River Valley, though the river itself lies to the east and runs through Uxbridge and Sutton. The Nipmuc Nation lived in the Blackstone River Valley and through what is now central Massachusetts, northwest Rhode Island, and northeast Connecticut. The Town of Douglas was incorporated in 1746. The Blackstone River Valley was the home of much of the early American industrial revolution and early manufacturing. Douglas has a history of industry, including metal working, a textile mill, forestry, and granite mining.

Douglas is just over 36 square miles large. It has very low population density: under 250 people per square mile. The population is largely concentrated in two town centers, in East Douglas to the northeast and around the Douglas Town Common toward the east. The Douglas State Forest lies in the western portion of the town and comprises nearly a quarter of the land area.

Douglas's climate is warm and humid. From 2000 – 2023, the average temperature as reported by the Worcester weather station was 48° F, with average temperatures of 25° F in January and

71° F in July. Average annual precipitation during that period was 51 inches.[1] With a temperate climate and a location some 40 miles from the Atlantic coast, Douglas and its neighboring communities are subject to a variety of severe weather, including hurricanes, nor'easters, thunderstorms, and blizzards.

Population

According to the 2022 Census estimate, the Town of Douglas has 9,100 people. This is as populous as it has ever been. It is a country suburb with low density and a pastoral character. It is expected to continue to grow, though more slowly than it has over the last two decades and reach a peak population of 10,200 people around 2040.[2]

Douglas has a less diverse population, with approximately 96% of residents identifying as white or Caucasian, compared to 79% statewide and 84.4% in Worcester County overall. Median household income ($137,000) is higher than the state ($96,500) or county ($88,500), and the poverty rate is much lower (3.1% in Douglas versus a bit more than 10% both state- and countywide).[3]

The age breakdown in Douglas is similar to the county and the state. It currently has a higher percentage of children under 18, but the population is expected to age over the coming decades. Currently only 17% of the population is 65 or older, but this is expected to increase to 26% by 2040.[4]

Despite Douglas's seemingly low levels of socially vulnerable populations, it is important to note the ways socioeconomic factors can impact community resilience. Disasters do not impact all people in the exact same way. The Fifth National Climate Assessment (chapter 21) states this very clearly:

> *Extreme heat, storms, flooding, and other climate-related hazards are causing disproportionate impacts among certain communities in the Northeast, notably including racial and ethnic minorities, people of lower socioeconomic status, and older adults. These communities tend to have less access to healthcare, social services, and financial resources and to face higher burdens related to environmental pollution and preexisting health conditions.*

Housing

Douglas has a mix of housing stock. Nearly 40% of the housing was built prior to 1980, split evenly between housing built before 1940 and between 1940 and 1980. Another 36% was built

[1] *NOWData*, National Weather Service, https://www.weather.gov/wrh/climate.
[2] *UMass Donahue Institute population projections*: https://donahue.umass.edu/business-groups/economic-public-policy-research/massachusetts-population-estimates-program/population-projections.
[3] Ibid.
[4] Ibid.

between 1980 and 1999. The remainder (24%) has been built since 2000. Roughly two thirds of those homes were built between 2000 and 2010. Single-family homes dominate (more than 85% of the housing stock). Nearly 85% of homes are occupied by people who own them. The median home value is $408,000, higher than the county median ($363,000) but lower than the statewide median ($484,000).[5]

1.7 History of Disaster Declarations

FEMA Region 1 (New England) has endured more than 150 federal emergencies (EM) and major disaster declarations (DR) since 1953. Many of these impacted Massachusetts. The following information (Table 1-1) gives an overview of major disaster declarations for Massachusetts (and in particular Worcester County, including Douglas):

Table 1-1 Significant Federal Emergency and Major Disaster Declarations, Worcester County

ID Number	Type	Date
DR-1994	Severe Storms and Tornadoes	June 1, 2011
EM 3343	Severe Storm	October 2011
DR-4051	Severe Storms/Snowstorm	October 2011
DR-4110	Severe Winter Storm/Snowstorm/Flooding	April 2013
DR-4214	Severe Winter Storm/Snowstorm/Flooding	April 2015
DR-4379	Severe Winter Storm/Snowstorm	March 2018
EM-3438	Covid-19 Pandemic	March 13, 2020
DR-4496	Covid-19 Pandemic	March 27, 2020
EM-3599	Hurricane Lee	September 2023
DR-4780	Severe Storms and Flooding	September 2023

Sources NOAA National Center for Environmental Information, www.ncdc.noaa.gov, FEMA Region 1 Declared Disasters, https://www.fema.gov/locations/massachusetts.

1.8 Recent Disaster Declarations

The communities of Worcester County (including Douglas) have experienced several recent hazards that have been declared as disasters. The following are descriptions of each of the recent storms (since 2018) that have been declared as disasters by FEMA and which have affected the Town of Douglas.

1.8.1 Severe Winter Storm/Snowstorm (FEMA DR-4379)

Early March 2018 brought three snowstorms in two weeks to Massachusetts. Only the final storm received a disaster declaration in Worcester County. However, the March 2-3 storm brought peak windspeeds of 50 mph and an inch of snow. The storm on March 7th brought nearly a foot of snow and peak windspeeds of 40 mph. The impacts of the later storm should be considered in the context of the previous storms.

[5] Ibid.

The storm on March 13-14, 2018, started in the Midwest and moved east toward the Atlantic coast, where it gained strength over the ocean. The storm dropped snow from Kentucky through Maine. The storm set records for the amount of snowfall in one day in Boston (14.5 inches March 13, 2018, versus 13.2 inches on March 19, 1956).[6] Snowfall rates in New England were as high as 3.25 inches per hour. Eastern Massachusetts received up to two feet of snow. The weather station in Worcester recorded nearly 22 inches of snow.[7] The storm disrupted communities, damaged infrastructure and caused school closures.

1.8.2 COVID-19 Pandemic (FEMA DR-4496 and EM-3438)

The COVID-19 pandemic disaster declaration extended from January 20, 2020, through May 11, 2023. Over the course of the pandemic, Massachusetts reported more than 2.2 million cases and more than 24,000 deaths. Around 12% of the cases and the deaths were from Worcester County, consistent with Worcester County's share of the state's population.[8] The hospitalization and death rates spiked in spring of 2020. In April 2020, Massachusetts saw death rates from COVID-19 reach more than 170 deaths a day.

Vaccines became available in spring 2021. Just under 85% of residents in Massachusetts are reported to be fully vaccinated.

The COVID-19 pandemic changed the way many people live and work. Many workplaces and schools closed and switched to virtual environments which changed commuting patterns. These shifts remain, as the way people work in 2024 is different than it was in 2019. COVID-19 also exposed issues in public health infrastructure as well as in the importance of indoor air quality, purification, and circulation. Many community events shifted to being held outdoors to reduce the spread of the virus.

1.8.3 Hurricane Lee (FEMA EM-3599)

Hurricane Lee started as Tropical Storm Lee in the tropical Atlantic Ocean in early September 2023. It organized and grew stronger extremely quickly - it is the third-fastest growing hurricane on record.[9] Rapid intensification is consistent with the impacts of climate change. As Lee moved north, the storm weakened and turned northwest. While FEMA issued the emergency declaration, and the state of Massachusetts declared a state of emergency, there was very little rain though high winds at Worcester Airport.[10]

1.8.4 Severe Storms and Flooding (FEMA DR-4780)[11]

A deamplifying mid-level shortwave with dewpoints in the 70s and decent instability brought

[6] National Weather Service: https://twitter.com/NWSBoston/status/973839757926158336.
[7] *NOWData,* National Weather Service.
[8] Data from Johns Hopkins Coronavirus Resource Center: https://coronavirus.jhu.edu/region/us/massachusetts.
[9] *Behind Felix (2007) and Wilma (2005)*: https://yaleclimateconnections.org/2023/09/hurricane-lee-peaks-as-a-cat-5-with-165-mph-winds/.
[10] *NOWData*, National Weather Service.
[11] https://www.ncdc.noaa.gov/stormevents/eventdetails.jsp?id=1121805.

scattered thunderstorms and widespread flash flooding to Massachusetts and Rhode Island. There were many streets closed, many cars stranded in flood waters, and several houses with flooded basements or first floors.

2.0 RISK ASSESSMENT

2.1 Introduction

Identifying potential hazards is the first step in any effort to reduce community vulnerability. The subsequent identification of the risk and vulnerability for a community are the primary factors in determining how best to allocate finite resources to address what mitigation might take place. FEMA's *Local Mitigation Planning Policy Guide* (April 19, 2023)[12] was originally used as a basic template to identify various natural hazard types. In accordance with recently released federal Executive Orders, FEMA updated the *Local Mitigation Planning Policy Guide* (April 11, 2025)[13] removing requirements related to climate change and equity. Finally, in June 2025, a new *Local Mitigation Planning Handbook*[14] update was released. The Town of Douglas LHMT and Consultant went back through and updated the 2025 Update in accordance with the June 2025 Policy Guide release.

The hazard identification and analysis processes involved all hazards that potentially threaten the Town of Douglas, also consistent with the *ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan*[15] (MA SHMCAP) – which fully integrates a hazard mitigation plan and a climate adaptation plan. Identifying and profiling each potential hazard that may affect Douglas enables the Town to make determinations related to:

- Which hazards merit special attention
- What actions might be taken to reduce the impact(s) of those hazards
- What resources are likely to be needed

The MA SHMCAP includes an updated Risk Assessment that considers the exposure and vulnerability of state assets, human populations, lifelines, critical facilities, economic activity, natural resources, and other infrastructure or resources of each hazard across the five sectors defined in the *2022 Massachusetts Climate Change Assessment*[16] (Climate Assessment) *Volume II Statewide Report*. These sectors are described in Figure 2-1.

[12] Federal Emergency Management Agency, *Local Mitigation Planning Policy Guide*, April 19, 2023, https://www.fema.gov/sites/default/files/documents/fema_local-mitigation-planning-policy-guide_042022.pdf.
[13] Federal Emergency Management Agency, *Local Mitigation Planning Policy Guide*, April 11, 2025, https://www.fema.gov/sites/default/files/documents/fema_hmd_local-mitigation-planning-policy-guide_2025.pdf.
[14] Federal Emergency Management Agency, Local Mitigation Planning Handbook, June 2025, https://www.fema.gov/sites/default/files/documents/fema_hmd_2025-local-mitigation-planning-handbook_06122025.pdf.
[15] Eastern Research Group, Inc., *ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan*, September 2023, https://www.mass.gov/files/documents/2023/10/10/2023%20ResilientMass%20Plan_10.10.23%20508.pdf.
[16] Executive Office of Energy and Environmental Affairs, Massachusetts Emergency Management Agency, *2022 Massachusetts Climate Change Assessment, Volume II,* December 2022, https://www.mass.gov/doc/2022-massachusetts-climate-change-assessment-december-2022-volume-ii-statewide-report/download.

Figure 2-1 Exposure and Vulnerability Sectors

	**Human sector** *Impacts to people's health, welfare, and safety. Includes mortality, injury, and mental health impacts. This sector also identifies the characteristics that make populations more vulnerable to hazard exposure. To inform this sector, the Commonwealth used data from the U.S. Census, the MA environmental justice data mapping tool, and population projections, among other sources.*
	***Governance sector*** Impacts to state and municipal owned buildings, government finances, and the ability of the government to run effectively and achieve its mission and functions and provide services to its service populations. Includes damage to state- or municipality-owned buildings, reductions in tax revenue, expenses for maintenance of state- or municipality-owned transportation infrastructure and impacts to government workers.
	***Infrastructure sector*** Impacts to buildings and transportation assets and services, and to utilities infrastructure involved in providing power, communications, wastewater, stormwater, and potable water. This sector includes an assessment of community lifelines and critical assets, which enable all other aspects of society to function. Critical facilities were identified as critical assets that enable all other aspects of society to function.
	***Natural environment sector*** Impacts to ecosystems, native species, ecosystem functions, recreation assets and open spaces, and natural resources, and how plants and animals can thrive there. Assesses vulnerabilities and consequences for critical resources and conserved lands. The Risk Assessment used geospatial data and tools such as BioMap, U.S. Geological Survey data, and others.
	***Economy sector*** Impacts to people's ability to work and make a living, due to damage to buildings, infrastructure, industries, and the natural environment. Includes interruptions to workplace or regular economic activity; disruptions to specific sectors such as agriculture, fisheries, or tourism; and economic damages to individuals.

Source: ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan.

2.2 Future Conditions

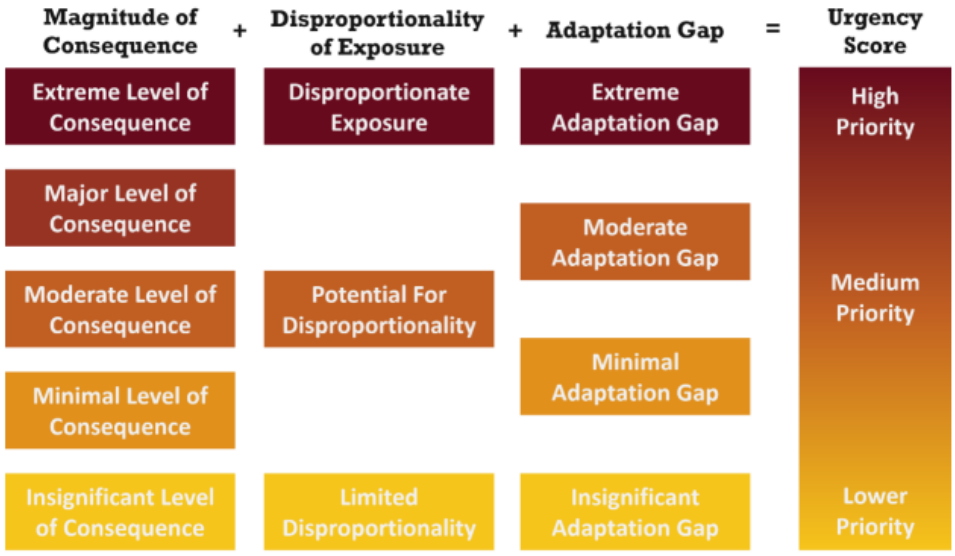
A hazard mitigation plan must consider an uncertain future. Past experience may not provide a reliable estimate of future risks. Climate change, demographic changes, and land use changes all impact how a community's risk may evolve. For more information on Douglas's current and future demographics, refer to the community profile section.

Findings from the *Climate Assessment Volume II Statewide Report* have been leveraged in the update of the risk assessment. The Climate Assessment includes an analysis of the most significant impacts that climate change poses to the Commonwealth across five sectors (human health, governance, infrastructure, natural environment, and economy) based on three factors:

- Magnitude of consequence: How large of a climate effect is expected from this impact? Scores are classified on a five-point scale, 'Extreme' to 'Insignificant', and focus on the magnitude of the impacts of climate change rather than the magnitude of the issue.
- Disproportionality of exposure: Will populations living in environmental justice areas be disproportionately affected more than the rest of the population? Measured on a three-point scale, 'Limited disproportionality' to 'Disproportionate impacts', evaluated both quantitatively and qualitatively.
- Need for effective adaptation: Is enough currently being done to adapt to this impact, or are there gaps in effective adaptation actions? Focuses on 'time sensitive' need to adapt facilitated through a prescribed approach of database development of adaptation actions and plans, analysis of actions and plans for relevance to climate assessment impacts, and evaluation of actions by impact via assignment of an adaptation score.

These factors are scored ranging from 0 to 100, then averaged to translate into an 'urgency score' or measure of the priority of the need for adaptation for each impact within each sector (Figure 2-2).

Figure 2-2 Urgency Score Components



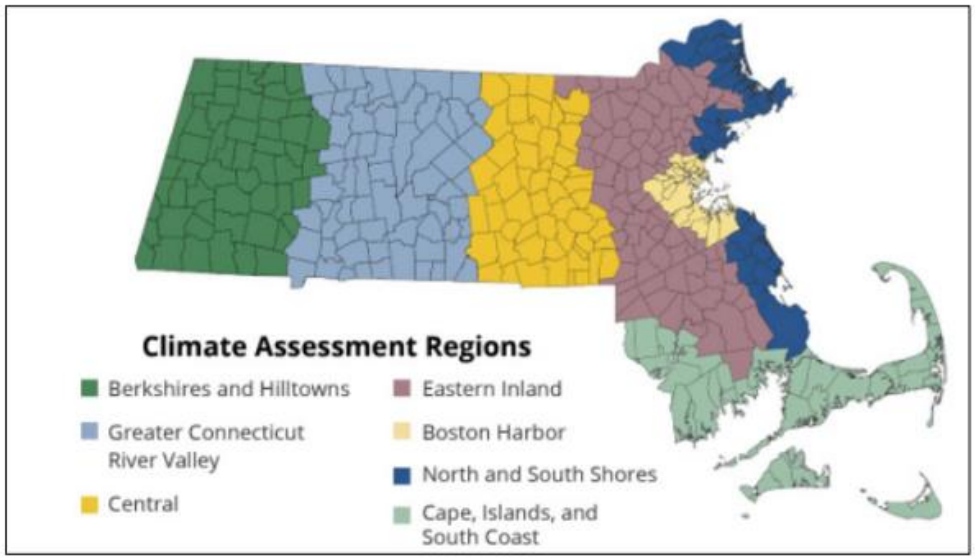
Source: 2022 Massachusetts Climate Change Assessment, Volume II.

Acknowledging the diversity of geography, economy, land use, and demographics across the Commonwealth, the *2022 Massachusetts Climate Change Assessment*[17] (Climate Assessment) *Volume III Regional Report*, subdivides the state into seven climate regions (Figure 2-3) and summarizes the highest urgency climate impacts across the five sectors (human health,

[17] Executive Office of Energy and Environmental Affairs, Massachusetts Emergency Management Agency, 2022 Massachusetts Climate Change Assessment, Volume III, December 2022, https://www.mass.gov/doc/2022-massachusetts-climate-change-assessment-december-2022-volume-iii-regional-reports/download.

governance, infrastructure, natural environment, and economy).

Figure 2-3 Climate Assessment Regions



Source: 2022 Massachusetts Climate Change Assessment, Volume III.

The Town of Douglas falls within the Central Region which is particularly vulnerable to climate stressors including increasing temperatures and more extreme precipitation patterns, including associated flooding and droughts. The most important climate risks for this region include changes to temperature extremes, changes in precipitation patterns, and consequent changes in the patterns of river flows that can lead to inland flooding.[18] A snapshot of the regional climate outlook through the end of the century is provided in Figure 2-4.

Figure 2-4 Regional Climate Outlook

2030	2050	2070	2090
NEAR TERM	MID-CENTURY	MID-LATE CENTURY	END OF CENTURY
The summer mean temperature could increase by 3.6°F from the historical period (1950-2013), worsening stress on electric transmission and utility distribution infrastructure.	The 1 percent annual chance river flood could be two times more likely to occur, increasing Blackstone River and other river flood risk.	There could be 38 more days above 90°F, contributing to extreme heat health impacts.	The historical 10 percent annual chance daily rainfall event (2.8 to 4 inches) could occur five times more frequently.

Source: 2022 Massachusetts Climate Change Assessment, Volume III.

[18] Ibid.

Climate Change Impacts in the Central Region [19]

The most urgent climate change impacts per sector for the Central Region are provided below. Additional details (urgency scores) and less urgent impacts are provided in the Climate Assessment, Volume III.

Human Sector

- Reduction in Food Safety and Security due to production and supply chain issues, as well as spoilage during power outages.
- Health and Cognitive Effects from Extreme Heat, including premature death and learning loss.

Infrastructure Sector

- Damage to Electric Transmission and Distribution Infrastructure associated with heat stress and extreme events.
- Loss of Urban Tree Cover due to heat, drought, and increased pests.

Natural Environment Sector

- Freshwater Ecosystem Degradation due to warming waters, drought, and increased runoff.
- Forest Health Degradation from warming temperatures, changing precipitation, increasing wildfire frequency, and increasing pest occurrence.

Governance Sector

- Increase in Costs of Responding to Climate Migration, including planning for abrupt changes in local populations.
- Increase in Demand for State and Municipal Government Services, including emergency response, food assistance, and state-sponsored health care.

Economy Sector

- Reduced Ability to Work, particularly for outdoor workers during extreme heat, as well as commute delays due to damaged infrastructure.
- Decrease in Agricultural Productivity as crop yields are impacted by precipitation patterns, extreme weather, pests, and other climate factors.

[19] Ibid.

2.3 Hazard Identification

The Douglas LHMT evaluated each of the hazards that might affect the Town. For the purposes of the 2025 update, and for consistency with the State Hazard Mitigation Plan, the LHMT organized natural hazards into the following categories:

- Flood-Related Hazards
- Winter-Related Hazards
- Wind-Related Hazards
- Geologic-Related Hazards
- Extreme Heat-Related Hazards
- Drought-Related Hazards
- Brushfire/Wildfire-Related Hazards
- Environmental-Related Hazards
- Changes to Groundwater-Related Hazards

The Horsley Witten Group, Inc. created new updated town-wide Geographical Information Systems (GIS) mapping including Figure 1 Flood Risks; Figure 2 Average Annual Snowfall; Figure 3 Historical Hurricane Tracks; Figure 4 Earthquakes; Figure 5 Wildland Urban Interface; Figure 6 Critical Facilities and Vulnerable Populations (Appendix A). The Town's evacuation routes and traffic control points are considered fluid dependent upon the event, location, and date/time of occurrence.

2.4 Hazard Profiles: Location, History, and Probability of Future Occurrence

Both risks and vulnerabilities must be considered in assessing hazards. The hazard is the actual event that poses a danger to the community, (e.g., the hurricane, tornado, earthquake, etc.). The term "risk" refers to the predicted impact that a hazard would have on a community and its people, services, specific facilities, and structures. The term "vulnerability" refers to the characteristics of the society or environment affected by the event that results in losses, financial and human.

The Douglas LHMT evaluated the risks and vulnerabilities of the Town. They discussed the risks the community may face, areas that are especially vulnerable, and the impacts (immediate and downstream) that natural disasters may cause. They assessed risks (the likelihood of adverse impacts associated with specific natural hazards) and examined vulnerabilities (the exposure of life or property within the context of the Town). This process yielded the Risk Assessment Matrix (Table 2-1). The matrix was then used to establish mitigation benefits and develop mitigation strategies (Section 4).

Hazard Index

The Douglas LHMT evaluated each of the hazards and collectively determined the likelihood of occurrence, locations affected, and potential impacts of each. This information was used to establish a Hazard Index (HI) value (HI=1 being lowest impact and HI=10 being highest impact)

for each of the types of natural hazards and is presented in Table 2-2. The highest hazard index values were assigned to those natural hazards that were deemed to have the highest level of impact to the community. These hazards include:

- Snow/Blizzards/Winter Storms/Nor'easters
- Ice Storms
- High Winds
- Brushfire/Wildfire

The Hazard Index for this 2025 HMP update utilizes language used in the FEMA State and Local Mitigation Planning How-to-Guide Series for frequency and severity categorization, including:

Criteria for Frequency Categorization

Very Low (1):	events that occur less frequently than once in 100 years (less than 1% per year).
Low (2):	events that occur at least once in the next 100 years (1% to 10% per year).
Moderate (3):	events that occur at least once in the next 10 years (10% to 40% per year).
High (4):	events that occur at least once in the next year (40% to 70% probability).
Very High (5):	events that occur more than once in the next year (70% to 100% probability).

The criteria used for severity categorization, based on past hazard events includes:

Criteria for Severity Categorization

Minor (1):	Very few injuries if any
	Minimal disruption on quality of life
	Shutdown of critical facilities and services temporarily
	Minor property damage
Limited (2):	Injuries and/or illness do not result in permanent disability
	Complete shutdown of critical facilities for more than a day
	Property severely damaged/destroyed < 25%, > 10%
Critical (3):	Multiple injuries possible
	Complete shutdown of critical facilities for more than a week
	Property severely damaged/destroyed < 50%, > 25%
Catastrophic (4):	Multiple deaths/injuries possible
	Complete shutdown of facilities for 30 days or more
	Property severely damaged/destroyed > 50%

Criteria for Location/Land Area Affected

Small:	Less than 10% of the town affected
Medium:	10 to 50% of the town affected
Large:	More than 50% of the town affected

Table 2-1 Risk Assessment Matrix

Vulnerable Area	Location	Ownership	Hazard	Primary Problem/Effect	Mitigation Objective	Risk Historical (H) Potential (P)
Power Supply	Town-wide	Public/Private	All Hazards	interrupted services/Public health, safety and welfare	Continuity of services/Improved public health, safety and welfare/Improved resilience	H and P
Critical Facilities/Vulnerable Populations Data	Town-wide	Public/Private	All Hazards	Impacts to public and private property/Compromised public health, safety and welfare/Recovery disruptions	Reduced damages to property/Improved public health, safety and welfare/Accelerated recovery/Improved resilience	H and P
Major Employers	Town-wide	Public/Private	All Hazards	Impacts to public and private property/Compromised public health, safety and welfare	Reduced damages to property/Improved public health, safety and welfare/Improved resilience	H and P
Dams	Town-wide	Public/Private	Flooding/Dam Failure/Earthquakes	Impacts to public and private property/Compromised public health, safety and welfare/Recovery disruptions	Reduced damages to property/Improved public health, safety and welfare/Accelerated recovery/Improved resilience	P
Localized Areas Subject to Flooding	Town-wide	Public/Private	Flooding/Wind/ Changes in Groundwater	Impacts to public and private property/Compromised public health, safety and welfare	Reduced damages to property/Improved public health, safety and welfare/Improved resilience	H and P

Table 2-1 Risk Assessment Matrix

Vulnerable Area	Location	Ownership	Hazard	Primary Problem/Effect	Mitigation Objective	Risk Historical (H) Potential (P)
Emergency Services	Town-wide	Public/Private	All Hazards	Compromised public health, safety and welfare/Disruption in emergency response and recovery	Improved public health, safety and welfare/Continuity of emergency response/Accelerated recovery/Improved resilience	H and P
Municipal Services	Town-wide	Public	All Hazards	Disruption in municipal services/Potential for contamination of natural resources/Compromised public health, safety and welfare	Continuity of municipal services/Protection of natural resources/Improved public health, safety and welfare/Improved resilience	H and P
Property Protection	Town-wide	Public/Private	All Hazards	Impacts to public and private property/Compromised public health, safety and welfare	Reduced damages to property/Improved public health, safety and welfare/Improved resilience	H and P
Natural Resources	Town-wide	Public/Private	Flooding/Extreme Heat/Changes in Groundwater/ Invasive Species	Compromised public health, safety and welfare/Potential for contamination of natural resources/Loss of habitat	Improved public health, safety and welfare/Protection of natural resources and habitat/Reduced damages to property/Improved resilience	H and P

Table 2-1 Risk Assessment Matrix

Vulnerable Area	Location	Ownership	Hazard	Primary Problem/Effect	Mitigation Objective	Risk Historical (H) Potential (P)
Public Health, Safety and Welfare	Town-wide	Public/Private	All Hazards	Compromised public health, safety and welfare	Improved public health, safety and welfare/Improved resilience	H and P
Resilience	Town-wide	Public/Private	All Hazards	Reduced resilience/Recovery disruption	Improved resilience/Accelerated recovery	H and P
Transportation Network	Town-wide	Public/Private	All Hazards	Disruption to transportation network and evacuation	Continuity of transportation network and evacuation/Improved resilience	H and P

Table 2-2 2025 Douglas, MA

Natural Hazard	*Frequency (i.e. Very Low, Low, Moderate, High, Very High)*	*Location (i.e. small, medium, large)*	*Severity (i.e. Minor; Limited; Critical; Catastrophic)*	*2025 Hazard Index (i.e. ranked by combining frequency and severity; 10 - high, 1 - low)*
Flood-Related Hazards				
- Riverine/Flash Flooding[1]	Low (High/4)	Medium (Small)	Minor (Minor/1)	3/Medium (Moderate/5)
- Inland/Urban Flooding/Heavy Rain[1]	Low (Very High/5)	Medium (Medium)	Minor (Minor/1)	3/Medium (Moderate/6)
- Dam Failures[1]	Very Low (Very Low/1)	Small (Medium)	Limited (Limited/2)	3/Medium (Low/3)
- Beaver Activity[1]	(Very High/5)	(Medium)	(Minor/1)	(Moderate/6)
Winter-Related Hazards				
- Snow/Blizzard/Winter Storm/Nor' easter	Very High (Very High/5)	Large (Large)	Limited (Limited/2)	2/High (High/7)
- Ice[1]	Very High (Very High/5)	Large (Large)	Limited (Limited/2)	2/High (High/7)
- Extreme Cold	Very High (Moderate/3)	Large (Large)	Limited (Limited/2)	4/Low (Moderate/5)
Wind-Related Hazards				
- Hurricanes/Tropical Storms	Low (Moderate/3)	Large (Large)	Limited (Limited/2)	3/Medium (Moderate/5)
- Tornadoes	Very Low (Low/2)	Small (Medium)	Limited (Limited/2)	4/Low (Moderate/4)
- High Winds	Moderate (Very High/5)	Small (Large)	Limited (Limited/2)	2/Medium (High/7)
- Lightning/Thunderstorms	Moderate (Moderate/3)	Small (Medium)	Minor (Minor/1)	2/High (Moderate/4)
- Hail[1]	(High/4)	(Medium)	(Minor/1)	(Moderate/5)
Geologic-Related Hazards				
- Earthquakes[1]	Very Low (Very Low/1)	Large (Large)	Minor (Minor/1)	5/Highest (Low/2)
Extreme Heat-Related Hazards				
- Extreme Heat[1]	Moderate (Very High/5)	Large (Large)	Limited (Minor/1)	4/Low (Moderate/6)
Drought-Related Hazards				
- Drought	Very Low (Moderate/3)	Large (Large)	Minor (Minor/1)	4/High (Moderate/4)
Brushfire/Wildfire-Related Hazards				
- Brushfire/Wildfire[1]	Moderate (Very High/5)	Medium (Small)	Minor (Limited/2)	4/Medium (High/7)
Environmental-Related Hazards				
- Aquatic Plant Invasive Species[1]	(Low/2)	(Small)	(Minor/1)	(Low/3)
- Vector Borne[1]	(Very High/5)	(Large)	(Minor/1)	(Moderate/6)
Changes to Groundwater-Related Hazards				
- Changes in Groundwater[1]	(Very Low/1)	(Small)	(Minor/1)	(Low/2)

Notes:

1: Ranked by Douglas LHMC (all others utilized NOAA Severe Events Database).

Blue Font: MVP priorities...Red Font: 2017 Modified priorities based on exsting conditions...based on second round of ranking

For the purposes of this 2025 Update and based on the Hazard Index, the Douglas LHMT determined that the Town is most at risk to the following hazards (and has advanced the assessment of the vulnerability of the at-risk areas, and the implications of experiencing these natural hazards:

- Riverine/Flash Flooding
- Heavy Rain/Inland and Urban Flooding
- Dam Failure
- Beaver Activity
- Blizzards/Heavy Snow/Winter Weather/Nor'easters
- Ice Storms
- Extreme Cold
- Hurricanes/Tropical Storms
- Tornadoes
- High Winds
- Lightning/Thunderstorms
- Hail
- Earthquakes
- Extreme Heat
- Drought
- Brushfire/Wildfire
- Aquatic Plant Invasive Species
- Vector-borne Illnesses
- Changes to Groundwater

Since the impacts of climate change can vary significantly depending upon the specific hazard, a climate change impacts section is included for each hazard profiled in this risk assessment.

The above hazards are not a complete listing of hazards that may impact Douglas. The Douglas LHMT agreed that this listing accurately represents those hazards that impact the Town most frequently and have the potential to cause fatalities, injuries, property and infrastructure damage, agricultural loss, damage to the environment, interruption of business, or other types of harm or loss. The following hazards will not be addressed in this 2025 Update:

- Avalanche
- Coastal Hazards
- Expansive Soils
- Land Subsidence
- Landslides
- Volcanoes
- Tsunamis

These hazards were considered and discussed during LHMT meetings, where it was determined these hazards would not be considered for the following reasons:

- They occur extremely infrequently or not at all in Douglas;
- They are highly unlikely to occur or to have severe impacts should they occur; and/or
- It is therefore not worth the resources to devote to researching their impacts.

The hazard-specific tables that follow each section represent the various natural hazard events that have occurred in and around the Town of Douglas, utilizing National Oceanic and Atmospheric Administration's (NOAA's) National Centers for Environmental Information (NCEI) (http://www.ncdc.noaa.gov/) and local knowledge from LHMT members as the best, currently available data. All NCEI data is county wide (Worcester County), unless otherwise noted.

Municipal Vulnerability Preparedness Program

As the Commonwealth advances an integrated climate change strategy per Executive Order 569, Douglas (along with many other Massachusetts cities and towns) is working to advance local and regional resiliency planning and climate preparedness efforts. After securing MVP Planning Grant funding from the Massachusetts Executive Office of Energy and Environmental Affairs (EOEEA), Douglas engaged in a Community Resilience Building Workshop and produced a town-wide vulnerability assessment and action-oriented resiliency plan in 2019. The Town became an MVP-Designated community, thereafter, making it eligible for MVP Action Grant funding to implement identified climate adaptation actions. The climate change projections developed under the MVP Program for precipitation and extreme temperatures have also been incorporated into the applicable hazard profiles.

2.4.1 Flood-Related Hazards

Flooding is the accumulation of water within a water body and the overflow of excess water onto adjacent floodplain lands (FEMA, Multi-Hazard Identification and Risk Assessment, 1997). A floodplain is the land adjoining the river/stream channel, ocean or other watercourse or water body that is susceptible to flooding.

There are several different types of flood hazards – from stormwater inundation and poor drainage infrastructure to riverine flooding and storm surges to dam failures. The most extensive damage would result from dam failure. However, the most frequent flood threats are riverine and stormwater flooding as well as flooding from beaver activity.

Under the NFIP, FEMA is required to develop flood risk data for use in both insurance rating and floodplain management. FEMA develops this data through Flood Insurance Studies (FIS). Detailed analyses are used to generate flood risk data only for developed or developing areas of communities. For undeveloped areas FEMA uses approximate analyses to generate flood risk data. Flood hazard areas are identified in the FEMA FIRMs. Flood hazard areas are divided into zones (V, X, A/AE, etc.) depending on the severity and type of flood threat. These zones are

those areas subject to inundation (shallow or deep) by a flood (and/or velocity wave action) that has a 1 percent chance of occurring during any given year.

The Town of Douglas is covered in Worcester County's FIS report, initially developed in 2011 and most recently revised in 2023. It profiles flood hazards within Douglas, including the Mumford River and Southwick Brook, as well as various miscellaneous streams and ponds in the Blackstone Watershed and the Quinebaug Watershed. Floodplains in Douglas include 'A/AE' and 'X' Zones (Figure 1 Flood Risks, Appendix A). 'A/AE' Zones are areas that would be inundated by a flood that has a 1% annual chance of occurring. The 1% annual chance is a regulatory standard used by federal agencies and most states to administer floodplain management programs and is also used by the NFIP as the basis for insurance requirements nationwide. 'X' Zones are areas that would be inundated in a flood that has a 0.2% chance of occurring in any given year. The LHMT used the information in the FIS report, the FIRMs, and the LHMT's professional experience of flood-prone areas to assess flood risks in the Town.[20]

Table 2-3 below represents the various significant flood-related hazard events that have been recorded in and around the Town of Douglas utilizing NOAA's NCEI. All events are for southern Worcester County unless otherwise noted.

Table 2-3 Significant Flood-Related Events, Worcester County

Hazard Type	Date	Level/Description	Damages	Notes
Flood	8/18/2023	Heavy rain		
Flood	7/10/2023	Heavy rain		Gilboa Road in Douglas had significant street flooding.
Flood	9/5/2022	Heavy rain		
Flood	9/2/2022	Heavy rain		Heavy rains led to street flooding.
Flood	8/7/2019	Heavy rain		
Flood	7/6/2019	Heavy rain		
Flood	9/26/2018	Heavy rain		Rainfall amounts of 1 to 3 inches.
Flood	8/4/2018	Heavy rain	$15,000 property damage	Rainfall amounts of 1 to 3 inches. Several cars were reported trapped in floodwaters.

Source: NOAA National Centers for Environmental Information, www.ncdc.noaa.gov. Data current through December 2023.

[20] FEMA did develop a non-regulatory Flood Risk Report for Middlesex and Worcester Counties in 2013. However, it covers the Concord River Watershed which is located north and east of Douglas.

Surface Water[21]

There are approximately 900 acres of land in Douglas (3.7% of the town's land area) that contain ponds and streams. The major water bodies include Wallum Lake, Manchaug Pond, Whitin Reservoir and Badluck Pond (also known as Crystal Lake). In addition to surface water, Douglas also contains approximately 74 miles of streams, 47 miles of which are headwaters. In 1996 the Rivers Protection Act defined "riverfront area" as the buffer of 200 feet on each side of perennial rivers and streams throughout Massachusetts. Because of its abundant water resources, this Act has significant impact on Douglas' development and natural resources.

The Mumford River originates in the watershed of Badluck Pond and Whitin Reservoir, flows through East Douglas and is a tributary of the Blackstone River. The watersheds of Badluck Pond and Whitin Reservoir include significant acreage within the Douglas State Forest. Fishing is the major recreational use of the river.

High water levels along the banks of the Mumford River.

North Street Bridge over the Mumford River.

Nearly all of Douglas' ponds and lakes are used for recreation and the town does recognize Whitin Reservoir as an emergency water supply. The town, however, does not have any public swimming or beach access although swimming is available in the Douglas State Forest at Wallum Lake. Douglas residents receive no special dispensation.

Wallum Lake

Wallum Lake is located in the southern part of Douglas within the State Forest, at the Burrillville/Douglas town line. The lake is approximately 322 acres in size, with about half of the acreage in Rhode Island. Wallum Lake is used extensively for recreational purposes such as swimming, fishing, boating, kayaking, and canoeing.

Whitin Reservoir

[21] *Town of Douglas Open Space and Recreation Plan,* Douglas Open Space Committee/Central Massachusetts Regional Planning Commission, 2023.

Whitin Reservoir is a warm-water reservoir located in the northwest quadrant of town and has some shoreline along the western edge within the Douglas State Forest. Two streams cross the Douglas State Forest to enter the Whitin Reservoir from the west and south. Private camps and full year residences line the shores of the reservoir. It is used for all recreational water sports and has a private water slide facility open to the public on a fee basis. There is presently no public access to this body of water except via the Douglas State Forest wooded areas. The reservoir is roughly 216 acres in size. In 2009 the Whitin Reservoir Association bought the reservoir from Interface Fabrics Group Finishing, Inc. to help control water flow.

Manchaug Pond
One half of the lake is in Douglas. The shoreline is privately owned and lined with camps and full-time residences. The pond supports Lake Manchaug Camping as well as three additional campgrounds and a state boat ramp in Sutton. It is also used for fishing, swimming, and boating. In 2008, an unsuccessful attempt was made to create a lake organization that would buy the pond from Interface Global. A year later, the Manchaug Pond Foundation was formed and continues to provide stewardship of the pond and watershed, as well as advocacy and education for its proper use and preservation as a part of the Blackstone River system. In 2012, ownership of the dam was transferred to the Town of Sutton from Interface Global due to the negotiation efforts of the Manchaug Pond Foundation.

Wallis Pond
Located south of Whitin Reservoir, Wallis Pond is a man-made body of water. A dam and significant shoreline were acquired when the Department of Environmental Management obtained the 120 acres known as the Wallis property. The pond is unstratified and has a high algae level and is not used for swimming or boating. Hiking
and fishing are popular activities at Wallis Pond.

Coopertown Brook
This brook is the major tributary to Whitin Reservoir and much of it is within the Douglas State Forest. It has become part of the Adopt-A-Stream program by the Douglas Conservation Commission.

Riverine/Flash Flooding

Riverine or inland flooding often occurs after heavy rain, particularly in areas of the state with high water tables. These areas are also particularly susceptible to flash flooding caused by rapid runoff occurring after heavy precipitation events, and in combination with spring snowmelt. Frozen ground conditions can also contribute to low rainfall infiltration and high runoff events that sometimes result in river flooding.

Heavy rains that cause inland and urban flooding make stormwater issues worse—and they are also made worse by inadequate stormwater management. Thunderstorms, winter storms,

nor'easters, and hurricanes all contribute to flood related hazards due to the large amounts of precipitation associated with them. Development often compounds the magnitude and frequency of urban flooding by increasing impervious surfaces. When all rainfall runs off paved surfaces rather than soaking into soil, the drainage infrastructure can be overwhelmed.

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

Massachusetts communities are experiencing more frequent and more intense storm events. The Town of Douglas can be uniformly affected by riverine/flash flooding events, dependent upon the location (amount of impervious surfaces within the area), existing/incoming weather conditions, and time of year (frozen ground conditions exacerbate flooding). Based on review of NOAA's NCEI and coordination/confirmation with the LHMT, there were available historic records of significant riverine/flash flooding events in Douglas since 2016. Due to the high frequency and minor severity of the potential for future riverine/flash flooding events as confirmed by the LHMT, the Town is considered at moderate risk for future riverine/flash flooding events.

Climate Change Impacts on Riverine/Flash Flooding

Riverine flooding will likely be exacerbated by increased storm intensity, as well as by increased precipitation. The Intergovernmental Panel on Climate Change (IPCC) identifies inland flooding in some urban regions as a "key risk" in North America, which may result disrupt people's livelihood and result in severe health risks.

Heavy Rain/Inland and Urban Flooding

Heavy rains that cause inland and urban flooding are often exacerbated by stormwater-related issues. Thunderstorms, winter storms, coastal storms and nor'easters, and hurricanes all contribute to interior flood related hazards due to the large amounts of precipitation associated with them. Development often compounds the magnitude and frequency of urban flooding by increasing impervious surfaces, also increasing the rate of drainage collection, reducing the carrying capacity of the land, and often overwhelming sewer system infrastructure.

Based on the very high frequency and minor severity of heavy rain and inland/urban flooding events as reported by NOAA's NCEI indicated in Table 2-3, and confirmed by the LHMT, in addition to the projected increases in precipitation, the Town is considered at moderate risk for future heavy rain/inland and urban flooding events.

Climate Change Impacts on Heavy Rain/Inland and Urban Flooding

Heavy precipitation events are becoming more frequent and intense in Massachusetts. Whether a hurricane, tropical storm, or extra-tropical storm (e.g., a nor'easter), there has been a global increase in both the frequency and the intensity of heavy precipitation events. This trend is consistent with physical responses to a warming climate, such as an increased amount of moisture in the atmosphere.

MVP Climate Change Projections on Heavy Rain

Douglas is located within portions of three basins, the Blackstone Basin (majority of the Town), French Basin (narrow section along the western border), and Quinebaug (small section of southwest). The average annual precipitation in Douglas is projected to increase an average of 6% by the 2030s and 8% by the 2050s across all three basins. The largest increases in precipitation are projected to occur during winter months. Table 2-4 below includes precipitation projections beginning with a Baseline (1971 – 2000) through mid-century (2050s) for the Blackstone, French, and Quinebaug Basins.

Table 2-4 Precipitation Projections, Blackstone, French, and Quinebaug Basins

Climate Parameter	Baseline 1970 - 2000	Projected Change in 2030s	Mid-Century 2050s
Total Precipitation (inches):			
Annual			
Blackstone Basin	47.1	47.4 – 52.7	48.8 – 53.9
French Basin	47.4	47.1 – 51.6	48.1 – 51.7
Quinebaug Basin	48.6	48.6 – 53.6	49.8 – 55.1
Winter			
Blackstone Basin	11.4	11.1 – 11.5	11.7 – 14.3
French Basin	11.2	12.3 – 14.1	12.6 – 14.5
Quinebaug Basin	11.5	11.0 – 13.6	11.6 – 14.5
Spring			
Blackstone Basin	12.0	11.98 – 14.1	12.0 – 14.2
French Basin	11.9	12.1 – 14.1	12.2 – 14.3
Quinebaug Basin	12.2	12.0 – 14.3	12.3 – 14.1
Summer			
Blackstone Basin	11.3	11.2 – 13.0	11.0 – 13.6
French Basin	11.6	10.0 – 12.1	10.1 – 12.5
Quinebaug Basin	11.8	11.6 - 13.5	11.5 – 14.0
Fall			
Blackstone Basin	12.4	11.2 – 13.8	11.1 – 14.5
French Basin	12.7	11.3 – 12.9	11.0 – 13.6
Quinebaug Basin	13.0	11.7 – 14.5	11.4 – 15.0
Annual Days with Precipitation	8	9 - 11	9 - 12
over 1 inch	8	8 – 10	9 – 12
Blackstone Basin	8	8 - 10	9 - 11

French Basin *Quinebaug Basin*			
Annual Days with Precipitation over 2 inches *Blackstone Basin* *French Basin* *Quinebaug Basin*	 1 <1 <1	 1 - 2 1 <1	 1 - 2 1 – 2 <1 - 1
Annual Days with Precipitation over 4 inches *Blackstone Basin* *French Basin* *Quinebaug Basin*	 <1 <1 0	 <1 <1 <1	 <1 <1 <1

Source: MVP Program, https://resilient.mass.gov/home.html.

Dam Failure

A dam is any artificial barrier with the ability to impound water, wastewater, or any liquid-borne material for the purpose of storage or water control. Dam failure can be a catastrophic type of failure characterized by the sudden, immediate, and uncontrolled release of impounded water or the likelihood of such an uncontrolled release with secondary impacts to downstream structures within the inundation zone.

A dam failure event includes the potential for a range of impacts on both residents and the built environment, including injury and loss of life, short- and long-term displacement, financial needs, and emotional/psychological trauma. A dam failure event can also impact a community's critical facilities/infrastructure including structural and equipment damage at municipal buildings, disruptions to normal/daily operations (water supply, sewer conveyance/treatment, and communications), and transportation disruptions. Dam failure events can also impact the environment/ecosystems by displacing wildlife, carrying pollution/hazardous materials into natural habitats, and disrupting natural ecological processes.

Extreme natural hazard events are often interconnected and can have cascading impacts on dams. Often, wildfires are the result of periods of drought and record high temperatures. In turn, charred landscapes are more vulnerable to flooding and landslides due to compromised soil integrity. The onset of heavy precipitation from severe storm events can exacerbate these resultant conditions, causing a chain of adverse impacts on dams that may affect upstream and downstream flooding potential.

The Massachusetts Department of Conservation & Recreation (DCR), Office of Dam Safety (ODS) is responsible for monitoring the condition of the state's dams. Dams are classified in two ways: by size and by hazard impacts. Non-jurisdictional dams store less than 15 acre-feet of water and are under 6 feet tall. They are not typically rated for risk. Jurisdictional dams are classified by hazard impacts—what would happen if the dam were to fail. It does not relate to the current condition or likelihood of failure of the dam. The classifications, per 302 Mass. Reg. 10.06, are:

- High Hazard – means a dam where failure or miss operation will result in a probable loss of human life.
- Significant Hazard – means a dam where failure or miss operation results in no probable loss of human life but can cause major economic loss, disruption of lifeline facilities, or impact other concerns detrimental to the public's health, safety, or welfare. Examples of major economic loss include but are not limited to washout of a state of federal highway, washout of two or more municipal roads, loss of vehicular access to residences (e.g. a dead-end road whereby emergency personnel could no longer access residences beyond the washout area), or damage to a few structures.
- Low Hazard – means a dam where failure or miss operation results in no probable loss of human life and low economic losses.

On February 10, 2017, Massachusetts Dam Safety Regulations were modified to require owners of significant hazard dams to prepare Emergency Action Plans (EAP) for their dams. This requirement became effective on February 10, 2017, when the DCR, Office of Dam Safety (ODS) promulgated regulatory changes mandated by amended General Laws Part 1-Title II, Chapter 21, Section 65 (b)-Emergency Action Plans for high and significant hazard dams.

The 2017 Plan listed 20 dams in Douglas. Since 2017, two dams (Gray's Pond Dam a.k.a Potter Road Dam, and Meeks Upper Pond Dam) no longer exist and have both been removed from the MA DCR ODS's database). The remaining 18 dams in Douglas are listed in Table 2-5. Eleven of them are small enough to be considered non-jurisdictional. Of the remaining seven, four are classified as 'low' hazard (Gilboa Pond Dam, Wallis Pond Dam, Morse Pond Dam, and Riddle Road Pond Dam). Douglas Mill Pond Dam and the Old Mill Pond Dam are both privately-owned and considered 'significant' hazard structures. Lastly, the Whitin Reservoir Dam is classified as a high hazard structure and is publicly-owned by the Whitin Reservoir Watershed District.

Due to the Town's limited availability of background data on dams, the Consultant for the 2025 Update made a public records request (via email) of DCR ODS and private owners for all of the dams located in Douglas. The list below describes all document returned by DCR ODS (and private owners where noted):

- Whitin Reservoir Dam (high hazard)
    - Phase I Inspection Report (September 1, 2023)
    - EAP (February 12, 2024)
- Old Mill Pond Dam (significant hazard)…private owner
    - Follow-Up Inspection Report (April 25, 2025)
    - EAP (combined with Douglas Mill Pond Dam EAP…October 2024)
    - Dam Breach Feasibility Evaluation (January 25, 2024)
- Douglas Mill Pond Dam (significant hazard)…private owner
    - Follow-Up Inspection Report (April 25, 2025)

    - EAP (combined with Old Mill Pond Dam EAP…October 2024)
    - Dam Breach Feasibility Evaluation (January 25, 2024)
- Gilboa Pond Dam (low hazard)
    - Phase I Inspection Report (September 19, 2019)
    - Certificate of Registration (October 21, 2019)
- Wallis Pond Dam (low hazard)
    - Phase I Inspection Report (April 27, 2015)
    - Follow Up Inspection/Evaluation Report (May 22, 2024)
- Morse Pond Dam (low hazard)
    - Phase I Inspection Report (January 17, 2020)
- Riddle Road Pond Dam (low hazard)
    - Visual Dam Inspection Report (June 2025)
    - Phase I Inspection Report (October 29, 2009)
- Railroad Pond Dam (non-jurisdictional)
    - Jurisdiction Verification Form (June 6, 2006)
- Dudley Pond Dam (non-jurisdictional)
    - Safety Visual Inspection (September 16, 2019)
    - Change of Hazard Classification (September 19, 2019)
- Potter Road Dam (non-jurisdictional)
    - No background data located
- Cedar Street Pond Dam (non-jurisdictional)
    - No background data located
- Lower Hunts Pond Dam (non-jurisdictional)
    - No background data located
- Hunts Pond Dam (non-jurisdictional)
    - Change of Hazard Classification (August 8, 2014)
- Old Storage Pond No. 1 Dam (non-jurisdictional)
    - Jurisdictional Determination (May 17, 2007)
- Laurel Brook Trout Pond Dam (non-jurisdictional)
    - No background data located
- Mill Pond Dam (non-jurisdictional)
    - Jurisdictional Determination (September 22, 2006)
- Chase Pond Dam (non-jurisdictional)
    - Jurisdictional Determination (September 13, 2006)
- Wellman Pond Dam (non-jurisdictional)
    - Safety Visual Inspection (July 16, 2008)
        - Recommendations provided
        - Owner to complete bathymetric survey to determine if meets NJ determination. If so, owner to petition DCR for reclassification…reclassified, no determination letter found.

- Gray's Pond Dam (non-jurisdictional/MA02761)
    - Jurisdiction Verification Form (May 18, 2007)
        - Letter states 'Correction: Potter Road Dam a.k.a. Gray's Pond Dam MA01172, Gray's Pond Dam deleted from ODS inventory'…Potter Road Dam MA01172 is non-jurisdictional.
- Meeks Upper Pond Dam (non-jurisdictional/MA02766)
    - Jurisdiction Verification Form (June 20, 2007)
        - Letter states 'A-E went to wrong dam. This dam does not exist. ODS will delete this from database'.

In addition to the inventoried dams located in Douglas, there are a number of dams upstream of Douglas that could also pose a risk to Douglas. Again, the Consultant for the 2025 Update made a public records request (via email) of DCR ODS for all of the dams located outside of/adjacent to Douglas to review the various inundation area descriptions and determine if the Town of Douglas would in fact be impacted by a dam breach. The available plans reviewed included:

- Eames Pond Dam
    - EAP (Peter Shaw/March 2020)
- Slaters Pond Dam
    - Phase I Inspection/Evaluation Report (Pare Corporation/December 3, 2024)
- Robinson Pond Dam
    - EAP (DCR ODS/July 2012)
- Stump Pond Dam
    - (EAP (Singletary Rod and Gun Club/December 20, 2019)
- Upper Meadow Pond Dam
    - Phase I Inspection/Evaluation Report (Lenard Engineering, Inc./November 20, 2020)
- Lackey Pond Dam
    - EAP (MA DCR Division of Fisheries & Wildlife/April 2025)

The Eames Pond Dam, Slaters Pond Dam, Robinson Pond Dam, and Stump Pond Dam, all classified as 'significant' hazard structures, serve large bodies of water (Sacarrappa Pond, Robinson Pond, and Stump Pond) and are located between 1.0-1.7 miles north of the Douglas border. Fortunately, the rivers flowing from these large bodies of water feed into uninhabited areas: Oxford forests first and Douglas' forests second. Therefore, these dams would not pose a risk to Douglas in the event of a dam breach.

The Town of Northbridge's Upper Meadow Pond Dam (low hazard/fair condition), in conjunction with Sutton's Lackey Pond Dam (significant hazard/good condition), could pose a threat to Douglas if water comes down Lackey Pond through Dunleavey Brook, however, this brook ends,

again, in uninhabited areas of Douglas. Outflow from a dam failure at Upper Meadow Pond Dam would be stored and controlled in Meadow Pond, while outflow from a dam failure at Lackey Pond Dam would not result in impacts beyond the towns of Sutton and Northbridge.

Old Mill Pond Dam/Douglas Mill Pond Dam

In January 2024, GZA GeoEnvironmental, Inc. completed a Dam Breach Feasibility Evaluation for both dams and evaluated the following alternatives:

- Repair and Reconstruction
- Permanent Breach
- No Action

The study determined that the spillway removal is feasible, and that passive downstream sediment release is potentially an option to consider based on the preliminary sediment quality results. Both dams have been issued certificates of non-compliance by ODS for their condition, and have been ordered to be repaired, or removed. The owner is seeking to remove both dams. Tighe & Bond is currently under contract with the dam owner to provide dam removal engineering services. The owner wishes to remove the dam as soon as 2027, pending the availability of funding.

The Consultant for the 2025 Update conducted a coordination call with the on-call engineer (Tighe & Bond) to discuss progress since the completion of the study. An informational resident meeting was held on May 13, 2025, by Tighe & Bond and included the following:

- March 2025: The Blackstone Watershed Collaborative (applicant on behalf of private owner) secured grant funds from the Narragansett Bay Estuary Program to conduct field data collection and develop permit-ready designs.
- April 2025: Project Team applied for grant funds from the Executive Office of Energy and Environmental Affairs (EOEEA) Dam and Seawall Program to complete the permitting process and develop dam removal final designs (awaiting award determination).

Dudley Pond Dam[22]

On September 16, 2019, Northwest Engineering, Inc. made measurements to determine the maximum structural height of Dudley Pond Dam. The resulting measurement determined that the structural height is 4.07 feet. Based on this information, ODS concurs that based on the Dudley Pond Dam being less than 6 feet in structural height, and by definition in 302 CMR 10.00 Dam Safety Rules and Regulations, Dudley Pond Dam be reclassified as Non-Jurisdictional.

[22] *Change of Hazard Classification of Dam Letter*, Dudley Pond Dam, Northwest Engineering Services, Inc. September 19, 2019.

Table 2-5 Inventoried Dams in Douglas, MA

MA ID #	Name	Ownership	Regulatory Authority	Hazard Classification	Water Body/Tributary
MA00200	Whitin Reservoir Dam	Whitin Reservoir Watershed District	ODS	High	Mumford River
MA01173	Old Mill Pond Dam	Private	ODS	Significant	Mumford River
MA02760	Douglas Mill Pond Dam	Private	ODS	Significant	Mumford River
MA00199	Gilboa Pond Dam	Town of Douglas	ODS	Low	Mumford River
MA02532	Wallis Pond Dam	MA DCR ODS	ODS	Low	Tributary of Whitin Reservoir
MA02770	Morse Pond Dam	Private	ODS	Low	Centerville Brook
MA02772	Riddle Road Pond Dam	Private	ODS	Low	Riddle Brook
MA02769	Railroad Pond Dam	Private	Non-Jurisdictional	N/A	Unnamed Brook
MA00889	Dudley Pond Dam	Private	Non-Jurisdictional	N/A	
MA01172	Potter Road Dam	Private	Non-Jurisdictional	N/A	
MA02762	Cedar Street Pond Dam	Private	Non-Jurisdictional	N/A	
MA02763	Lower Hunts Pond Dam	Private	Non-Jurisdictional	N/A	
MA02764	Hunts Pond Dam	Private	Non-Jurisdictional	N/A	
MA02765	Old Storage Pond No. 1 Dam	Private	Non-Jurisdictional	N/A	
MA02768	Laurel Brook Trout Pond Dam	Private	Non-Jurisdictional	N/A	
MA02771	Mill Pond Dam	Private	Non-Jurisdictional	N/A	
MA02773	Chase Pond Dam	Private	Non-Jurisdictional	N/A	
MA03336	Wellman Pond Dam	Private	Non-Jurisdictional	N/A	

Source: Douglas LHMT, MA DCR ODS, MassGIS.

Whitin Reservoir Dam[23]

The Whitin Reservoir Dam is publicly-owned and maintained by the Whitin Reservoir Watershed District and is classified as a high hazard structure. The dam had historically been used to impound Whitin Reservoir for use as a water supply to a former mill building located downstream of the dam. However, all operations and manufacturing have ceased at this location. Currently the dam impounds water for recreational purposes. Discharges from the dam

[23] *Whitin Reservoir Dam Phase I Inspection/Evaluation Report,* PARE Corporation, September 1, 2023.

are also used for sanitation purposes by the Town of Douglas.

Owner: Whitin Reservoir Watershed District
MA #: 00200
Type: Earthen embankment
Tributary: Mumford River
Height: 33 feet
Storage Capacity: 4,475 acres/feet
Last Inspection: September 1, 2023
Hazard Classification: High Hazard
EAP: February 12, 2024
O & M: Yes, February 2022
Whitin Reservoir Dam supports a public road along its crest with mixed residential/commercial areas within the downstream area along Northwest Main Street, West Street, Manchaug Street, as well as utilities, residential, commercial, and public safety structures. It appears that a failure of the dam at maximum pool will likely cause loss of life and serious damage to home (s), industrial or commercial facilities, important public utilities, main highways, or railroads.

In order to reduce the load on the dam during the winter months and to provide additional storage capacity for snow melt and winter storms, the impoundment should be drawn down by the end of October to El. 590.6 and returned to normal pool El. 596.6 in April. The low-level outlet should be utilized to lower the level of the impoundment to the drawdown elevation. In order to maintain this elevation, the low-level gate should be regularly adjusted to regulate the level of the impoundment.

Flow through the spillways and outlet structure is contained within natural stream channels that converge further downstream. Further downstream of the dam consists of residential and commercially developed areas before the flow joins the Mumford River. Downstream dams within the inundation area, include but are not limited to:

- Potter Road Dam
- Old Mill Pond Dam
- Douglas Mill Pond Dam
- Gilboa Pond Dam

The following dams are downstream of Route 146:

- Lackey Pond Dam
- Lower Meadow Pond Dam
- Ring Shop Pond Dam
- Linwood Pond Dam
- Whitin Pond Dam

- Caprons Pond Dam (Mumford River in Uxbridge)

In total, 112 structures would be impacted under a 'Fair Weather Breach' and a 'Wet Weather Breach' during a 'normal, sunny day' and during a '1/2 PMF storm'. A complete listing of the streets inundated in order of anticipated flood arrival time is summarized below:

- Northwest Main Street
- Manchaug Street
- Gilboa Street
- A Street
- Cummings Court
- Yacino Drive
- West Street
- Potter Road
- Mumford Street
- Conservation Drive
- Whitin Heights
- Mechanic Street
- Charles Street
- North Street
- Cross Street
- Northeast Main Street
- Cook Street
- B Street

The following information was extracted from the most recent Emergency Action Plan. This data represents the best available data and is located in Appendix B:

- Hydrologic/Hydraulic Studies
    - Hydrology
    - Dam Break Analysis
        - Table 8.2: Model Sections
        - Table 8.3: Dam Failure Flow Data
- Inundation Map
    - Figure 8.1 Inundation Map
- Evacuation Contact List
    - Table 2.1 Residents Contact List

The most recent Phase 1 Inspection Report rated the overall physical condition of the Whitin Reservoir Dam as satisfactory, meaning that there are minor operational and maintenance deficiencies. Infrequent hydrologic events would probably result in deficiencies. The consultants (PARE Corporation) who performed the inspection made several recommendations, including:

Studies and Analyses

1. Complete an updated H&H analysis. Although previous H&H analyses have been completed for this structure (1980, 2007, during EAP development), there are inconsistencies between them with the peak flows and peak pool levels reported and all of them appear to have only evaluated PMF and the ½ PMF storm event. The previous analyses would be used to the extent practical to develop an updated analysis that would also include lower recurrent storm events (i.e. 50-year, 100-year, etc.) that would be used to calibrate the model. The updated analyses could then be used to develop and implement hydraulic modifications at the structure in order to accommodate the SDF, as discussed in remedial modification #2.
2. Continue to monitor and evaluate the observed seepage, leakage, and wet areas along the base of the downstream wall. Seepage and stability evaluations should be completed in accordance with current dam safety regulations. Pending the results of the seepage analysis, modifications may be required as discussed in remedial modifications #3.
3. Evaluate the hydraulic and structural capacity of the dike at maximum pool conditions based on survey elevations. Pending the results of the evaluations, modifications to the dike may be required.
4. Coordinate the completion of a site-specific risk and safety assessment to further evaluate, categorize, and determine the need for implementing a site safety improvement program.
5. Continue to monitor the leakage previously observed under the primary spillway; concrete scour at the primary spillway; and scour holes noted downstream of the spillways of the as part of routine monitoring.

Yearly & Recurrent Maintenance Recommendations

1. Continue regular monitoring and inspections of the dam. Included in the monitoring program should be continued regular monitoring of the cracks and depressions along the crest of the dam near the spillway culverts, the settlement at the crest near the right abutment, leakage under and through the spillway, leakage and seepage rates through the downstream stone masonry wall, possible movement of the upstream and downstream walls (utilizing survey monuments), and routine inspection of all other components of the structure. Complete formal inspections in accordance with current state regulations. As the dam is currently classified as a high hazard potential dam, inspections are required every 2 years.
2. Regular maintenance activities should be performed to control and prevent growth of unwanted vegetation, including weeds and brush within the face of the masonry walls and vegetation within the approach and discharge channels

of the primary and auxiliary spillways. Clearing of brush and removal of vegetation should continue to be performed at least once per year. Additional maintenance activities should be performed to address the following minor maintenance deficiencies observed during this inspection:

   a. The surface erosion at the left abutment and right abutment should be filled and vegetated.
   b. The isolated voids within the un-mortared sections of the upstream riprap should be filled with riprap.

3. Continue to routinely monitor and survey the upstream wall to check for indications of movement. Routinely monitor the utility poles located on the downstream side of the crest for indications of movement.
4. Continue to complete routine reviews and updates of the EAP. Complete periodic training of involved personnel.

Minor Repair Recommendations

1. Continue to seal cracks and patch depressions in the roadway in the area of the spillway culverts.
2. Continue to clear the tree and brush growth at the dam and dike.
3. Clear the unwanted vegetation and debris within the approach and discharge areas of the spillways.
4. Complete concrete repairs at the primary/auxiliary spillway. the scour holes within the downstream channel of the auxiliary and primary spillways.

A mitigation action has been included in Section 4.3 for the Town to coordinate with the Whitin Reservoir Watershed District to ensure completion of the improvements identified in the most recent Phase I Inspection Report, and to annually update the EAP (note that an updated Phase I Inspection Report will be required by September 1, 2025).

The mitigation action also states that the Town of Douglas will also encourage the Whitin Reservoir Watershed District to collaborate on a range of specific actions that address reducing risk to/from this high-hazard potential dam, including:

- Rehabilitating/Removing the dam
- Adopting/Enforcing land use ordinances in inundation zones
- Elevating structures in inundation zones
- Adding flood protection such as berms, floodwalls or floodproofing in inundation zones

The Consultant for the 2025 Update interviewed a representative of the Whitin Watershed District to discuss recent improvements that have been completed associated with the Whitin Reservoir Dam, including:

- Emergency spillway at northwest corner of the Whitin Reservoir:

    - All gates have been upgraded and are maintained in accordance with the O & M Manual and are fully operational for the use and maintenance of water levels.
    - A saddle dyke had been added in the early 1980's to the backside of the Cove of the reservoir to control unregulated flows from this low topographical area and is included in the O & M Manual and included in the biannual Phase I Dam Inspections.
- Management of water levels in the Reservoir:
    - In 2023, the District invested in a remote monitoring system (HOBO RX 2300) which sounds alarms during periods of excessive rainfall (rise in impoundment), as well as when water levels drop. This system is used daily for monitoring and maintaining appropriate water levels for the current season and more frequently (multiple times a day) during storm events for real time water level management.

Old Mill Pond Dam[24]

The Old Mill Pond Dam is privately-owned and maintained by Hayward Landing Apartments Limited Partnership and is classified as a significant hazard structure. The dam was originally constructed in approximately 1880 to provide waterpower for woolen manufacturers at the adjacent mill building. Currently the purpose of the dam and its impoundment is for recreational/aesthetic value.

Old Mill Pond Dam is located upstream of both the Douglas Mill Pond Dam (approximately 0.15 miles) and Gilboa Pond Dam (approximately 1.43 miles). Failure of the Old Mill Pond Dam may result in the domino-effect failure of the Douglas Mill Pond Dam and loss of life and damage to homes (in the adjacent apartment building).

Owner: Hayward Landing Apartments Limited Partnership
MA #: 01173
Type: Concrete gravity
Tributary: Mumford River
Height: 17.5 feet
Storage Capacity: 7.4 acres/feet
Last Inspection: April 25, 2025
Hazard Classification: Significant Hazard
EAP: October 2024
O & M: No

The most recent Follow-Up Inspection Report rated the overall physical condition of the Old Mill Pond Dam as poor, meaning that significant structural, operational, and maintenance deficiencies are clearly recognized under normal loading conditions. The consultants (Tighe & Bond) who performed the inspection made several recommendations, including:

[24] *Old Mill Pond Dam Follow-Up Inspection Report,* Tighe & Bond, April 25, 2025.

Studies and Analyses

1. Prepare an Operations & Maintenance Manual (O &M Manual).
2. Divert flow to inspect the spillway crest, downstream face, and toe of the overflow section to verify integrity of foundation and determine extent of material lost from scour.

Yearly & Recurrent Maintenance Recommendations

1. Remove emerging vegetation throughout the dam.

Minor Repair Recommendations

1. Repair surface cracking along top of the dam.
2. Fill depression along right side of the top of the dam.

Remedial Modifications Recommendations

1. Repair deteriorated concrete throughout the dam.
2. Reconstruct left abutment/training wall.
3. Restore missing masonry.
4. Install a functioning low-level outlet at the dam or provide for some alternate means of impoundment drawdown.

A mitigation action has been included in Section 4.3 for the Town to collaborate with the private dam owners to obtain funding for the removal of the dam.

Douglas Mill Pond Dam[25]

The Douglas Mill Pond Dam is privately-owned and maintained by Hayward Landing Apartments Limited Partnership and is classified as a significant hazard structure. The dam was originally constructed for industrial purposes and power generation for the former Hayward and Schuster Mills. Currently, the purpose of the dam and its impoundment is for recreational/aesthetic value as well as providing water for emergency fire protection usage in the adjacent building

Immediately downstream of the dam is the closed walkway/bridge to access the associated apartment building. The Hayward Landing apartment building is along the right downstream channel for approximately 250-feet. The downstream channel is a steeply banked, deep channel with natural wooded vegetation along both sides of the channel after the Mumford River bends almost 180 degrees around the apartment complex. Approximately 1,400-feet downstream of the channel is the North Street bridge. Further downstream (approximately 1.1 miles) is the Gilboa Pond Dam, a low-hazard dam.

[25] *Douglas Mill Pond Dam Phase I Inspection/Evaluation Report,* GZA GeoEnvironmental, Inc. June 2, 2021.

Owner: Hayward Landing Apartments Limited Partnership
MA #: 02760
Type: Concrete gravity
Tributary: Mumford River
Height: 17.5 feet
Storage Capacity: 5.0 acres/feet
Last Inspection: April 25, 2025
Hazard Classification: Significant Hazard
EAP: October 2024
O & M: No

The most recent Follow-Up Inspection Report rated the overall physical condition of the Douglas Mill Pond Dam as poor, meaning that significant structural, operational, and maintenance deficiencies are clearly recognized under normal loading conditions. The consultants (Tighe & Bond) who performed the inspection made several recommendations, including:

Studies and Analyses

1. Prepare an Operations & Maintenance Manual (O &M Manual).
2. Perform a Hydrologic and Hydraulic (H & H) analysis to evaluate the adequacy of the spillway for the SDF.
3. Inspect the spillway crest, downstream face, abutments, and toe of the overflow section in the dry to verify integrity of concrete, foundation, and determine extent of material lost (if any) from scour. GZA notes water control and/or flow diversion is necessary to perform this task.

Recurrent Maintenance Recommendations

1. Clear timber and debris from spillway.
2. Remove emerging woody vegetation throughout the dam.

Remedial Modifications Recommendations

1. Repair deteriorated concrete throughout the dam.
2. Reconstruct left abutments/training walls.
3. Install a functioning low-level outlet at the dam or provide for some alternate means of impoundment drawdown.
4. Repair deteriorated concrete at southeastern corner of the turbine room.
5. Investigate source of turbine room seepage and seal leak.
6. If turbine is no longer needed, remove turbine and unstable flooring. Fill voids with concrete to create a stable slab.
7. Retail a structural engineer to further investigate the structural integrity of the turbine room and provide repair recommendations.

A mitigation action has been included in Section 4.3 for the Town to collaborate with the private dam owners to obtain funding for the removal of the dam.

Gilboa Pond Dam[26]

Gilboa Pond Dam is publicly-owned and maintained by the Town of Douglas and is classified as a low hazard structure. In 2019, the Town of Douglas, MA acquired ownership of the dam accompanying the former Massachusetts Holding Company's (MHC) East Douglas Facility through unpaid taxes. The dam's current primary purpose is to maintain adequate pond elevation for dry fire hydrants located adjacent to the pond. The intake for the MHC Facility is no longer in use.

Owner: Town of Douglas, MA
MA #: 00199
Type: Unmortared granite blocks in a tiered configuration
Tributary: Mumford River
Height: 9.8 feet
Storage Capacity: 285 acres/feet
Last Inspection: December 2019
Hazard Classification: Low Hazard
EAP: not required
O & M: No

The most recent Phase 1 Inspection Report rated the overall physical condition of the Gilboa Pond Dam as satisfactory, meaning that there are minor operational and maintenance deficiencies and that infrequent hydrologic events would probably result in deficiencies. The consultants (Kleinschmidt Associates) who performed the inspection made several recommendations, including:

<u>Studies and Analyses</u>

1. No studies or analyses are recommended. No hydrologic or hydraulic analyses are known to have been done for the dam, but, in consideration of the dam's low hazard potential classification, no hydrologic or hydraulic analyses are warranted.

<u>Recurrent Maintenance Recommendations</u>

1. Keep large debris clear from the upstream side of the dam.
2. Monitor the condition of the concrete gate structure and make repairs if and when the structure's integrity or functionality becomes jeopardized.

[26] *Gilboa Pond Dam Phase I Inspection/Evaluation Report,* Kleinschmidt Associates. December 16, 2019.

3. Monitor the condition of the downstream face by taking photos annually from similar vantage points and comparing to prior years' photos.
4. Monitor the river back immediately downstream of the right abutment of the dam, especially during and after high-flow events, to make sure the integrity of the dam is not threatened.
5. Although it is not 'required', an Operation and Maintenance Manual should be developed for the dam.

Minor Repair Recommendations

1. No minor repairs are recommended at this time.

Remedial Modifications Recommendations

1. No remedial modifications are recommended at this time.

A mitigation action has been included in Section 4.3 for the Town to complete the recommended improvements identified in the most recent Phase I Inspection Report and to develop an Operation & Maintenance Manual.

Wallis Pond Dam[27]
Wallis Pond Dam state-owned and maintained by the Douglas State Forest and is classified as a low hazard structure. The dam was constructed in the early 1800's and used as a sawmill. The current use of the dam is for recreational purposes for the Douglas State Forest.

Owner: MA DCR
MA #: 02532
Type: Earthen embankment
Tributary: Tributary of Whitin Reservoir
Height: 16 feet
Storage Capacity: 75 acres/feet
Last Inspection: May 22, 2024
Hazard Classification: Low Hazard
EAP: not required
O & M: No

Wallis Pond Dam.

The most recent report is the Dam Safety Follow-up Visual Inspection (May 22, 2024). GEI's field inspection confirmed dam deficiencies noted in the previous Follow-up Inspection Report performed on January 18, 2023, and the previous Phase I Inspection Report performed on April

[27] *Wallis Pond Dam Follow-Up Inspection/Evaluation Report,* GEI Consultants, May 22, 2024.

27, 2015 (both by Fuss & O'Neill, Inc.). The current condition of the dam is considered to be poor, meaning that significant structural, operation and maintenance deficiencies are clearly recognized under normal loading conditions. Deficiencies observed by GEI include the following:

- No existing detailed H & H analysis.
- No Operations and Maintenance Manual.
- There is seepage in the masonry wall to the right of the primary spillway.
- Lack of low-level outlet.
- Sparse turf coverage on the crest.
- Beaver Dam upstream.
- The base of the spillway end all appears to be either undermined or the stones beneath the spillway appear to be fallen.

GEI also identified two additional deficiencies:

- The masonry walls that lined the downstream channel of the dam were leaning towards the channel from many trees lining the walls. There were some areas where the stones had fallen.
- Minor undermining was observed where the concrete spillway walls met the masonry portion of the spillway.

The deficiencies noted in the previous inspections and confirmed during this follow-up field inspection and the corresponding recommendations are included below.

<u>Studies and Analyses</u>

1. A detailed H & H analysis with survey should be completed by a qualified consulting engineer to assess the potential for overtopping and the need for additional spillway capacity.
2. An Operations and Maintenance (O & M) Manual should be developed and implemented for this dam. The O & M Manual should contain explicit schedules and instructions for maintenance activities to be performed on the dam and its appurtenances, as well as operational procedures to be followed under both routine and flood conditions.

<u>Recurrent Maintenance Recommendations</u>

1. Remove debris from the primary spillway, auxiliary spillway pipes, approach, and discharge areas. (during 2024 inspection auxiliary spillway pipes were debris free, but debris existed downstream of the main spillway).
2. Cut brush on the embankments and within 25 feet of the dam toe and abutments.

3. Mow and maintain a healthy cover of grass with a height of 3 to 12 inches.
4. Monitor for new animal burrows, sinkholes, or depressions, and repairs as necessary.
5. Monitor for increased beaver activity within the impoundment or downstream channel.
6. Monitor for increased leakage rates or embankment material migration through the downstream left masonry wall.

Maintenance and Minor Repair Recommendations

1. Repair bare areas on the dam crest. Seed areas and establish a healthy cover of grass.
2. Repair sinkholes/depressed areas on the dam crest behind masonry walls.
3. Replace missing capstones and chink areas on the downstream left masonry wall where stone is missing.
4. Remove the trees, stumps, and root systems on and from within 25 feet of the dam. Fill and compact the resultant voids and reestablish grass cover.
5. Investigate the extent of undermining and/or missing stones at the base of the downstream masonry face at the primary spillway and repair as necessary.
6. Fully remove beaver dam approximately 450 feet upstream of the dam to deter increased beaver activity and re-impoundment of the upstream portion of the pond.

Remedial Modifications Recommendations

1. Repair left upstream masonry wall and provide seepage control measures.
2. Grade the upstream slope of the embankment and provide adequate riprap armoring.

A mitigation action has been included in Section 4.3 for the Town to coordinate with the MA DCR ODS to ensure completion of the improvements identified in the most recent Follow-up Inspection Report.

Morse Pond Dam[28]
Morse Pond Dam is privately-owned and maintained by Lawrence A. Basile and is classified as a low hazard structure. The current purpose of the dam is for recreational use.

Owner: Lawrence A. Basile
MA #: 02770
Type: Earthen embankment
Tributary: Centerville Brook
Height: 9 feet
Storage Capacity: 118.3 acres/feet
Last Inspection: January 17, 2020

[28] *Morse Pond Dam Phase I Inspection/Evaluation Report,* McClure Engineering, Inc. January 17, 2020.

Hazard Classification: Low Hazard
EAP: not required
O & M: No

The most recent Phase 1 Inspection Report rated the overall physical condition of the Morse Pond Dam as poor, meaning that significant structural, operation and maintenance deficiencies are clearly recognized under normal loading conditions. The consultants (McClure Engineering, Inc.) who performed the inspection made several recommendations, including:

Studies and Analyses

1. Prepare a formal Operation & Maintenance Manual.
2. Prepare an Emergency Action Plan.
3. Perform a detailed hydrologic/hydraulic analysis.
4. Investigate wet areas at the toe.

Recurrent Maintenance Recommendations

1. Control vegetation on the dam and areas within 20 ft of any part of the dam.
2. Remove debris from the spillway as needed.
3. Perform regular inspections of the dam especially before and after rain events.

Minor Repair Recommendations

1. No minor repairs are recommended at this time until remedial measures are undertaken.

Remedial Modifications Recommendations

1. Remove all stumps on the crest and slopes of the dam from previous tree removal efforts.
2. Remove all woody vegetation and trees on the entire dam and abutments and within 20 ft of any part of the dam.
3. Regrade dam crest and slopes and plant grass.
4. Provide slope erosion at waterline on upstream side of dam.

A mitigation action has been included in Section 4.3 for the Town to coordinate with the MA DCR ODS to ensure completion of the improvements identified in the most recent Phase I Inspection Report and to develop an Operation & Maintenance Manual.

Riddle Road Pond Dam[29, 30]

Riddle Road Pond Dam is privately-owned and maintained by Catherine Olson and is classified as a low hazard structure. The current purpose of the dam is for recreation and wildlife purposes.

[29] *Riddle Road Pond Dam Visual Dam Inspection Report*, Kleinschmidt. June 2025.
[30] *Riddle Road Pond Dam Phase I Inspection/Evaluation Report,* Lenard Engineering, Inc. October 29, 2009.

Owner: Catherine Olson
MA #: 02772
Type: Earthen embankment
Tributary: Riddle Brook
Height: 13 feet
Storage Capacity: 30 acres/feet
Last Inspection: Visual Dam Inspection Report (June 2025)
Hazard Classification: Low Hazard
EAP: not required
O & M: No

A Visual Dam Inspection was completed in June 2025 with Town Officials present given the Town of Douglas' objective to purchase the property to construct a new municipal facility, and the additional costs and opportunity costs associated with the dam could impede the process of constructing the new facility. The most recent Visual Dam Inspection Report (June 2025) rated the overall physical condition of the Riddle Road Pond Dam as poor, meaning that significant structural, operation and maintenance deficiencies are clearly recognized under normal loading conditions. The dam in its current condition presents dam safety and general liability risks for the Town of Douglas if it purchases the property. The dam currently does not comply with a multitude of MA DCR 302 CMR10.00 Dam Safety requirements. Additionally, apparently none of the recommendations for studies, maintenance and repairs from the 2009 Phase I Inspection/Evaluation Report were completed and maintained, based on Kleinschmidt's onsite observations.

Kleinschmidt recommends four potential options for the Town of Douglas to consider based on this inspection. Additional work will be necessary to further develop any of these four options. The references below to specific sections of DCR 302 CMR10.00 are presented as overviews and highlight overarching requirements.

<u>Remove & Replace</u>

Removing the existing dam and replacing it with a modern equivalent is plausible but represents a significant undertaking and cost would be a key consideration. First, the removal process would involve *DCR10.09 (Remove)* requirements, including *DCR 10.09(8)* which requires the owner to obtain a Certificate of Approval stating the dam was removed in accordance with the approved plans and specifications. Next, *DCR 10.14 Design and Construction Criteria for New and Existing Dams* presents considerable engineering requirements. The process would require preliminary and final reports to support an application for a Chapter 253 permit to replace the dam.

Notably the design portion alone will take significant time and budget. There is no design information or engineering drawings available for the existing dam and a replacement dam will require gathering of new information, engineering analysis, and development of a design by a licensed Professional Engineer.

A replacement dam would improve dam safety considerably, however, public safety at and downstream of the dam would remain as perpetual liabilities for the Town of Douglas. *DCR 10:13 Liability* clearly assigns liability to the owner for damage to property of others or injuries up to loss of life resulting from operation, failure of or mis-operation of a dam.

Providing a cost estimate for the dam replacement portion of this option is beyond the scope of the inspection report. Additional information is necessary to develop even a basic Association for the Advancement of Cost Engineering (AACE) estimate with a low range of -20% to -50% and a high range of +30% to +100% of the actual cost.

Repair & Maintain

Repairing and maintaining the existing dam either by the current owner in advance of a property sale or afterwards by the Town of Douglas would be another option to comply with the DCR requirements. However, the current condition of the dam, lack of an engineered design/plans and *DCR10.09 (Repair) Permit* requirements combine to make the repair and maintain option impracticable. The process would require preliminary and final reports to support an application for a Chapter 253 permit to repair the dam. Based on the reviewed information and the visual inspection, Kleinschmidt does not recommend this option based on engineering judgement, the anticipated high costs and significant time and regulatory approval process for a rehabilitated dam.

Decommission

Removing the existing dam and restoring the pond area to natural conditions either by the current owner in advance of a property sale or afterwards by the Town of Douglas appears viable. Kleinschmidt acknowledges that there may be underlying rights and expectations by abutters and community members that would require resolution, and FEMA floodway, historic, and environmental considerations to address.

Similar to both options above, *DCR10.09 (Remove)* requires preliminary and final reports to support an application for a Chapter 253 permit to remove the dam. *DCR 10.09(6)* would require notice and drawdown notification to the local Conservation Commission and the Commonwealth Division of Fish and Wildlife for Natural Heritage and Endangered Species considerations. *10.09(8)* requires the owner to obtain a Certificate of Approval stating the removal was completed in accordance with the approved plans and specifications.

There are many other removal considerations beyond those of DCR 302 CMR10.09. There is some information available about the decommissioning process based on historic reports and Kleinschmidt's experience with dam removals. Kleinschmidt presents a summary of the decommissioning option in Appendix B.

Pursue an Alternate Site

Eliminating this property from consideration due to the dam is viable if the Town of Douglas has alternate sites available for purchase for their proposed objectives. Remove & Replace, Repair & Maintain, and Decommission all represent significant undertakings with two perpetuating dam liabilities if the dam continues to exist and is owned by the Town of Douglas. Given the Town of Douglas' objective is to construct a new municipal facility, the additional costs and opportunity costs associated with the dam could impede the process of constructing the new facility. Thus, pursuit of an alternate site for the municipal facility is a viable alternative if another suitable property can be identified that meets the Town's location, space, and cost constraints.

Should the Town of Douglas decide not to purchase this site for a new municipal facility, the consultants (Lenard Engineering, Inc.) who performed the 2009 Phase I Inspection/Evaluation made several recommendations not yet completed, including:

Studies and Analyses

1. Conduct preliminary hydrologic and hydraulic analysis (H&H) to determine spillway capacity and corresponding impoundment levels. This will allow the owner to determine an impoundment level that will provide adequate freeboard for the design flood (50-year event).
2. Investigate the condition of the low-level outlet gate.

Recurrent Maintenance Recommendations

1. Regularly mow.
2. Fill low spots, ruts, areas of erosion and runoff with suitable fill. Reseed areas of thin vegetation with grassy cover.
3. Remove debris from all outlets and downstream channels.
4. Remove brush within 10 feet of the dam area, including downstream toe. Apply herbicide to stumps or use other suitable means to discourage re-growth.
5. Monitor seepage and leakage to look for changing conditions.

Minor Repair Recommendations

1. Remove all trees and wood vegetation from the embankment (do not remove stumps); and within 10 feet of the toe to facilitate inspection and monitoring of seepage conditions.

2. Establish and maintain an adequate vegetative ground cover on the downstream embankment. A conservation mix containing native species of grass and wild flowers would be appropriate.
3. If the beavers persist in blocking the outlet and raising the water level it may be necessary to install "beaver deceivers".

Remedial Modifications Recommendations

1. None.

The consultant (Kleinschmidt) who performed the visual inspection does not recommend dam repair or dam replacement and considers decommissioning as a viable option. Kleinschmidt's recent experience decommissioning other similar dams indicates this could be a practical, cost-effective solution. Furthermore, removal would create numerous environmental benefits. A mitigation action has been included in Section 4.3 for the Town to coordinate with the private dam owner and make a decision regarding purchase of this site for a new municipal facility, followed by which direction to pursue: remove/replace; repair/maintain; or decommission. Should the Town decide not to purchase this site, the mitigation action also includes recommendations for improvements identified in the 2009 Phase I Inspection/Evaluation.

Climate Change Impacts on Dams

The increase in precipitation and frequency of intense rainfall events, which will cause an increase in river discharge and peak flows, may also lead to overtopping and damage of aging dams or structures in need of repair and maintenance. Heavy precipitation events may also impact local water levels.

Should there be a dam breach at any of the inventoried structures in Douglas, the immediate areas surrounding the structure, as well as properties located downstream (within the individually identified inundation zones) of the structure are most vulnerable. Based on review of NOAA's NCEI and coordination/confirmation with the LHMT, there were no available historic records of significant dam failure events in Douglas since 2016. Based on the very low frequency and limited severity of the potential for future dam failures, as confirmed by the LHMT, the Town is considered to be at moderate risk for future dam failure events.

Beaver Activity[31]

Beavers are common and abundant throughout most of Massachusetts. They are becoming increasingly common in southeastern Massachusetts but are still absent from Cape Cod and the islands. Since European settlement, more than half of the wetlands in the lower 48 states have been lost. By damming streams and forming shallow ponds, beavers create wetlands. These

[31] https://www.mass.gov/info-details/learn-about-beavers?_gl=1*1ia7ski*_ga*MTA1NzQ1MjExMS4xNzExMDUzNjI0*_ga_MCLPEGW7WM*MTcxNTQ0OTMwOC4xLjAuMTcxNTQ0OTMwOC4wLjAuMA.

wetlands provide habitat for a tremendous diversity of plants, invertebrates, and wildlife. People benefit too. Wetlands control downstream flooding by storing and slowly releasing floodwater. They also improve water quality by removing or transforming excess nutrients, trapping silt, binding and removing toxic chemicals, and filtering out sediment.

There are five main options for resolving conflicts with beavers:

1. Tolerance: People who learn to tolerate a certain amount of beaver influence on their land generally find that co-existing with beavers provides far more benefits than perceived harm. Beavers create excellent wetland habitats that benefit a huge diversity of plant and animal life.
2. Enclosures: Fencing can provide a long-term solution, while preserving the beneficial aspects of beavers. The most effective way to protect specific trees and shrubs is to construct exclosures around them. These exclosures should be constructed of heavy-gauge fencing, be a minimum of 4 feet tall, and be flush with the ground. To protect larger areas, such as orchards or nurseries, standard fencing is usually sufficient since beavers are poor climbers, rarely burrow under fences, and generally don't chew fencing unless it is wrapped tightly around trees or shrubs.
3. Breaching & Removing the Dam: Dam breaching is an immediate, but short-term solution to flooding problems caused by beaver. If beaver remain at a site during a dam breach, they will be cued by the sound of escaping water, and will usually rebuild the damaged dam quickly, sometimes overnight.
4. Water Level Control Devices (WLCD): Sometime referred to as "beaver pipes," WLCDs can regulate water at desirable levels behind dams. By successfully installing an effective WLCD, the life of a beaver wetland, and its associated benefits, can be prolonged. WLCDs require regular maintenance and may not be effective in all situations.
5. Lethal Removal: Beavers are an important natural resource in Massachusetts. They are classified as a furbearer species, for which a regulated trapping season and management program have been established. Removal of problem beavers can be a quick way to alleviate beaver problems when done by an experienced trapper. Beavers can be trapped during the open season (November 1 – April 15) by a licensed trapper using permissible traps (i.e. box or cage-type traps). By removing beaver during the regulated trapping season, they can be used as a natural resource. An Emergency Permit is needed to trap beavers with restricted traps (i.e. body-gripping traps, "Conibear" traps) and to trap beaver outside the regulated trapping season. It is against state law to capture and release beaver into another area.

It is against state law to capture and release beavers into another area. Often people want to capture problem animals and release them someplace else. However, moving wildlife is detrimental to both people and wildlife populations and is against the law. This law has been in effect for many years, protecting both people and wildlife. The Central Mass. Mosquito Control Project (CMMCP) receives many requests from city and town officials and property owners

seeking assistance to alleviate flooding caused by beaver activity.

Wallis Pond beaver dam.

Massachusetts Permitting[32]

Permitting for Beaver Removal and Beaver Dam Breaching or Installation of a Water Flow Device.

The main remedies for beaver control are trapping beaver, breaching dams or installing water-level control devises (beaver deceivers). The use of these measures will be assessed on a case-by-case basis by the Wetlands Project Coordinator and recommendations will be discussed with the property owner and town officials. The most appropriate form of control will be utilized per M.G.L. 131, s. 80A.

Massachusetts Beaver Law[33]

M.G.L. c. 131, s. 80 A — An Act relative to Foothold Traps and Certain Other Devices.

The law grants permitting authority with local Boards of Health in situations where beaver activity is causing threats to human health and safety. The law also outlines what types of beaver conflicts could constitute a threat to human health and safety, though the local Boards of Health can use their own discretion.

Since 2017, the Douglas Board of Health has issued 21 Beaver Permits (primarily the Walnut Street area, Webster Street, Northwest Main Street, and South Street), trapped 18 beavers, and added six screens to cross-drain inlets where repetitive beaver activity has been experienced. Based on the very high frequency and minor severity of beaver activity as ranked and confirmed by the LHMT, the Town is considered at moderate risk for future impacts of beaver activity.

Climate Change Impacts on Beaver Activity[34]

Beavers actually increase our ability to adapt to floods, droughts, and wildfires. Riverscapes are stream or river habitats and their associated floodplains, wetlands, and riparian vegetation. These habitats are disproportionately important parts of the landscape, especially in arid and semi-arid regions. Riverscapes with beaver dam complexes are capable of naturally storing more water during storms and slowly releasing it later in the year. This reduces flood peaks and can prolong water availability during periods of heat and drought, supporting riparian vegetation and decreasing water-related stresses for aquatic and terrestrial wildlife. The wet, saturated soils and

[32] https://www.cmmcp.org/beaver-mitigation-program/pages/laws-permits.
[33] Ibid.
[34] https://www.nrdc.org/bio/amy-mcnamara/partnering-beavers-adapt-climate-change.

braided stream channels don't readily burn and can therefore also serve as firebreaks, slowing the spread of fire, and giving firefighting teams time to contain them before they get out of control.

The Massachusetts Division of Fisheries and Wildlife has developed the *Beavers and the Law: A Citizen's Guide to Addressing Beaver Conflicts*, referenced in Section 3 of this 2025 Update.

Property/People at Risk from Flood-Related Hazards

Douglas often experiences minor flooding at isolated locations due to drainage problems, or problem culverts. The following specific flooding locations were identified/confirmed by the LHMT based on knowledge of past flood events:

- Wallis Street (west side of Whitin Reservoir, area associated with Shady Lane)
- North Street (in the area associated with the No. 37 bridge…bridge has still not been replaced and is impacted whenever the Mumford River swells)
- Northwest Main Street, Webster Street, and South Street (beaver activity)

Douglas also has a number of culverted streams throughout town, several of which were identified during the May 2020 MVP Workshop as currently undersized. Notable culverts were located at the Whitin Reservoir causeway (entire length of causeway when water levels rise), Wallis Street (between Whitin Reservoir and Bad Luck Pond – the Town previously sought grants for remediation efforts), Charles Street at Wellman Brook (Charles Street/Northeast Main Street), and Walnut Street and Tinkerville Brook. As precipitation volume and intense rain events increase with climate change, these culverts will not be able to handle the capacity of water needing to flow through them.

The Wallis Street culvert is currently a 3-sided culvert. It should be replaced with a box culvert, the causeway should be elevated, and the road should be widened in order to increase capacity.

The North Street Bridge over the Mumford River was also identified as a concern because of its low arch over the water and narrow roadway. The low arch is a risk during flooding when debris may become trapped under the bridge, and the narrow roadway creates a bottleneck along an important evacuation route for the town. The spillway there should be replaced and a culvert should be installed.

Though not as high a risk, the Mechanic Street bridge over the Mumford River is low and should also be upgraded.

Flood Hazard Areas

FEMA Flood Zones

The various ponds and rivers/streams located throughout the community represent those areas subject to inundation by the 100-year flood zone, while other low-lying areas are subject to

inundation by the 500-year flood zone.

A, AE/100-Year Flood Zone

The A/AE zone or 100-year flood zone (has a 1% chance of flooding occurring each year) is a regulatory standard used by federal agencies and most states to administer floodplain management programs and is also used by the NFIP as the basis for insurance requirements nationwide. Below is a breakdown of the number of parcels (by land use type), critical facilities, and vulnerable populations susceptible to inundation in the A, AE/100-Year Flood Zone:

Parcels affected: (731 parcels in total)

- Chapter 61/61A/61B Property: 19
- Commercial – Office Building: 2
- Commercial – Outdoor Recreational Properties: 1
- Commercial – Retail Trade: 1
- Commercial – Retail Trade (Automotive/Marine Craft/Other): 1
- Commercial – Storage warehouses/Distribution Facilities: 4
- Exempt Property – Charitable: 3
- Exempt Property – Lands held by other Towns/Cities/Districts (Vacant): 3
- Exempt Property – Municipal/County (Improved): 8
- Exempt Property – Municipal/County (Vacant): 11
- Exempt Property – Other: 1
- Exempt Property – Religious Groups: 2
- Exempt Property – State: 39
- Industrial – Electric Generation Plants: 2
- Industrial – Manufacturing/Processing: 2
- Multiple-Use Property: 2
- Residential – Apartments: 5
- Residential – Residences: 534
- Unknown: 12
- Vacant – Developable Land: 33
- Vacant – Potentially Developable Land: 2
- Vacant – Undevelopable Land: 45

Critical Facilities/Vulnerable Populations/Environmental Justice Populations

Critical facilities are those public or private facilities that possess added value to the community and deserve additional consideration when determining mitigation strategies to protect these resources from natural hazard risks. Vulnerable populations are those public or private facilities that are host to vulnerable residents – children in day care or schools, seniors living in congregate care settings, or disabled residents living independently in the community. The list of critical facilities and vulnerable populations was updated by the LHMT and Consultant with modifications/revisions (Figure 6, Appendix A). Several of the Town's critical facilities/vulnerable populations are located in high hazard areas including FEMA Flood Zones.

The US Environmental Protection Agency defines Environmental Justice (EJ) as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Within the context of natural hazards and their mitigation, potential EJ concerns may arise from income-related factors, discrimination (overt or institutional), cultural isolation and barriers, language isolation, lack of transportation access, and disability (especially among the elderly). There are no EJ areas/communities identified in Douglas.

Critical Facilities affected:

- Douglas Wastewater Treatment Facility
- Hemlock Street Bridge
- South Street Bridge
- Cedar Street Bridge
- Mechanic Street Bridge
- Potter Road Bridge
- Lovett Bridge (Cook St. Bridge)
- West Street Bridge
- Manchaug Street Bridge
- South Street Bridge
- Main St. Bridge
- Gilboa Pond Dam
- Whitin Reservoir Dam
- Dudley Pond Dam
- Potter Road Dam
- Wallis Pond Dam
- Douglas Mill Pond Dam
- Cedar Street Pond Dam
- Lower Hunts Pond Dam
- Hunts Pond Dam
- Mill Pond Dam

- Riddle Road Pond Dam
- Chase Pond Dam

Vulnerable Populations affected:

- Classic Envelope Inc.

X/500-Year Flood Zone

The X zone or 500-year flood zone is a flood that has a 0.2% chance of occurring each year. Below is a breakdown of the number of parcels (by land use type), critical facilities, and vulnerable populations impacted by the X flood zone:

Parcels affected: (258 parcels in total)

- Chapter 61/61A/61B Property: 209
- Commercial – Retail Trade (Automotive/Marine Craft/Other): 1
- Exempt Property – Charitable: 1
- Exempt Property – Lands held by other Towns/Cities/Districts (Vacant): 1
- Exempt Property – Municipal/County (Improved): 1
- Exempt Property – Municipal/County (Vacant): 6
- Exempt Property – Religious Groups: 2
- Exempt Property – State: 22
- Industrial – Manufacturing/Processing: 3
- Industrial Mining/Quarrying: 1
- Residential – Residences: 156
- Unknown: 10
- Vacant – Developable Land: 16
- Vacant – Potentially Developable Land: 1
- Vacant – Undevelopable Land: 17

Critical Facilities affected:

- Old Storage Pond Dam #1
- Morse Pond Dam
- Wellman Pond Dam

Vulnerable Populations affected:

- Open Sky Community Services

Overview Summary of Flood-Related Hazard Impacts:

Social/Economic Impacts

- All flood-related hazards profiled here can impact public health, safety and welfare by way of inundation contaminating drinking water supplies and spreading water-borne

diseases, often resulting in temporary/permanent displacement of residents due to flood damages and causing emotional/psychological stress.

Environmental Impacts

- All flood-related hazards profiled here can impact the environment/ecosystems by way of inundation displacing wildlife, carrying pollution/hazardous materials into natural habitats, and disrupting natural ecological processes

Infrastructure/Built Environment Impacts

- All flood-related hazards profiled here can impact a community's critical facilities/infrastructure by way of inundation including structural and equipment damage at public/private buildings, disruptions to normal/daily actions (water supply, sewer conveyance/treatment, and communication), and transportation network disruptions.

Probability of Future Occurrence of Flood-Related Hazards

As new development and urbanization continues, with the increase of impervious surfaces increasing the rate of drainage collection and reducing the carrying capacity of the land, it is likely urban flooding and stormwater runoff events will also increase on a more frequent basis with even lower storm events. Until the Town permanently addresses the number of streets and properties subject to repetitive flooding identified earlier, the Town will continue to address these areas as needed in the short-term. The presence of numerous rivers, the continuing increase in frequency and severity of events and compounded by stormwater collection deficiencies in inland areas, the Town will continue to be at moderate risk for future riverine/flash flooding events, moderate risk for future inland/urban flooding and heavy rain, low risk for future dam failures and moderate risk for future flow hazard events from beaver activity (Table 2-2 Hazard Index).

2.4.2 Winter-Related Hazards

Winter weather events can include heavy snow, ice, and extreme cold. Heavy snow can bring the community to a standstill by inhibiting mobility (transportation networks, pedestrian travel), knocking down trees and utility lines, and cause structural collapses in older buildings. Ice can damage utility lines and communication towers. Both events can cause indirect issues such as freezing/rupturing pipes from lack of heat, while also changing the ground's frost level, creating problems for underground infrastructure.

Table 2-6 below represents the various significant winter-related hazard events that have occurred in and around the Town of Douglas since 2017, utilizing NOAA's NCEI. All events are for southern Worcester County unless otherwise noted.

Table 2-6 Significant Winter-Related Events, Worcester County

Hazard Type	Date	Level / Description	Damages	Notes
Blizzards/Snow/Nor'easters				
Winter Weather	1/18/2015	4-8''		Freezing rain also
Heavy Snow	1/24/2015	4-8''		
Blizzard	1/26/2015	1-2'		
Heavy Snow	2/2/2015	5-7''		
Winter Weather	2/5/2015	1-6''		
Heavy Snow	2/8/2015	9-18''		
Heavy Snow	2/14/2015	5-13''		3 indirect fatalities
Winter Weather	2/21/2015	2-5''		13 building collapses
Winter Weather	2/8/2016	3-8''	$5k	
Winter Weather	3/21/2016	2-6''		
Winter Weather	4/3/2016	3-7''		
Winter Weather	10/27/2016	1-2''	$700	
Winter Weather	12/17/2016	3-6''		
Winter Storm	1/7/2017	5-9"		
Heavy Snow	3/14/2017	7-14"		
Winter Storm	2/9/2017	8-14"		
Winter Storm	2/12/2017	5-7"		
Winter Storm	12/9/2017	5-7"		
Winter Weather	12/23/2017	0.25-0.5" ice accumulation	$2k	
Winter Weather	12/25/2017	1.5-5"		
Winter Storm	1/4/2018	10-17"		
Winter Weather	2/7/2018	1" snowfall; 0.1" ice accumulation	$40k	
Heavy Snow	3/1/2018			
Winter Storm	3/7/2018	7-17"	$120k	
Winter Storm	3/13/2018	14-28"	$5k	
Heavy Snow	3/20/2018			
Heavy Snow	11/15/2018	7.5"		
Winter Storm	1/19/2019	4-8"		
Winter Storm	3/3/2019	10-18"		
Heavy Snow	12/1/2019	17.1"		
Winter Weather	12/30/2019	0.1-0.2" ice accumulation	$0.7k	
Heavy Snow	4/18/2020	4-5"	$5.2k	
Heavy Snow	10/30/2020	6"	$2k	
Heavy Snow	12/5/2020	5.1"		

Heavy Snow	12/16/2020	10-16"		
Winter Storm	2/1/2021	12-18"		
Heavy Snow	2/7/2021	5-8"		
Heavy Snow	1/7/2022	6-12"		
Blizzard	1/28/2022	5-18"		
Heavy Snow	2/13/2022	5-9"		
Heavy Snow	2/25/2022	6-8"		
Heavy Snow	12/13/2022			
Heavy Snow	12/21/2022			
Heavy Snow	2/27/2023	5-6''		
Heavy Snow	3/14/2023	1''		
Extreme Cold/Wind Chill				
Extreme Cold/Wind Chill	2/15/2015	38° below 0		
Extreme Cold/Wind Chill	2/13/2016	25-35° below 0		
Extreme Cold/Wind Chill	1/6/2018	25-32° below 0		
Extreme Cold/Wind Chill	1/21/2019	34° below 0		

Source: NOAA National Centers for Environmental Information, www.ncdc.noaa.gov. Data current through August 2023.

Snow/Blizzards/Winter Storms/Nor' Easters

Heavy snow affects the entire state, but the highest amounts typically occur in the northern and northwestern areas of the state. The extent of winter storms is measured in inches for snowfall and ice accumulation and windspeeds (mph) for high winds.

In addition to snowfall, ice, and high winds, winter storms often cause erosion and flooding. Utility and power lines can break from the weight of snow or ice coupled with strong winds. This could put residents at risk of losing heat, electricity, and water (if using well water). Snow melting poses problems as well such as road flooding in low lying areas.

The impact of winter weather is measured in terms of the financial costs associated with preparing for, responding to, and recovering from the event. The Northeast Snowfall Impact Scale (NESIS) characterizes and ranks high-impact Northeast snowstorms. It was developed by Paul Kocin of The Weather Channel and Louis Uccellini of the National Weather Service (NWS) (Kocin and Uccellini, 2004). These storms have large areas of 10-inch snowfall accumulations and greater. NESIS ranks the storms from one: least impact to five: most impact (Table 2-7). NESIS scores are a function of the area affected by the snowstorm, the amount of snow, and the number of people living in the path of the storm. Because it uses population information in addition to meteorological data, NESIS gives an indication of a storm's societal impacts.

The aerial distribution of snowfall and population information are combined in an equation that calculates a NESIS score which varies from around one for smaller storms to over ten for extreme storms. The raw score is then converted into one of the five NESIS categories. The largest NESIS values result from storms producing heavy snowfall over large areas that include major metropolitan centers. Since 2015, there have been 22 snowstorms that resulted in snowfalls in Douglas of at least 10 inches (Table 2-8).

Table 2-7 NESIS Snowfall Impact Scale

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

Source: https://www.ncei.noaa.gov/access/monitoring/rsi/nesis.

Table 2-8 Winter Storms Producing over 10 Inches of Snow, Douglas 2015 – 2023

Date	NESIS Value	NESIS Category	NESIS Classification
1/25/2015	2.62	2	Significant
1/29/2015	5.42	3	Major
2/8/2015	1.32	1	Notable
2/20/2015	1.31	1	Notable
3/3/2015	1.66	1	Notable
1/22/2016	7.66	4	Crippling
1/4/2017	2.52	2	Significant
2/9/2017	1.87	1	Notable
3/14/2017	5.03	3	Major
2/9/2017	1.87	1	Notable
1/4/2018	1.71	1	Notable
3/1/2018	1.65	1	Notable
3/7/2018	3.45	2	Significant
3/13/2018	3.16	2	Significant
3/20/2018	1.63	1	Notable
3/3/2019	1.29	1	Notable
12/16/2020	3.31	2	Significant
2/1/2021	4.93	3	Major
1/7/2022	1.6	1	Notable
1/28/2022	1.73	1	Notable
12/13/2022	8.52	4	Crippling
12/21/2022	2.66	2	Significant

Source: https://www.ncei.noaa.gov/access/monitoring/rsi/nesis.

Heavy snow affects the entire state, but the highest amounts typically occur in the northern and northwestern areas of the state. Usually, the impact and vulnerability of winter weather is measured in terms of the financial costs associated with preparing for, responding to, and recovering from the event. The Town uniformly continues to experience heavy snow and winter storms with greater frequency and severity. Based on the very high frequency and limited severity of snow/blizzards/winter storms/nor' easter events as reported by NOAA's NCEI indicated in Table 2-6 and confirmed by the LHMT, the Town is considered at high risk for future heavy snow/blizzard/winter storm/nor'easter events.

Climate Change Impacts on Snow/Blizzard/Winter Storm/Nor' Easter Events
Climate change will result in increased average global temperatures. These impacts are already being felt in New England, as average winter temperatures in the region have risen 3.8°F in the last 30 years. Although at first glance this would appear to make winters less severe the Northeast has experienced the largest increase in extreme precipitation events in the country, which often fall as heavy wet snow in the winter.

Ice Storms[35]

Ice storm conditions are defined by liquid rain falling and freezing on contact with cold objects, creating ice buildups of one-fourth an inch or more. These can cause severe damage. An ice storm warning, which is now included in the criteria for a winter storm warning, is issued when a half inch or more of accretion of freezing rain is expected. This may lead to dangerous walking or driving conditions and the pulling down of power lines and trees.

Ice storms can be classified using the Sperry-Piltz Ice Accumulation Index (SPIA). The SPIA (Table 2-9) is a tool used to predict and measure the potential impact of ice storms on infrastructure and communities. Developed by meteorologists Ernest Sperry and David Piltz, the SPIA is a forward-looking, ice accumulation/ice damage prediction index that uses an algorithm of researched parameters that, when combined with NWS forecast data, predicts the projected footprint, total ice accumulation, and resulting potential damage from approaching ice storms.

[35] *Commonwealth of Massachusetts Hazard Identification and Risk Assessment* (HIRA), February 2019.

Table 2-9 Sperry-Piltz Ice Accumulation Index

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

Source: *https://www.spia-index.com/*.

Based on review of NOAA's NCEI and coordination/confirmation with the LHMT, there were no available historic records of ice storm events in Douglas since 2016. Due to the very high frequency and limited severity of ice storms as ranked the LHMT, the Town is considered at high risk for future ice storm events.

Climate Change Impacts on Ice Storms[36]

Although winters are becoming warmer and milder, extreme weather events are also on the rise. The formation of ice begins with a layer of above-freezing air above a layer of sub-freezing temperatures closer to the surface. Frozen precipitation melts to rain while falling into the warm air layer and then begins to refreeze in the cold layer below. If the precipitate refreezes while still in the air, it will land on the ground as sleet. As the atmosphere continues to warm, increased movement of warm air masses across the continent during winter could increase the

[36] http://www.caccmi.org/climate-change-and-ice-storms/.

frequency of icy weather.

Extreme Cold

Extreme cold events often accompany winter storms, may be left in their wake, or occur without any associated storm activity, and can lead to hypothermia and frostbite. Extreme cold temperatures vary depending on the normal climate of the region however, Douglas can expect to be uniformly affected. For Massachusetts, extreme cold typically means temperatures below zero degrees Fahrenheit. Extreme cold can adversely affect people - some more than others, infants and residents 65 years of age or more are especially vulnerable.

Wind Chill temperature is the temperature that people and animals feel when outside and it is based on the rate of heat loss from exposed skin by the effects of wind and cold. The Wind Chill Chart (Figure 2-5) shows three shaded areas of frostbite danger. Each shaded area shows how long a person can be exposed before frostbite develops. In Massachusetts, a wind chill warning is issued by the NWS Taunton Forecast Office when the Wind Chill Temperature Index, based on sustained wind, is –25° F or lower for at least three hours.

Figure 2-5 Wind Chill Temperature Index

	Temperature (°F)																	
Calm	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
5	36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
10	34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
15	32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
20	30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
25	29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
30	28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
35	28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
40	27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
45	26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
50	26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
55	25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-97
60	25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98

Wind (mph)

Frostbite Times — 30 minutes — 10 minutes — 5 minutes

$$\text{Wind Chill (°F)} = 35.74 + 0.6215T - 35.75(V^{0.16}) + 0.4275T(V^{0.16})$$

Where, T=Air Temperature(°F) V=Wind Speed (mph)

Effective 11/01/01

Source: https://www.weather.gov/media/ajk/brochures/Wind_Chill_Temperature_Index.pdf.

Based on the moderate frequency and limited severity of extreme cold events since 2016 as reported by NOAA's NCEI indicated in Table 2-6, and confirmed by the LHMT, Douglas is considered at moderate risk to extreme cold.

Climate Change Impacts on Extreme Cold Temperatures

Climate change will result in increased average global temperatures, which will likely decrease the number of extremely cold days. This decrease in extremely cold days has already been documented and is expected to continue into the near future.

MVP Climate Change Projections on Extreme Cold Temperatures

As mentioned above, climate change impacts will result in increased average temperatures, so the number of extreme cold days is expected to decrease. Douglas should experience fewer days with temperatures below freezing, and thus, will expend less energy on heating in the winter months. Table 2-10 below includes temperature projections (Annual and Winter) with a Baseline (1971 – 2000) through mid-century (2050s) for the Blackstone, French, and Quinebaug Basins.

Table 2-10 Extreme Cold Temperature Projections, Blackstone, French, and Quinebaug Basins

Climate Parameter	Baseline 1970 - 2000	Projected Change in 2030s	Mid-Century 2050s
Average Annual Temperature (°F)			
Blackstone Basin	48.2	50.4 – 52.4	51.1 – 54.5
French Basin	47.1	49.2 – 51.4	50.1 – 53.5
Quinebaug Basin	46.9	50.0 – 51.2	49.8 – 53.2
Average Winter Temperature (°F)			
Blackstone Basin	27.1	29.3 – 31.8	.9 – 34.3
French Basin	25.8	28.0 – 30.9	28.7 – 33.5
Quinebaug Basin	25.4	27.7 – 30.4	28.8 – 32.9
Minimum Annual Temperature (°F)			
Blackstone Basin	37.7	40.0 – 42.2	40.8 – 44.2
French Basin	36.5	38.8 – 41.1	39.8 – 43.1
Quinebaug Basin	35.9	38.2 – 40.5	39.2 – 42.5
Minimum Winter Temperature (°F)			
Blackstone Basin	17.5	20.0 – 22.7	20.7 – 25.2
French Basin	16.0	18.7 – 21.6	19.4 – 24.2
Quinebaug Basin	15.3	17.9 – 18.9	18.6 – 23.4
Annual Days with Minimum Temperature Below 32 (°F)			
Blackstone Basin	143	133 - 117	125 - 104
French Basin	151	141 – 124	132 – 111
Quinebaug Basin	156	145 - 130	137 - 118
Winter Days with Minimum Temperature Below 32 (°F)			
Blackstone Basin	83	81 - 76	80– 72
French Basin	84	83 – 78	82 – 74
Quinebaug Basin	85	84 - 79	83 - 76
Annual Heating Degree-Days (Base 65 °F)	6,651	6,112 – 5,518	5,905 – 5,052
Blackstone Basin	6,983	6,421 – 5,776	6,187 – 5,269

French Basin	7,052	6,489 – 5,856	6,250 – 5,351
Quinebaug Basin			
Winter Heating Degree-Days (Base 65 °F)			
Blackstone Basin	3,430	3,243 – 2,989	3,184 – 2,766
French Basin	3,554	3,361 – 3,078	3,293 – 2,851
Quinebaug Basin	3,587	3,395 – 3,121	3,328 – 2,896

Source: MVP Program, www.resilientma.org.

Property/People at Risk from Winter-Related Hazards

New England experiences winter storms in more extreme ways than most of the rest of the country. The average annual snowfall for the Town of Douglas isdivided into two different zones…the western half of the Town falls within Zone H (48.1'' to 72.0'' per year) while the eastern half of the Town falls within Zone G (36.1'' to 48.0'' per year), see Figure 2 Average Annual Snowfall, Appendix A. Minor hazards include flooding during snow melt and treacherous roadways due to ice, snow and downed wires/trees making roadways impassable, particularly for emergency vehicles. Snow drifting on roadways is also a concern on the following roadways:

- Main Street
- West Street
- Bigelow Road
- Church Street
- NW Main Street
- Wallis Street
- Riedell Road

Historically, icing of streets occurs on the following roadways:

- Main Street
- Sunset Drive
- North Street
- Gilboa Street
- Davis Street
- Mumford Street
- Cross Street
- Conservation Drive
- Johnson Court
- West Street
- Grove Street
- West St at NW Main Street
- Birch Street
- Oak Street
- NW Main Street
- Ledgestone Road
- Ledgewood Drive

- Wallis Street
- SW Main Street
- High Street
- Hilltop Drive
- Reid Road
- Birch Hill Road
- Wallum Lake Road
- Walnut Street
- Hemlock Street
- Chestnut Street
- Old Farm Road
- SE Main Street
- Linden Street
- Fairbanks Court
- Perry Street
- Yew Street
- Webster Street

Overview Summary of Winter-Related Hazard Impacts:

Social/Economic Impacts

- Extreme cold temperatures can present significant challenges to the homeless, the elderly and those with disabilities/medical conditions and heightened risks of frostbite and hypothermia.
- Extended power outages can lead to a surge in alternative heating sources and the risk of carbon monoxide poisoning and fires.
- School closures/delays can disrupt student learning and working families in general with child care needs.
- Power outages can result in business closures resulting in loss of revenue.

Environmental Impacts

- Extended power outages can lead to disruptions in municipal wastewater services leading to potential contamination concerns.

Infrastructure/Built Environment Impacts

- Transportation network impacts include slick/treacherous roads leading to travel disruptions (including emergency response) and accidents.
- Public transportation impacts can limit residents' mobility forcing residents to travel on-foot in adverse weather conditions.
- Bridges/Overpasses freeze before other surfaces/pavements leading to accidents.

- Ice can accumulate on antennas, cell towers, and communications lines leading to interruptions/loss of power and communications.
- Extreme cold temperatures can damage roads and railways, while also impairing the functioning of emergency equipment.

Probability of Future Occurrence of Winter-Related Hazards

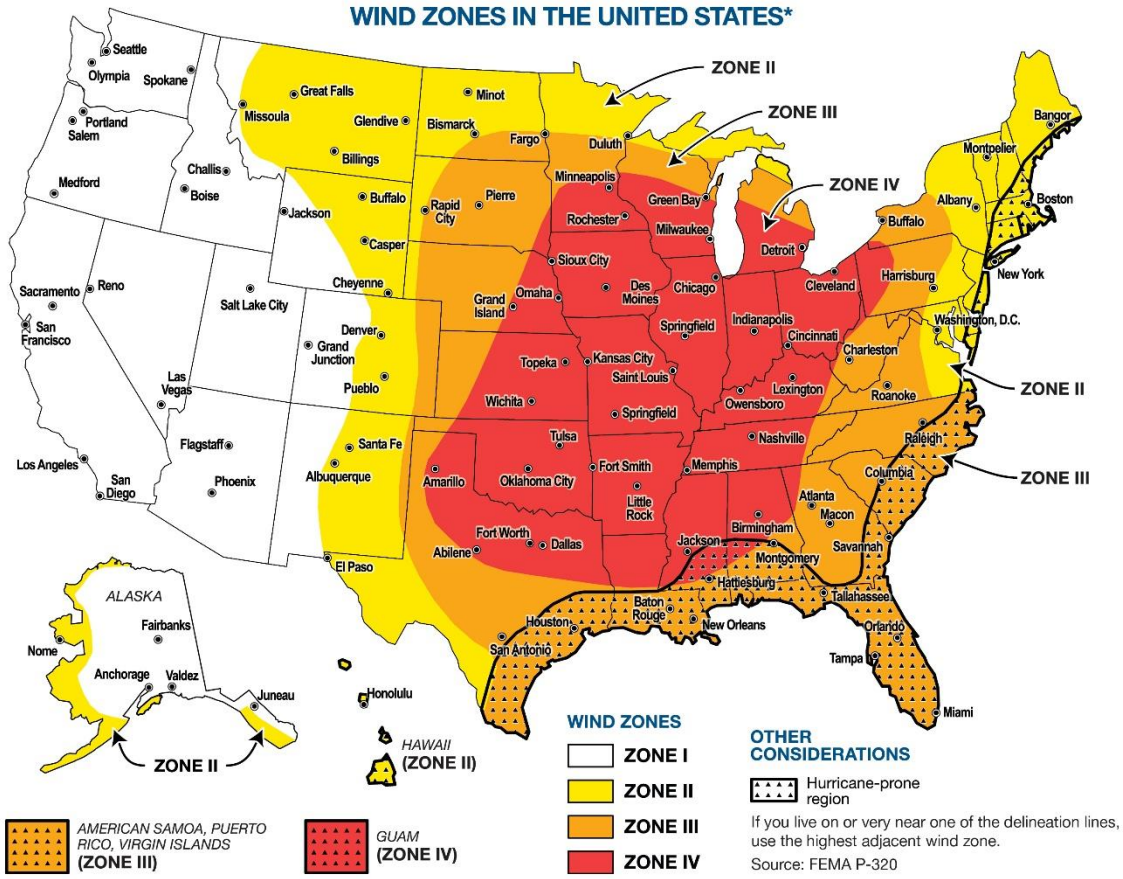
According to past history and climatic conditions, and the inability to predict extreme snow and temperature events, the Town will continue to be at high risk for snow/blizzard/winter storms/nor' easters and ice storms, and moderate risk for extreme cold ice events (Table 2-2 Hazard Index).

2.4.3 Wind-Related Hazards

Wind is the movement of air caused by a difference in pressure from one place to another. Local wind systems are created by the immediate geographic features in the area, such as mountains, valleys, or large bodies of water. Wind effects can include blowing debris, interruptions in elevated power and communications utilities, and intensification of the effects of other hazards related to winter weather and severe storms.

Massachusetts is susceptible to high winds from several types of weather events: before and after frontal systems, hurricanes and tropical storms, severe thunderstorms and tornadoes, and Nor'easters. Occasionally, lower wind gusts (40 to 45 mph) can cause power outages from downed trees and wires. Based on historical tornado and hurricane data, FEMA has produced a map that depicts maximum wind speeds for design of safe rooms. The Commonwealth is located within Wind Zone II, with speeds up to 160 mph (Figure 2-6). The entire Commonwealth is also located within the hurricane-susceptible region.

Figure 2-6 Wind Zones in the United States



Source: FEMA.

Table 2-11 below represents the various significant wind-related hazard events that have occurred in and around the Town of Douglas since 2015 utilizing NOAA's NCEI. All events are for southern Worcester County unless otherwise noted.

Table 2-11 Significant Wind-Related Events, Worcester County

Hazard Type	Date	Level / Description	Damages	Notes
Hurricanes/Tropical Storms				
Tropical Storm	9/21/2017		$1k	Jose
Tropical Storm	8/4/2020		$7K	Isaias
Tropical Storm	8/22/2021		$9k	Henri
Tornadoes				
Tornado	7/26/2018	EF-1		East Douglas, Maple St.
High/Strong Winds				
High Winds	3/17/2015			

High Winds	3/31/2016	50 kts		Wires downed
High Winds	2/13/2017	38 kts		
High Winds	3/2/2017	51 kts	$12k	Trees down
High Winds	3/14/2017	53 kts	$3k	
Strong Wind	3/22/2017	45 kts	$5k	
Strong Wind	4/16/2017	43 kts	$2k	
Strong Wind	5/2/2017	35 kts	$1k	
Strong Wind	5/15/2017	33 kts	$1k	
Strong Wind	10/24/2017	40 kts	$3k	
Strong Wind	10/26/2017	40 kts	$1k	
High Winds	10/30/2017	35 kts		
Strong Wind	11/10/2017	41 kts	$5k	
High Winds	11/18/2017	50 kts	$5k	
Strong Wind	12/13/2017	31 kts	$2k	
Strong Wind	1/12/2018	40 kts	$2k	
High Winds	3/2/2018	52 kts	$40k	
Strong Wind	10/11/2018	43 kts	$20k	
Strong Wind	10/11/2018	43 kts	$4k	
Strong Wind	10/11/2018	43 kts	$30k	
Strong Wind	10/15/2018	40 kts	$7k	
Strong Wind	10/17/2018	39 kts	$1k	
Strong Wind	10/27/2018	35 kts	$3k	
Strong Wind	11/3/2018	44 kts	$3k	
Strong Wind	11/10/2018	39 kts	$0.8k	
Strong Wind	1/24/2019	41 kts	$1k	
Strong Wind	1/30/2019	40 kts	$1k	
Strong Wind	2/8/2019	43 kts	$2.5k	
High Winds	2/25/2019	58 kts	$10k	
Strong Wind	4/3/2019	48 kts	$5k	
Strong Wind	4/15/2019	43 kts	$2k	
Strong Wind	4/15/2019	42 kts	$0.5k	
Strong Wind	4/19/2019	43 kts	$1.5k	
Strong Wind	10/16/2019	45 kts	$0.5k	
Strong Wind	10/17/2019	45 kts	$0.5k	
Strong Wind	10/17/2019	45 kts	$0.5k	
Strong Wind	10/17/2019	45 kts	$0.5k	
Strong Wind	10/17/2019	45 kts	$0.5k	
Strong Wind	10/17/2019	45 kts	$0.8k	
Strong Wind	10/17/2019	45 kts	$0.5k	
Strong Wind	10/31/2019	43 kts	$0.5k	
Strong Wind	10/31/2019	39 kts	$0.3k	
Strong Wind	10/31/2019	39 kts	$1k	
High Winds	11/1/2019	49 kts	$6k	

Strong Wind	1/8/2020	43 kts	$1k	
Strong Wind	1/8/2020	43 kts	$0.5k	
Strong Wind	1/8/2020	43 kts	$1k	
Strong Wind	1/12/2020	43 kts	$1k	
Strong Wind	1/12/2020	43 kts	$0.5k	
Strong Wind	2/27/2020	45 kts	$2k	
Strong Wind	3/13/2020	44 kts	$0.5k	
Strong Wind	4/9/2020	43 kts	$0.3k	
High Winds	4/13/2020	50 kts	$1.7k	
Strong Wind	4/22/2020	46 kts	$6k	
High Winds	5/9/2020	46 kts	$10k	
Strong Wind	9/30/2020	40 kts	$1k	
Strong Wind	11/1/2020	43 kts	$0.5k	
Strong Wind	11/1/2020	43 kts	$0.5k	
Strong Wind	11/2/2020	45 kts	$1.3k	
Strong Wind	11/15/2020	48 kts	$0.5k	
Strong Wind	11/15/2020	43 kts	$0.3k	
High Winds	11/30/2020	51 kts	$28k	
Strong Wind	12/25/2020	43 kts	$4.5k	
High Winds	3/1/2021	54 kts	$8.5k	
Strong Wind	3/12/2021	43 kts	$2k	
Strong Wind	3/14/2021	46 kts	$1k	
High Winds	3/29/2021	50 kts	$1.8k	
Strong Wind	4/30/2021	49 kts	$0.5k	
Strong Wind	11/12/2021	46 kts	$0.5k	
Strong Wind	12/6/2021	43 kts	$1.5k	
Strong Wind	11/20/2022	35 kts	$1k	
Strong Wind	11/20/2022	35 kts	$3k	
Strong Wind	11/20/2022	35 kts	$0.5k	
Strong Wind	11/30/2022	43 kts	$3k	
Strong Wind	11/30/2022	43 kts	$0.3k	
Strong Wind	11/30/2022	43 kts	$6k	
Strong Wind	11/30/2022	43 kts	$2.5k	
High Winds	12/23/2022	51 kts	$4k	
High Winds	2/3/2023	52 kts		
Lightning/Thunderstorms				
Lightning	6/27/2017	50 kts	$1 k	Douglas, house struck on Main St.
Thunderstorm Wind	7/17/2019	50 kts	$1 k	Douglas, tree downed on South St.
Lightning	7/16/2021		$2k	
Hail				
Hail	7/24/2015	0.75"		East Douglas, Maple St.

Source: NOAA National Centers for Environmental Information, www.ncdc.noaa.gov. Data current through August 2023.

Wind is measured in miles per hour or in knots. In 1805, Sir Francis Beaufort developed the Beaufort Wind Scale that describes what different levels of wind look and feel like (Table 2-12).

Table 2-12 Beaufort Wind Scale

Wind Force	MPH	Description	Impacts On Land
0	0-1	Calm	Calm, smoke rises vertically
1	1-3	Light Air	Direction of wind shown by smoke drift, but not wind vanes
2	4-7	Light Breeze	Wind felt on face, leaves rustle, ordinary vanes move by wind
3	8-12	Gentle Breeze	Leaves and small twigs in constant motion, wind extends light flag
4	13-18	Moderate Breeze	Raises dust and loose paper, small branches are moved
5	19-24	Fresh Breeze	Small trees in leaf begin to sway
6	25-31	Strong Breeze	Large branches in motion, whistling heard in telegraph wires, umbrellas used with difficulty
7	32-38	Near Gale	Whole trees in motion, inconvenience felt when walking against the wind
8	39-46	Gale	Twigs breaking off trees, generally impedes progress
9	47-54	Severe Gale	Slight structural damage occurs; slate blows off roofs
10	55-63	Storm	Seldom experienced inland, trees uprooted, considerable structural damage occurs
11	64-72	Violent Storm	Very rarely experienced, accompanied by wide-spread damage
12	73+	Hurricane	

Source: https://www.weather.gov/mfl/beaufort.

Hurricanes

Hurricanes are defined as a large circulating windstorm covering hundreds of miles that forms over warm ocean water. To be officially classified as a hurricane, the wind speeds must exceed 74 miles per hour. In the northern hemisphere winds circulate in a counterclockwise direction. The winds that accompany hurricanes have the potential to cause serious damage. Downed power lines leave residents without electricity and can impede business for days. Fallen trees can damage buildings and block roadways. Unsecured building components including gutters, screened enclosures, roof coverings, shingles, car ports, porch coverings, overhangs, siding,

decking, windows, walls, gables can be blown off structures and carried by the wind to cause damage in other places. Wind driven rain often causes water damage in roof and wall envelopes.

Hurricane damages come from wind, rain, tornadoes, floods/storm surge, and the effects of very low air pressure. The Saffir-Simpson Hurricane Wind Scale (SSHWS) intensity category system was developed in the 1970s to characterize a hurricane's destructive potential by indicating wind speeds and range of damage, see Table 2-13 below. The SSHWS category system measures sustained wind speed, central pressure, storm surge height, and coastal damage potential within five intensity categories.

Table 2-13 Saffir-Simpson Hurricane Wind Scale

Scale No. (Category)	Wind (mph)	Potential Damage
1	74 - 95	Minimal: Damage is primarily to shrubbery and trees, mobile homes, and some signs. No real damage is done to structures.
2	96 – 110	Moderate: Some trees topple, some roof coverings are damaged, and major damage is done to mobile homes.
3	111 – 130	Extensive: large trees topple, some structural damage is done to roofs, mobile homes are destroyed, and structural damage is done to small homes and utility buildings.
4	131 – 155	Extreme: Extensive damage is done to roofs, windows and doors; roof systems on small buildings completely fail; and some curtain walls fail.
5	> 155	Catastrophic: Roof damage is considerable and widespread, window and door damage are severe, there are extensive glass failures, and entire buildings could fail.
Additional Classifications: Tropical Storm 39 – 73, Tropical Depression < 38		

Source: NOAA.

The NWS will issue a hurricane warning when sustained winds of 74 mph or higher are reached and expected within a coastal area within 24 hours. On average, there are approximately 10 named tropical storms along the east coast of the U.S. each year, six of which are likely to develop into hurricanes, with only two or three likely to reach category 3 on the SSHWS. The SSHWS underwent a minor modification for 2012 in order to resolve awkwardness associated with conversions among the various units used for wind speed in advisory products. The change broadens the Category 4 wind speed range by one mile per hour (mph) at each end of the range, yielding a new range of 130-156 mph. Figure 3 Historical Hurricane Tracks (Appendix A) shows historic tracks of hurricanes in and around the Town of Douglas over time.

Based on the moderate frequency and limited severity of hurricane events over time, as reported by NOAA's NCEI indicated in Table 2-11, and confirmed by the LHMT, Douglas is considered at moderate risk to hurricanes.

Climate Change Impacts on Hurricanes

Climate change is expected to result in the increased frequency and intensification of hurricanes and tropical storms worldwide. Rising sea levels, coupled with potentially higher hurricane wind speeds, rainfall intensity, and storm surges will combine to create more intense hurricanes, resulting in increased impacts to coastal communities. Research predicts a global increase in the intensity of such storms on average, by 2% to 11%, based on the IPCC mid-range emission scenario projections, as well as a poleward expansion in the latitude at which storms will reach their highest intensity. Some experts have noted that the three massive storms from the 2017 hurricane season (Harvey, Irma, and Maria) are consistent with this expected intensification.

Hurricanes and tropical storms are expected to result in more rainfall. This increase has been observed and is expected both globally (IPCC 2014) and for the Atlantic basin, including the U.S. east coast. Based on a synthesis of current science, NOAA predicts that Atlantic hurricanes and tropical storms in the coming century will have higher rainfall rates than present storms, especially near the center of the storm. Hurricane Harvey, which resulted in a record 51.9 inches of rainfall at one station west of Houston, Texas, is one recent example of this trend.

Tornadoes/High Winds

Tornadoes are violently rotating columns of air in contact with and extending between a cloud and the surface of the earth. Generally, winds in most tornadoes are 100 mph or less, but can exceed 250 mph in the most violent and least frequent tornadoes. Several conditions are required for the development of tornadoes and associated thunderstorm clouds, including abundant low-level moisture to contribute to the development of a thunderstorm, along with a trigger/cold front to lift the moist air. Tornadoes typically begin in a supercell (severe thunderstorm). They usually form in areas where strong winds are turning in a clockwise direction and can be in the traditional funnel shape, or in a slender rope-like form.

Measuring the intensity of a Tornado

Typically, tornadoes are categorized by frequency values from historic data and area impacted based on the length and width of the damage path. Tornado damage severity is measured by the Enhanced Fujita Tornado Scale, where wind speed is estimated from the amount of damage (Table 2-14).

Table 2-14 Enhanced Fujita Scale

Fujita Scale			Derived		Operational EF Scale	
F Number	**Fastest ¼ mile (mph)**	**3-second gust (mph)**	**EF Number**	**3-second gust (mph)**	**EF Number**	**3-second gust (mph)**
0	40 - 72	45 - 78	0	65 - 85	0	65 - 85
1	73 - 112	79 - 117	1	86 - 109	1	86 - 110

2	113 - 157	118 - 161	2	110 - 137	2	111 - 135
3	158 - 207	162 - 209	3	138 - 167	3	136 - 165
4	208 - 260	210 - 261	4	168 - 199	4	166 - 200
5	261 - 318	262 - 317	5	200 - 234	5	Over 200

Source: NOAA.

Climate Change Impacts on Tornadoes

Research suggests here is a greater risk of more off-season tornadoes in a warmer future climate. This could mean more tornadic activity at a time of year when people are expecting it the least. Results are inconclusive for whether tornadoes could become more or less frequent during the traditional severe weather season.[37,38]

Based on the low frequency and limited severity of tornado events over time (one tornado in 2018) as reported by NOAA's NCEI indicated in Table 2-11 and confirmed by the LHMT, the Town of Douglas is considered to be at moderate risk to tornadoes. Based on the very high frequency and limited severity of strong wind events as reported by NOAA's NCEI indicated in Table 2-11 and confirmed by the LHMT, the Town of Douglas is considered to be at high risk to future strong/high wind events.

Lightning/Thunderstorms

Thunderstorms are formed when warm, moist air rises into cold, dry air with sufficient energy to create a storm cloud with strong updrafts and downdrafts. The extent of thunderstorms is typically measured through the windspeed and extent of precipitation. All thunderstorms produce lightning. Lightning can strike outside of areas where it is raining and may occur as far as 10 miles away from rainfall. It can strike from any part of the storm and may even strike after the storm has seemed to pass. Hundreds of people across the nation are injured annually by lightning.

Thunderstorms impact a smaller area compared with winter storms or hurricanes. However, they can be very dangerous and destructive. 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. They can cause property damage and injury from wind, flooding, hail, or lightning.

NOAA characterizes a thunderstorm as severe when it produces one or more of the following:

[37] *The realization of extreme tornadic storm events under future anthropogenic climate change*. Trapp, R.J., and K.A. Hoogewind, 2016.

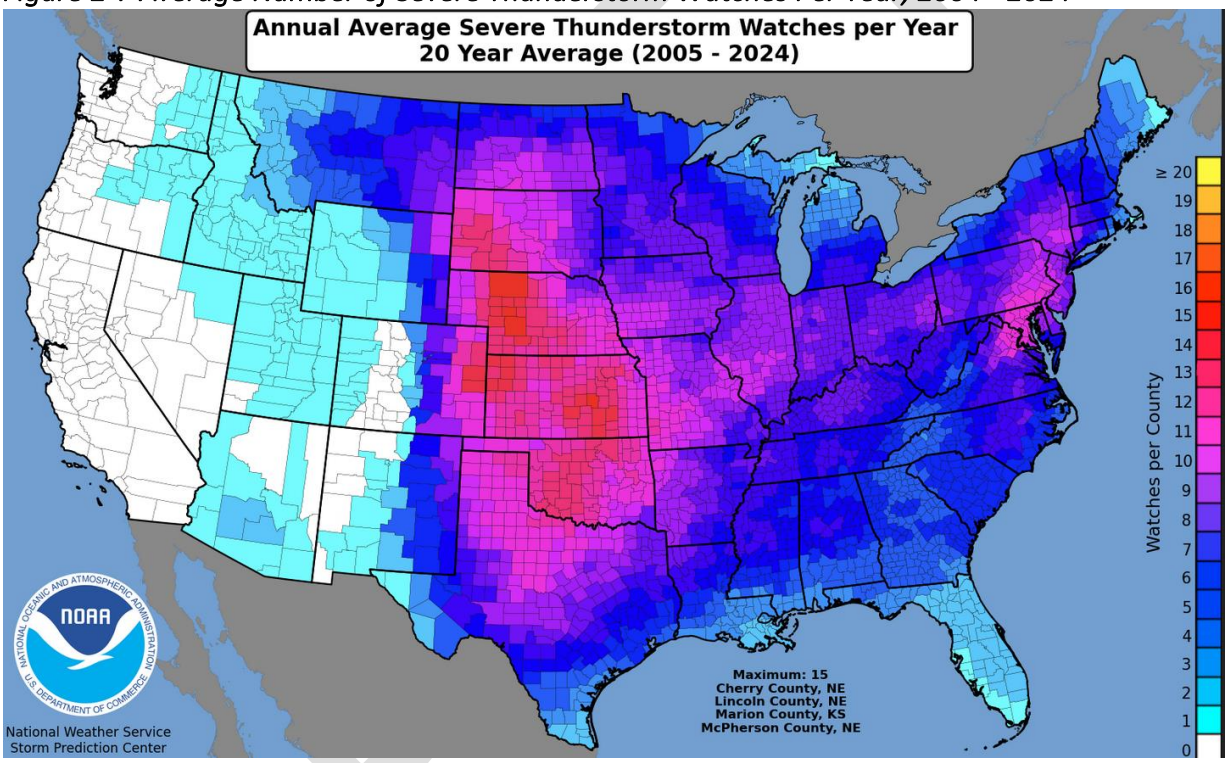
[38] *The impact of human-induced climate change on potential tornado intensity as revealed through multi-scale modeling*. Woods, et al, 2023.

- Hail of one inch in diameter or larger
- Wind gusts to 58 mph or greater
- One of more tornadoes

NOAA's Storm Prediction Center, along with the NWS, tracks the annual average of severe thunderstorm watches per year by county (Figure 2-7) and can issue advisory messages based on forecasts and observation, including:

- Severe Thunderstorm Watch: Issued to alert people to the possibility of a severe thunderstorm developing in the area. The expected timeframe for these storms is three to six hours.
- Severe Thunderstorm Warning: Issued when severe thunderstorms are imminent. The warning is highly localized and covers parts of one to several counties.

Figure 2-7 Average Number of Severe Thunderstorm Watches Per Year, 2004 - 2024

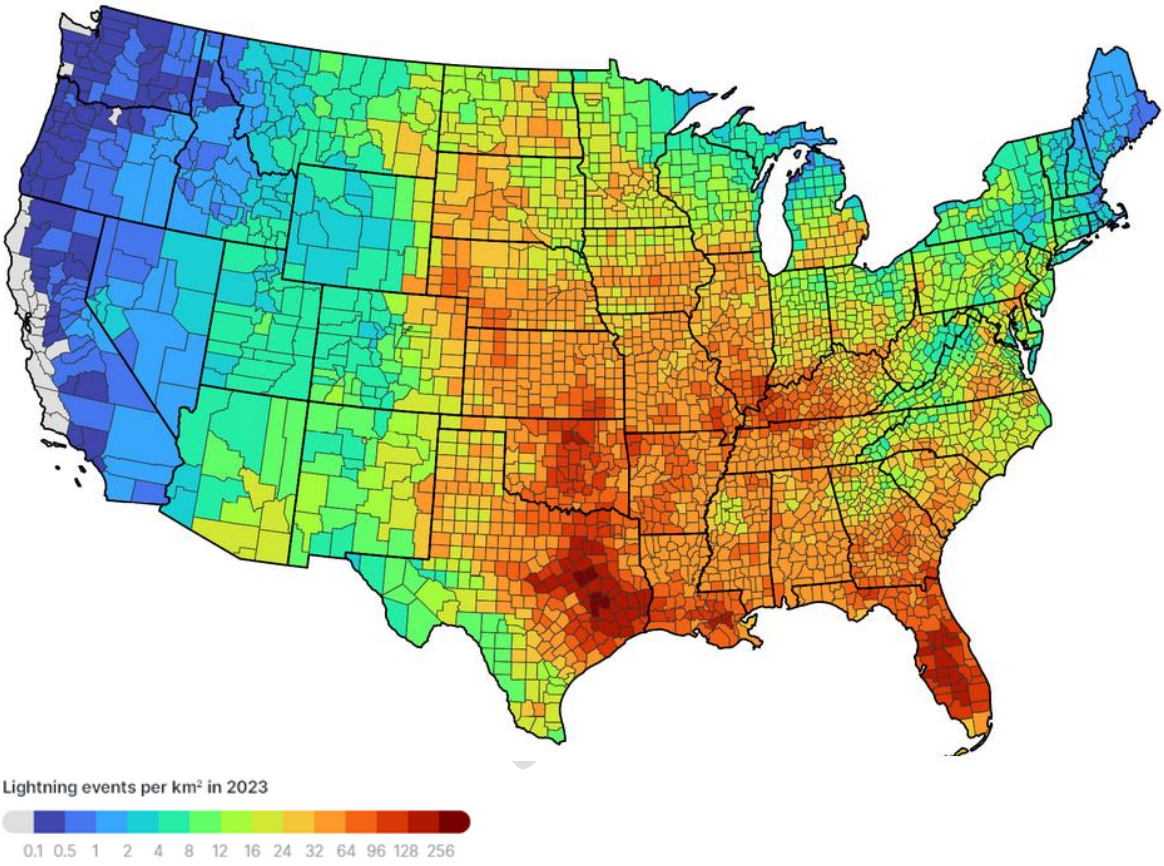


Source: https://www.spc.noaa.gov/wcm/20ysvra.png.

All thunderstorms produce lightning, and therefore all thunderstorms are dangerous. Lightning often strikes outside of areas where it is raining and may occur as far as 10 miles away from rainfall. It can strike from any part of the storm and may even strike after the storm has seemed to pass. Hundreds of people across the nation are injured annually by lightning, most commonly when they are moving to a safe place but have waited too long to seek shelter. The Town of Douglas can be uniformly affected by lightning and thunderstorms, dependent-upon the time of day, existing/incoming weather conditions, and time of year.

Vaisala, a global leader in weather, environmental, and industrial measurements publishes Annual Lightning Reports. The data comes from the Vaisala U.S. National Lightning Detection Network (NLDN), the longest continuously operating and most scientifically valid lightning detection network in the world. Figure 2-8 shows the average number of recorded lightning events over the period covered.

Figure 2-8 Lightning Events per km², 2016 - 2023



Source: https://www.vaisala.com/en/press-releases/2024-01/report-reveals-most-lightning-prone-us-metropolitan-areas-and-risk-wind-farms.

Building construction, location, and nearby trees or other tall structures will have a large impact on how vulnerable an individual facility is to a lightning strike. A rough estimate of a structure's likelihood of being struck by lightning can be calculated using the structure's ground surface area, height, and striking distance between the downward-moving tip of the stepped leader (negatively charged channel jumping from cloud to earth) and the object. In general, buildings are more likely to be struck by lightning if they are located on high ground or if they have tall protrusions such as steeples or poles which the stepped leader can jump to. Electrical and

communications utilities are also vulnerable to direct lightning strikes. Damage to these lines has the potential to cause power and communications outages for businesses, residences, and critical facilities.

Based on the moderate frequency and minor severity of lightning/thunderstorm events since 2016, as reported by NOAA's NCEI indicated in Table 2-11 and confirmed by the LHMT, Douglas is considered at moderate risk to future lightning and thunderstorm events.

Hail

Cumulonimbus clouds (thunderheads) form hail when strong updrafts carry water droplets to a height at which they freeze. Eventually, these ice particles become too heavy for the updraft to hold up. They then 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.

The Tornado and Storm Research Organisation (TORRO) developed the TORRO Hailstorm Intensity Scale in 1986 to measure the extent and impacts of hail storms. Table 2-15 categorizes hail by scale code, intensity category, size description, diameter, and typical damage.

Table 2-15 TORRO Hail Intensity Scale

Scale	Intensity Category	Description	Typical Diameter (inches)	Typical Damage Impacts
H0	Hard Hail	Pea	0.25	No damage
H1	Potentially Damaging	Mothball	0.50	Slight general damage to plants, crops
H2	Significant	Marble/Grape	0.75	Significant damage to fruit, crops, vegetation
H3	Severe	Walnut	1.25	Severe damage to fruit and crops, damage to glass and plastic structures, paint and wood scored
H4	Severe	Pigeon's egg > Squash ball	1.50	Widespread glass damage, vehicle bodywork damage
H5	Destructive	Golf ball > Pullet's egg	1.75	Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries
H6	Destructive	Hen's egg	2.0	Bodywork of grounded aircraft dented; brick walls pitted
H7	Destructive	Tennis ball > Cricket ball	2.5	Severe roof damage, risk of serious injuries
H8	Destructive	Large orange > softball	2.75	Severe damage to aircraft

H9	Super Hailstorms	Grapefruit	3.0	Extensive structural damage. Risk of seven even fatal injuries to persons caught in the open
H10	Super Hailstorms	Melon	4.0	Extensive structural damage. Risk of seven even fatal injuries to persons caught in the open

Source: TORRO.

Structure vulnerability to hail is determined mainly by construction and exposure. Metal siding and roofing is better able to stand up to the damages of a hailstorm than many other materials, although it may also be damaged by denting. Exposed windows and vehicles are also susceptible to damage. Crops are extremely susceptible to hailstorm damage, as even the smallest hail stones can rip apart unsheltered vegetation.

Based on the high frequency and minor severity of hail events since 2016, as reported by the NCEI indicated in Table 2-11, and confirmed by the LHMT, the risk of future hail events is considered moderate in Douglas.

Property/People at Risk from Wind-Related Hazards

Wind events are quite normal in New England and happen regularly each year. In the winter months, the Town of Douglas is susceptible to high winds from nor'easters and winter storms (very high frequency). Spring and summer seasons usually bring a number of severe thunderstorms to the region (moderate frequency). During the late summer and fall seasons, the area is at risk from a hurricane or tropical event (moderate frequency).

Overview Summary of Wind-Related Hazard Impacts:

Social/Economic Impacts

- School closures/delay can disrupt student learning and working families in general with child care needs.
- Power outages can result in business closures resulting in loss of revenue.
- Lightning and hail can directly strike individuals causing injuries/death.
- Mental health impacts can result from the experience of a tornado, the loss of personal belongings, and the loss of loved ones.

Environmental Impacts

- Extended power outages can lead to disruptions in municipal wastewater services leading to potential contamination concerns.
- Water-related elements of hurricanes can cause flooding.

Infrastructure/Built Environment Impacts

- Transportation network impacts include blocked roadways from wind-blown debris/downed trees and wires leading to travel disruptions (including emergency response) and accidents.
- Downed trees/wires can lead to interruptions/loss of power and communications.
- Water-related elements of hurricanes can cause flooding.
- High winds and lightning can cause impacts such as downed trees onto structures, vehicles, roadways, and power lines resulting in disruptions in travel, communications, and vital services.
- Hail alone can cause significant property damage to structures, roofs, and windows.
- Wind-related elements of hurricanes can impact older buildings damaging roofs and windows and cause structural failure.

Probability of Future Occurrence of Wind-Related Hazards

The frequency of hurricanes/tropical storms and thunderstorms has been moderate (10% – 40% chance in any given year). This is expected to increase, though to remain within that probability band. The frequency of tornadoes has been low (1% - 10% chance per year) and is expected to remain so. More research is needed into the impacts of climate change on tornadoes. The frequency of hail events has been high (40% - 70% chance in any given year), and is expected to increase, but to stay in that probability band. Overall, the frequency of high wind events has been very high (greater than 70% chance of occurring per year), and it is expected to remain so, or even to increase.

2.4.4 Geologic-Related Hazards

An earthquake is the sudden release of strained energy in the Earth's crust, resulting in energy waves that radiate outward from the earthquake source. The point on the Earth's surface directly above the focus is called the earthquake epicenter. The severity of earthquake effects depends on the magnitude of energy released; proximity to the epicenter; depth to the epicenter; duration; geologic characteristics; and type of ground motion. Ground movement can damage structures and infrastructure.

When earthquakes occur, much of the damage is a result of structure s falling under the stress created by the ground movement. Another significant effect is damage to public and private infrastructure (i.e., water service, communication lines, drainage systems, etc.). Because earthquakes are highly localized it is difficult to assign regional boundaries that share the same relative degree of risk.

Measuring the Intensity of an Earthquake

An earthquake's severity can be expressed in terms of magnitude and intensity. Magnitude is defined by the amount of seismic energy released at the hypocenter of the earthquake, based on the amplitude of the earthquake waves recorded on seismographs, using the Richter

Magnitude Scale, (Table 2-16). Intensity is defined by the observed effects of ground shaking on people, buildings, and the natural environment, which varies with the distance from the epicenter. The Modified Mercalli (MMI) Intensity Scale is used to evaluate the effects of earthquakes. It describes how strongly an earthquake was felt at a particular location (Table 2-17). Another measure of the relative strength of an earthquake is the expanse of area the shaking is noticed.

Table 2-16 Richter Magnitude Scale

Richter Magnitude	Earthquake Effects
2.5 or less	Not felt or felt mildly near the epicenter, but can be recorded by seismographs
2.5 to 5.4	Often felt, but only causes minor damage
5.5 to 6.0	Slight damage to buildings and other structures
6.1 to 6.9	May cause a lot of damage in very populated areas
7.0 to 7.9	Major earthquake; serious damage
8.0 or greater	Great earthquake; can totally destroy communities near the epicenter

Source: USGS, 2012.

Table 2-17 Modified Mercalli Intensity Scale

Mercalli Intensity	Description
I	Felt by very few people, barely noticeable.
II	Felt by few people, especially on upper floors.
III	Noticeable indoors, especially on upper floors, but may not be recognized as an earthquake.
IV	Felt by many indoors, few outdoors. May feel like passing truck.
V	Felt by almost everyone, people have trouble standing. Small objects move, trees and poles may shake.
VI	Felt by everyone, people have trouble standing. Heavy furniture can move; plaster can fall off walls. Chimneys may be slightly damaged.
VII	People have difficulty standing. Drivers feel cars shaking. Some furniture breaks. Loose bricks fall from buildings. Damage is slight to moderate in well-built buildings; considerable in poorly built buildings.
VIII	Buildings suffer slight damage if well-built; severe damage if poorly built. Some walls collapse.
IX	Considerable damage to specially built structures; buildings shift off their foundations. The ground cracks. Landslides may occur.
X	Most buildings and their foundations are destroyed. Some bridges are destroyed. Dams are seriously damaged. Large landslides occur. Water is thrown on the banks of canals, rivers, and lakes. The ground cracks in large areas.
XI	Most buildings collapse. Some bridges are destroyed. Large cracks appear in the ground. Underground pipelines are destroyed.

XII	Almost everything is destroyed. Objects are thrown into the air. The ground moves in waves or ripples. Large amounts of rock may move.

Source: USGS, 2012.

The Clinton-Newbury fault zone includes many faults along a line that forms a 97-mile arc from its northeast end near Newbury, Massachusetts the Atlantic Coast southwest to Clinton and Worcester, MA, and then south into Connecticut. However, there have been no earthquakes reported in Douglas. The closest earthquake epicenters were reported in Oxford, MA (January 16, 1990/1.9 magnitude) and in Sutton, MA (December 23, 1982). Based on review of NOAA's NCEI and coordination/confirmation with the LHMT, there were no available historic records of earthquakes in Douglas since 2016. Based on the very low frequency and minor severity of the potential for future earthquakes, as confirmed by the LHMT, the risk of future earthquakes in Douglas in considered low.

Climate Change Impacts on Earthquakes

Current science does not indicate a connection between climate change and seismic risk. There may be indirect connections between changes in groundwater or precipitation due to climate change and the impacts of earthquakes. Scientists are studying these connections.

Property/People at Risk from Geologic-Related Hazards

Since earthquakes have been detected all over New England, seismologists suspect that a strong earthquake could be centered anywhere in the region in the future. Additionally, the New England mapped geologic faults don't currently provide any indications specific to potential locations where a strong earthquake most likely to be centered.

All structures in Douglas are potentially vulnerable to seismic ground shaking. The most vulnerable are historic buildings constructed of unreinforced masonry. Other critical facilities or infrastructure at risk are unknown; their construction determines their ability to withstand seismic shaking. Since building codes do not require seismic proofing, the impact would be expected to be severe if an earthquake were to hit the Town of Douglas. The Town of Douglas can be uniformly affected by earthquakes.

Overview Summary of Geologic-Related Hazard Impacts:

Social/Economic Impacts

- All geologic-related hazards can cause displacement of individuals as homes and workplaces become uninhabitable.

Environmental Impacts

- All geologic-related hazards can trigger cascading hazards such as the release of hazardous materials.

Infrastructure/Built Environment Impacts

- All geologic-related hazards can cause transportation network impacts including compromised roads and bridges resulting in disruptions to residents' mobility, emergency services, and supply chains.
- All geologic-related hazards can cause disruptions to municipal services (i.e., water service, communications, and drainage systems).

Probability of Future Occurrence of Geologic-Related Hazards

The Commonwealth has a 2% chance that an earthquake with a peak horizontal acceleration of 50 km above magnitude will occur within the next 50 years. A 'G' is the average acceleration produced by gravity at the earth's surface (9.80665 meters per second squared). This measurement describes ground shaking during earthquakes. New England is not considered to be a hot spot for earthquakes, especially when compared to the western United States. Given the historic pattern of earthquakes, the Town will continue to be at low risk for ground shaking (Table 2-2 Hazard Index).

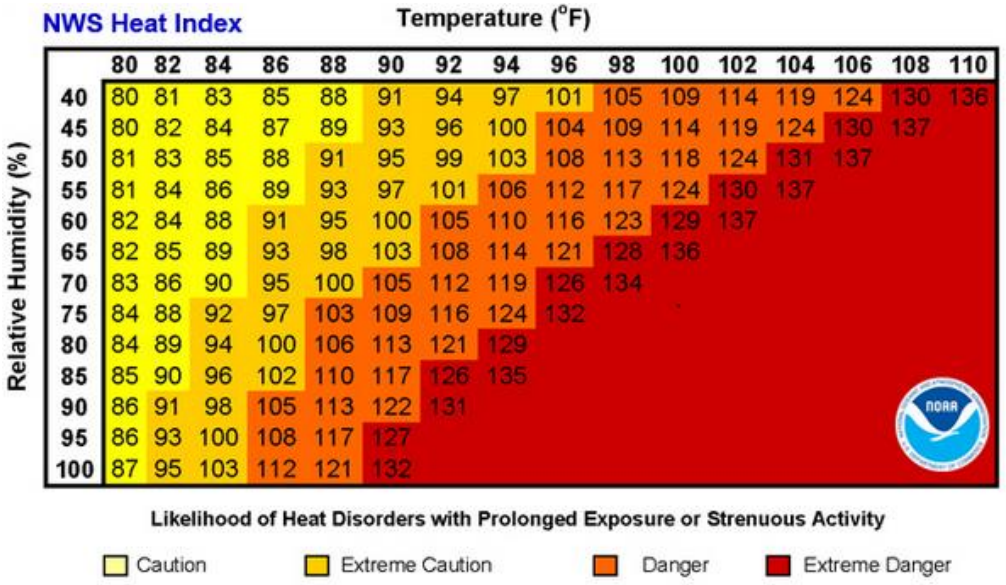
2.4.5 Extreme Heat-Related Hazards

Extreme heat occurs when a system of high atmospheric pressure moves into an area. In such a high-pressure system, air from upper levels of our atmosphere is pulled toward the ground, where it becomes compressed and increases temperatures. This high concentration of pressure makes it difficult for other weather systems to move into the area, which is why periods of extreme heat can last for several days, or even weeks. The longer the system stays in an area, the hotter temperatures become. The high pressure inhibits winds, making them faint to almost non-existent. Because the high-pressure system also prevents clouds from entering a region, sunlight can become punishing, increasing temperatures even more. The combination of all these factors come together to create what is known as a heat wave. Typically, a heat wave can last two or more days with significant impacts on human health and/or infrastructure. Heat waves can also cause catastrophic crop failures, cause roads to crumble, and can cause the ground around residences to dry out, leaving them susceptible to subsidence.

NOAA's NWS maintains a Heat Index (Figure 2-9), which is a measure of how hot it really feels when relative humidity is also factored in with actual air temperatures. As an example, if the air temperature is 96°F and the relative humidity is 65%, the heat index, how hot it feels, is 121°F. The NWS also initiates alert procedures when the Heat Index is expected to exceed 105°-110°F (depending on local climate) for at least two consecutive days:

- Caution – fatigue possible,
- Extreme Caution – sunstroke, muscle cramps, and/or heat exhaustion possible,
- Danger – sunstroke, muscle cramps, and/or heat exhaustion likely, and
- Extreme Danger – heat stroke or sunstroke highly likely.

Figure 2-9 NOAA's National Weather Service Heat Index



Source: https://www.weather.gov/phi/heatcond.

Based on review of NOAA's NCEI and coordination/confirmation with the LHMT, there were no available historic records of extreme heat events in Douglas since 2016. Based on the very high frequency and minor severity, and projected increases for more days with warmer temperatures, as confirmed by the LHMT, the Town of Douglas is considered to be at moderate risk for this 2025 Update (Table 2-2 Hazard Index). The Town of Douglas can expect to be uniformly affected by extreme heat conditions.

Climate Change Impacts on Extreme Heat

More intense and prolonged heat waves are predicted with climate change. The frequency of days with high temperatures at or above 90°F has already increased (Vallee and Giuliano, 2014). The average number of days expected to be above 90°F in 1950 was about seven, while the new normal is 12.

MVP Climate Change Projections on Extreme Heat

As mentioned previously, climate change impacts will result in increased average temperatures, so the number of extreme heat days is expected to increase. Douglas should experience more days with warmer temperatures, particularly days over 90 degrees, and thus, will expend more energy on cooling. Table 2-18 below includes temperature projections with a Baseline (1971 – 2000) through the mid-century (2050s) for the Blackstone, French, and Quinebaug Basin Watersheds.

Table 2-18 Extreme Heat Temperature Projections, Blackstone, French, and Quinebaug Basins

Climate Parameter	Baseline 1970 - 2000	Projected Change in 2030s	Mid-Century 2050s
Average Annual Temperature (°F)			
Blackstone Basin	48.2	50.4 – 52.4	51.1 – 54.5
French Basin	47.1	49.2 – 51.4	50.1 – 53.5
Quinebaug Basin	46.9	49.0 – 51.2	49.8 – 53.2
Maximum Annual Temperature (°F)			
Blackstone Basin	58.7	61.0 – 62.8	61.4 – 64.9
French Basin	57.7	59.7 – 61.8	60.4 – 64.1
Quinebaug Basin	57.8	59.9 – 62.0	60.6 – 64.2
Annual Days with Maximum Temperature Over 90 (°F)			
Blackstone Basin	5	10 - 20	13 - 34
French Basin	3	7 – 16	10 – 28
Quinebaug Basin	3	8 -17	11 - 30
Annual Cooling Degree-Days (Base 65 °F)			
Blackstone Basin	499	725 – 944	795 – 575
French Basin	419	631 – 434	702 – 1,126
Quinebaug Basin	417	626 - 828	695 – 1,131

Source: MVP Program, www.resilientma.org.

Property/People at Risk from Extreme Heat-Related Hazards

Overview Summary of Extreme Heat-Related Hazard Impacts:

Social/Economic Impacts

- Impacts to vulnerable populations (elderly, homeless, special needs, and those with chronic health conditions) will be exacerbated (potential for cardiovascular and respiratory complications).
- Can endanger those who work outdoors.
- Increased demand for comfort/cooling stations (emergency services).
- Stressors (mental health) on those who do not have/can't afford air conditioning.
- Increased demands on emergency personnel and medical facilities.

Environmental Impacts

- Particularly damaging to agriculture (crops/livestock) stressing water supply sources (economic impacts and food security).
- Excessively dry ground conditions can be susceptible to subsidence and exacerbate stormwater runoff.
- Compromised air quality conditions can result in increased hospital admissions for heat-related illness.
- Potential for drought (s) to exacerbate conditions for wildfires.

Infrastructure/Built Environment Impacts

- Increased electricity demand for cooling which can lower the ability of transmission lines to carry power.
- Impacts on transportation systems:
    - Higher temperatures can cause pavement to soften and expand causing rutting/potholes, stress bridge joints, and limit construction activities outdoors.
- Disruptions to water distribution systems:
    - Limited supply of water sources and quality of water sources.

Probability of Future Occurrence of Extreme Heat-Related Hazards

As mentioned previously, climate change impacts will result in increased average temperatures, so the number of extreme heat days is expected to increase.

2.4.6 Drought-Related Hazards

Drought is a temporary irregularity characterized by long durations of below normal precipitation. Drought occurs in virtually all climatic zones yet varies significantly from one region to another, due to its relationship to normal precipitation in that specific region. Drought can affect agriculture, water supply, aquatic ecology, wildlife, and plant life.

Drought can be defined or grouped by the following:

- Meteorological drought is a measure of departure of precipitation from normal, defined solely on the degree of dryness.
- Agricultural drought links various characteristics of meteorological (or hydrological) drought to agricultural impacts with a focus on precipitation shortages, differences between actual and potential evapo-transpiration, soil water deficits, reduced groundwater or reservoir levels, etc.
- Hydrological drought is associated with the effects of precipitation (including snowfall) shortfalls on surface or subsurface water supply and when water supplies are below normal.
- Socioeconomic drought is associated with the supply and demand of some economic goods with elements of meteorological, hydrological, and agricultural drought.

Table 2-19 below represents the various significant drought-related hazard events that have been recorded in and around the Town of Douglas utilizing NOAA's NCEI. All events are for southern Worcester County unless otherwise noted.

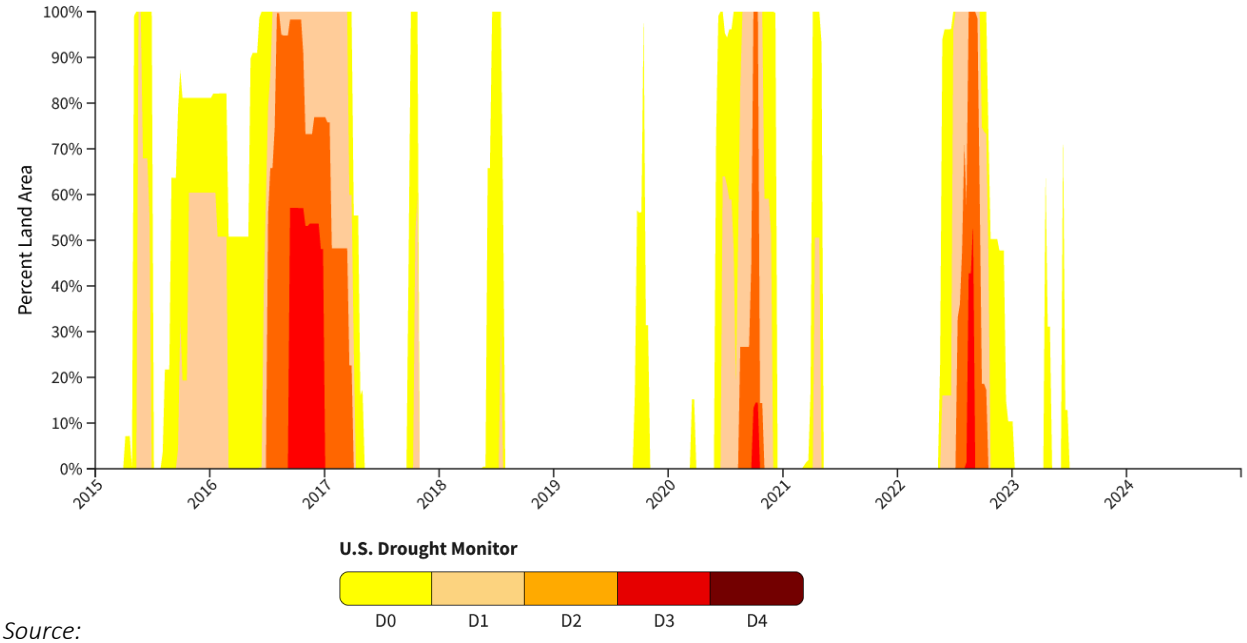
Table 2-19 Significant Drought-Related Events, Worcester County

Hazard Type	Date	Level / Description	Notes
Drought			
Drought	8/2/2016	D2	
Drought	9/1/2016	D2	
Drought	10/1/2016	D2	
Drought	11/1/2016	D2	
Drought	12/1/2016	D2	
Drought	1/1/2017	D2 to D1	1/1 to 1/24
Drought	2/1/2017	D2	2/1 to 2/28
Drought	3/1/2017	D2 to D1	3/1 to 3/21

Source: NOAA National Centers for Environmental Information, www.ncdc.noaa.gov. Data current through December 2023.

The U.S. Drought Monitor shows that Worcester County has experienced a number of drought events across a range of intensities, particularly in 2016, 2020, and 2022 (Figure 2-10). Almost every year since 2016, the Town has experienced DO – abnormally dry conditions, short-term dryness slowing plant/crop progress, and for 2022, approximately 50% of the Town entered the D3 – Extreme Drought classification.

Figure 2-10 Drought Occurrences, Worcester County, 2010 – 2023



Source: https://www.drought.gov/states/massachusetts/county/Worcester.

The severity of a drought would determine the scale of the event. The U.S. Drought Monitor includes five classifications for drought (Table 2-20).

Table 2-20 Drought Classifications Scale

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

Source: US Drought Monitor, http://droughtmonitor.unl.edu/.

Based on the moderate frequency and minor severity of drought events as reported in NOAA's NCEI indicated in Table 2-19, as confirmed by the LHMT, the risk of drought is considered moderate in Douglas. The Town of Douglas can expect to be uniformly affected by future drought conditions.

Climate Change Impacts on Drought-Related Hazards

Although droughts can be variable, we can generally expect climate change to result in increased average global temperatures, and in turn increasing the potential for drought conditions.

Property/People at Risk from Drought-Related Hazards

Roughly 30% of Douglas residents and businesses are served by Douglas Municipal Water, while most others (70%) utilize individual private well water. The U.S. Drought Monitor also records information on historical drought occurrence. Unfortunately, data are only available at the state level. So, while the impact of a drought can be assessed as 'minor' overall, with very little damage to people or property likely to occur, impacts may be higher in parts of town that are not located within the Town's water service area.

Overview Summary of Drought-Related Hazard Impacts:

Social/Economic Impacts

- Agricultural operations experience loss of revenue.

Environmental Impacts

- Agricultural operations/trees/landscaping become stressed and susceptible to insects.
- Irrigation use increases impacting water supplies.
- Lower water levels in streams, reservoirs, and wells

- Higher risk of algal blooms
- Reduced riverine bank stability

Infrastructure/Built Environment Impacts

- Fire danger (wildfires/brushfires) is elevated.

Probability of Future Occurrence of Drought-Related Hazards

Although Massachusetts is relatively small, it has a number of distinct regions that experience significantly different weather patterns and react differently to the amounts of precipitation they receive.[39] Outside of 2016 and 2017, very few drought events have occurred in southern Worcester County. For this 2025 Update, Douglas is considered at moderate risk for drought-related events.

2.4.7 Brushfire/Wildfire-Related Hazards

Wildfires are defined as any non-structure fire that occurs in vegetated wildland, including grass, shrub, leaf litter/debris, and forested tree fuels. Most susceptible to the hazard are pitch pine, scrub oak, and oak forests – the most flammable vegetative fuels. Small wildfires are common throughout Massachusetts, especially during drought or near-drought conditions.

The Wildland Urban Interface (WUI) – the area where structures and human development meet and intermingle with undeveloped wildland, creates an environment in which fire can move readily between structural and vegetative fuels, mapped in yellow (Figure 5 Wildland Urban Interface, Appendix A). The WUI includes the Intermix WUI – areas where housing and vegetation intermingle[40].

The Northwest Fire Science Consortium has classifications for 3 different classes of wildfires[41]:

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

Table 2-21 below represents the number of wildland fire incident responses for the Douglas Fire Department since 2017.

[39] Ibid.
[40] Radeloff, V.C., R.B. Hammer, S.I. Stewart, J.S. Fried, S.S. Holcomb, and J.F. McKeefry. 2005. *The Wildland Urban Interface in the United States*. Ecological Applications 15:799-805.
[41] https://www.nwfirescience.org/sites/default/files/publications/Types%20of%20Fire.pdf.

Table 2-21 Wildland Fire Incidents, Douglas, MA

Year	No. of Responses
2017	11
2018	4
2019	7
2020	12
2021	19
2022	13
2023	13
2024	9

Source: Douglas Fire Department, February 2025.

The impact and vulnerability to wildfire is influenced by a variety of factors, such as land cover conditions, weather and the effectiveness of land management techniques. Suburban neighborhoods located at the WUI are very vulnerable to wildfire. Individual buildings may be more or less vulnerable to damage from wildfire based on factors such as the clear distance around the structure, and the structure's construction materials. A fire in any of these areas would quickly overwhelm local resources and could possibly threaten homes nearby.

Douglas has a mixed fire department with professional firefighters supported by on-call volunteers. Along with 24 other towns, Douglas participates in the Southern Worcester County Fire District (Mutual Aid District 7). Douglas issues permits for controlled burning of yard waste every year between January and May. Upon application of burn permits, the Fire Department advises permitees about proper and safe burn technique. Douglas does not use cisterns for fighting fires, not in the range of municipal water and hydrants. Instead, Douglas fills water tankers using hydrants and then sets up portable pools near the site of the fire. The tankers fill the pool, refill themselves using hydrants, and continuously replenish the portable pools. This system has served the Town well for the most part; hydrants have lost pressure in the past, resulting in water being pulled from nearby rivers. The Town should investigate the cause of losing pressure in hydrants to ensure adequate fire-fighting capabilities.

Wildfire April 2023.

Potential vulnerabilities to wildfires include damage to structures and other improvements, and impacts on natural resources. Smoke and air pollution from wildfires can be a health

hazard, especially for sensitive populations including children, the elderly, and those with respiratory and cardiovascular diseases.

Climate Change Impacts on Brushfire/Wildfire

Climate scenarios project summer temperature increases between 2° C and 5° C and precipitation decreases of up to 15 percent. Such conditions would exacerbate summer drought and further promote high-elevation wildfires, releasing stores of carbon and further contributing to the buildup of greenhouse gases. Forest response to increased atmospheric carbon dioxide—the so-called "fertilization effect"—could also contribute to more tree growth and thus more fuel for fires, but the effects of carbon dioxide on mature forests are still largely unknown. Climate change is also predicted to bring increased wind damage from major storms, as well as new types of pests to the region. Both increased wind and the introduction of new pests could potentially create more debris in wooded areas and result in a larger risk of fires.

Property/People at Risk from Brushfire/Wildfire-Related Hazards

In Douglas, an estimated 78% of the total land area is forested, and is therefore at risk, but this forested area is mostly contained in the western part of town, making up the Douglas State Forest. Development varies significantly from low- to high-density, therefor, wildfire vulnerability increases for areas with more uninterrupted tracts of forest land.

Overview Summary of Wildfire/Brushfire-Related Hazard Impacts:

Social/Economic Impacts

- Compromised air quality impacts.

Environmental Impacts

- Loss of natural resources, critical habitat and displacement/migration of species to other areas.

Infrastructure/Built Environment Impacts

- The spread to buildings/built environment can result in significant financial impacts/loss of structure/assets.

Probability of Future Occurrence of Brushfire/Wildfire Hazards

Most brushfires/wildfires are a result of negligent and/or intentional human behavior (arson, open flames, and cooking) and are preventable. Wildfire season in Massachusetts begins in late March and typically ends in early June, which also corresponds with the driest live fuel moisture periods of the year. For this 2025 Update, Douglas is considered at high risk for future brushfire/wildfire-related events (Table 2-2 Hazard Index).

2.4.8 Environmental-Related Hazards

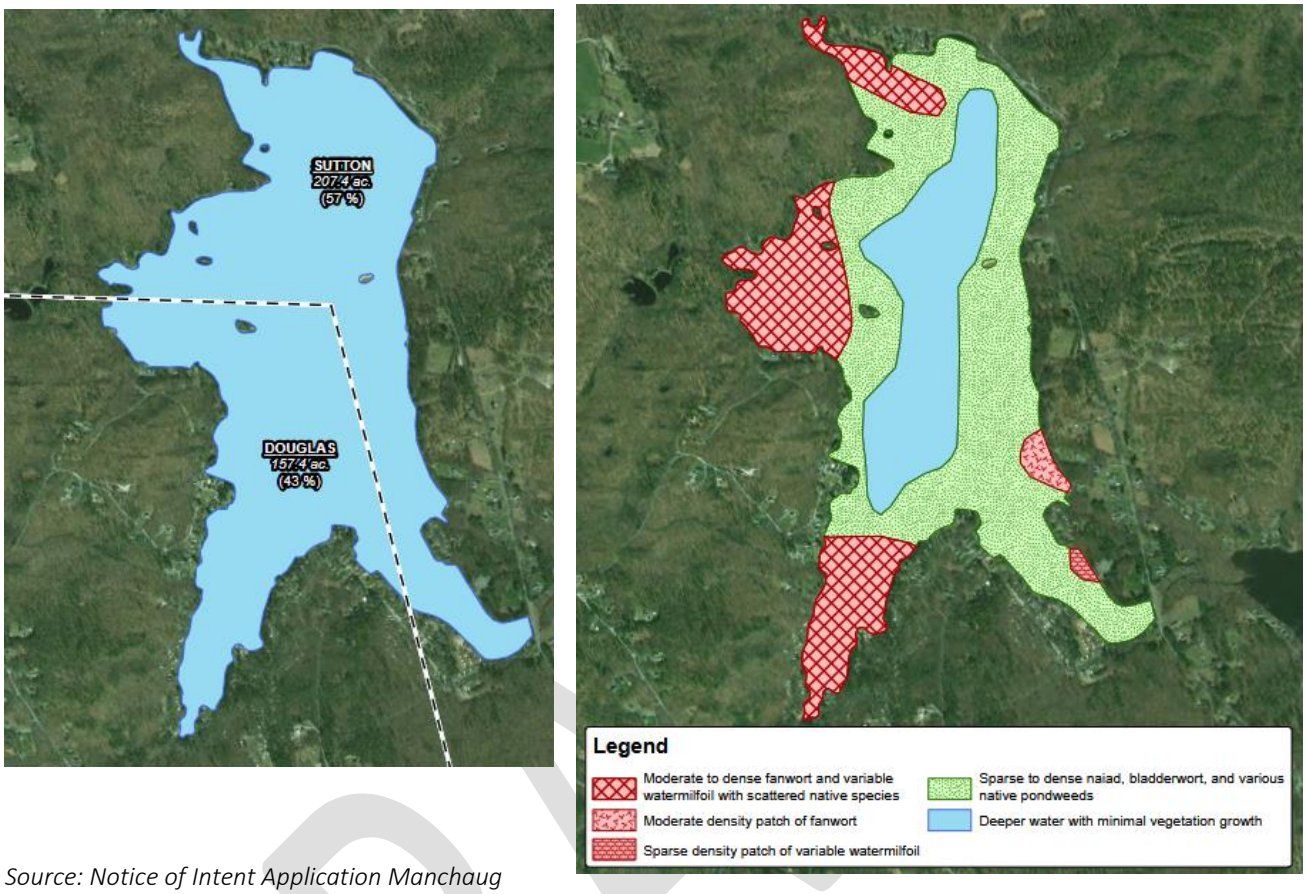
For this 2025 Update, the Douglas LHMT have classified aquatic plant invasive species and vector-borne hazards as environmentally-related hazards.

Invasive Species (Aquatic Plant)[42]

Invasive species are non-native species that can impact the environment, the economy or human health. The Towns of Douglas and Sutton maintain an aquatic plant management contract with SOLitude Lake Management for Manchaug Pond to manage two primary species Fanwort and Variable Milfoil (Figure 2-11). This contract includes implementation of USEPA/State registered herbicides and/or algaecides, diver-assisted suction harvesting, and/or other Best Management Practices (BMPs) applied to manage aquatic vegetation and algae to protect the interests of the Wetlands Protection Act by impeding eutrophication and improving habitat value. The objective of the management program is to control growth of nuisance and non-native aquatic plant and algae species, including: to improve and maintain open water habitat; maintain water quality; promote growth of less pervasive native plant species; and provide safe recreational access to the pond.

[42] *Notice of Intent Application Manchaug Pond Aquatic Management Program*, SOLitude Lake Management, May 2018.

Figure 2-11 Vegetation Assemblage/Waterbody Area by Town



Source: Notice of Intent Application Manchaug Pond Aquatic Management Program, Solitude Lake Management, May 2018.

Aquatic plant species impacting the Town of Douglas include:

- ***Bladderwort*** (*Ultricularia spp.)*
  Due to its lack of roots, Bladderwort can grow into dense, complex mats, limiting water circulation, crowding out native vegetation, and cause odors to develop in aquatic ecosystems.
- ***Clasping-Leaf Pondweed*** (*Potamogeton perfoliatus*)
  A native aquatic plant that provides important habitat and food for wildlife that can become abundant and requirement management to prevent interference with other aquatic plant species.
- ***Common Reed*** (*Phragmites australis*)
  Considered a highly invasive plant species forming dense stands that crowd out native vegetation in wetlands, along rover banks, and lakeshores, significantly reducing biodiversity and altering the ecosystem by changing water flow and creating fire hazards.
- ***Coontail*** (*Ceratophillum demersum*)
  Can be either desirable or undesirable depending on the management goals for the particular body of water. When excessive, undesirable effects include reduction in open

water, creation of a 'scummy' appearance, limiting fishing access and interfering with boating and swimming.

- *Fanwort* (*Cambomba caroliniana*)
  Can grow very fast and out-compete native vegetation disrupting native fish communities and clogging drainage systems.
- *Large-Leaf Pondweed* (*Potamogeton amplifolius)*
  A native aquatic plant that if unmanaged can grow to become a nuissance population, and interfering with recreational activities.
- *Northern Naiad* (*Najas flexilis*)
  An invasive that starts growing early in the season which often leads to the blocking of sunlight from reaching native species and inhibiting their growth. Can also outcompete nearby plants for space.
- *Southern Naiad* (*Najas guadalupensis*)
  Considered a native plant in many parts of the United States, it can become invasive in certain areas due to its rapid growth and forming dense mats that interfere with water flow and recational activities…not technically an invasive but can behave as such in specific situations.
- *Tapegrass* (*Vallisneria americana*)
  Considered a native plant in many parts of the United States, it can become invasive in certain areas due to its rapid growth and forming dense mats that interfere with water flow and recational activities…not technically an invasive but can behave as such in specific situationsVariable-Leaf Pond weed (*Potamogeton gramineus*)
- *Variable Milfoil* (*Myriophyllum heterophyllum*)
  Thick growth may degrade water quality, displace beneficial native plants, and impede recreation such as swimming, fishing, and boating.

Manchaug Pond supports a desirable assemblage of aquatic vegetation. A diverse community of aquatic vegetation provides multiple benefits for the ecosystem including a food source for aquatic animals, fish and wildlife habitat, improved water quality, shoreline stabilization, improved aesthetics, and reduced chances of establishment by exotic invasive vegetation. Fanwort and variable watermilfoil are reaching maximum growth in two coves (Mumford River outlet & Summer Court Cove) of Manchaug Pond. Access through these two areas has declined due to the thick growth and high biomass of these two species while consistent boat traffic causes regular fragmentation, which is a primary form of reproduction for both fanwort and watermilfoil. Continued monitoring and management of invasive species is recommended as described above.

Vector-Borne Illnesses

A vector-borne disease results from an infection transmitted to humans and other animals by blood-feeding anthropods such as mosquitos and ticks.

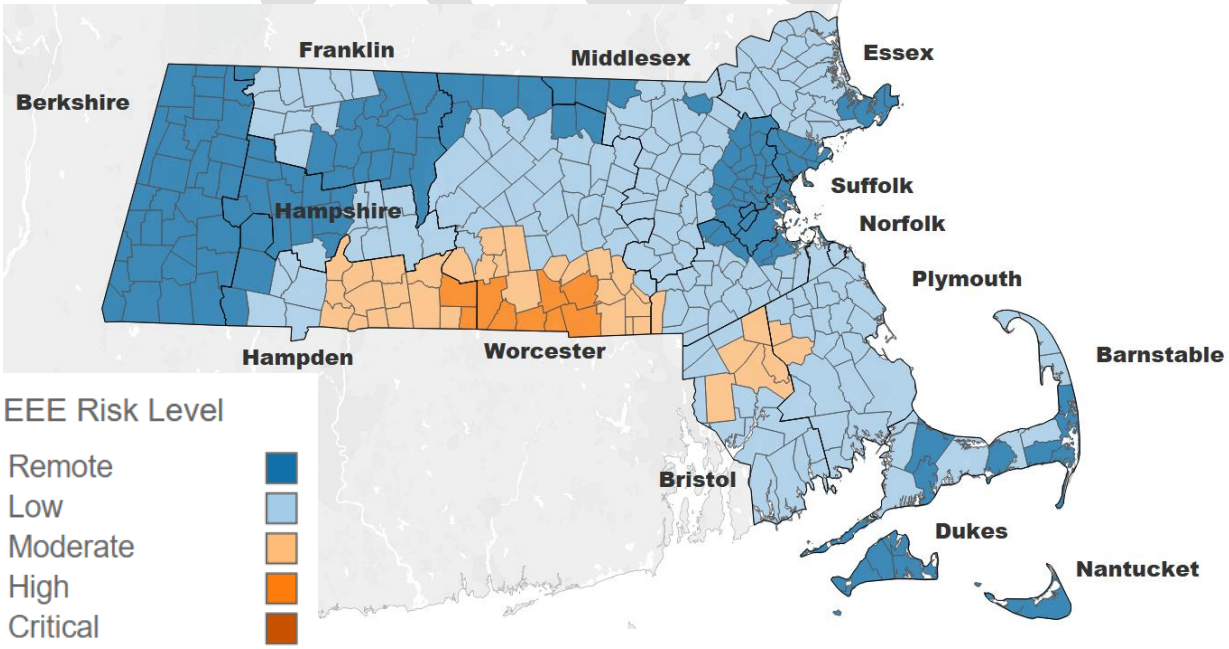
Arboviruses[43]

The Northeast region is home to over 60 mosquito species.[44] Mosquitos live and breed in a variety of habitats:

- Containers in urban and suburban areas
- Pasture land and open fields
- Dry woodland and tree holes
- Salt marshes
- Swamps and wet woodlands

The Massachusetts Department of Public Health, Bureau of Infectious Disease and Laboratory Sciences (MA DPH) conducts surveillance for West Nile and Eastern Equine Encephalitis (also called arboviruses) that are spread by mosquitoes in Massachusetts. This surveillance consists of routine testing of mosquitoes and tracking cases in humans and provides information about when and where people could be at risk. In 2023, there were 15 cases (two in Douglas) of Eastern Equine Encephalitis. The risk level in 2023 was 'Moderate' for Douglas (Figure 2-12). Also in 2023, there were 8 cases of West Nile Virus in Worcester County, Massachusetts. The risk level was 'Low' for Douglas (Figure 2-13).

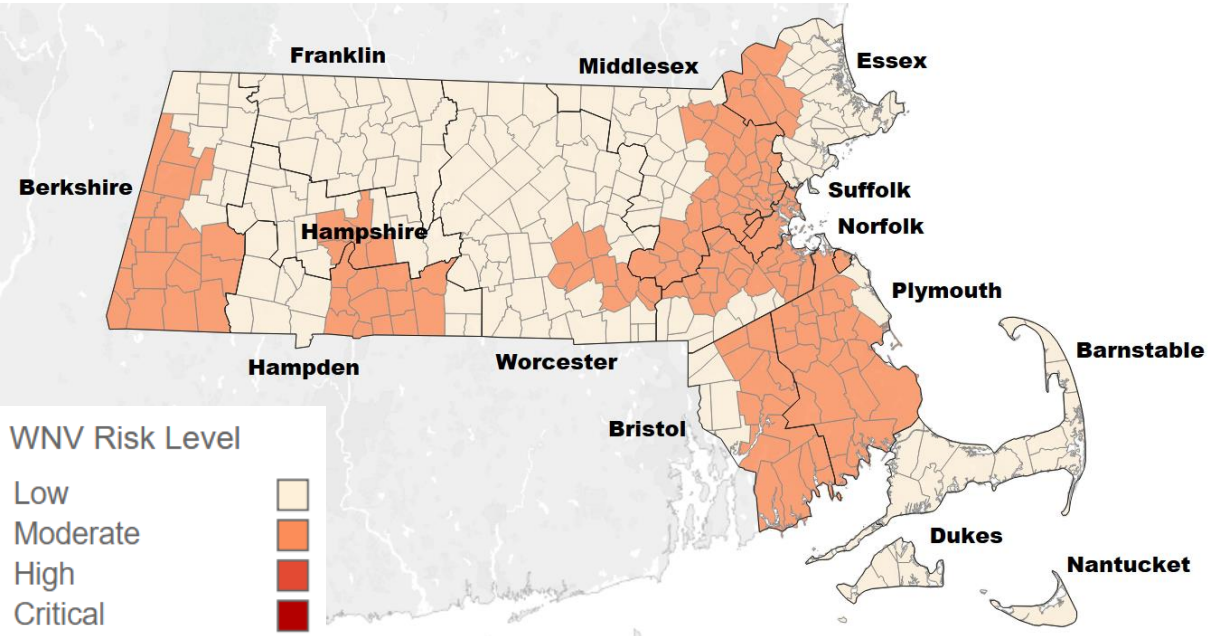
Figure 2-12 Eastern Equine Encephalitis Risk Level by City/Town, Massachusetts, October 11, 2023



Source: MD DPH Arbovirus Disease Surveillance Summary.

[43] Massachusetts Department of Public Health, Bureau of Infectious Disease and Laboratory Sciences. *Arbovirus Disease Surveillance Summary,* https://www.mass.gov/lists/arbovirus-surveillance-plan-and-historical-data#current-data-.
[44] Northeast Regional Center for Excellence in Vector-Borne Diseases, https://www.neregionalvectorcenter.com/mosquitoes.

Figure 2-13 West Nile Virus Risk Level by City/Town, Massachusetts, October 11, 2023



Source: MD DPH Arbovirus Disease Surveillance Summary.

Tickborne Disease[45]

Tickborne disease (s) are also tracked by the MA DPH and includes a subset of four tickborne diseases, as well as Lyme Disease, including:

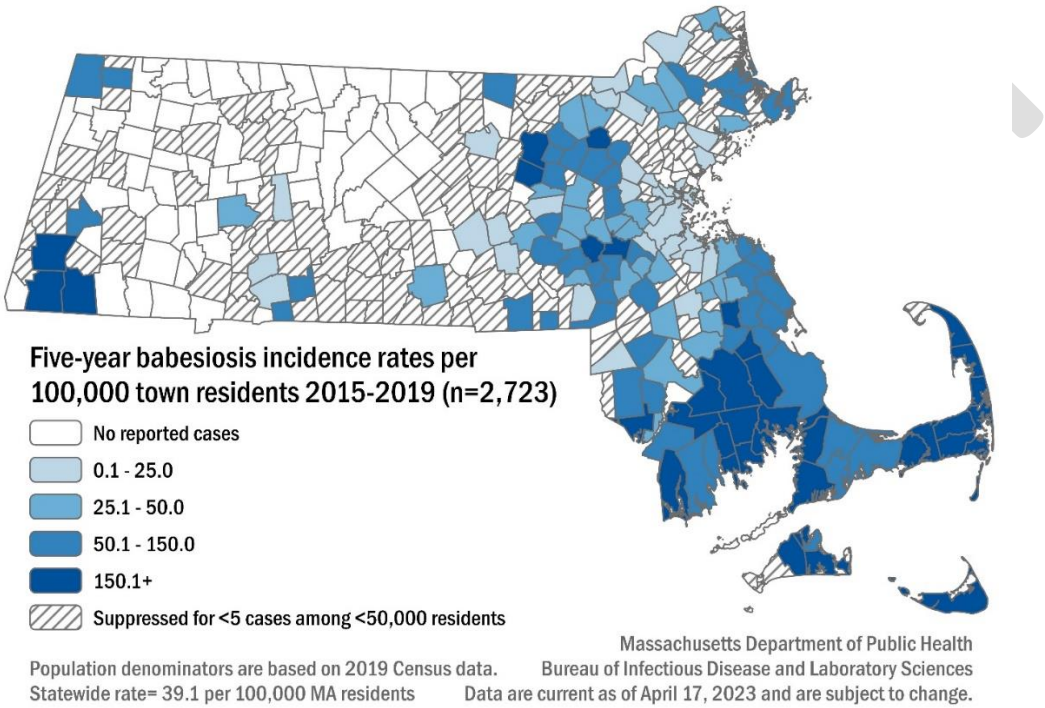
- Babesiosis: A disease caused by a microscopic parasite (*Babesia microti*) that infects red blood cells. In 2018, there were 29 confirmed cases in Worcester County.
- Human Granulocytic Anaplasmosis (HGA): A disease caused by the bacterium *Anaplasma phagocytophilum*. In 2019, there were 85 confirmed and probable cases in Worcester County.
- *Borrelia miyamotoi* infection: A type of spiral-shaped bacteria that is closely related to the bacteria that cause tickborne relapsing fever. Infection is often referred to as borreliosis. In 2019, there were two confirmed cases in Worcester County.
- Powassan virus infection: There are two types of Powassan virus in Massachusetts. Type one is found in ticks that feed on woodchucks (groundhogs); while type two is carried by black-legged ticks. There were two confirmed cases reported in Worcester County 2013 – 2019.
- Lyme: A disease caused by the bacterium *Borrelia burgdorferi* and rarely *Borrelia m*ayonii. In 2014, there were 421 confirmed cases and 226 probable cases in Worcester County.

[45] Massachusetts Department of Public Health, Bureau of Infectious Disease and Laboratory Sciences. *Tickborne Disease Surveillance Summary, 2019.* https://www.mass.gov/lists/tick-borne-disease-surveillance-summaries-and-data.

Figures 2-14 through 2-18 show the five-year incidence rates for the tickborne diseases discussed above. Numbers are per 100,000 population by city/town. The incidence rates over the five-year period for Douglas fall under the following ranges:

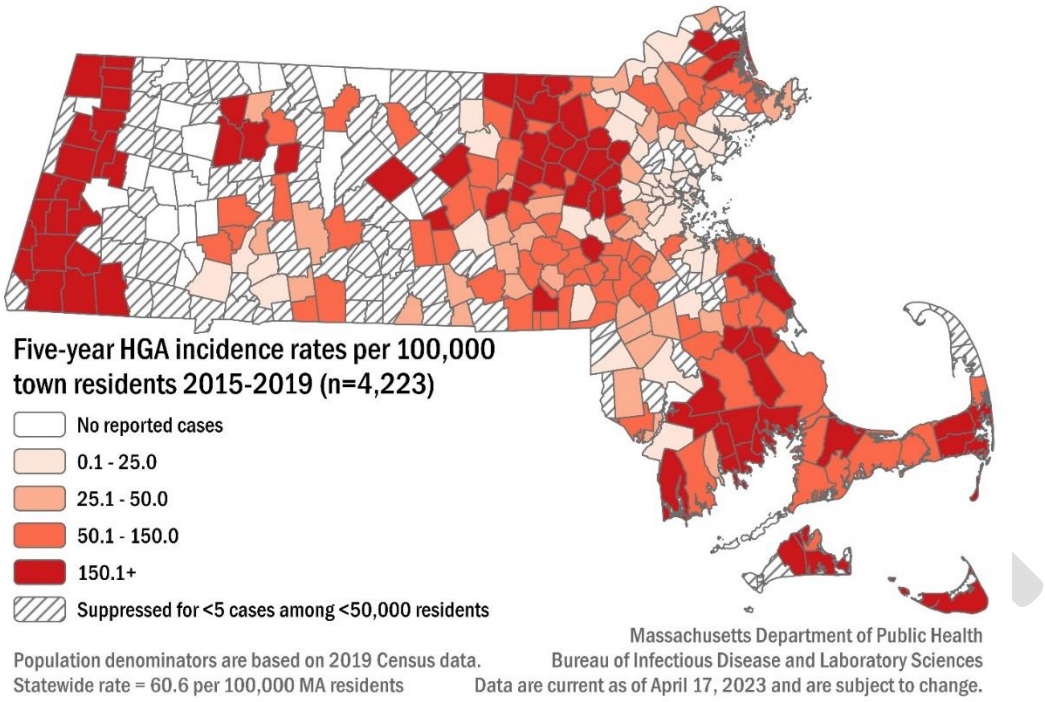
- Babesiosis: Suppressed for <5 cases among <50,000 residents
- Human Granulocytic Anaplasmosis (HGA): Suppressed for <5 cases among <50,000 residents
- *Borrelia miyamotoi* infection: 1 - 5
- Powassan virus infection: 1 - 5
- Lyme: 101 - 250

Figure 2-14 Five-Year Babesiosis Incidence Rates per 100,00 population by City/Town, Massachusetts, 2015 - 2019



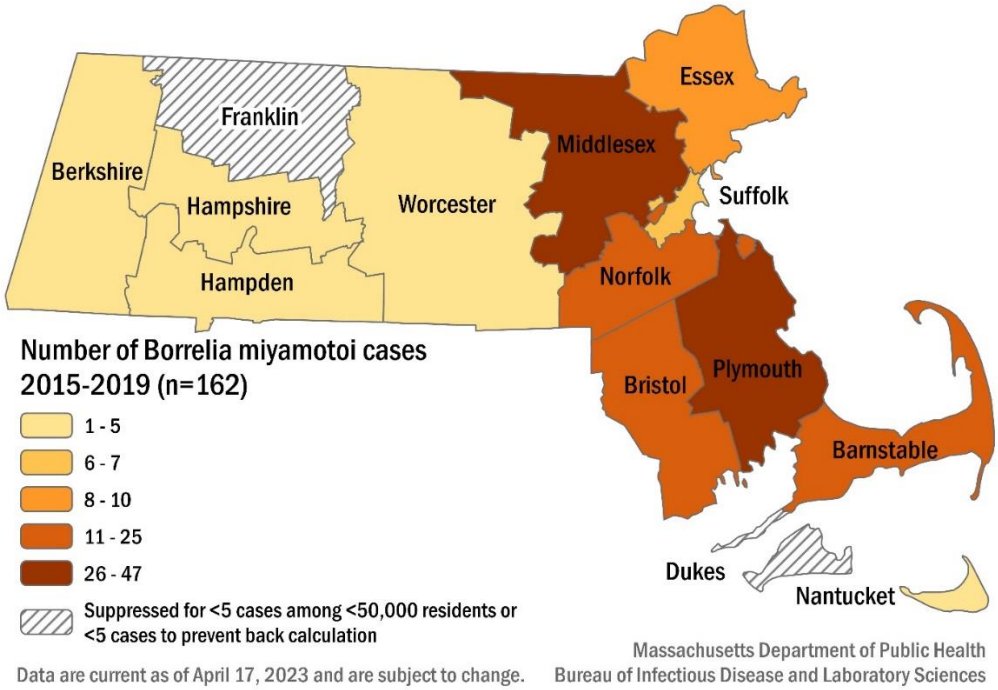
Source: MD DPH Tickborne Disease Surveillance Summary.

Figure 2-15 HGA Incidence Rates per 100,000 Population by City/Town, Massachusetts, 2015 – 2019



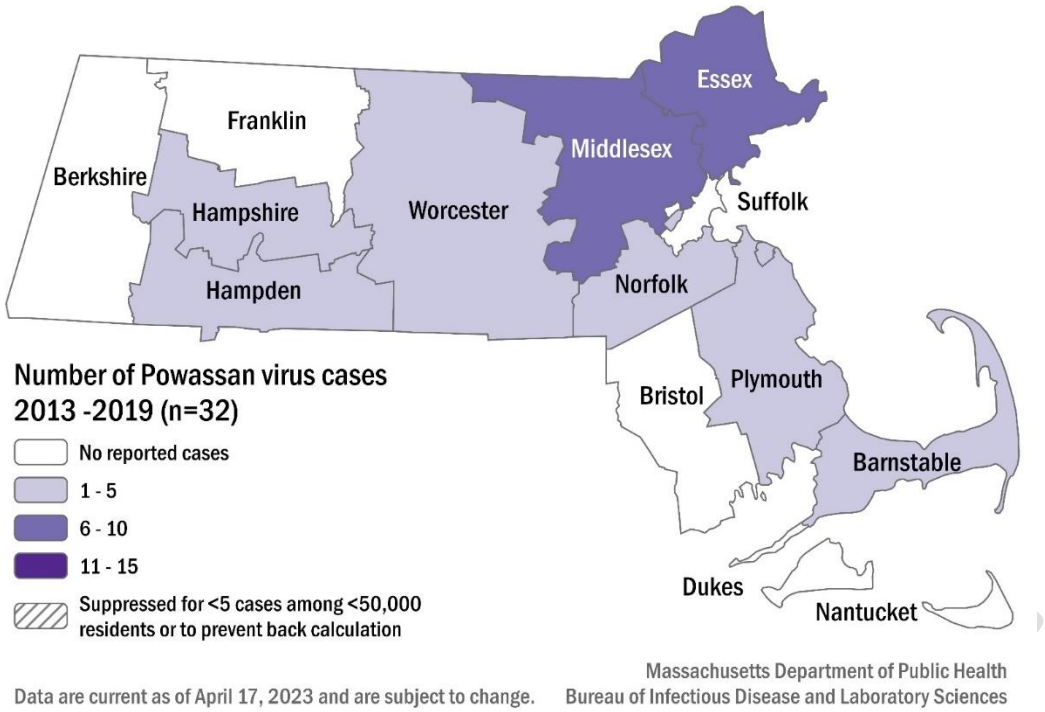
Source: MD DPH Tickborne Disease Surveillance Summary.

Figure 2-16 Borrelia Miyamotoi Cases by City/Town, Massachusetts, 2015 - 2019



Source: MD DPH Tickborne Disease Surveillance Summary.

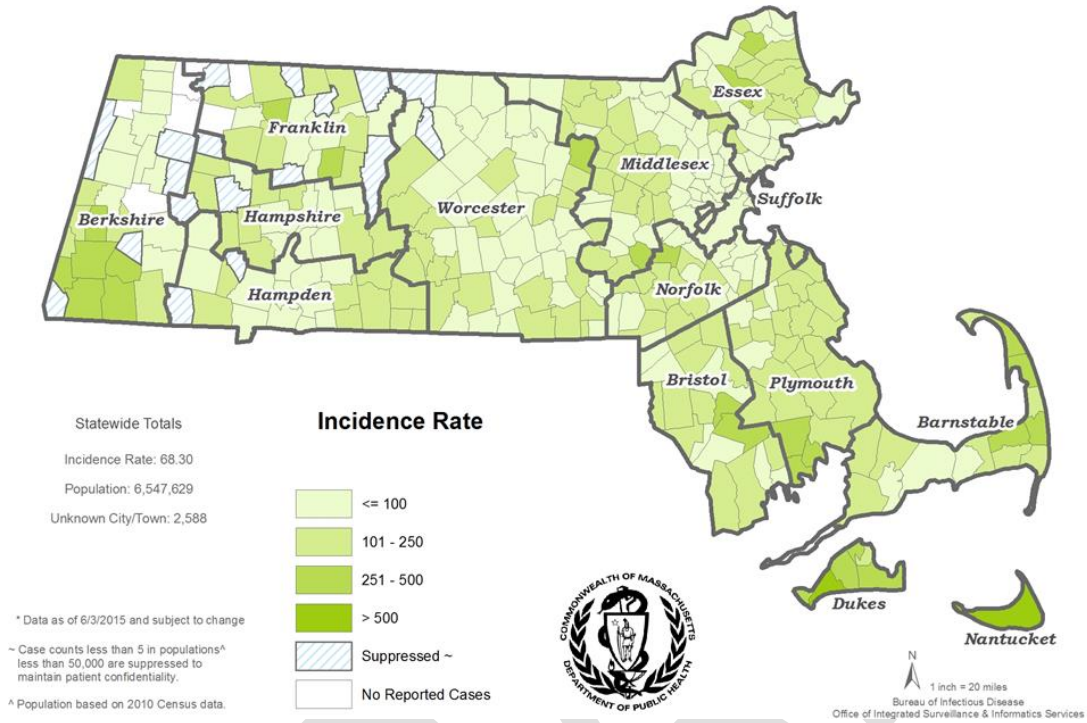
Figure 2-17 Powassan Virus Cases by City/Town, Massachusetts, 2013 – 2019



Source: MD DPH Tickborne Disease Surveillance Summary.

Babesiosis, HGA, and Borrelia *miyamotoi* are tickborne diseases that are endemic to the Commonwealth. Powassan virus is a rare tick-borne flavivirus that can cause neuroinvasive disease in humans. Transmission of all four diseases can happen when an individual is bitten by a black-legged tick (*Ixodes scapularis*). Powassan virus can also be transmitted by the woodchuck tick (*Ixodes cookie*). Most infections occur in the warm spring and summer months when young (nymph) ticks are most active, though adult ticks may feed on humans and transmit disease year-round if temperatures are above freezing. Black-legged ticks are most commonly found in grassy or wooded areas where deer and mice are present. Because these diseases (and others including Lyme disease) are all transmitted by the same species of tick there is risk of co-infection with multiple pathogens from the same bite.

Figure 2-18 Lyme Disease Incidence Rates per 100,000 population for Confirmed and Probable Lyme Disease, Massachusetts, 2010 - 2014



Source: MD DPH Tickborne Disease Surveillance Summary.

There were no available historic records for invasive species (aquatic plant species) townwide, however, the *Notice of Intent Application Manchaug Pond Aquatic Management* Plan was obtained from the Whitin Reservoir Watershed District that included the identification of several aquatic plant species within Manchaug Pond. Based on the low frequency and minor severity, as ranked/confirmed by the LHMT, the Town of Douglas is considered to be at low risk to future impacts associated with invasive species (aquatic plant species). Based on the very high frequency and minor severity of vector-borne impacts, accessed from the MA DPH and confirmed by the LHMT, The Town of Douglas in considered to be at moderate risk for future vector-borne illnesses.

Climate Change Impacts on Invasive Species-Related (Aquatic Plant) and Vector-Borne -Related Hazards[46]

Climate change is predicted to increase the abundance of invasive species and expand their habitat ranges. Species hierarchies in ecosystems that are stressed (due to climate change associated drought, increased temperatures, wildfires, etc.) will be more susceptible to invasive species.

[46] Eastern Research Group, Inc., *ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan*, September 2023, https://www.mass.gov/files/documents/2023/10/10/2023%20ResilientMass%20Plan_10.10.23%20508.pdf.

The Intergovernmental Panel on Climate Change (IPCC) reported with high confidence that the prevalence of vector-borne diseases has increased in recent decades and that the prevalences of malaria, dengue, Lyme disease, and West Nile virus infection in particular are expected to further increase during the next 80 years if measures are not taken to adapt and strengthen control strategies.[47]

Property/People at Risk from Environmental-Related Hazards

Invasive species typically harm native species through predation, habitat degradation and competition for shared resources. Negative consequences can be far-reaching, considering they can spread at astonishing rates and can affect property values, agricultural productivity, public utility operations, native fisheries, tourism, outdoor recreation, and the overall health of an ecosystem.

Aquatic plant invasive species have been identified in Bad Luck Pond, Whitin Reservoir, and Manchaug Pond.

Overview Summary of Invasive Species-Related Hazard Impacts:

Social/Economic Impacts

- Loss of recreational opportunities/resources.

Environmental Impacts

- Habitat loss and degradation.
- Loss of native fish/wildlife/plant species.
- Agricultural impacts/loss.
- Impacts to potable water supply.

Infrastructure/Built Environment Impacts

- Compromised drainage systems/components.

Overview Summary of Vector-Borne-Related Hazard Impacts:

Social/Economic Impacts

- Health consequences including widespread illness and increased mortality rates.
- Post-recovery health concerns including long-term organ damage and/or chronic illnesses.
- Mental health concerns (i.e., post-traumatic stress disorder, depression, anxiety disorders).

[47] https://www.nejm.org/doi/full/10.1056/NEJMra2200092.

Environmental Impacts

- Very limited impacts.

Infrastructure/Built Environment Impacts

- Very limited impacts.

The entire Town of Douglas is susceptible to vector-borne illnesses. Late summer and fall are prime seasons for the spread of arboviruses. Most tickborne infections occur in the warm spring and summer months when young (nymph) ticks are most active, though adult ticks may feed on humans and transmit disease year-round if temperatures are above freezing.

Probability of Future Occurrence of Environmental-Related Hazards

Eradication involves both chemical and mechanical methods, combined with ongoing monitoring. Often, due to limited staffing and diminished municipal budgets, limited controlled stands are often realized at best. Most invasives are considered more of a nuisance hazard and not directly associated with any primary impacts of other weather-related hazards such as loss of life, limited evacuation, or property damage. As previously stated, the prevalence of many vector-borne diseases are expected to continue to increase over the next 80 years unless measures are not taken to adapt and strengthen control strategies.

2.4.9 Changes to Groundwater-Related Hazards[48]

There are three primary risks associated with groundwater in Massachusetts: increase in groundwater levels, groundwater resource depletion, and contamination of groundwater by pollution and salinity changes from sea level rise and flooding.[49] Douglas is vulnerable to the first two risks, excluding sea level rise impacts.

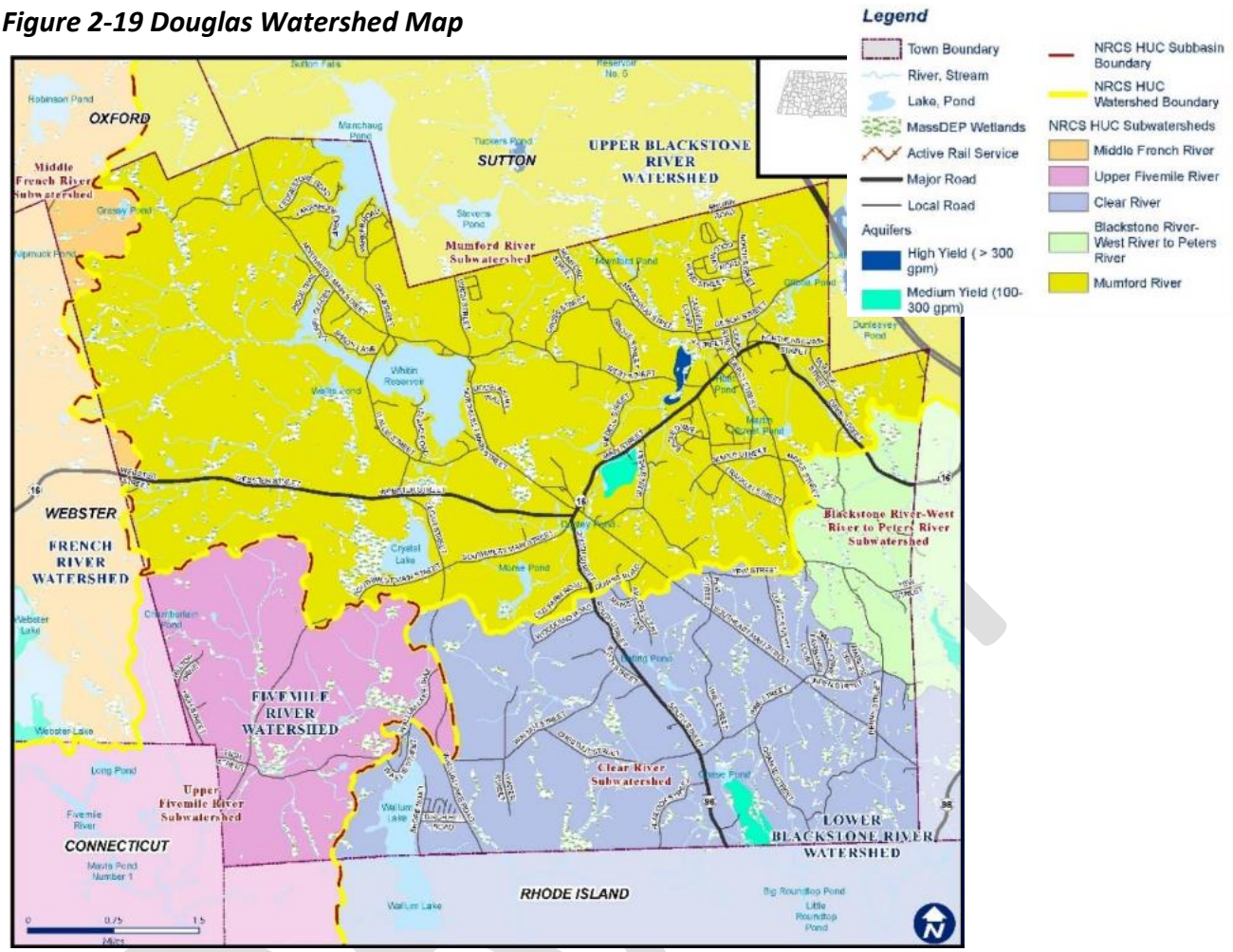
Watershed Overview

There are three main watersheds that fall within Douglas's Town boundaries: the Upper Blackstone River Watershed (over half of the community), the Lower Blackstone River Watershed (approximately a third of the community towards the southeast border and into Rhode Island), the Five Mile River Watershed (towards the southwest border and into Connecticut), along with one additional watershed - the French River Watershed (a small portion of the community at the far northeast corner) as shown in Figure 2-19.

[48] *Douglas Open Space and Recreation Plan*, 2023.

[49] Eastern Research Group, Inc., *ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan*, September 2023, https://www.mass.gov/files/documents/2023/10/10/2023%20ResilientMass%20Plan_10.10.23%20508.pdf.

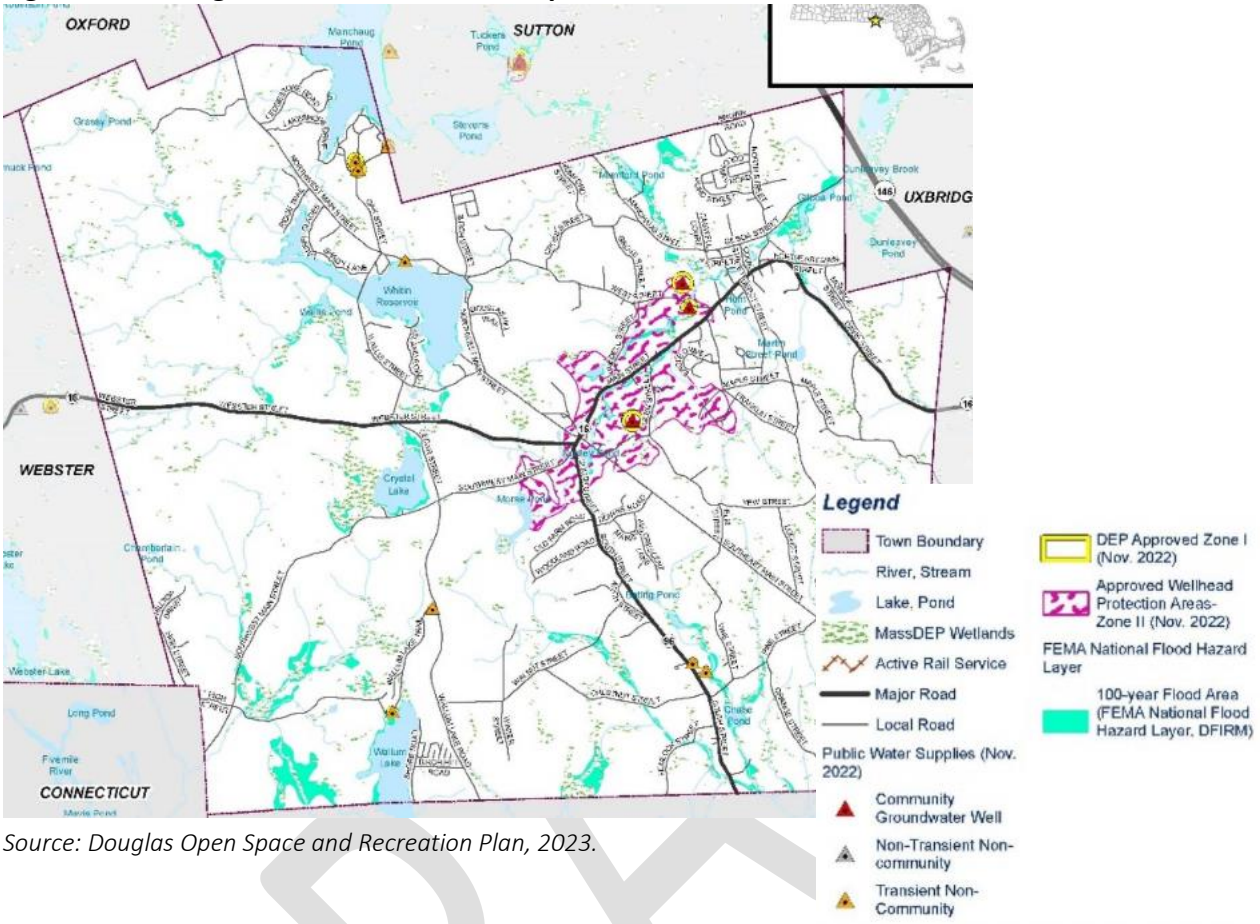
Figure 2-19 Douglas Watershed Map



Source: Douglas Open Space and Recreation Plan, 2023.

Douglas is located in an area containing 12 aquifers, one of which is a high yield aquifer (defined as yielding more than 300 gallons per day without the threat of depletion). Approximately 27% (190 acres) of the primary aquifer recharge areas are covered by residential land uses, two acres contain waste disposal sites, and ten acres contain commercial development. The most significant watershed areas are located in the western half of town and the lower southeast section of town near Greene Brook. It is important to monitor these areas as Douglas depends on groundwater for the town's water supply. Douglas' water resources includes public supply wells, which includes Zones I and II protection areas (Figure 2-20). Zone I represents the protective radius required around a public water supply well or wellfield. Zone II represents municipal wells or the area that directly contributes to the recharge of the wells during periods of heavy demand and extreme drought conditions.

Figure 2-20 Douglas Water Resources Map



Source: Douglas Open Space and Recreation Plan, 2023.

Based on the very low frequency and minor severity of changes to groundwater-related hazards, as confirmed by the LHMT, the risk of changes to groundwater is considered low in Douglas.

Climate Change Impacts on Changes to Groundwater

Modeled projections for 2030 in the Blackstone River, French, and Quinebaug Basins, show average annual temperature increasing in the range of 2.2 to 4.2 degrees F, 2.1 to 4.3 degrees F, and 2.1 to 4.3 degrees F respectively, while average annual precipitation is increasing in the range of -0.3 (only decrease identified) to 5.6 inches, 0.3 to 4.2 inches, and 0 to 5.0 inches respectively. These changes are projected to vary by season, a factor that will influence water availability, flood threat and drought impacts.

Property/People at Risk from Changes to Groundwater-Related Hazards

Groundwater pollution occurs when there is the presence of harmful substances in the groundwater. These substances contaminate the water source and can negatively impact human health and the environment. This contamination can occur from leaks of underground storage tanks holding hazardous chemicals, runoff from agricultural activities and lawn maintenance, and leaching of improperly maintained septic systems. Similarly, surface water pollution is the

presence of harmful substances in bodies of water such as rivers, lakes, ponds, and streams. This contamination can also negatively impact human health, the environment, and aquatic plants and animals. Runoff from agricultural activities, urban areas, wastewater treatment plants, and sewage can cause this contamination. In the Town of Douglas, there are thirteen regulated facilities and one underground storage tank within the water supply protection area that could threaten ground and/or surface water pollution.

Overview Summary of Changes in Groundwater-Related Hazard Impacts:

Social/Economic Impacts

- Loss of recreational opportunities/resources.

Environmental Impacts

- Habitat loss and degradation.
- Agricultural impacts/loss.

Infrastructure/Built Environment Impacts

- Compromised water supply for fire suppression.
- Impacts to potable water supplies.

Probability of Future Occurrence of Changes to Groundwater-Related Hazards

Since climate projects for annual temperature and precipitation are anticipated to continue to increase (with the exclusion of a slight precipitation decrease for the French Basin), and the potential risks of contamination due to regulated facilities, Douglas is considered at low risk for future impacts from changes to groundwater -related hazards.

2.5 Vulnerability

Vulnerability indicates what is likely to be damaged by the identified hazards and how severe that damage could be. After identifying types and areas of risk, a vulnerability analysis can help to determine the gaps in the community. This section examines the vulnerability of the built environment, such as structures, utilities, roads, and bridges, as well as social and environmental vulnerability. A vulnerability analysis also estimates the number of people exposed to hazards, including elderly populations and concentrated populations. This also includes such things as whether the shelter capacity is sufficient for the affected population, and whether businesses are likely to face temporary closure due to natural disasters. Historical damages are often good indicators for current exposure and potential damage.

A vulnerability chart was developed based on the identification and profile of the natural hazards that have occurred throughout Douglas over time, as presented earlier in Section 2.4. Below, Table 2-22 Vulnerability Matrix 2025 describes the expected frequency of occurrence, and the potential severity of the damage resulting from each individual hazard evaluated for this2025

Update. Coordination with the State Plan was also a consideration in the development of the updated Vulnerability Matrix.

Table 2-22 Vulnerability Matrix 2025 Update

Hazard	Frequency	Severity
Flood-Related Hazards	Very High	Minor
Winter-Related Hazards	Very High	Limited
Wind-Related Hazards	Moderate/High	Limited
Geologic-Related Hazards	Very Low	Minor
Extreme Heat-Related Hazards	Very High	Limited
Drought-Related Hazards	Moderate	Minor
Brushfire/Wildfire-Related Hazards	Very High	Limited
Environmental-Related Hazards	Moderate	Minor
Changes in Groundwater-Related Hazards	Very Low	Minor

Source: LHMT.

Impacts of Changes in Population Patterns and Changes in Land Use/Development

Flood-Related Hazards

- Changes in Population Patterns: The population is expected to continue to grow and age steadily with the potential to expose a growing elderly population to the floodplain and areas of localized flooding, as described in Section 2.4.1.
- Changes in Land Use/Development: Existing codes/regulations will help to minimize flood impacts. New development areas may produce additional flooding due to increases in impervious surfaces.

Winter-Related Hazards

- Changes in Population Patterns: The population is expected to continue to grow and age steadily with the potential to expose a growing elderly population to severe winter storms/temperatures, as described in Section 2.4.2.
- Changes in Land Use/Development: Douglas shouldn't be impacted by changes in land use/development.

Wind-Related Hazards

- Changes in Population Patterns: The population is expected to continue to grow and age steadily with the potential to expose a growing elderly population to hurricanes and tropical storms, as described in Section 2.4.3.
- Changes in Land Use/Development: Douglas shouldn't be impacted by changes in land use/development.

Geologic-Related Hazards

- Changes in Population Patterns: The population is expected to continue to grow and age steadily with the potential to expose a growing elderly population/population to earthquakes as described in Section 2.4.4.
- Changes in Land Use/Development: Increases in development will create additional demands for groundwater extraction/storage which could in turn affect the Earth's crust/fault system and when/where earthquakes occur.

Extreme Heat-Related Hazards

- Changes in Population Patterns: The population is expected to continue to grow and age steadily with the potential to expose a growing elderly population to extreme heat temperatures/health impacts, as described in Section 2.4.5.
- Changes in Land Use/Development: Increases in development will exacerbate heat island effects, particularly where trees have been removed and impervious surfaces (asphalt/roofs) are added.

Drought-Related Hazards

- Changes in Population Patterns: The population is expected to continue to grow and age steadily with the potential to expose a growing elderly population to future droughts, as described in Section 2.4.6.
- Changes in Land Use/Development: Increases in development will create additional demands for limited water resources.

Brushfire/Wildfire-Related Hazards

- Changes in Population Patterns: The population is expected to continue to grow and age steadily with the potential to expose a growing elderly population to future brushfire/wildfire-related hazards, as described in Section 2.4.7.
- Changes in Land Use/Development: Development within the WUI can lead to a higher risk of brushfires/wildfires.

Environmental-Related Hazards

- Changes in Population Patterns: Douglas shouldn't be impacted by population changes.
- Changes in Land Use/Development: Douglas shouldn't be impacted by changes in land use/development.

Changes in Groundwater-Related Hazards

- Changes in Population Patterns: The population is expected to continue to grow and age steadily with the potential to expose a growing elderly population/population in general to additional groundwater extraction/water storage demands and potentially affecting water supply resources, as described in Section 2.4.9.

- Changes in Land Use/Development: Increases in development will create additional demands for groundwater extraction/storage.

2.5.1 Development Trends

Since the 2017 plan, Douglas's vulnerability to natural disasters has not significantly changed. However, it is important to note that the frequency and severity of natural hazard events continue to increase as a result of impacts from climate change. New developments are in compliance with the updated State building codes and stormwater standards, and in turn, these more restrictive codes help facilitate decreases in a structure's overall vulnerability.

Residential/Commercial Development Trends

Development interest and activity, although limited, continues in Douglas. Below is a list of major development projects (approved, under construction, or completed since the 2017 plan), all outside the Special Flood Hazard Area (SFHA).

Residential:

- Sleepy Hollow Subdivision – Joseph Road (2016)
  - 18 single family homes
  - Constructed (road acceptance pending 2025)
- The Lane at Hunts Pond (2016)
  - 3 residential lots
  - Lots constructed, private way
- Assisted Living Facility - 124 Martin Road (2016)
  - Approved, never constructed
- Gilboa Court Extension – Gilboa Court (2017)
  - 5 residential lots
  - Road constructed, lots never built
- Southeast Main Residential Compound - Stonehill Drive (2017)
  - 4 residential lots
  - Constructed
- Maple Street Residential Compound (2018)
  - 2 residential lots
  - Unknown status
- JEH Real Estate Investment Company – 40 Depot Street (2020)
  - Multi-family, 6 units
  - Constructed
- Cooperstown Realty Trust – 768-772 NW Main Street (2022)
  - 5 residential lots
  - Under construction
- Sutton Douglas Development – 5 Forest Street (2022)

    - 5 residential lots
    - Under construction

Commercial:

- Puresky Energy (AMP solar) - 269 Wallum Lake Road (2019)
    - Constructed
- Douglas Renewables LLC – 170 Wes Street (2019)
    - Constructed
- Blue Wave Solar LLC – 45 Oak Street (2020)
    - Under construction
- Capital Cannabis – 93 Davis Street (2020)
    - 3,500 SF
    - Constructed
- Dauphinais Concrete – 1 Lackey Dam Road (2021)
    - Sand Pit
    - Under Construction
- Scannell Properties – Lackey Dam Road (2021)
    - Tri-Town Warehouse (607,486 SF)
    - Constructed
- Peter Michael Business Park – 100 Davis Street/Legacy Circle (2021)
    - Industrial Subdivision – 9 lots
    - Under construction
- CRG Management – 123 Gilboa Street (2022)
    - 1,102,500 SF
    - Constructed
- McIntyre Loam Inc. – 8 Legacy Circle (2022)
    - Manufacturing of earth materials
    - Under construction
- Second Generation Partners – 1/3 Legacy Circle (2023)
    - Outdoor storage of materials
    - Constructed
- Pyne Sand and Stone – 93 Cliff Street (2024)
    - Manufacturing of earth materials
    - Approved
- O'Leary Welding – 140 Davis Street (2024)
    - Metal building (7,823 SF)
    - Under construction
- Pyne Sand and Stone – 286 Webster Street)
    - Outdoor vehicle storage
    - Under construction

- Robert Speroni – 147 Davis Street (2024)
    - Outdoor processing of wood materials
    - Under construction
- McIntyre Loam – Legacy Circle (rear lot, 2024)
    - Outdoor processing of earth material
    - Under Appeal

2.5.2 Economic Vulnerability

NFIP-Insured Property Damage

As seen in Table 2-23 FEMA estimated that the value of property insured by the NFIP in Douglas is just over $2 million as of September 22, 2023 (according to FEMA records supplied by the MA State Floodplain Coordinator). There are no properties located in Douglas that have experienced repetitive loss damages (according to data provided by FEMA Region 1). According to FEMA records supplied by the State Floodplain Coordinator, as of May 3, 2023, there have been three loss claims paid in total with $4,886 in payments.

Table 2-23 Summary of National Flood Insurance Program Activity in Douglas, MA

Total Policies	Coverage Value	Policies in A-Zone	Losses Paid
6	$2,055,000	6	$4,886

Source: FEMA, NFIP through September 22, 2023.

The majority of the NFIP-insured properties are located where development occurs near flood plains or low-lying areas.

Impacts of FEMA Flood Zones

HW performed an analysis to estimate the total land and building values within FEMA A/AE/100 and X/500-year flood zones. The number and types of residential, commercial, industrial, and municipally-owned structures are described earlier in Section 2.4.1 and quantified in Table 2-24 Total Vulnerability FEMA A/AE/100-Year Flood Zone Summary and Table 2-25 Total Vulnerability FEMA X/500-Year Flood Zone and also shown on Figure A.1-1 Flood Risks (East) and Figure 1 Flood Risks located in Appendix A. All flood zone data presented is based on the FEMA FIRMs, effective July 4, 2011 for the majority of the Town, with the exception of the southwestern corner of the Town (Community Panel #25027C0995F) which is effective as of June 21, 2023.

Table 2-24 Total Vulnerability FEMA A/AE/100-Year Flood Zone Summary

Land Use (by Land Use Code)	No. of Parcels Impacted	Total Value
Chapter 61, 61A, or 61B Property	18	$864,462
Commercial - Office Building	2	$1,828,300
Commercial - Outdoor Recreational Properties	1	$506,100
Commercial - Retail Trade	1	$317,500

Commercial - Retail Trade (Automotive, Marine Craft and Other Engine Propelled Vehicles, Sales and Service)	1	$1,408,200
Commercial - Storage Warehouses and Distribution Facilities	4	$3,065,200
Exempt Property - Charitable	3	$315,600
Exempt Property - Lands held by other Towns, Cities, or Districts (Vacant)	3	$766,600
Exempt Property - Municipal/County (Improved)	8	$26,319,800
Exempt Property - Municipal/County (Vacant)	11	$1,682,400
Exempt Property - Other	1	$4,186,400
Exempt Property - Religious Groups	2	$176,500
Exempt Property - State	39	$6,812,100
Industrial - Electric Generation Plants	2	$266,100
Industrial - Manufacturing and Processing	2	$166,630,600
Multiple-Use Property	2	$1,132,900
Residential - Apartments	5	$15,103,400
Residential - Residences	534	$229,928,200
Unknown	12	$8,653,677
Vacant - Developable Land	33	$5,751,000
Vacant - Potentially Developable Land	2	$353,400
Vacant - Undevelopable Land	45	$1,142,300
Total	**731**	**$477,210,739**

Source: Douglas Tax Assessor CAMA data, Massachusetts Property Tax Use Code.

Table 2-25 Total Vulnerability FEMA X/500-Year Flood Zone Summary

Land Use (by Land Use Code)	No. of Parcels Impacted	Total Value
Chapter 61, 61A, or 61B Property	20	$206,610
Commercial - Retail Trade (Automotive, Marine Craft and Other Engine Propelled Vehicles, Sales and Service)	1	$716,700
Exempt Property - Charitable	1	$867,200
Exempt Property - Lands held by other Towns, Cities, or Districts (Vacant)	1	$25,900
Exempt Property - Municipal/County (Improved)	1	$245,000
Exempt Property - Municipal/County (Vacant)	6	$1,457,100
Exempt Property - Religious Groups	2	$2,393,000
Exempt Property - State	22	$5,307,600
Industrial - Manufacturing and Processing	3	$1,818,100
Industrial - Mining and Quarrying	1	$2,143,200
Residential - Residences	156	$76,932,100
Unknown	10	$2,276,295

Vacant - Developable Land	16	$3,120,300
Vacant - Potentially Developable Land	1	$169,400
Vacant - Undevelopable Land	17	$581,000
Grand Total	**258**	**$98,259,505**

Source: Douglas Tax Assessor CAMA data, Massachusetts Property Tax Use Code.

Impacts of Business Interruption

Notwithstanding the obvious costs of commercial property damage, the impacts of potential business interruption from a natural disaster in Douglas cannot be underestimated. Business closure result in a reduction of revenues to proprietors and a loss of wages to employees. State and local tax revenues can be significantly reduced. In addition to the costs of commercial property damage, the impacts from potential business interruption following a disaster in Douglas could have long-lasting effects on the local economy, quality of life, and sense of place that has been maintained and preserved for generations.

2.5.3 Social Vulnerability

A critical step in assessing risk and vulnerability of Douglas to natural hazards is to identify the links between the potential destructive impacts to the built and natural environments and that relationship to the social structure. The social assets/potential losses continue to be key components of the community and include the closure of institutions, loss of vital services (communication and transportation systems), and disruption in the movement of goods and services, and emotional strain from financial and physical losses.

The vulnerability of a community obviously includes the potential for direct damage to residential, commercial and industrial property, schools, government, and critical facilities. However, it also includes the potential for disruption of communication and transportation following disasters. Any disruption to the infrastructure, such as a loss of electric power or break in gas lines, can interrupt businesses and cause stress to affected families. This is especially the case where residents are forced to evacuate their homes and become subject to shortages of basic supplies.

Public Infrastructure and Emergency Life Lines

There are several public buildings/structures/infrastructure located in flood plains. In addition to potential physical damage to structures and infrastructure, various access roads for these buildings/structures are vulnerable from time to time with limited access due to flooding, as described previously in Section 2.4.1.

Drinking Water Supply Systems

The Town of Douglas's public water system provides an average of 200,000 gallons per day (GPD), serving approximately 3,900 residents through 1,162 service connections. The system operates well below its maximum capacity. When all four municipal wells are run simultaneously, they provide a combined capacity of 966,000 GPD, offering ample room to accommodate future

growth in demand.

Although the system is not currently nearing its capacity limits, the Town is proactively evaluating future water supply needs to ensure long-term sustainability. In May 2025, sonar testing was conducted in the Davis Street area to locate potential underground water sources for a new municipal well. Additional supply sources may need to be developed over the next decade to support expanding residential, commercial, and industrial areas. However, such development comes with challenges, including permitting, siting, funding, and environmental impacts.
There is a Town bylaw regarding seasonal water use restrictions; these restrictions are in place annually from May 1st through September 30th. The Town also conducts regular public outreach and provides consumer education and water system updates through printed materials and its website.

There is no mutual aid agreement in place with surrounding communities for emergency water supply. However, the Town has implemented an Emergency Response Plan (ERP) to prepare for incidents involving system disruption. The current infrastructure can meet minimum daily demand and treatment (MDDT) requirements for 49 to 72 hours in the event of a treatment or production facility outage. The system includes a robust alarm and monitoring network that alerts operations staff to potential problems in real time.

Water quality monitoring is conducted in accordance with Massachusetts Department of Environmental Protection (MassDEP) regulations to ensure public health and safety. The Town's water supply is sourced from four groundwater wells—two located off Main Street and two northeast of Glen Street. All four wells draw from an aquifer classified as highly vulnerable to contamination, due to the absence of hydrogeologic barriers that would otherwise prevent pollutant migration.

The distribution system includes a booster pump station on Main Street that helps maintain adequate water pressure in higher elevation service areas. The system features two water storage tanks: one on Church Street with a capacity of 750,000 gallons, and another on Franklin Street holding 250,000 gallons. The Town maintains roughly 21.5 miles of water mains, although many of the existing pipes are older cast iron lines, which are undersized and prone to breaks and service interruptions.

Geographic coverage of municipal water service remains limited, with most service concentrated in East Douglas Village. This lack of coverage presents ongoing challenges for fire protection and potable water availability in unserved areas. Water mains extend:

- West along Main Street to Southwest Main Street, nearing Cedar Street, and serve adjacent roads including Riedell Road, Sunset Drive, Franklin Street to Eagle View, Depot Street to Railroad Avenue, Brookside Drive, part of Martin Road, and West Street.

- Eastward up Davis Street to the High School.
- North Street to Colonial Road and the Sutton town line at Compass Point Condominiums.
- South and southeast along the entire length of Gilboa Street, from just beyond 163 Manchaug Road into the Town of Uxbridge.

Landowners seeking new water service must complete an application through the Water Department. In most cases, the cost of extending infrastructure is the responsibility of the landowner or developer.

The Town has completed several major system upgrades in recent decades. In 2017, a new pump station was built on Main Street to convey water between the two storage tanks. Twelve-inch water mains were installed to extend service into Uxbridge via Gilboa Street and to the Douglas High School via Davis Street, supporting targeted areas for economic development. Central downtown mains were upgraded to 16-inch pipes. All wells were rehabbed or replaced in the last three years.

In 2022, the Town received a $3.3 million grant to upgrade water infrastructure on Northeast Main Street. This project included the installation of 3,600 feet of water main to loop Northeast Main Street to Gilboa Street, improving pressure balance and service reliability. The project was completed in 2023.

The most recent improvement occurred in June and July 2025, when the Town upgraded water mains on Depot Street, replacing an 8-inch pipe with a 12-inch main between Main Street and Railroad Avenue. The project was funded through a combination of ARPA funding, local tax and state aid, and enterprise funds from the water and sewer department. This upgrade was specifically designed to ensure adequate fire suppression capacity—including sprinklers and standpipes—for the planned retrofit of the second floor of the Douglas Municipal Center.

The last comprehensive water system study was completed in 2009 and was designed as a 20-year plan. The Town is currently in the process of developing a *Water Asset Management Plan* to guide future improvements and investments. Additionally, a *Lead Service Line Inventory* was completed in 2024.

Sewer/Wastewater Service

The Town operates a municipally managed sewer system and treatment facility that supports over 1,200 customers. The system is governed by both state and federal environmental regulations to ensure reliable service and regulatory compliance. The Douglas Wastewater Treatment Facility (WWTF) is located at 29 Charles Street, adjacent to the Mumford River. The Town's sewer system was originally constructed in the 1970s. The current WWTF was built in 2005 and was designed to handle an average daily flow of 0.6 million gallons per day (MGD), with a peak hourly flow of 1.5 MGD. At present, the facility sees an average daily flow of

approximately 0.2 MGD.

The WWTF operates under the National Pollutant Discharge Elimination System (NPDES) Small Wastewater Treatment Facility General Permit. The most recent permit became effective on September 1, 2023, and included no major changes to discharge limits from the previous permit issued in 2007. The facility currently provides wastewater services to roughly 1,224 customers across the Town of Douglas.

Douglas's sewer system includes both horizontal and vertical assets. The horizontal assets consist of approximately 64,100 linear feet of gravity sewer pipe, 8,500 linear feet of sewer force mains, and 336 sewer manholes. Vertical assets include three wastewater pump stations, as well as one additional privately-owned pump station. The Gilboa Street Pump Station was upgraded in 2024. The Davis Street Pump Station, constructed in 2001, houses a submersible pump capable of 650 gallons per minute (GPM). The Colonial Road Pump Station, built in the late 1980s, contains dual pumps with a combined capacity of 100 GPM at 23 total dynamic head (TDH).

In May 2022, the Massachusetts Clean Water Trust and MassDEP notified the Town of Douglas that it qualified for an Asset Management Planning (AMP) Grant under the 2022 Clean Water State Revolving Fund (CWSRF) Final Intended Use Plan. The Town initiated the AMP project in the fall of 2022 and engaged Tighe & Bond to evaluate the sewer system. Tighe & Bond compiled an inventory of the Town's wastewater assets using various data sources, including the Town's GIS system, record drawings, annual reports, and operations and maintenance plans. The AMP project was completed in January 2024 and sets forth a roadmap for maintaining system integrity and planning for future growth.

As part of the 2024 AMP, Tighe & Bond conducted a risk-based evaluation of system components, guided by two key questions: (1) How likely is the asset to fail? and (2) If the asset fails, what are the consequences? A total of 172 vertical assets were evaluated at the WWTF, and an additional 27 assets were reviewed at the Colonial Road and Davis Street pump stations. The majority of assets at the WWTF and Davis Street station were found to be low risk. However, 31% of the Colonial Road Pump Station's assets were identified as immediate or high risk. Of particular concern, 8% of all evaluated assets were critical to the WWTF's operations and regulatory compliance. These high-risk assets were prioritized in the AMP's capital planning recommendations. Horizontal assets were also assessed and most received low or not applicable risk scores. This indicates that the Town's sewer collection system is, overall, in good physical condition.

At the time the AMP was completed in early 2024, the Town was actively expanding its sewer infrastructure with support from an Economic Development Administration (EDA) infrastructure grant. This funding enabled the Town to extend sewer service from Gilboa Street to a large warehouse development located on Lackey Dam Road in Uxbridge. In addition, the Town

established a new sewer connection for a warehouse located between Gilboa Street and Northeast Main Street in Douglas. An existing pump station was also upgraded to accommodate the increased flow resulting from these extensions. These efforts highlight the Town's proactive approach to supporting economic development while ensuring adequate system capacity.
The 2024 AMP includes a Capital Improvement Plan (CIP) that outlines key investments needed between 2024 and 2028. The CIP prioritizes the replacement and rehabilitation of high-risk vertical assets, ensures the WWTF continues to meet regulatory standards, and addresses system needs associated with anticipated development and population growth.

Looking ahead, the Town should continue to evaluate the benefits and costs associated with extending the sewer system. Key benefits of system expansion include environmental protection through reduced reliance on septic systems, economic development through commercial and industrial growth, and residential expansion in areas that have historically been restricted by poor soil conditions that do not meet Title V standards. A formal cost-benefit analysis should be conducted to determine whether the long-term environmental and economic advantages of system expansion outweigh the capital and operational costs.

The Town of Douglas has taken significant steps toward ensuring the long-term reliability and sustainability of its wastewater infrastructure. The 2024 AMP provides a strategic framework for system evaluation, risk management, capital planning, and future development. Continued investment, regular updates to the AMP, and thoughtful system expansion will ensure that the Town remains compliant with environmental regulations and well-positioned for future growth.

Stormwater Systems
The Town of Douglas manages stormwater in coordination with its consultant, Comprehensive Environmental Incorporated (CEI), which oversees compliance with the Town's Stormwater Management Plan. CEI is responsible for compiling and organizing data related to street sweeping, catch basin cleaning, outfall inspections and testing, and the maintenance of Best Management Practices (BMPs).

The Town currently maintains 831 public catch basins, of which 499 are located within the Municipal Separate Storm Sewer System (MS4) district, and 332 are outside of it. Additionally, there are 182 private catch basins in Douglas. These are not maintained by the Town, as they fall under the responsibility of private property owners. To date, the Town has identified 15 stormwater BMPs within the MS4 district. The number of BMPs located outside the MS4 district remains unknown; however, efforts are underway to inventory and document these as part of a broader initiative to improve understanding of the Town's stormwater infrastructure.
All drainage pipes in Douglas operate as gravity-fed systems. At this time, the total length of drain pipes, open channels, and culverts has not been calculated. The Town plans to develop a GIS mapping system in the coming years to more accurately capture and manage this infrastructure data.

Stormwater infrastructure on private property is the responsibility of the property owners and is not regulated or maintained by the Town. Similarly, stormwater systems along state-owned roads are maintained by the Commonwealth of Massachusetts.

In May 2025, the Town adopted a new stormwater bylaw at the Annual Town Meeting. This updated bylaw brings the Town into compliance with the minimum requirements of the U.S. Environmental Protection Agency's (EPA's) MS4 permit regulations. As part of its MS4 permit obligations, the Town conducts public education and outreach to increase awareness of stormwater pollution prevention. Educational materials—including flyers on fertilizer use, pet waste disposal, and leaf litter management—are made available to residents via the Town's website.

In addition, the Town has developed an Illicit Discharge Detection and Elimination (IDDE) Plan to comply with the EPA's 2016 National Pollutant Discharge Elimination System (NPDES) General Permit for stormwater discharges from small MS4 systems in Massachusetts.
Lastly, the Town of Douglas actively participates in regional stormwater initiatives through its involvement with the Blackstone Watershed Collaborative.

Utility Systems
The Consultant for the 2025 Update coordinated with Community Engagement representatives from National Grid, primarily due to the concern raised by the LHMT that Douglas is considered the 'end of the line' and thus, losing power/services first and for extended periods of time. National Grid representatives mentioned two ongoing projects:

- AMI/Smart Meters Project: an automated metering infrastructure project that will collect customer usage data and alarm information and transmit to National Grid via AMI Field Area Network. These new meters will speak to the bounds where outages currently exist in order to more effectively anticipate service improvements.
- S19 ACR Project: a transmission line improvement project to upgrade electric transmission lines. The project is primarily focused on the Towns of Webster, Oxford, Sutton, and Millbury, although limited portions of Douglas are included where lines run through Douglas.

National Grid representatives indicated that solar and battery power development continues to increase and also emphasized utility power is necessary to run solar during outages (frequent misconception). Thus, emergency power generation (permanent/mobile generators) support is critical for the Town's continuity of services.

Transportation Systems[50]

Road conditions throughout Douglas are generally good. New developments, however, are impacting existing roadways and maintenance needs are increasing with drainage impacts. Million-dollar utility and roadway infrastructure improvements were completed in 2010. Pedestrian and biking infrastructure within the Town of Douglas exists along sidewalks and trails in town. Biking opportunities are accessible along the Southern New England Trunkline Trail, the Midstate Trail, and in the Douglas State Forest. There are no protected bike lanes in Town.

Roadways and Bridges

Transportation infrastructure would likely experience an acceleration in deterioration of its components, like asphalt, from the combination of extreme temperatures, increased precipitation, and flooding. Extreme temperatures for long periods would cause thermal expansion of metal structures and stress bridge infrastructure. This would also affect roadway materials through softening and expanding, which can lead to rutting and potholes. While a warmer climate may lead to a decreased need to provide snow and ice removal, more rapid freezing and thawing cycles could cause more acute damage sustained during the warmer months.

Several Massachusetts' Department of Transportation projects have been initiated (with some completed) regarding bridge repair/replacement and resurfacing projects through the Transportation Improvement Program (TIP) in Table 2-26.

Table 2-26 Douglas TIP Projects

Location	Project #	Status	Bridge #	Description of Work
Resurfacing				
Douglas/Northbridge/Sutton/Uxbridge – Resurfacing/Related Work Route 146 (Providence Pike)	604474	Completed		Resurfacing
Douglas/Northbridge/Sutton/Uxbridge – Resurfacing/Related Work Route 146 NB	606035	Completed		Resurfacing
Resurfacing/Related Work Webster Street (Route 116) from T.L. (MM 2.8) to Main Street (MM 6.9)	608168	Completed		Resurfacing
Douglas/Northbridge/Sutton/Uxbridge Pavement Preservation Route 146	609106	Completed		Resurfacing
Miscellaneous				
Uxbridge to Worcester – Guide/Traffic Sign Replacement Section Route 146	610717	Design (2025)		Structural Signing

[50] *Town of Douglas Open Space and Recreation Plan*, Douglas Open Space Committee/Central Massachusetts Regional Planning Commission, 2023.

Reclamation/Box Widening/Turning Lanes Davis Street/Main Street/Northeast Street Intersection	601377	Completed		Reclamation
Douglas/Millbury/Northbridge/Sutton/Uxbridge – Traffic Signs Improvement on Route 146	603434	Completed		Sign Installation/Upgrading

Source:
https://hwy.massdot.state.ma.us/ProjectInfo/Main.asp?ACTION=GISReportByCity&SELECTED_CITY_ID=77&FILTER_STATUS=&PHASE_STATUS_CODE=0&TIP_STATUS_CODE=All&PROJECT_SEARCH_ORDER_FIELD=&PROJECT_SEARCH_ORDER_DIRECTION=.

Evacuation/Population at Risk

The use of mass care facilities during an emergency is dependent on a variety of circumstances which include warning time, public awareness of the hazard, the level of encouragement from public officials and the availability of shelters. Shelter facilities are managed by the Town Administrator and Emergency Management Director and provide mass care services to evacuees and displaced persons. Shelter facilities will be activated at the direction of the Town Administrator or Emergency Management Director; shelter facilities are not automatically activated during times of emergency; therefore, residents should obtain guidance and information from local officials on which shelters may be open.

The following facilities are designated as emergency shelters and may be activated during times of emergency:

Primary Shelter: Douglas High School
33 Davis Street
Douglas, MA 01516
(508) 476-7310

Alternate Shelter: Adult Social Center
331 Main Street
Douglas, MA 01516
(508) 476-2283

Shelter use is not easily predicted because each emergency situation has different variables such as the length of the warning period, official encouragement of the evacuation, public awareness of the location and availability of shelter, and the severity of the approaching hazard. Shelter use may be higher in the winter, such as an ice or snowstorm, since homes would be without heat should there be power outages.

2.5.4 Environmental Vulnerability

Hurricanes, earthquakes, nor'easters, floods or any weather-related hazard event, in addition to invasive species, will have particular impacts on the natural and built environment. Differences in storm size, speed of movement, wind speeds, and landfall location relative to vulnerable

resources makes for high variability in impacts and related costs associated with weather-related events. For invasive species, the location and breadth of the growth/stands will cause the same variability in impacts, however, mostly indirect in nature. Extreme heat can impact utilities with increased demands on electricity/energy, transportation systems by softening asphalt pavement, water supply by increased demands, and can also exacerbate drought conditions and in turn, creating wildfire conditions.

When the natural environment is impacted there are both direct and indirect costs. Impacts of severe weather events to the natural environment include both direct (loss of habitat and salinization of land/ groundwater) and indirect costs (widespread inland damage to the built environment, threats to ecosystems/ species, and contamination of potable water supply).

2.6 Federal Funding Assistance

Since 2020, The Town of Douglas has received federal grant assistance through FEMA, CARES Act, and ARPA grants for the following events:

<u>FY 2020 Federal Grants</u>

- CARES Act Funding
    - $30,548.00
        - Main items for funding provided for:
            - Personnel at Fire Dept. to mobilize two ambulances due to lengthy contamination times transporting COVID positive/suspected cases

<u>FY 2021 Federal Grants</u>

- CARES Act Funding
    - $108,671.00
        - Main items for funding provided for:
            - Personnel at Fire Dept. to mobilize two ambulances due to lengthy contamination times transporting COVID positive/suspected cases
- ARPA Funding
    - $472,997.20
        - Main items for funding provided for:
            - Municipal infrastructure
            - Consulting services
- CARES Act (Council on Aging) Funding
    - $1,000.00
        - Main items for funding provided for:
            - Food/Meal packaging supplies to assist vulnerable/elderly population

- PPE (masks/face shields/gloves/hand sanitizer/wipes/HEPA filtration units)
- Personnel (cafeteria staff meal prep/bus driver's deliveries)

FY 2022 Federal Grants

- CARES Act Funding
  - $439,502.08
    - Main items for funding provided for:
      - Personnel at Fire Dept. to mobilize two ambulances due to lengthy contamination times transporting COVID positive/suspected cases.
- FEMA COVID Funding
  - $89,704.31
    - Main items for funding provided for:
      - Purchase of PPE
- FEMA HMGP Funding
  - $27,000
    - Main items for funding provided for:
      - Hazard Mitigation Plan Update
- ARPA Funding
  - $851,409.33
    - Main items for funding provided for:
      - COVID tests
      - Phone Project
      - Exhaust System Retro/HVAC – Fire Department
      - Personnel
      - Design/Consulting Services

FY 2023 Federal Grants

- ARPA Funding
  - $1,350,759.98
    - Main items for funding provided for:
      - HVAC System – Fire Department
      - Consulting Services
      - North Street Project
      - School Security
      - Security Doors – Fire Department
      - Depot Street W/S Project
      - Temporary Trailers – Fire Department

- FEMA Funding
    - $6,449.32
        - Main items for funding provided for:
            - Vaccine supplies

FY 2024 Federal Grants

- FEMA COVID Funding
    - $64,206.16
        - Purchase of PPE

3.0 CAPABILITY ASSESSMENT

3.1 Introduction

The Capabilities Assessment section documents local, state, and federal department, agency, and program capabilities in terms of pre- and post-disaster activities. It has been organized into three (3) main sections: Planning and Regulatory capabilities, Administrative and Technical capabilities, and Financial capabilities to better define the programs, policies, and funding opportunities each department or agency is implementing to reduce risk and work towards implementing hazard mitigation programs targeted at increased resiliency.

The Town of Douglas implements several hazard mitigation policies and procedures, current state laws, executive orders, and regulations to promote the safety of its residents and minimize risk to community assets. This section presents a brief description of each of the primary mitigation programs currently in place.

3.2 Planning and Regulatory Capabilities

Town of Douglas Open Space and Recreation Plan, 2023[51]

The Open Space and Recreation Plan is a planning document intended to guide the long-term protection and enhancement of Douglas's open space and recreation resources. The Town already has many protected resources, including natural areas intended for water supply protection and flood control. Relevant actions from the Open Space and Recreation Plan are referenced below:

Goal 1. Preserve the Rural Character of the Town.

Objective: Retain Private Forests and Trees

Actions:

- Develop forest management best practices on Town lands and promote with private landowners.
- Develop and implement a Tree Protection Bylaw, or something similar, to prevent clear-cutting of residential, commercial, and industrial parcels.
- Develop an outreach program to educate the public on the benefits of the Community Preservation Act.

Objective: Maintain Historic Character and Scenic Resources

Actions:

- Adopt the Community Preservation Act.

[51] *Town of Douglas Open Space and Recreation Plan*, Douglas Open Space Committee, Central Massachusetts Regional Planning Commission, 2023.

Objective: Prioritize Open Space Preservation

Actions:

- Strengthen open space preservation and tree protection in Zoning Bylaw and Regulations.
- Establish a land bank for future acquisitions.
- Work with the Town Planner and Assessor to identify parcels that may provide access to recreational resources and/or that are contiguous with other open space parcels through the disposition of tax title properties meeting localized recreational needs.
- Prioritize parcels under Chapter 61 for future acquisition.

Goal 2. Protect the Town's Natural Resources.

Objective: Fortify Surface and Groundwater Resources from Adverse Impacts

Actions:

- Identify priority preservation areas around the Town's water supply wells and within groundwater protection districts.
- Identify priority protection areas critical to preserving private water supply wells in areas of high risk due to land use or development threats.

Objective: Retain the Native Ecosystem and Reduce Urban Pollution.

Actions:

- Identify and keep track of changes in insect deer and plant/tree populations.

Goal 3. Build the Climate Resiliency of the Town.

Objective: Reduce Flooding and Stormwater Concerns

Actions:

- Install bioswales at sidewalks in new construction/developments.
- Assess the culverts near the Town's open space and recreation facilities and upgrade as necessary using stormwater best management practices.
- Educate the public on building within flood hazard areas.
- Educate the public on impacts of fertilizer runoff from properties within a certain distance of water resources.

Objective: Strengthen the Awareness of Extreme Temperatures and Drought Impacts

- Develop a public education campaign about insect-borne diseases and prevention.
- Develop a public education campaign about drought and wildfire awareness.
- Install a local weather station to monitor temperature and precipitation changes.

Objective: Reduce Impacts Caused by Winter Storms and Severe Storms

Actions:

- Develop best management practices for treating roads during ice and snowstorms with organic matter.

Town of Douglas Municipal Vulnerability Preparedness Summary of Findings, May 2020[52]

As the Commonwealth advances an integrated climate change strategy per Executive Order 569, Douglas (and many other Massachusetts cities and towns) is working to advance local and regional resiliency planning and climate preparedness efforts. After securing Municipal Vulnerability Preparedness (MVP) Planning Grant funding from the Massachusetts Executive Office of Energy and Environmental Affairs, Douglas engaged in a Community Resilience Building Workshop and developed a town-wide vulnerability Assessment and action-oriented resiliency plan in 2020. The Town became an MVP-designated community, making it eligible for MVP Action Grant funding to implement identified climate adaptation actions.

As identified in its Summary of Findings report, Douglas's top hazards include flood, drought, winter storms, and wind events. Related to these top hazards, areas of concern include forested areas throughout the Town, localized flooding, dams, and public safety education.

Douglas's Top Priority Actions

The workshop ended with consensus on five top priority recommendations to improve the Town's long-term hazard and climate resilience. These priority recommendations and implementation actions are as follows:

Infrastructure Actions

- Replace/Upgrade the North Street Bridge. A study on upgrading or replacing the North Street Bridge to be completed in order to improve flooding and evacuation issues.
- Evaluate culverts for potential updates will improve current infrastructure and help Douglas prepare for expected increases in flood events.
    - Townwide: Study capacity of culverts throughout the town, create a priority list of those that need 'rightsizing' or switching to box culverts.
    - Causeway Street: Upgrade capacity.
    - Wallace Street: Replace with box culvert, increase capacity.
    - North Street: Replace culvert that was removed as part of spillway removal.
- Evaluating dams. Evaluating dams for potential updates will improve current infrastructure and help Douglas prepare for expected increases in flood events.
    - Whitin Reservoir Dam. Upgrade/replace emergency spillway. Improve relationship with water district re: water level management.
    - Wallis Pond Dam. Upgrade/Replace dam.

[52] *Town of Douglas Municipal Vulnerability Preparedness Summary of Findings,* Douglas Open Space Committee, Central Massachusetts Regional Planning Commission, May 2020.

Environmental Actions

- Managing brush for forest fire safety. Improve management of forested lands throughout the Town, whether DCR, Town, or privately-owned.
    - Develop and enact forest management plans including brush and dead-wood clearing programs, including public outreach to encourage action on private lands, to reduce fuel load in forest areas. Study potential for controlled burns.
    - Increase Town tree trimming budget. Document street tree conditions throughout Town and create a prioritized list for removal or pruning based on hazard level. Develop plan for storage and use of removed trees.

Societal Actions

- Addressing EEE risk. Develop public education campaign about the risks of insect-borne diseases, especially EEE and Lyme.

Subdivision Rules and Regulations[53]

Section 1.0 Purpose (MGL Ch. 41, Section 81M

The subdivision control law has been enacted for the purpose of protecting the safety, convenience and welfare of the inhabitants of Douglas by regulating the laying out and construction of ways in subdivisions providing access to the several lots therein, but which have not become public ways, and ensuring sanitary conditions in subdivisions and in proper cases parks and open areas. The powers of a Planning Board and a Board of Appeals under the subdivision control law shall be exercised with due regard for the provision of adequate access to all of the lots in a subdivision by ways that will be safe and convenient for travel; for lessening congestion in such ways and in the adjacent public ways; for reducing danger to life and limb in the operation of motor vehicles; for securing safety in the case of fire, flood, panic and other emergencies; for insuring compliance with the applicable zoning or bylaws; for securing adequate provision for water distribution, sewerage, drainage and other municipal services, protection of natural water sources, flood control wetland areas, and other requirements; and for coordinating the ways in a subdivision with each other and with the public ways in the Town and with the ways in neighboring subdivisions. Such powers may also be exercised with due regard for the policy of the commonwealth to encourage the use of solar energy and protect the access to direct sunlight of solar energy systems. It is the intent of the subdivision control law that any subdivision plan filed with the planning board shall receive the approval of such board if said plan conforms to the recommendation of the board of health and to the reasonable rules and regulations of the planning board pertaining to subdivisions of land; provided, however, that such board may, when appropriate, waive, as provided for in section eighty-one R, such portions of the rules and regulations as is deemed advisable.

[53] *Rules and Regulations Governing the Subdivision of Land*, revised May 26, 2009.

Section 5.0 Design Standards/5.4 Protection of Natural Resources
Due regard shall be shown for all natural features, such as topography, large trees, water courses, scenic points, historic spots, and similar community assets, which, if preserved, will add attractiveness and value to the subdivision.

Section 6.0 Required Improvements for an Approved Subdivision/6.6 Trees
In accordance with Planning Board policy, trees shall be installed at an average spacing of one hundred feet on both sides of proposed roadways. All trees must be hardwoods, one and one-half (1-1/2) to two (2) inches in diameter, ten (10) to twelve (12) feet tall with good straight stems. These trees shall be planted in the five-foot grass strips.

All trees that do not survive shall be replaced prior to final road acceptance.

Zoning Bylaw, October 5, 2004[54]

Section 1.0 Purpose and Authority
1.1 Purpose
These regulations are enacted to promote the general welfare of the Town of Douglas, to protect the health and safety of its inhabitants, to encourage the most appropriate use of land throughout the town, and to increase the amenities of the town, all as authorized by, but not limited by, the provisions of the Zoning Act, G.L. c. 40A, as amended, and Section 2A of 1975 Mass. Acts 808. Additional requirements are included:

- Section 3.0 Use Regulations
  - 3.4 Nonconforming Uses and Structures
    - 3.4.7 Reconstruction after Catastrophe or Demolition
      A nonconforming structure may be reconstructed after a catastrophe or after demolition in accordance with the following provisions:
      1. Reconstruction of said premises shall commence within three years after such catastrophe or demolition.
      2. Building(s) as reconstructed shall be located on the same footprint as the original nonconforming structure, shall be only as great in volume or area as the original nonconforming structure, and shall meet all applicable requirements for yards, setback, and height.
      3. In the event that the proposed reconstruction would (a) cause the structure to exceed the volume or area of the original nonconforming structure or (b) exceed applicable requirements for yards, setback, and/or height or (c) cause the structure to be

[54] *Zoning Bylaw,* Master Plan Implementation Committee/Douglas Planning Board/Attorney Mark Bobrowski, October 25, 2004.

located other than on the original footprint, a special permit shall be required from the Board of Appeals prior to such reconstruction.

- Section 5.0 General Regulations
  - General Landscaping Requirements
- Section 8.0 Overlay Districts
  - 8.1 Water Resource Protection Overlay District
    - 8.1.1 Purpose

      To promote and protect the health, safety and general welfare of the Community by preserving and protecting surface and groundwater resources of the Town. It is necessary to prevent contamination of these water supplies from any use of land or building which may reduce the quality and/or quantity of the water resources.
    - 8.1.7 Drainage

      All runoff from impervious surfaces shall be recharged on the site by being diverted toward areas covered with vegetation for surface infiltration to the maximum extent possible and practicable. Stormwater infiltration basins must be designed to handle a twenty-five (25) year storm. Dry wells shall be used only where other methods are infeasible, and shall be preceded by oil, grease and sediment traps to facilitate removal of contamination. Any and all retention areas and structures shall be permanently maintained in full working order by the owner.
  - 8.3 Floodplain District
    - 8.3.1 Statement of Purpose

      The purposes of the Floodplain District are to:

      1) Ensure public safety by reducing the threats to life and personal injury.
      2) Eliminate new hazards to emergency response officials.
      3) Prevent the occurrence of public emergencies resulting from water quality, contamination, and pollution due to flooding.
      4) Avoid the loss of utility services which if damaged by flooding would disrupt or shut down the utility network and impact regions of the community beyond the site of flooding.
      5) Eliminate costs associated with the response and cleanup of flooding conditions.
      6) Reduce damage to public and private property resulting from flooding waters.

- 8.3.2 Floodplain District Boundaries and Base Flood Elevation and Floodway Data
    - 8.3.2.1 Floodplain District Boundaries

      The Floodplain District is herein established as an overlay district. The District includes all special flood hazard areas within the Town of Douglas designated as Zones A and AE, on the Worcester County Flood Insurance Rate Map (FIRM) issued by the Federal Emergency Management Agency (FEMA) for the administration of the National Flood Insurance Program. The map panels of the Worcester County FIRM that are wholly or partially within the Town of Douglas are dated June 21, 2023. The exact boundaries of the FPPOD are defined by the 100-year base flood elevations shown on the FIRM and further defined by the Worcester County Flood Insurance Study (FIS) report dated July 4, 2011. The FIRM and FIS report are incorporated herein by reference and are on file with the Town Clerk, Planning Board, Building Official, Conservation Commission and Community Development Department.

    - 8.3.2.2 Base Flood Elevation and Floodway Data

      1. Floodway Data. In Zone A, AE, along watercourses that have not had a regulatory floodway designated, the best available Federal, State, local, or other floodway data shall be used to prohibit encroachments in floodways which would result in any increase in flood levels within the community during the occurrence of the base flood discharge.
      2. Base Flood Elevation Data. When proposing subdivisions or other developments greater than 50 lots or 5 acres (whichever is less), the proponent must provide technical data to determine base flood elevations for each developable parcel shown on the design plans.

Douglas Master Plan, April 1998/Douglas Master Plan Implementation Committee Final Report, April 2007

The Douglas Master Plan identifies a long-term vision for the Town of Douglas' future development and community improvements and establishes a set of goals and strategies to guide implementation of the Town's vision. The Master Plan is comprehensive, with chapters including land use; open space and recreation; and natural, cultural, and historic resources

among others.

The Douglas Master Plan Implementation Committee Final Report includes a status update of the 87 recommendations included in the 1998 Master Plan. Since the Fall of 1998, the Committee has worked to address each of the 87 recommendations with each identified as:

- Approved at Douglas Town Meeting
- Disapproved by voters
- Committee voted to close the recommendation

The Town is currently updating the Douglas Master Plan from 1998.

Drinking Water System Risk & Resilience Assessment[55]

This report provides documentation of the Douglas Water Department's risk and resilience assessment, as required by the America's Water Infrastructure Act (AWIA) of 2018.The assessment was performed by conducting workshops with key staff to facilitate a series of discussions about risk to the utility due to malevolent acts and natural hazards, resilience of the system to those threats, and potential capital and operational risk reduction countermeasures.

The Water Department's Utility Resilience Index (URI) was determined to help assess the utility's capacity to respond and recover from an incident that impacts critical operations. The URI used together with the risk assessment results, aids in the development of an overall risk management plan. The following recommendations were identified in Section 3.2.1 as options to help the Water Department increase their URI score:

- Update the Emergency Response Plan and conduct annual trainings and functional exercises. The ERP should be updated according to the MassDEP Bureau of Resource Protection – Drinking Water Program "Emergency Response Plan 9ERP) Compliance Checklist", last updated November 14, 2013. In addition, the Water Department's plan must "comply with 310 CMR 22.04 (13) and the Massachusetts Guidelines and Policies for Public Water Systems, Chapter 12 – Emergency Response Planning Requirements including Appendix O – Handbook for Water Supply Emergencies." The Water Department should ensure the ERP addresses all the hazards discussed in this report including emergency response and preparedness procedures in the event of a cyber-attack.
- Join the Massachusetts Water/Wastewater Agency Response Network (MAWARN).
- Determine methods to receive critical parts and equipment in the event of a failure within 24 hours; joining MAWARN or developing relationships with additional vendors may help to reduce equipment procurement lead times.
- Conduct cross-training of employees to have at least 75% of staff response-capable in critical operations and maintenance positions and available as backup in the event of a

[55] *Drinking Water System Risk & Resilience Assessment*, Tighe & Bond, June 2021.

pandemic illness.

- Consider the development of a Business Continuity Plan (BCP); the AWWA has developed a guidance document to assist water utilities with preparation of a BCP. The end goal of a BCP is to maintain operations – financially, managerially, and functionally, after any incident.
- Conduct a formal asset management program assessment of the drinking water system infrastructure according to the Government Accounting Standards Board (GASB) asset management standards.

The Water Department is required to review, update, and submit a re-certification of the RRA and ERP at least every 5 years (2026) and reflect new EPA guidance if any.

Lead Observers in the Non-Tidal Aquatic Connectivity Protocol Training

Utilizing the standardized Non-Tidal Aquatic Connectivity protocol from the North Atlantic Connectivity Collaborative (NAACC) to improve aquatic connectivity and standardize road-stream-crossing data collection, the Blackstone Watershed Collaborative has been assessing culverts, and training others to do so, while also increasing resilience. In 2024, the Blackstone Watershed Collaborative conducted a training in Douglas to certify municipal staff, consultants, environmental non-profit staff, and volunteers as Lead Observers in the NAACC Protocol. Three members of the Douglas DP were certified, including the DPW Director/Highway Superintendent.

Hayward Landing Retaining Walls Repair

The Town is working with Aries Engineering, LLC to prepare design plans and specifications to repair two failing retaining walls at the 26 North Street property in Douglas, MA. The two walls are approximately 100-feet long on the north side of the Hayward Landing site adjacent to the Mumford River. The retaining walls support a parking lot for residents' parking. Stormwater improvements are planned to be incorporated with the retaining wall repair work. Hayward Landing put the project out to bid on May 15, 2025.

Blackstone River Watershed Needs Assessment Report (September 2021)[56]

The project reflects the outcome of the Narragansett Bay Estuary Program (NBEP) hosted *State of the Blackstone River Watershed Workshop* and the perspectives of those who have worked tirelessly to improve the health of the Blackstone River Watershed. In September 2019, EPA's Southeast New England Program (SNEP) awarded funding to NBEP to pursue the Project through September 2021. The Project brought together diverse regional interests over a series of eight meetings to identify and prioritize needs and then develop specific actions that are responsive to these needs that can help improve water quality, habitat, and resilience of the Blackstone.

[56] *Blackstone River Watershed Needs Assessment Report*, Narragansett Bay Estuary Program, September 2021.

Town of Douglas Sewer Asset Management Plan CWSRF No. 7070 Draft[57]

In the Fall of 2022, Tighe & Bond evaluated the Town's sewer system to compile an asset inventory from a variety of existing data sources such as the Town's current GIS, record plans, annual reports, and operations and maintenance plans. Interviews with system operations and maintenance staff, as well as facility site visits, were conducted to develop a thorough understanding and inventory of the sewer system.

The plan includes recommended upgrades and replacements to the Town's vertical and horizontal assets within the wastewater system (WWTF and pump stations) over the next 5-year planning period, including:

Vertical Assets

- Code Violations. Multiple code violations were observed during the site visits:
  - Process Building Electrical Room
  - MCC 4
  - MCC 3
  - Utility Building
  - Garage and Office Building
  - Colonial Street Pump Station
  - Headworks Room
  - SBRs
  - Utility Building
- 2024 Project Recommendations
  - Improvements to Mechanical Disc Filter
  - Improvements to Sludge Pump Station
  - Improvements to the SBR Basins
  - SBR Blower Replacement
- 2025 Project Recommendations
  - Plant Water System Replacement
  - Chemical Feed System Improvements
  - SBR Improvements
  - Blower Replacements
- 2026 Project Recommendations
  - Replace the Colonial Street Pump Station
- 2027 Project Recommendations
  - UV System Upgrade
- 2028 Project Recommendations
  - Microstrainer and Grit Removal System Upgrade

[57] *Town of Douglas Sewer Asset Management Plan CWSRF No. 7070 Draft*, Tighe & Bond, January 2024.

Horizontal Assets

- Sanitary Sewer Evaluation Survey (SSES) Follow-up Recommendations
  - Heavy Cleaning
  - Additional CCTV Inspection
  - Chemical Root Treatment
  - CIPP Liner Repairs
  - CIPP lining
  - Seal MH Connections/Wet Well
  - Chemical Sealing of Manholes
  - MH Benchwall/Pipe Seal Repairs
  - MH Frame and Cover Replacements
  - MH Chimney Repairs
  - Manhole Cover Insert
  - Sewer Replacement
  - Excavation Point Repairs

Overall Recommendations

- GIS Expansion. Transition to digital workorders, performing annual GIS updates as work is performed to keep it current and improve overall record keeping and work efficiency.
- Annual Collection System Maintenance. CCTV inspect 10% of the collection system (approx.. 6,500 lf) each year.
- Updates to the Asset Management Plan. Routinely review and update the Asset Management Plan.

Wetland Bylaw[58]

SECTION 1: PURPOSE

The purpose of this Bylaw is to protect the floodplains and wetlands of the Town of Douglas by controlling activities deemed to have a significant effect upon wetland values, including but not limited to the following: Public or Private water supply, groundwater, flood control, erosion control, storm damage prevention, water pollution control, wildlife, recreation, aesthetics and fisheries (collectively, the "interests protected by this Bylaw").

Massachusetts State Building Code

The Town of Douglas enforces the Massachusetts State Building Code which includes many detailed regulations regarding wind loads, earthquake resistant design, flood-proofing, and snow loads.

[58] *Douglas Wetland Bylaw,* Article 8 of the Town of Douglas General Bylaws, August 19, 2003.

Wind-Related Hazards

The Town enforces the Massachusetts State Building Code where provisions are adequate to mitigate against most wind damage. The code's provisions are the most cost-effective mitigation measure against tornadoes given the extremely low probability of occurrence.

Geologic-Related Hazards

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

Section 1612.2.5 sets up seismic hazard exposure groups and assigns all buildings to one of these groups according to Table 1612.5. Group II includes buildings which have a substantial public hazard due to occupancy or use and Group III are those buildings having essential facilities which are required for post-earthquake recovery, including fire, rescue and police stations, emergency rooms, power-generating facilities, and communication facilities.

Notice of Intent Application Manchaug Pond Aquatic Management Program[59]

The Application sought approval to initiate an Aquatic Management Program at Manchaug Pond in Douglas and Sutton, MA. USEPA/State registered herbicides and/or algaecides, diver-assisted suction harvesting and/or other BMPs will be applied to manage nuisance aquatic vegetation and algae to protect the interests of the Wetlands Protection Act by impeding eutrophication and improving habitat value.

Resource Management Plan Douglas State Forest[60]

Resource Management Plans (RMPs) are foundational documents that identify a park, forest, or reservation's defining natural, cultural, and recreational resources and identify potential threats and opportunities to guide DCR's continued stewardship of the property and to inform future decisions about the property in a way that celebrates and preserves its identity.

RMPs are prepared for "all reservations, parks, and forests under the management of the department" (M.G.L. c. 21, Section 2F). These plans "shall include guidelines for the operation

[59] *Notice of Intent Application Manchaug Pond Aquatic Management Program*, Solitude Lake Management, May 2018.

[60] *Resource Management Plan Douglas State Forest,* Massachusetts Department of Conservation and Recreation – Division of Conservation and Resource Stewardship, Office of Cultural Resources, 2024.

and land stewardship of the aforementioned reservations, parks, and forests, shall provide for the protection and stewardship of natural and cultural resources and shall ensure consistency between recreation, resource protection, and sustainable forest management.“ DCR finalizes RMPs following a public process and adoption by the DCR Stewardship Council. The contents of this RMP represent the best available information at the time of adoption by the Stewardship Council.

The threats and opportunities identified in this RMP are used to inform th development of management recommendations, including:

Natural Resources

- Review and implement MassDEP Wellhead Protection Tips and Guidance (MassDEP 1995, MassDEP 2011) within the Forest's Zone I Wellhead Protection Areas.
- Investigate relocating picnic facilities outside the Zone 1 Wellhead Protection Area at Wallum Lake Recreation Area or relocating well outside of high-use recreation areas.
- Install a secured perimeter fence around the wellhead at the Wallum Lake Recreation Area.
- Replace the existing privy at the Mid-State Trail shelter with a conforming on-site sewage disposal system, as permitted by Douglas Health Department, NHESP, MHC, and other regulators, as appropriate.
- Meet with representatives of MassWildlife, Rhode Island Department of Environmental Management, the Connecticut Department of Energy and Environmental Protection, and Indigenous peoples to identify common interests in the conservation of natural resources at Douglas State Forest, Mine Brook Wildlife Management Area, and Buck Hill Wildlife Management Area.
- Survey the state Endangered plant population, map the extent of the population and adjacent suitable habitat, and develop and implement a Habitat Management Plan to protect this species within Douglas State Forest.

Cultural Resources

- Work with Indigenous partners to inventory, document, conserve, and interpret Indigenous peoples' resources and history within the Forest.
- Meet with representatives of MassWildlife, Rhode Island Department of Environmental Management, the Connecticut Department of Energy and Environmental Protection, and Indigenous peoples to identify common interests in the preservation of cultural resources at Douglas State Forest, Mine Brook Wildlife Management Area, Buck Hill Wildlife Management Area, and Air Line Trail State Park.

Recreation

- Implement recommendations in the Program Accessibility Assessment (IHCD 2019).

- Fill or cap the open well adjacent to the campsite entrance.
- Meet with representatives of MassWildlife, Rhode Island Department of Environmental Management, the Connecticut Department of Energy and Environmental Protection, and Indigenous peoples to identify common interests in nature-based recreation at Douglas State Forest, Mine Brook Wildlife Management Area, Buck Hill Wildlife Management Area, and Air Line Trail State Park.

Chapter 103: An Act Authorizing the Establishment of the Whitin Reservoir Watershed District in the Town of Douglas[61]

The Whitin Reservoir Watershed District was established in 2008 to continue stewardship of the Whitin Reservoir Dam and impoundment, and for the continued preservation of the diverse and important ecosystem that it formed and has sustained for over 150+ years.

SECTION 1. There shall be established a district within the Town of Douglas, which shall be known as the Whitin Reservoir Watershed District, which, upon its establishment in the manner set forth in this act, shall constitute a body politic and corporate. The district shall be generally bounded and described as follows:

B. Actual Boundaries.
(a) The general boundaries described in subsection (a) are intended to be guidelines only. The actual district boundaries shall include those separately assessed parcels within the town of Douglas as shown on the maps maintained by the board of assessors for the town and which either: (1) abut directly on the shoreline of Whitin Reservoir; or (2) except as set forth in the following paragraph, consists of all the property of a holder of a recorded private right of access to land which abuts the shoreline of Whitin Reservoir in such a manner that the owner or proprietor of such land is afforded by such recorded right, a right of access to Whitin Reservoir for bathing, boating or other water recreational activities at a location where members of the general public may lawfully be excluded from such use.

SECTION 3. The district, upon its establishment in the manner set forth in this act, shall have the following purposes and powers:

(a) to initiate and coordinate research and surveys for the purpose of gathering data on the lake, related shore lands, watershed and the drainage basis and other matters directly pertaining to the improvement of water quality, reclamation, preservation and maintenance of the lake for general recreational use;
(b) to plan lake rehabilitation, enhancement, maintenance and preservation projects and water quality improvement and to acquire by any legal manner , purchase, own, operate, repair, maintain or manage an impound or dam;

[61] *An Act Authorizing the Establishment of the Whitin Reservoir Watershed District in the Town of Douglas*, Chapter 103, May 13, 2008

(c) to implement , conduct, coordinate and supervise such projects, subject to the grant of necessary approvals by the appropriate local, state and federal governmental agencies, including the Town of Douglas, the Department of Environmental Management, Department of Environmental Protection, and the Department of Fisheries, Wildlife and Recreational Vehicles, or their successor agencies and the appropriate funding or regulatory agencies of the federal government and, if required, under the supervision of such agencies ;
(d) to make and enter into all manner of contracts and agreements necessary or incidental to the exercise of any power granted to the district by this act;
(e) to adopt an annual budget and to raise and appropriate funds in amounts necessary to carry out the purposes for which the district is formed;
(f) to acquire, dispose of and encumber real and personal property for the purposes of the district, including but not limited to the power to acquire real estate or a limited interest in real estate by eminent domain under and subject to chapters 79 and 80A of the General Laws; provided however, that, the district's power of eminent domain shall be limited to property lying within the general boundaries of the district not already appropriated to public use by the commonwealth or the Town of Douglas and solely for the purposes set forth in subsections (a), (b) and (c);
(g) to manage, control and supervise equipment and facilities necessary or appropriate to accomplish the purposes of this act, including, but not limited to, weed harvesting equipment, dredging apparatus, lake draw down facilities for either temporary or permanent water level control, weed control or water quality improvement and recreational swimming and boating facilities for public use;
(h) to construct, acquire, or lease, or purchase, improve, maintain and operate such equipment and facilities and such other equipment, materials, supplies, facilities and services as shall be required to accomplish the purposes of this act, to the same extent and subject to the same limitations as shall apply to towns in the commonwealth under the General Laws;
(i) to apply for, accept and expend financial assistance from the federal government, the commonwealth, Worcester county and the Town of Douglas;
(j) to apply for, receive and expend funds from charitable foundations or other private entities and individuals in the form of grants, gifts, loans and advances for purposes of the district;
(k) to employ such persons, including consultants as may be deemed necessary in its judgment, and to fix their compensation;
(l) to adopt by-laws, which shall be consistent with the powers conferred by this act and with other applicable provisions of the General Laws, for the regulation of its affairs and the conduct of its business;
(m) to perform all duties and exercise all responsibilities required by the Town of Douglas, pursuant to any grant awarded by the Department of Environmental Protection under chapter 628 of the acts of 1981, chapter 286 of the acts of 1982, and chapter 722 of the acts of 1969, or any grant awarded by the Division of Environmental Management or any other public agency, subject to approval by the Commissioner of Environmental Protection or his designee so as to permit the district to act as direct grantee or sub-grantee under the Town of Douglas ;

(n) to borrow at any meeting of the district, for the purpose of meeting preliminary or current expenses, such sums as may be necessary and to issue therefor general obligation temporary notes for a period of not more than 2 years; provided, however, that such notes shall be issued only in anticipation of assessments and other revenues of the district for the fiscal year in which such notes are issued or in anticipation of money to be received from the sale of longer term bonds or notes for such purposes as are otherwise permitted in this act;
(o) to sue and be sued in its own name and to plead and be impleaded; provided, however, that neither the district nor any of its officers or employees shall be liable in tort except under chapter 258 of the General Laws; and provided further, that the district may indemnify its officers and employees to the extent provided in said chapter 258;
(p) to invest any funds not required for the immediate use of the district in such manner and to the extent permitted under the General Laws for the investment of such funds by the treasurer of a town;
(q) to procure insurance against any loss or liability which may be sustained or incurred in carrying out this act in such amount as the district shall deem necessary and appropriate and with insurers licensed to furnish such insurance in the commonwealth;
(r) to perform generally all acts which are necessary or convenient to implement the powers which are expressly or by necessary implication conferred upon the district by this act and which are not otherwise prohibited under any provision of the General Laws; and
(s) in carrying out its purposes and exercising its powers as set forth in this act, the district shall, to the extent reasonably possible and in coordination with other sources, maintain water flows into the Mumford river sufficient to supply adequate water flows to the Town of Douglas Municipal Sewage Treatment Plant, subject to chapter 253 and section 40 of chapter 131 of the General Laws and regulations promulgated thereunder.

3.3 Administrative and Technical Capabilities

Illicit Discharge Detection and Elimination Plan, June 30, 2019[62]

This Illicit Discharge Detection and Elimination (IDDE) Plan has been developed by the Town of Douglas to address the requirements of the United States Environmental Protection Agency's (EPA's) 2016 National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems (MS4) in Massachusetts, hereafter referred to as the "2016 MS4 Permit." The 2016 Massachusetts MS4 Permit was signed on April 4, 2016 and has an effective date of July 1, 2018. The permit was cosigned by the Massachusetts Department of Environmental Protection (MassDEP) and thus is jointly regulated by EPA and MassDEP.

The 2016 Massachusetts MS4 Permit requires that each permittee, or regulated community, address six Minimum Control Measures (MCMs). These measures include the following:

1. Public Education and Outreach;

[62] *Illicit Discharge Detection and Elimination (IDDE) Plan*, Comprehensive Environmental Inc. June 30, 2019.

2. Public Involvement and Participation;
3. Illicit Discharge Detection and Elimination Program;
4. Construction Site Stormwater Runoff Control;
5. Stormwater Management in New Development and Redevelopment (Post Construction Stormwater Management); and
6. Good Housekeeping and Pollution Prevention for Permittee Owned Operations.

Under MCM 3, the permittee is required to implement an IDDE program to systematically find and eliminate sources of non-stormwater discharges to its municipal separate storm sewer system and implement procedures to prevent such discharges. The IDDE program must be recorded in a written (hardcopy or electronic) document. This IDDE Plan has been prepared to address this requirement.

IDDE Program Responsibilities include:

- Drainage system mapping (HD, CD);
- Determining and inspecting key junction manholes (WD, CD, BOH);
- Catchment delineation and prioritization for field screening (HD, CD);
- Dry and wet weather outfall investigations where required (HD, CD);
- Performing systematic catchment investigations (HD, CD, BOH);
- Investigating and eliminating IDDE sources (HD, CD, BOH);
- Enforcing IDDE ordinance requirements (CC);
- Tracking illicit discharge connections and removals for annual reporting (HD, CD, BOH);
- Incorporating IDDE into public education efforts (HD, CD); and
- Providing annual employee training (HD, CD, BOH)

Stormwater Management Program Plan, June 2019[63]

Douglas is one of many Massachusetts communities regulated under the Environmental Protection Agency's (USEPA) National Pollutant Discharge Elimination System (NPDES) Phase II rule (40 CFR 122). The rule requires regulated operators of municipal separate storm sewer systems (MS4) to develop a Stormwater Management Program (SWMP) and Best Management Practices (BMPs) to reduce the impacts of stormwater discharges. The requirements are outlined in the NPDES General Permits for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems in Massachusetts, which was signed on April 4, 2016, with an effective date of July 1, 2018, hereinafter referred to as the 2016 MS4 Permit.

[63] *Stormwater Management Program Plan*, Comprehensive Environmental Inc. June 30, 2019.

Article 11: Municipal Storm Drain System Bylaw[64]

Section 1: Purpose

A. Increased and contaminated stormwater runoff is a major cause of impairment of water quality and flow in lakes, ponds, streams, rivers, wetlands, and groundwater; contamination of drinking water supplies; alteration or destruction of aquatic and wildlife habitat; and flooding.
B. Regulation of illicit connections and discharges to the municipal storm drain system is necessary for the protection of the Town's water bodies and groundwater, and to safeguard the public health, safety, welfare and the environment.
C. The objectives of this by-law are:
    1. to prevent pollutants from entering the Town's municipal separate storm sewer system (MS4);
    2. to prohibit illicit connections and unauthorized discharges to the MS4;
    3. to require the removal of all such illicit connections;
    4. to comply with state and federal statutes and regulations relating to stormwater discharges; and
    5. to establish the legal authority to ensure compliance with the provisions of this by-law through inspection, monitoring, and enforcement.

Town of Douglas Municipal Website

The Town of Douglas maintains a municipal website (https://douglas-ma.gov/) that includes a number of resources for residents.

Municipal Departments

Town of Douglas Building Department

The Building Department is responsible for all residential and commercial permits that are submitted including but not limited to electric, gas, plumbing, and sheet metal/mechanical for all projects requiring duct work.

Town of Douglas Community Development Department

The Community Development Department provides assistance to project applicants in navigating through the state and local permitting processes by assisting with the understanding of which permits may be needed for particular projects and with the interpretation of regulations.

- Subdivision Regulations
- Zoning Bylaws
- Master Plan information

Town of Douglas Fire Department

The Fire Department provides fire suppression, rescue services, public education, and advanced

[64] *Town of Douglas General Bylaws*, Article 11: Municipal Storm Drain System Bylaw, Adopted January 1, 1974.

emergency medical care safely and promptly to the community.

- Fire Safety for Kids:
    - Halloween Safety Information Sheet
    - Winter Holiday Safety Tips
    - College Fire Safety
- CO/Smoke Detector Information:
    - Carbon Monoxide Safety Guide
    - Smoke/Carbon Monoxide Guide When Selling a One- or Two-Family House
- Open Burning Permits and Regulations
- Student Awareness if Fire Education (SAFE) Program information

Town of Douglas Highway Department

The Highway Department maintains over 130 miles of roadway, including paving, plowing, sanding, drainage, cutting brush, signage, road lines, crosswalks and repairs.

- Winter Parking Ban
- FY 2025 Pavement Management Summary:

  Since implementing its Pavement Management System (PMS) in 2020, Stantec has continued working with the Town in maintaining its PMS. In the Fall of 2024, Stantec completed a re-survey of the Town's public roadway network, determined today's average road network Pavement Condition Index (PCI), roadway repair backlog, and investigated three (3) future funding scenarios based on today's construction cost.

Town of Douglas Police Department

The Police Department is responsible for enforcement of the laws, interaction with the public in a professional and educational posture, as well as active cooperation with other law enforcement agencies.

- Snow Removal Town Bylaw:
    - Article 3, Section 2:

      The owner or occupant of any premises abutting on a public way of the town on which there is a public sidewalk shall as soon as reasonably possible, so dispose or treat ice and snow accumulating thereon as to make said sidewalk reasonably available and safe for public passage. No person shall lay, throw or place or cause to be laid, thrown or placed, in any public way of the town ice or snow in such quantity or condition as to obstruct public passage of said way.

Town of Douglas Water/Sewer Department

Find water ban information, conservation tips, and pay your water/sewer bill online.

- Consumer Confidence/Water Quality Reports
- Cross Connection Control and Backflow Prevention Information
- Emergency contact information
- Water ban information
- Water Conservation Tips
- Water leak repair notifications

Town of Douglas MS4 Stormwater Department

Reporting of the Town of Douglas NPDES/MS4 Stormwater status to the DEP/EPA.

- Spring Fertilizer and Lawn Care Message
- MS4 Leaf Litter Flyer
- Greenscapes Guide to Lawn Care
- Public Education News Articles – Fertilizer

Municipal Boards/Commissions

Town of Douglas Board of Health

The Board is charged with the protection of public health and to fulfill their duties by developing, implementing and enforcing health policies which are developed through Federal, State and local regulations.

Town of Douglas Conservation Commission

The Douglas Conservation Commission is the official agency specifically charged with the protection of the natural resources in the Town of Douglas.

Town of Douglas Council on Aging

The Council on Aging works to respond to the needs of seniors in the Douglas community through developing, promoting and encouraging programs and services in a positive atmosphere.

Town of Douglas Open Space Committee

The Committee works on land preservation projects to preserve open space and important habitats throughout Town.

Town of Douglas Planning Board

The Planning Board oversees subdivisions, special permit granting, holding public hearings, zoning changes, and approving special permits for things like earth removal or accessory apartments.

Comprehensive Emergency Management Plan[65]

The purpose of the Town of Douglas Comprehensive Emergency Management Plan (CEMP) is to establish the overall framework for integration and coordination of emergency management and response activities and to facilitate coordinated response to any emergency or event in the Community requiring multi-agency response or support. The CEMP identifies local agencies and partner organizations that provide command and coordination capabilities for an emergency or event and describes how command and response components are organized and managed. The plan provides guidance to all departments and agencies in the Community and details general roles and responsibilities of local departments and partnering stakeholders before, during, and following an emergency situation or event. It also provides for the systematic integration of additional emergency resources but does not replace other federal, state or national emergency operations plans or procedures. It identifies lines of authority and organizational relationships for the management of emergency response actions, describes how people and property are protected in an emergency or disaster, and identifies legal authority.

Further, the purpose of this plan is to prescribe those activities to be taken by the Community Chief Municipal Official as well as by other government and community officials to protect the lives and property of all of the citizens of the Community in the event of a natural or human-caused emergency or disaster, including terrorism, and to satisfy the requirement that the Community have an effective and operational emergency management plan.

The CEMP is comprised of this Base Plan, and a series of attachments, which provide an in-depth tool to build a strong emergency management plan.

The CEMP is intended to accomplish the following goals:

- Assign responsibilities to agencies, organizations and individuals for carrying out specific actions during an emergency or event;
- Detail the methods and procedures to be used by designated personnel to assess emergencies and take appropriate actions to save lives and reduce injuries, prevent or minimize damage to public and private property, and protect the environment;
- Provide a process by which emergency response personnel and local government staff can efficiently and effectively prevent, mitigate, prepare for, respond to, and recover from emergencies and disasters;
- Identify the responsibilities of local agencies and partnering stakeholder and organizations during emergencies or events; and
- Identify lines of authority and coordination for the management of an emergency or event.

Emergency Operations Center

The Town maintains a primary emergency operations center (EOC) that serves as the central point for coordination of the community's emergency management and response activities,

[65] *Town of Auburn Comprehensive Emergency Management Plan*, Version 1.0. December 31, 2019.

maintaining situational awareness about the emergency situation, and facilitating requests for deployment of resources. In the event that the primary EOC is rendered or deemed unusable, emergency operations will relocate to an alternative EOC location.

Primary EOC	Douglas Municipal Center 29 Depot Street
Alternate EOC	Douglas Fire Headquarters 64 Main St.

Massachusetts (Greater Grafton) Medical Reserve Corps

Douglas can use the MA Medical Reserve Corps (MRC) to supplement its capacity to meet local emergency response and public health needs. The MRC operates with the objective to strengthen communities by establishing a system of medical and public health volunteers who can aid and expertise to existing medical and emergency service providers during times of regional/community need.

Mutual Aid System

The Town of Douglas is part of a mutual aid system (e.g., the provision of services from one jurisdiction to another during times of need) for additional resources from many fronts.

Community-to-Community Mutual Aid

Douglas has opted into statewide mutual aid agreements, allowing the Town to request support from any Massachusetts community for response activities. It also provides a way for Douglas to share its resources with neighboring communities that are experiencing emergency response limitations. Established agreements and plans document the procedures and standards for intrastate mutual aid.

- Massachusetts Fire and EMS Mobilization Plan: In a disaster situation, the IC (Fire) initially requests mutual assistance by utilizing the local mutual aid system and when additional mutual aid is necessary then requests are supported from within Fire District Region 7.
- Statewide Public Works Mutual Aid: Assistance provided under this agreement includes, but is not limited to fire service, law enforcement, emergency medical services, transportation, communications, public works, engineering, building inspection, planning and information assistance, resource support, public health, health and medical services, search and rescue assistance and any other resource, equipment or personnel that a party to the agreement may request or provide in anticipation of, or in response to, a public safety emergency.
- Northern Rhode Island Fire District: Douglas no longer participates in the Northern Rhode Island Mutual Ad Association. However, the Town still does perform mutual aid with all northern Rhode Island, even as far as North Smithfield on a regular basis.

- Central MA Emergency Medical Services Inc. (CMEMSC)[66]: CMEMSC was designated by the Department of Public Health as the Region II emergency medical services council in 1977 in compliance with 105 CMR 170.102 & 170.103. As a quasi-governmental agency and 501 (c)(3) non-profit organization, the goal is to foster improvement to and assure the availability of competent EMS services throughout the region. CMEMSC provides assistance and support to the Department of Public Health in a cooperative effort to coordinate, maintain, and improve the EMS system throughout Central Massachusetts.

  CMEMSC offers EMS system planning information, and educational and technical assistance to local jurisdictions and EMS system providers. CMEMSC also serves as a resource to pre-hospital providers seeking clarification regarding pre-hospital treatment protocols and guidance in following state EMS regulations.

  CMEMSC's communication center, CMED (Central Medical Emergency Direction) provides a direct communication link between ambulances and emergency departments at area hospitals. Through CMED, EMTs may communicate directly with an emergency physician or nurse for optimal patient care. CMED is also a vital component in the coordination of EMS response to Mass Casualty Incidents and patient distribution to multiple hospitals.

- Statewide Fire Mobilization Plan: This is a coordinated third level of mutual aid to all Massachusetts communities and adjacent states after they have exhausted their normal mutual aid agreements and to integrate all types of specialized fire rescue resources into a comprehensive and workable plan. Douglas typically utilizes the Fire Mobilization Plan after exhausting all local mutual aid resources, including organized strike teams that exist within Massachusetts Fire District 7. Typically, this would occur at an incident that is higher than a fourth alarm.
- Central MA Law Enforcement Council (CEMLEC)[67]: The CEMLEC is a non-profit corporation consisting of over 60 municipal law enforcement agencies and one county Sheriff that assist each other through a mutual aid agreement. CEMLEC augments local departments by providing specialized services, equipment and personnel, while ensuring that the requesting police chief maintains overall control of law enforcement activities.
- Heath and Medical Coordinating Coalition HMCC) – Region 2[68]: The Massachusetts Department of Public Health's Office of Preparedness and Emergency Management (OPEM) has developed Health and Medical Coordinating Coalitions (HMCC) in each of the six regions throughout the state. These HMCCs are made up of healthcare organizations and local public health departments; additionally, each coalition has an Executive

[66] https://cmemsc.org/about.php.
[67] http://www.cemlec.com/.
[68] https://maregion2hmcc.org/.

Committee that consists of representatives from the following disciplines: community health centers, EMS, hospitals, local public health, and long-term care.

For each region, OPEM has chosen a Sponsoring Organization to oversee the fiscal and administrative aspects of the program. Within each Sponsoring Organization there are a Program Manager and a Planning and Operations Coordinator, who each serve in a full-time capacity.

In Region 2, the City of Worcester has been named the Sponsoring Organization, with the HMCC Program Manager, HMCC Planning and Operations Coordinator, and Chief of Emergency Preparedness making up the Division of Public Health's Office of Health and Medical Preparedness. Additionally, the Worcester Regional Medical Reserve Corps (WRMRC) is housed within that office.

- State-to-Community Mutual Aid

  MEMA is authorized to make available any equipment, services, or facilities owned or organized by the Commonwealth for use in the Town of Douglas, upon request by the Town Selectmen and appointed agents to include the Emergency Management Director, Fire Chief, or Police Chief when there is a declaration of an emergency by the Governor that includes the Town. Furthermore, MEMA is authorized to reinforce emergency management agencies is areas stricken by emergencies or disasters.

  Massachusetts has entered into agreements with the New England states and Canadian provinces to rapidly access resources for both notice and non-notice events, including:

- New England State Police Compact (NESPC) provides mutual aid and assistance in the event of police emergencies, and to provide for the powers, duties, rights, privileges, and immunities of police personnel when rendering such aid.
- Northeastern Forest Fire Protection Compact (NFFPC) provides the means for member states and provinces to cope with fires that might be beyond the capabilities of a single member through information, technology, and resource sharing.

Other Mutual Aid Agreements

Douglas can also receive assistance through the Commonwealth's participation in broader interstate and international mutual aid compacts:

- The Emergency Management Assistance Compact (EMAC) is an interstate mutual aid agreement that covers all 50 states, the District of Columbia, Puerto Rico, Guam, and the U.S. Virgin Islands. The National Emergency Management Association (NEMA) provides administrative support for EMAC. EMAC acts as a complement to the federal disaster response system and may be used in lieu of or in conjunction with federal assistance. The

Town, through Massachusetts may receive assistance via EMAC after a state of emergency is declared when resources are not available in the Commonwealth.

- The International Emergency Management Assistance Compact (IEMAC) is a mutual aid compact which covers the six New England states as well as the Canadian provinces of Quebec, New Brunswick, Prince Edward Island, Nova Scotia, and Newfoundland. IEMAC operates under the same principles as the EMAC, save that the governor of an affected member state does not need to declare a state of emergency before requesting resources through IEMAC.

Citizen Emergency Response Team (CERT)

The CERT Team in Douglas operates as part of Tri-Epic, a Local Emergency Planning Committee (LEPC) which allows the Town to pool their CERT resources with that of several other central Massachusetts communities (Dudley, Oxford, Southbridge, Sturbridge, Brimfield, Charlton, Auburn and the State of Massachusetts). Internally, Douglas has a support/logistics position that serves as a liaison when the CERT is utilized.

Emergency Notifications

Emergency alert and warning systems are designed to allow local authorities to warn the public of impending or current threats or emergencies affecting their area. Such public warning systems are essential to communicating critical emergency information to the public during times when other communications systems may not be dependable. Public warnings may be issued during severe weather, flooding, fire, hazardous material release, terrorist threat, water contamination, and any other threats to life, property, and safety. During these or any other type of emergency when the need to relay emergency public information is immediate, Unified Command will coordinate the development of public warning messages. The Public Information Officer will implement the dissemination of the messages via the public warning systems. Warning the public about an emergency or disaster includes various means of communication which are summarized in the table below:

- Emergency Alert System (EAS)
- Wireless Emergency Alerts
- Local Access TV Station
- Community Website Notifications
- Sirens
- Social Media
- Variable Message Boards
- Code Red

Emergency Notifications for Persons with Access and Functional Needs

Access and functional needs populations will be warned of emergencies by available methods, including the following:

- Visually Impaired: EAS messages on radios, sirens, NOAA Weather Radio, reverse notification systems (locally based), route alerting (locally based), door to door notification (locally based)
- Hearing Impaired: Captioned EAS messages on television, TTY on reverse telephonic notification systems (locally based), route alerting (locally based), door to door notification (locally based)
- Non-English speaking: Language messages on radio and/or TV, NOAA Weather Radio, route alerting, door-to-door, other

Municipal Administration and Staff

Various Town of Douglas municipal officials, staff, and board/commission members work well together to develop, update, and implement plans and policies to promote the safety of residents and minimize risk to the community.

Coordination with Neighboring Municipalities

The Town of Douglas coordinates with the Towns of Webster, Oxford, Sutton, and Uxbridge periodically across municipal issues. The Town will continue to coordinate with these communities on natural hazard mitigation planning, specifically regarding any shared resource plans and evacuation plans.

3.4 Financial Capabilities

Federal and State Grant Opportunities

The Town, across all municipal departments, considers and pursues all applicable federal, state and local grant opportunities to assist in implementing hazard mitigation programs, such as FEMA, Housing and Urban Development (HUD CDBG) Program, United States Department of Agriculture – Natural Resources Conservation Service (USDA-NRCS) and Rural Development Grants, Massachusetts Municipal Vulnerability Preparedness Program, Massachusetts Coastal Resilience Grant Program, Massachusetts Water Quality Grants, GrantWatch, and U.S. Economic Development Administration (EDA).

FEMA Hazard Mitigation Assistance (HMA) Program (HMGP, BRIC, and FMA)

Since 2020, the Town of Douglas has applied for and received approximately $160,359.79 in federal grant assistance (see Section 2.6 for additional details).

CARES Act

Since 2020, the Town of Douglas has applied for and received approximately $579,721.08 in federal grant assistance (see Section 2.6 for additional details).

ARPA (American Rescue Plan Act)

Since 2020, the Town of Douglas has applied for and received approximately $2,675,166.51 in federal grant assistance (see Section 2.6 for additional details).

HUD CDBG Program

A flexible program that provides communities with resources to address a wide range of unique community development needs, particularly the Disaster Recovery Assistance Program which provides grants to help cities, counties, and States recover from Presidentially-declared disasters, especially in low-income areas, subject to availability of supplemental appropriations.

USDA NRCS and Rural Development Grants

Provides conservation technical assistance, financial assistance, and conservation innovation grants. USDA Rural Development operates over fifty financial assistance programs for a variety of rural applications.

MA MVP Program

Provides action grants to communities that are MVP-Certified.

MA Water Quality Grants

Financial assistance options available for drinking water, wastewater, septic systems, wetlands, and watersheds in Massachusetts.

GrantWatch

A proprietary grant searching engine for non-profits.

US EDA

EDA disaster grants are available under the Economic Adjustment Assistance (EAA) program. EAA funds can be awarded to assist a wide variety of activities related to disaster recovery, including economic recovery strategic planning grants, and public works construction assistance.

Existing Protection Matrix

A summary of the main identified existing and future protection measures presented in Sections 3.2, 3.3, and 3.4 are summarized on Table 3-1. These measures constitute the baseline protection that was further evaluated by the Douglas LHMT to determine gaps in Douglas' protection from natural disasters. Goal statements and specific actions were then developed to mitigate the identified gaps in the existing protection. These identified protection measures facilitate the Town of Douglas to implement various hazard mitigation programs, ultimately making the community more resilient.

Table 3-1 Existing Protection Matrix Douglas, MA

Existing Protection	Description	Area Covered	Effectiveness and/or Enforcement	Improvements or Changes Needed
Planning and Regulatory				
Open Space and Recreation Plan, 2023				
	Includes goals and objectives relative to the Town's natural resources, particularly water protection (potable and drinking) and land conservation.	Town-wide	Effectiveness: Very Good Enforcement: Conservation Commission	Continue to Utilize
Municipal Vulnerability Preparedness Summary of Findings, 2020				
	The Town has become an MVP-Certified community, and as such is eligible to seek implementation grants through the Commonwealth for any hazard mitigation actions identified as a result of the MVP process.	Town-wide	Effectiveness: Good Enforcement: Planning Board/Community Development Dept.	Monitor for update...in progress
Subdivision Rules and Regulations				
	Intended to guide the laying out of subdivisions in a way that provides adequate access, sanitary conditions, amenities as appropriate, and protects the public's health, safety and welfare.	Town-wide	Effectiveness: Very Good Enforcement: Planning Board/Community Development Dept.	Continue to Utilize
Zoning Bylaw				
	Intended to regulate land use within the town to regulate community welfare, protect property values, and manage development in an orderly way.	Town-wide	Effectiveness: Very Good Enforcement: Building Dept./Planning Board/Community Development Dept.	Continue to Utilize
Douglas Master Plan, 1998/Implementation Committee Final Report, 2007				
	Serves as a guide to the Town for future decision-making on actions that will have long-term impacts to the Town's economic, social and physical resiliency.	Town-wide	Effectiveness: Very Good Enforcement: Planning Board	Monitor for update…in progress

Table 3-1 Existing Protection Matrix Douglas, MA

Existing Protection	Description	Area Covered	Effectiveness and/or Enforcement	Improvements or Changes Needed
Planning and Regulatory				
Drinking Water System Risk and Resilience Assessment				
	Facilitates discussions about risk to the utility due to malevolent acts and natural hazards, resilience of the system to threats, and potential capital and operational risk reduction countermeasures.	Town-wide	Effectiveness: Good Enforcement: Water and Sewer Dept.	Continue to Utilize
Lead Observers in the Non-Tidal Aquatic Connectivity Protocol Training				
	Intended to inform municipal personnel on methods to improve aquatic connectivity and standardize road-stream-crossing data collection.	Town-wide	Effectiveness: Good Enforcement: Highway Dept./Water and Sewer Dept.	Continue to Utilize
Hayward Land Retaining Walls Repair				
	Design plans/specifications for the repair of two failing retaining walls adjacent to the Mumford River.	Hayward Landing Apartments	Effectiveness: Good Enforcement: Building Dept.	Monitor…currently out to bid
Blackstone River Watershed Needs Assessment Report, 2021				
	Intended to identify and prioritize needs/develop actions that are responsive to help improve water quality, habitat, and resilience of the Blackstone River.	Blackstone River Corridor	Effectiveness: Good Enforcement: Highway Dept./Conservation Commission	Continue to Utilize
Town of Douglas Sewer Asset Management Plan CWSRF No. 7070 Draft				
	Intended to identify upgrades and replacements to the Town's vertical and horizontal assets within the wastewater system over the next 5 years.	Town-wide	Effectiveness: Good Enforcement: Water and Sewer Dept.	Continue to Utilize
Wetlands Bylaw				
	Intended to protect the floodplains and wetlands of the Town of Douglas by controlling activities deemed to have a significant effect upon natural resources.	Town-wide	Effectiveness: Good Enforcement: Conservation Commission	Continue to Utilize

Table 3-1 Existing Protection Matrix Douglas, MA

Existing Protection	Description	Area Covered	Effectiveness and/or Enforcement	Improvements or Changes Needed
Planning and Regulatory				
Massachusetts State Building Code				
	The Massachusetts State Building Code contains many detailed regulations regarding wind loads, earthquake resistant design, flood-proofing and snow loads.	Town-wide	Effectiveness: Very Good Enforcement: Planning Board/Building Dept.	Continue to Utilize
Notice of Intent Application Manchaug Pond Aquatic Management Program				
	Application for registered herbicides and/or algaecides, diver-assisted suction harvesting and/or other BMPs to manage nuisance aquatic vegetation and algae.	Town-wide	Effectiveness: Very Good Enforcement: Conservation Commission	Continue to Utilize
Resource Management Plan Douglas State Forest				
	A foundational document that identifies a park, forest, or reservation's defining natural, cultural, and recreational resources and identifies threats and opportunities to guide DCR's continued stewardship of the property and to inform future decisions about the property.	Douglas State Forest	Effectiveness: Very Good Enforcement: Fire Dept./Conservation Commission	Continue to Utilize
Chapter 103: An Act Authorizing the Establishment of the Whitin Reservoir Watershed District in the Town of Douglas				
	Intended to describe the boundaries, purposes, and powers of the District within the Town of Douglas.	Town-wide	Effectiveness: Good Enforcement: Town Administrator/Select Board	Continue to Utilize
Administrative and Technical				
illicit Discharge Detection and Elimination Plan, 2019				
	Intended to address the requirements of the US EPA's 2016 NPDES General Permit for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems in MA.	Town-wide	Effectiveness: Good Enforcement: Waer and Sewer Dept.	Continue to Utilize

Table 3-1 Existing Protection Matrix Douglas, MA

Existing Protection	Description	Area Covered	Effectiveness and/or Enforcement	Improvements or Changes Needed
Administrative and Technical				
Stormwater Management Program Plan, 2019				
	Describes and details the activities and measures that will be implemented to meet the terms and conditions of the 2016 MS4 General Permit.	Town-wide	Effectiveness: Good Enforcement: Water and Sewer Dept.	Continue to Utilize
Article 11: Municipal Storm Drain System Bylaw				
	Intended to prevent pollutants from entering the Town's MS4; to prohibit illicit connections/unauthorized discharges to the MS4; requires the removal of all such illicit connections; to establish the legal authority to ensure compliance through inspection, monitoring, and enforcement.	Town-wide	Effectiveness: Good Enforcement: Water and Sewer Dept.	Continue to Utilize
Municipal Website				
	A municipal webpage hosted on the Town's website that includes a variety of local, state and regional emergency program information for residents, business owners and tourists.	Town-wide	Effectiveness: Very Good Enforcement: All Departments	Continue to Utilize
Comprehensive Emergency Management Plan				
	Provides a framework for a community-wide emergency management system to ensure a coordinated response to emergencies and coordinated support of certain pre-planned events.	Town-wide	Effectiveness: Very Good Enforcement: Fire Dept.	Continue to Utilize
Massachusetts (Greater Grafton) Medical Reserve Corps				
	Operates with the objective to strengthen communities by establishing a system of medical and public health volunteers who can aid and provide expertise to existing medical and emergency service providers during times of regional/community need.	Regional	Effectiveness: Good Enforcement: Fire Dept./Board of Health	Continue to Utilize

Table 3-1 Existing Protection Matrix Douglas, MA

Existing Protection	Description	Area Covered	Effectiveness and/or Enforcement	Improvements or Changes Needed
Administrative and Technical				
Mutual Aid System				
	Provides services from one jurisdiction to another during times of need for additional resources from many fronts.	Regional	Effectiveness: Very Good Enforcement: Fire Dept.	Continue to Utilize
Citizen Emergency Response Team				
	Utilizes citizen volunteers to assist during periods of emergency situations/disasters.	Town-wide	Effectiveness: Very Good Enforcement: Fire Dept.	Continue to Utilize
Emergency Notifications for Persons with Access and Functional Needs				
	Community channels used to distribute important community alerts and time-sensitive emergency situation information to local residents and businesses who are visually impaired, hearing impaired, and non-English speaking.	Town-wide	Effectiveness: Very Good Enforcement: Fire Dept.	Continue to Utilize
Municipal Administration and Staff				
	Municipal officials, staff, Boards and Commissions all work together to develop, implement and update policies and plans to promote the safety of residents and minimize risk to the community.	Town-wide	Effectiveness: Very Good Enforcement: Town Administrator, Select Board, Municipal Department Chairs	Maintain
Coordination with Neighboring Municipalities				
	Coordination to identify applicable efficiencies (resource-sharing and Mutual Aid agreements).	Regional context	Effectiveness: Very Good Enforcement: Fire Dept.	Maintain

Table 3-1 Existing Protection Matrix Douglas, MA

Existing Protection	Description	Area Covered	Effectiveness and/or Enforcement	Improvements or Changes Needed
Financial				
Federal/State Grant Opportunities				
	FEMA HMA Program. HMGP/FMA - since 2017, the Town of Douglas has applied for and received approximately $160,359.63 in grant assistance from FEMA. https://www.fema.gov/grants/mitigation.	Town-wide		Continue to utilize
	CARES Act. The Coronavirus Aid, Relief, and Economic Security Act (2020) and the Coronavirus Response and Consolidated Appropriations Act (2021) provided fast and direct economic assistance for American workers, families, small businesses, and industries. https://home.treasury.gov/policy-issues/coronavirus/about-the-cares-act. Since 2017, the Town of Douglas has applied for and received approximately $579,721.08 in grant assistance.	Town-wide		No longer available
	ARPA. American Rescue Plan Act. Since 2017, the Town of Douglas has applied for and received approximately $2,675,166.51 in grant assistance to stimulate the economy and address the COVID-19 pandemic.	Town-wide		No longer available
	HUD CDBG Disaster Recovery Assistance: https://www.hud.gov/hudprograms/disaster-recovery	Low-income areas		Continue to utilize

Table 3-1 Existing Protection Matrix Douglas, MA

Existing Protection	Description	Area Covered	Effectiveness and/or Enforcement	Improvements or Changes Needed
Financial				
	USDA, Natural Resources Conservation Service (NRCS) Conservation Technical Assistance: http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/technical/cta Financial Assistance: http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/ Conservation Innovation Grant Programs	Town-wide		Continue to utilize
	MA MVP Program https://www.mass.gov/municipal-vulnerability-preparedness-mvp-program	Statewide		Continue to utilize
	MA Water Quality Grants https://www.mass.gov/info-details/water-resources-grants-financial-assistance	Statewide		Continue to utilize
	GrantWatch https://www.grantwatch.com/	Statewide		Continue to utilize
	US EDA https://www.eda.gov/funding-opportunities/	Statewide		Continue to utilize

Opportunities to Expand and Improve Capabilities to Reduce Risk

Although the Town of Douglas has a wide range of capabilities and is well-positioned to address/mitigate natural hazards profiled for the community, staff should remain vigilant working towards improvement planning. Opportunities to expand and improve upon capabilities are described below for consideration.

Planning and Regulatory Capabilities

- Integrate hazard mitigation/resilience into future updates of the Town's other key plans (Open Space and Recreation Plan, Municipal Vulnerability Preparedness Summary of Findings, Master Plan) in alignment with this HMP Update.
- Conduct bylaw/regulatory reviews and updates for hazard mitigation, climate resilience and adaptation opportunities (incorporating LID, GI, and other nature-based solutions to mitigate the effects of extreme heat, heavy precipitation, and flooding).
- Increase the number of staff available to support local floodplain management activities (appoint a local Floodplain Administrator).

Administrative and Technical Capabilities

- Integrate the risk assessment information from this HMP Update at the next update to the Comprehensive Emergency Management Plan's Threat, Hazard and Vulnerability Summary.
- Build staff capacity for mitigation activities through increased training and professional development opportunities (GIS capacity).
- Leverage the Town's website, social media, and community events to promote risk awareness and low-cost mitigation activities.
- Identify/Address any unmet needs related to targeted outreach/education for more vulnerable populations.

Financial Capabilities

- Integrate long-term risk reduction/resilience as a key principle/screening/prioritization criterion for the annual Town Budget and Capital Plan process.

3.5 National Flood Insurance Program

Douglas implements and enforces the state building code and fully participates in the NFIP. Douglas supports natural resource management and protection, which is articulated in the Open Space and Recreation Plan, the Master Plan, and the MVP Summary of Findings report. Douglas understands that participation in the NFIP is an essential step in mitigation flood damage and is working to consistently enforce NFIP compliant policies in order to continue its participation in this program. The Building Commissioner oversees enforcement of the floodplain regulations in

Douglas.

The Town implements the substantial improvement/substantial damage provisions of its floodplain management regulations as required per the NFIP (CFR Title 44, Parts 59 through 65) and Massachusetts State Building Code (780 CMR). The Town also coordinates with State Flood Hazard Management Program personnel to assure that proper practices are followed and that a post-disaster plan will be in place to implement all Substantial Improvement/Substantial Damage provisions.

Table 3-2 Actions for Continued Compliance with NFIP below lists those actions that the Town has done and will continue to do and those actions that will be done within the next five years for continued compliance with the NFIP.

Table 3-2 Actions for Continued Compliance with NFIP

Actions (Listed in order of priority)	Done/Ongoing	To be Done
Join the NFIP.	X	
Participate in NFIP training by State and/or FEMA.	X	
Establish mutual aid agreements with neighboring communities to address administering the NFIP following a major storm event.	X	
Address NFIP monitoring and compliance activities.	X	
Revise/adopt subdivision regulations and erosion control regulations to improve floodplain management in the community.	X	
Participate in the CRS.		X
Prepare, distribute, or make available NFIP, insurance and building code explanatory pamphlets or booklets.		X
Identify and become knowledgeable on non-compliant structures in the community.	X	
Identify and become knowledgeable of submit to rate structures.		X
Identify cause of submit to rate structure and analyze how to prevent non-compliant structures in the future.		X
Inspect foundations at time of completion before framing to determine if lowest floor is at or above	X	
Require use of elevation certificates.		X
Report any changes in the Special Flood hazard Area to FEMA within 180 days of change.		X
Identify and keep track of LOMA/LOMR in the community.	X	
Gain familiarity with community's Flood Insurance Rate Maps.	X	

Address repetitive loss structures.		X

Source: Douglas LHMT

3.6 Community Rating System

NFIP's CRS Program is a voluntary program that recognizes and encourages a community's efforts that exceed the NFIP minimum requirements for floodplain management. The CRS program emphasizes three goals:

- the reduction of flood losses
- facilitating accurate insurance rating
- promoting the awareness of flood insurance

By participating in the CRS Program, communities can earn a 5-45% discount for flood insurance premiums based upon the activities that reduce the risk of flooding within the community. The Town does not currently participate in the CRS Program.

4.0 MITIGATION STRATEGY

4.1 Introduction

Removing and precluding development from hazardous areas is the best method of mitigation. However, this cannot be the sole focus of hazard mitigation in Douglas. The Town's character and functionality require a level of intimacy with the areas of greatest risk – flood-related, winter-related and wind-related hazard events.

4.2 Mitigation Activities

In completing the risk and vulnerability analyses, the LHMT considered projects and actions that would reduce Douglas's vulnerability to the identified hazards. The 2025 Risk Assessment Matrix (Table 2-1) is the basis for the mitigation actions presented in Section 4.3.

4.3 Mitigation Action Plan

The LHMT considered the goals of the 2025 Update and re-prioritized the matrix and the associated actions based on historical damage, safety of the population, property protection and consistency with townwide goals and objectives. Where applicable, mitigation actions carried forward from the 2017 plan include the new 'Priority Score' for each mitigation action (2025 HMP Update), along with the 2017 plan prioritization (not completed/partially completed) to reflect any changes in the prioritization of actions/comparative purposes. Issues and objectives were aligned to public health risks, evacuation and mass care considerations, disruption of essential services and potential economic losses to Douglas.

Similar to the 2017 plan, mitigation actions were separated into four broad categories to facilitate local implementation discussions, especially regarding budget considerations and roles/responsibilities:

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

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

Education and Awareness Programs - Integrate education and outreach into the community to raise awareness of overall or hazard-specific risk and generate support for

individual or community-wide efforts to reduce risk. Awareness and education seek to affect broad patterns of behavior, essentially altering a culture. Awareness-building activity tends to have a fairly slow effect, although in the end it can provide extraordinary benefits with relatively little cash outlay.

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

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

The LHMT has worked to set goals and objectives that are bound by a time frame and are compatible and consistent with state hazard mitigation goals. Upon submitting this 2025 HMP Update to MEMA, the State Hazard Mitigation Committee (SHMC) is expected to review and approve these goals and objectives to ensure consistency with statewide goals and objectives. The time frames used for this strategy are as follows (recognizing a five-year planning horizon):

- Short Term: less than 1 year
- Medium Term: 1 year – < 3 years
- Long Term: > 3 years – < 5 years

Mitigation actions include cost estimates 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
- Low – less than $50,000
- Moderate – more than $50,000, but less than $100,000
- High – over $100,000

Other relevant departments/agencies that can offer support to the project are also listed. Finally, possible finance options are offered. Under each action number, the source (s) for the mitigation action is identified in red font as a visual que for the general reader not closely involved in the development of the 2025 Update. Once the 2025 Update receives FEMA's 'Approved Pending Adoption' the mitigation strategy will be put into motion.

Evaluation/Selection of Mitigation Actions

After reviewing the Town's identified risks and vulnerabilities to natural hazards, the input/feedback from the public workshop and recommendations from the Town, and the local Capability Assessment, the LHMT selected mitigation actions to incorporate into the 2025 Update.

Prioritization of Actions

Due to budgetary constraints and other limitations, it is often impossible to implement all mitigation actions. The LHMT needed to select the most cost-effective actions for implementation first to use resources efficiently and develop a realistic approach toward mitigation risks. The DMA 2000 supports this principle of cost-effectiveness by requiring action plans to follow a prioritization process that emphasizes benefits over costs. DMA 2000 states:

> *"The mitigation strategy section shall include an action plan describing how the actions identified in section (c)(3)(ii) will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs."*

For this 2025 Update, the LHMT used FEMA's STAPLEE Qualitative Method/Relative Score to identify, evaluate, and prioritize proposed mitigation actions. The STAPLEE method uses the following criteria to assess proposed mitigation actions:

- **Social:** Assess whether it will be socially accepted within the community.
- **Technical:** Assesses whether it will be technically feasible and whether it will help to reduce losses in the long term.
- **Administrative:** Assesses the community's capabilities for carrying out the projects.
- **Political:** Assesses local and state political support for the project.
- **Legal:** Assesses whether state and local laws will allow for implementation of the project.
- **Economic:** Assesses the cost-effectiveness and sources of funding for the project.
- **Environmental:** Assesses how the project will affect the environment

Table 4-1 summarizes the proposed mitigation actions for Douglas, organized by category and priority. These mitigation actions were prioritized as either High, Medium, or Low priority based on the STAPLEE evaluation. Each of the 23 criteria on the STAPLEE worksheets was assigned either a 'favorable', 'less favorable' or 'not applicable' rating. The priority level was set by the total scores ([total favorable] – [total less favorable]) generated from the worksheets. High priority actions received a majority of criteria with favorable ratings, compared to criteria with less favorable or not-applicable rating, and resulted in a score of 10 or greater, Medium priority mitigation actions received a combination of favorable, less favorable, and not-applicable ratings for the criteria, and resulted in scores ranging between 0 and 9. Low mitigation actions received a majority of less favorable or not-applicable ratings for the criteria and resulted in a score of less than 0. The Town of Douglas will make a good faith effort to implement these actions within the

constraints of the local budget, staff resources, and new demands from state and federal agencies.

Table 4-1 STAPLEE Analysis

	STAPLEE Criteria																								
	SOCIAL		TECHNICAL			ADMINISTRATIVE			POLITICAL			LEGAL			ECONOMIC				ENVIRONMENTAL					TOTAL		PRIORITY SCORE
ACTION	Community Acceptance: Is action socially acceptable?	Effect on Segment of Population: Equity issues?	Technical Feasibility: Will action work?	Long-Term Solution: Does action solve problem or symptom?	Secondary Impacts: Will action create more problems than it solves?	Staffing: Someone to coordinate action?	Funding Allocated: Is there enough funding available?	Maintenance/Operations: Are there ongoing requirements?	Political Support: Is action politically acceptable?	Local Champion: Is there a local champion?	Public Support: Is there public support to implement action?	State Authority: Is the state authorized to implement the action?	Existing Local Authority: Does the Town have the authority to implement the action?	Political Legal Challenge: Will the action be challenged?	Benefit of Action: Do benefits exceed costs?	Cost of Action: Do costs exceed benefits?	Contributes to Economic Goals: Does action contribute to economic development goals?	Outside Funding Required: Does action require outside funding to implement?	Effect on Land/Water: Does action affect the environment?	Effect on Endangered Species: Are endangered/threatened species affected?	Effect on HAZMAT Waste Sites: Will action impact HAZMAT sites?	Consistent with Environmental Goals: Is action consistent with local environmental goals?	Consistent with Federal Laws: Will action require regulatory approvals?	Plus	Minus	
STRUCTURE AND INFRASTRUCTURE																									
HIGH PRIORITY ACTION (S)																									
1	+	N	+	+	+	+	+	-	+	+	+	N	N	N	-	+	+	+	+	N	+	+	N	16	2	**14**
2	+	+	+	+	+	+	-	-	+	+	+	N	+	+	+	-	+	-	+	N	+	+	-	16	5	**11**
3	+	N	+	+	+	+	+	+	+	+	+	N	+	N	+	-	+	-	-	N	N	N	N	13	3	**10**
4	+	N	+	+	+	+	+	+	+	+	+	N	+	N	+	-	+	-	-	N	N	N	N	13	3	**10**
MEDIUM PRIORITY ACTION (S)																									
5	+	+	+	+	+	+	-	-	+	+	+	N	+	+	-	+	+	-	+	N	+	-	-	15	6	**9**

Table 4-1 STAPLEE Analysis

ACTION	STAPLEE Criteria																					TOTAL		PRIORITY SCORE
	SOCIAL		TECHNICAL			ADMINISTRATIVE			POLITICAL			LEGAL			ECONOMIC				ENVIRONMENTAL							
	Community Acceptance: Is action socially acceptable?	Effect on Segment of Population: Equity issues?	Technical Feasibility: Will action work?	Long-Term Solution: Does action solve problem or symptom?	Secondary Impacts: Will action create more problems than it solves?	Staffing: Someone to coordinate action?	Funding Allocated: Is there enough funding available?	Maintenance/Operations: Are there ongoing requirements?	Political Support: Is action politically acceptable?	Local Champion: Is there a local champion?	Public Support: Is there public support to implement action?	State Authority: Is the state authorized to implement the action?	Existing Local Authority: Does the Town have the authority to implement the action?	Political Legal Challenge: Will the action be challenged?	Benefit of Action: Do benefits exceed costs?	Cost of Action: Do costs exceed benefits?	Contributes to Economic Goals: Does action contribute to economic development goals?	Outside Funding Required: Does action require outside funding to implement?	Effect on Land/Water: Does action affect the environment?	Effect on Endangered Species: Are endangered/threatened species affected?	Effect on HAZMAT Waste Sites: Will action impact HAZMAT sites?	Consistent with Environmental Goals: Is action consistent with local environmental goals?	Consistent with Federal Laws: Will action require regulatory approvals?	Plus	Minus	
STRUCTURE AND INFRASTRUCTURE																								
MEDIUM PRIORITY ACTION (S)																								
6	+	N	+	+	+	+	-	-	+	+	+	N	+	+	+	-	+	-	-	N	-	+	+	14	6	**8**
7	+	+	+	+	-	+	-	-	+	+	+	N	+	+	-	+	+	-	+	N	N	+	-	14	6	**8**
8	+	+	+	+	N	+	-	N	+	+	+	N	-	+	+	-	+	-	N	N	N	N	N	11	4	**7**
9	+	+	+	+	+	+	-	-	+	+	+	-	-	+	-	-	+	-	+	N	-	+	+	14	8	**6**
10	+	+	+	+	+	+	-	-	+	+	+	-	-	+	-	-	+	-	+	N	-	+	+	14	8	**6**
11	+	N	+	+	+	+	+	-	+	+	N	N	+	N	+	-	-	-	N	N	N	N	N	10	4	**6**

Table 4-1 STAPLEE Analysis

	STAPLEE Criteria																								
	SOCIAL		TECHNICAL			ADMINISTRATIVE			POLITICAL			LEGAL			ECONOMIC				ENVIRONMENTAL					TOTAL		PRIORITY SCORE
ACTION	Community Acceptance: Is action socially acceptable?	Effect on Segment of Population: Equity issues?	Technical Feasibility: Will action work?	Long-Term Solution: Does action solve problem or symptom?	Secondary Impacts: Will action create more problems than it solves?	Staffing: Someone to coordinate action?	Funding Allocated: Is there enough funding available?	Maintenance/Operations: Are there ongoing requirements?	Political Support: Is action politically acceptable?	Local Champion: Is there a local champion?	Public Support: Is there public support to implement action?	State Authority: Is the state authorized to implement the action?	Existing Local Authority: Does the Town have the authority to implement the action?	Political Legal Challenge: Will the action be challenged?	Benefit of Action: Do benefits exceed costs?	Cost of Action: Do costs exceed benefits?	Contributes to Economic Goals: Does action contribute to economic development goals?	Outside Funding Required: Does action require outside funding to implement?	Effect on Land/Water: Does action affect the environment?	Effect on Endangered Species: Are endangered/threatened species affected?	Effect on HAZMAT Waste Sites: Will action impact HAZMAT sites?	Consistent with Environmental Goals: Is action consistent with local environmental goals?	Consistent with Federal Laws: Will action require regulatory approvals?	Plus	Minus	
STRUCTURE AND INFRASTRUCTURE																									
MEDIUM PRIORITY ACTION (S)																									
12	+	N	+	+	N	+	N	-	+	+	N	+	+	+	+	-	-	N	+	N	N	+	-	11	5	**6**
13	+	N	+	+	N	+	N	-	+	+	N	+	-	+	+	-	-	N	+	N	N	+	-	11	5	**6**
14	+	N	+	+	-	+	-	-	-	-	-	+	+	-	-	+	-	+	+	N	N	+	-	10	10	**0**
LOW PRIORITY ACTION (S)																									
15	+	N	+	+	+	+	-	-	-	+	-	N	N	-	+	-	+	-	+	N	N	+	-	10	8	**-2**
16	-	-	+	+	+	+	-	-	-	+	-	N	-	-	-	+	N	-	-	N	-	+	-	7	-13	**-6**
PREPAREDNESS, COORDINATION, AND RESPONSE																									
HIGH PRIORITY ACTION (S)																									
17	+	N	+	+	N	+	+	N	+	+	+	N	+	+	+	+	N	N	+	N	N	+	+	15	0	**15**

Table 4-1 STAPLEE Analysis

	STAPLEE Criteria																								
	SOCIAL		TECHNICAL			ADMINISTRATIVE			POLITICAL			LEGAL			ECONOMIC				ENVIRONMENTAL					TOTAL		PRIORITY SCORE
ACTION	Community Acceptance: Is action socially acceptable?	Effect on Segment of Population: Equity issues?	Technical Feasibility: Will action work?	Long-Term Solution: Does action solve problem or symptom?	Secondary Impacts: Will action create more problems than it solves?	Staffing: Someone to coordinate action?	Funding Allocated: Is there enough funding available?	Maintenance/Operations: Are there ongoing requirements?	Political Support: Is action politically acceptable?	Local Champion: Is there a local champion?	Public Support: Is there public support to implement action?	State Authority: Is the state authorized to implement the action?	Existing Local Authority: Does the Town have the authority to implement the action?	Political Legal Challenge: Will the action be challenged?	Benefit of Action: Do benefits exceed costs?	Cost of Action: Do costs exceed benefits?	Contributes to Economic Goals: Does action contribute to economic development goals?	Outside Funding Required: Does action require outside funding to implement?	Effect on Land/Water: Does action affect the environment?	Effect on Endangered Species: Are endangered/threatened species affected?	Effect on HAZMAT Waste Sites: Will action impact HAZMAT sites?	Consistent with Environmental Goals: Is action consistent with local environmental goals?	Consistent with Federal Laws: Will action require regulatory approvals?	Plus	Minus	
PREPAREDNESS, COORDINATION, AND RESPONSE																									
MEDIUM PRIORITY ACTION (S)																									
18	+	N	+	+	N	+	-	-	+	+	+	+	+	+	+	-	N	-	+	+	N	+	-	14	5	**9**
LOCAL PLANS AND REGULATIONS																									
HIGH PRIORITY ACTION (S)																									
19	+	N	+	+	+	+	-	N	+	+	+	N	+	N	+	-	+	-	+	+	N	+	-	14	4	**10**
20	+	N	+	+	+	+	-	-	+	+	+	+	+	+	+	-	+	+	-	-	-	+	+	16	6	**10**
MEDIUM PRIORITY ACTION (S)																									
21	+	N	+	+	-	+	-	-	+	+	+	N	+	-	+	-	+	-	+	-	-	+	+	13	8	**5**
22	+	N	+	+	N	+	-	-	+	+	+	N	+	+	-	+	+	-	-	N	-	+	-	12	7	**5**

STRUCTURE AND INFRASTRUCTURE

High Priority Action (s)

Action #1

The Town will ensure the completion of recommended improvements identified in the most recent Phase I Inspection Report and to also develop an Operations and Maintenance Manual for Gilboa Pond Dam.

…2025 Risk Assessment

Studies and Analyses

1. No studies or analyses are recommended. No hydrologic or hydraulic analyses are known to have been done for the dam, but, in consideration of the dam's low hazard potential classification, no hydrologic or hydraulic analyses are warranted.

Recurrent Maintenance Recommendations

1. Keep large debris clear from the upstream side of the dam.
2. Monitor the condition of the concrete gate structure and make repairs if and when the structure's integrity or functionality becomes jeopardized.
3. Monitor the condition of the downstream face by taking photos annually from similar vantage points and comparing to prior years' photos.
4. Monitor the river back immediately downstream of the right abutment of the dam, especially during and after high-flow events, to make sure the integrity of the dam is not threatened.
5. Although it is not 'required', an Operation and Maintenance Manual should be developed for the dam.

Minor Repair Recommendations

1. No minor repairs are recommended at this time.

Remedial Modifications Recommendations

1. No remedial modifications are recommended at this time.

- Action Type: Planning, Pre-Disaster
- Priority Score: 2025 Score: 14 – High Priority
- Lead: Fire/Emergency Management Department
- Supporting: Town Administrator/Board of Selectmen
- Time Frame: Long Term
- Financing Options: Municipal Operating Budget (Fire Department budget), FEMA Hazard Mitigation Grants Assistance
- Cost Estimate: High

- Benefit: Reduced impacts/costs associated with flooding/Improved Public Health, Safety and Welfare/Improved resilience
- Vulnerable Area: Dams/Public Health, Safety and Welfare/Property Protection
- Hazards Addressed: Flood-related/Geologic-related Hazards

Action #2

Implement the recommendations from the Town of Douglas Sewer Asset Management Plan CWSRF No. 7070 Draft associated with operations at the Town's Wastewater Treatment Facility (WWTF)/Sewer Pump stations:

- *Improvements to Sludge Pump Station*
- *Replace the Colonial Street Pump Station*
- *GIS Expansion*
- *CCTV Inspections*
- *Updates to Asset Management Plan*

…Town of Douglas Sewer Asset Management Plan CWSRF No. 7070 Draft

- Action Type: Planning, Pre-Disaster
- Priority Score: 2025 Score: 11 – High Priority
- Lead: Sewer Department
- Supporting: Town Administrator/Board of Selectmen
- Time Frame: Long Term
- Financing Options: Municipal Operating Budget (Sewer Department budget), FEMA Hazard Mitigation Grants Assistance
- Cost Estimate: High
- Benefit: Continuity of Municipal Services/Natural Resource Protection/Improved resilience
- Vulnerable Area: Natural Resources/Municipal Services/Public Health, Safety and Welfare
- Hazards Addressed: Flood-related/Changes to Groundwater-related Hazards

Action #3

The LHMT expressed concerns that the Town of Douglas is located at the 'end of the line' regarding National Grid's service line. This often results in limited service reliability and delays in reconnection. Discussions with National Grid centered around the importance for the Town of Douglas to effectuate the continuity of electrical services for their critical facilities, specifically related to public infrastructure.

- *Water Booster Station (102 Main Street)…portable 60 kw generator*
- *Water Pump (Turbine) Station (29 West Street)…portable generator for chemical feed and monitoring equipment/genset (generator and engine combination). Part of agreement with CRG Warehouse, awaiting occupancy permit to start project (chemical feed/monitoring is needed for backup) and order portable generator.*

…2017 Plan/2025 Risk Assessment

- Action Type: Planning, Pre-Disaster
- Priority Score: 2017 Score: High Priority/2025 Score: 10 – High Priority
- Lead: Water/Sewer Department
- Supporting: Town Administrator
- Time Frame: Medium Term
- Financing Options: Municipal Operating Budget (Water/Sewer Department budget), FEMA Hazard Mitigation Grant Assistance
- Cost Estimate: Moderate
- Benefit: Continuity of services (uninterrupted water supply)/Improved resilience
- Vulnerable Area: Municipal Services/Power Supply/Public Health Safety and Welfare
- Hazards Addressed: Flood-related/Winter-related/Wind-related/Geologic-related/Extreme Heat-related/Brushfire-Wildfire-related Hazards

Action #4

The LHMT expressed concerns that the Town of Douglas is located at the 'end of the line' regarding National Grid's service line. This often results in limited service reliability and delays in reconnection. Discussions with National Grid centered around the importance for the Town of Douglas to effectuate the continuity of electrical services for their critical facilities.

- *Adult Social Center (331 Main Street)…also secondary shelter location*
- *Douglas Food Pantry (St. Denis Church/23 Manchaug Street)*

…2025 Risk Assessment

- Action Type: Planning, Pre-Disaster
- Priority Score: 2025 Score: 10 – High Priority
- Lead: Fire/Emergency Management Department
- Supporting: Police Department
- Time Frame: Medium Term
- Financing Options: Municipal Operating Budget (Fire Department budget), FEMA Hazard Mitigation Grants Assistance
- Cost Estimate: High
- Benefit: Continuity of emergency services/Improved Public Health, Safety and Welfare/Improved resilience
- Vulnerable Area: Emergency Services/Public Health, Safety and Welfare
- Hazards Addressed: Flood-related/Winter-related/Wind-related/Geologic-related/Extreme Heat-related/Brushfire-Wildfire-related Hazards

Medium Priority Action (s)

Action #5

Insufficient drainage infrastructure at the Fire Station and DPW Garage in Douglas is causing

severe flooding which affects emergency vehicle response ability to enter and exit the Fire Station and causes road closures and also direct significantly sedimented stormwater into Centerville Brook and its associated wetlands where the stormwater ends up. The Town will continue to partner with the Blackstone Watershed Collaborative towards this effort, as well as other non-profits to accomplish the goals of the community. This project seeks to:

- *Maintain and expand an existing bioretention area at the Fire Station*
- *Design and install two new bioretention areas at the fire station (one with a swale leading to it)*
- *Address sediment at the DPW Garage by paving an existing impervious packed-dirt parking lot*
- *Cover an existing sand pile*
- *Install a subsurface infiltration trench under the parking area through a sediment vault and perforated pipes*
- *Lastly, include a public education by designing and installing signage at this highly-visible site explaining nature-based solutions and co-benefits*

…2025 Risk Assessment/Blackstone Watershed Collaborative coordination

- Action Type: Planning, Pre-Disaster
- Priority Score: 2025 Score: 9 – Medium Priority
- Lead: Highway Department
- Supporting: Conservation Commission, Blackstone Watershed Collaborative
- Time Frame: Medium Term
- Financing Options: Municipal Operating Budget (Highway Department budget), FEMA Hazard Mitigation Grants Assistance, MVP Action Grants
- Cost Estimate: High
- Benefit: Reduced impacts/costs associated with flooding/Improved resilience/Continuity of transportation network
- Vulnerable Area: Localized Areas Subject to Flooding/Public Health, Safety and Welfare/Property Protection/Transportation Network
- Hazards Addressed: Flood-related, Winter-related, Wind-related Hazards

Action #6

Ensure that critical facilities are adequately protected against flood-related hazards.…2025 Risk Assessment

- *Douglas Wastewater Treatment Facility: 100-Year Flood Zone*

- *Hemlock Street Bridge: 100-Year Flood Zone*
- *South Street Bridge: 100-Year Flood Zone*
- *Cedar Street Bridge: 100-Year Flood Zone*
- *Mechanic Street Bridge: 100-Year Flood Zone*
- *Potter Road Bridge: 100-Year Flood Zone*

- *Lovett Bridge (Cook St. Bridge) : 100-Year Flood Zone*
- *West Street Bridge: 100-Year Flood Zone*
- *Manchaug Street Bridge: 100-Year Flood Zone*
- *South Street Bridge: 100-Year Flood Zone*
- *Main St. Bridge: 100-Year Flood Zone*

- *Gilboa Pond Dam: 100-Year Flood Zone*
- *Whitin Reservoir Dam: 100-Year Flood Zone*
- *Dudley Pond Dam: 100-Year Flood Zone*
- *Potter Road Dam: 100-Year Flood Zone*
- *Wallis Pond Dam: 100-Year Flood Zone*
- *Douglas Mill Pond Dam: 100-Year Flood Zone*
- *Cedar Street Pond Dam: 100-Year Flood Zone*
- *Lower Hunts Pond Dam: 100-Year Flood Zone*
- *Hunts Pond Dam: 100-Year Flood Zone*
- *Mill Pond Dam: 100-Year Flood Zone*
- *Riddle Road Pond Dam: 100-Year Flood Zone*
- *Chase Pond Dam: 100-Year Flood Zone*
- *Old Storage Pond Dam #1: 500-Year Flood Zone*
- *Morse Pond Dam: 500-Year Flood Zone*
- *Wellman Pond Dam: 500-Year Flood Zone*

  - Action Type: Planning, Pre-Disaster
  - Priority Score: 2025 Score: 8 – Medium Priority
  - Lead: Fire/Emergency Management Department
  - Supporting: Highway Department/Private Property Owners
  - Time Frame: Long Term
  - Financing Options: Municipal Operating Budget (Fire Department/Highway Department budgets), Private property owner (s) funds, FEMA Hazard Mitigation Grants Assistance
  - Cost Estimate: High
  - Benefit: Minimized/Reduced impacts and costs/Continuity of municipal services/Protection of property
  - Vulnerable Area: Municipally-owned Infrastructure/Property Protection/Resilience/Critical Facilities and Vulnerable Populations
  - Hazards Addressed: Flood-related/Winter-related/Wind-related Hazards

Action #7

Develop an implementation strategy to address property and streets subject to flooding.

…2025 Risk Assessment/MVP Summary of Findings (North St. bridge area)

Determine what mitigation activities…maintenance (catch basin cleaning) v. monitoring (State roads/beaver-related activity) v. structural/replacement (undersized pipes/culvert replacement) v. pavement management (roadway crown/ponding) can alleviate the problem while creating the most benefit to the community for each street (e.g., address those roads that are part of the Town's evacuation route first, then main thoroughfares, etc.).

Streets/Properties Subject to Flooding

Monitoring

Walnut Street (in the area of 55 Walnut St.)

- Specific Flooding Area: Walnut Street
- Flooding Cause: Beaver-related activity

Northwest Main Street (in the area of 59 Northwest Main St.)

- Specific Flooding Area: Northwest Main Street
- Flooding Cause: Beaver-related activity

Structural/Replacement

Wallis Street

- Specific Flooding Area: near stream between Whitin Reservoir and Bad Luck Lake, west side of Whitin Reservoir (in the area of 32 Wallis St.)
- Flooding Cause: Upgrade undersized, old stone culvert

Charles Street

- Specific Flooding Area: Charles Street (in the area of 7 Charles St.)
- Flooding Cause: Upgrade undersized culvert

North Street

- Specific Flooding Area: area associated with the No. 37 Bridge
- Flooding Cause: bridge still not replaced and impacted whenever Mumford River swells, due to low arch over the water and narrow roadway (also evacuation route). Replace spillway and install a culvert.

Birch Street

- Specific Flooding Area: drainage and water runoff draining in a northerly direction onto crest of Whitin Reservoir Dam (in winter, an icing of roadway issue)
- Flooding Cause: Upgrade undersized culvert

NW Main Street

- Specific Flooding Area: drainage water moving in a southerly direction onto Whitin Reservoir Dam crest and spilling from roadway into spillway approach area affecting residents along the area of NW Main St. (Icing is prevalent during winter months. Runoff begins outside of District bounds but dumps into Whitin Reservoir (sand and salt emptying into Whitin Reservoir).
- Flooding Cause: Upgrade undersized culvert

- Action Type: Planning, Pre-Disaster
- Priority Score: 2017 Score: Medium Priority/2025 Score: 8 - Medium Priority
- Lead: Highway Department
- Supporting: Water/Sewer Department, Conservation Commission, Board of Health
- Time Frame: Medium Term
- Financing Options: Municipal Operating Budget (Highway Department budget), FEMA Hazard Mitigation Grants Assistance
- Cost Estimate: High
- Benefit: Reduced impacts/costs associated with flooding/Improved resilience
- Vulnerable Area: Localized Areas Subject to Flooding/Public Health, Safety and Welfare/Property Protection/Transportation Network
- Hazards Addressed: Flood-related, Winter-related, Wind-related Hazards

Action #8

Ensure that vulnerable populations are adequately protected against flood-related hazards.

…2025 Risk Assessment

- *Classic Envelope Inc. (major employer): 100-Year Flood Zone*
- *Open Sky Community Services (major employer): 500-Year Flood Zone*

- Action Type: Planning, Pre-Disaster
- Priority Score: 2025 Score: 7 – Medium Priority
- Lead: Private Business Owners
- Supporting: Town Administrator/Board of Selectmen
- Time Frame: Long Term
- Financing Options: Private business owner (s) funds
- Cost Estimate: Moderate
- Benefit: Minimized/Reduced impacts and costs/Protection of property/Improved public health, safety and welfare
- Vulnerable Area: Major Employers/Property Protection/Public Health, Safety and Welfare/Resilience/Critical Facilities and Vulnerable Populations
- Hazards Addressed: Flood-related/Winter-related/Wind-related Hazards

Action #9

Conduct a townwide culvert capacity study to identify improvements and prepare for projected increases in precipitation/flooding. As a starting point, the Town should consider the 25 culverts previously assessed/entered into the NAACC database via technical assistance provided in 2024 by the Blackstone Watershed Collaborative.

- *Create a priority list of those in need of 'rightsizing' and replacement:*
    - *along the entire length of the Whitin Reservoir causeway (when water levels rise): elevate the causeway and widen roadway for increased capacity*
    - *Wallis Street (between Whitin Reservoir and Bad Luck Pond): currently a 3-sided culvert, replace with box culvert*
    - *Charles Street at Wellman Brook (Charles St. and Northeast Main St.)*
    - *Walnut Street and Tinkerville Brook*
    - *North Street (replace culvert that was removed as part of the spillway removal.*

…2025 Risk Assessment/MVP Summary of Findings 2020/Blackstone River Watershed Needs Assessment Report

- Action Type: Planning, Pre-Disaster
- Priority Score: 2025 Score: 6 – Medium Priority
- Lead: Highway Department
- Supporting: Water/Sewer Department, Conservation Commission, Board of Health
- Time Frame: Long Term
- Financing Options: Municipal Operating Budget (Highway Department budget), FEMA Hazard Mitigation Grants Assistance, MVP Action Grants
- Cost Estimate: High
- Benefit: Reduced impacts/costs associated with flooding/Improved resilience/Continuity of transportation network
- Vulnerable Area: Localized Areas Subject to Flooding/Public Health, Safety and Welfare/Property Protection/Transportation Network
- Hazards Addressed: Flood-related, Winter-related, Wind-related Hazards

Action #10

The Town of Douglas recently submitted an application to the Division of Ecological Restoration/MA Dept. of Fish and Game Culvert Replacement Municipal Assistance Grant Program (along with a letter of support from the Blackstone Watershed Collaborative) for the creation of a 60% permit-ready design for the replacement of the Webster Street and Wallis Streets culverts (also part of a primary evacuation route). This effort will leverage previous investments made on the stream through the replacement of the Cedar Street crossing (2021), and open 2.96 stream miles by connecting Whitin Reservoir (an area of Biomap critical natural landscape and a Coldwater Fishery), and Badluck Lake (an area of Biomap core habitat, critical natural landscape, aquatic core, rare species core, and regional connectivity). The Town will continue to partner with the Blackstone Watershed Collaborative towards this effort, as well as other non-profits to accomplish the goals of the community.

…2025 Risk Assessment/Tighe & Bond coordination call/Blackstone River Watershed Needs Assessment Report

- Action Type: Planning, Pre-Disaster
- Priority Score: 2025 Score: 6 – Medium Priority
- Lead: Highway Department
- Supporting: Conservation Commission
- Time Frame: Long Term
- Financing Options: Municipal Operating Budget (Highway Department budget), FEMA Hazard Mitigation Grants Assistance
- Cost Estimate: High
- Benefit: Reduced impacts/costs associated with flooding/Improved resilience/Continuity of transportation network and evacuation route
- Vulnerable Area: Localized Areas Subject to Flooding/Public Health, Safety and Welfare/Property Protection/Transportation Network
- Hazards Addressed: Flood-related Hazards

Action #11

The Town will establish a private/ham radio frequency to communicate available resources, evacuation, and other pertinent information to residents quickly and effectively if power goes down.

…2017 Plan

- Action Type: Planning, Pre-Disaster
- Priority Score: 2017 Score: Medium Priority/2025 Score: 6 – Medium Priority
- Lead: Fire/Emergency Management Department
- Supporting: Police Department, National Grid
- Time Frame: Medium Term
- Financing Options: Municipal Operating Budget (Fire Department budget), FEMA Hazard Mitigation Grants Assistance
- Cost Estimate: Low
- Benefit: Continuity of emergency services/Improved Public Health, Safety and Welfare/Improved resilience
- Vulnerable Area: Emergency Services/Public Health, Safety and Welfare
- Hazards Addressed: Flood-related/Winter-related/Wind-related/Geologic-related/Extreme Heat-related/Brushfire-Wildfire-related Hazards

Action #12

The Town will coordinate with the private dam owners for the Morse Pond Dam and Riddle Road Pond Dam accordingly:

- *Morse Pond Dam*

    - *Recommended improvements identified in the January 17, 2020 Phase I Inspection Report*
    - *Operations and Maintenance Manual development*
- *Riddle Road Pond Dam*
    - *Determine if purchase of the site is the preferred alternative, followed by the identification of next steps (remove/replace, repair/maintain, or decommission)*
    - *If the Town's decision is not to purchase, coordinate with the private owner to ensure the recommended improvements from the 2009 Phase I Inspection Report are completed.*

…2025 Risk Assessment

Morse Pond Dam:

Studies and Analyses

1. Prepare a formal Operation & Maintenance Manual.
2. Prepare an Emergency Action Plan.
3. Perform a detailed hydrologic/hydraulic analysis.
4. Investigate wet areas at the toe.

Recurrent Maintenance Recommendations

1. Control vegetation on the dam and areas within 20 ft of any part of the dam.
2. Remove debris from the spillway as needed.
3. Perform regular inspections of the dam especially before and after rain events.

Minor Repair Recommendations

1. No minor repairs are recommended at this time until remedial measures are undertaken.

Remedial Modifications Recommendations

1. Remove all stumps on the crest and slopes of the dam from previous tree removal efforts.
2. Remove all woody vegetation and trees on the entire dam and abutments and within 20 ft of any part of the dam.
3. Regrade dam crest and slopes and plant grass.
4. Provide slope erosion at waterline on upstream side of dam.

Riddle Road Pond Dam:

Studies and Analyses

1. Conduct preliminary hydrologic and hydraulic analysis (H&H) to determine spillway capacity and corresponding impoundment levels. This will allow the

owner to determine an impoundment level that will provide adequate freeboard for the design flood (50-year event).
2. Investigate the condition of the low-level outlet gate.

Recurrent Maintenance Recommendations

1. Regularly mow.
2. Fill low spots, ruts, areas of erosion and runoff with suitable fill. Reseed areas of thin vegetation with grassy cover.
3. Remove debris from all outlets and downstream channels.
4. Remove brush within 10 feet of the dam area, including downstream toe. Apply herbicide to stumps or use other suitable means to discourage re-growth.
5. Monitor seepage and leakage to look for changing conditions.

Minor Repair Recommendations

1. Remove all trees and wood vegetation from the embankment (do not remove stumps); and within 10 feet of the toe to facilitate inspection and monitoring of seepage conditions.
2. Establish and maintain an adequate vegetative ground cover on the downstream embankment. A conservation mix containing native species of grass and wild flowers would be appropriate.
3. If the beavers persist in blocking the outlet and raising the water level it may be necessary to install "beaver deceivers".

- Action Type: Planning, Pre-Disaster
- Priority Score: 2025 Score: 6 – Medium Priority
- Lead: Private Dam Owner (s)
- Supporting: Town Administrator/Board of Selectmen
- Time Frame: Long Term
- Financing Options: Private dam owner funds
- Cost Estimate: High
- Benefit: Reduced impacts/costs associated with flooding/Improved Public Health, Safety and Welfare/Improved resilience
- Vulnerable Area: Dams/Public Health, Safety and Welfare/Property Protection
- Hazards Addressed: Flood-related/Geologic-related Hazards

Action #13

The Town will coordinate with MA DCR ODS to ensure the completion of recommended improvements identified in the most recent Phase I Inspection Reports/Follow-Up Inspection Reports for the following:

- *Wallis Pond Dam (recommended improvements)*

Wallis Pond Dam:

Studies and Analyses

1. A detailed H & H analysis with survey should be completed by a qualified consulting engineer to assess the potential for overtopping and the need for additional spillway capacity.
2. An Operations and Maintenance (O & M) Manual should be developed and implemented for this dam. The O & M Manual should contain explicit schedules and instructions for maintenance activities to be performed on the dam and its appurtenances, as well as operational procedures to be followed under both routine and flood conditions.

Recurrent Maintenance Recommendations

1. Remove debris from the primary spillway, auxiliary spillway pipes, approach, and discharge areas. (during 2024 inspection auxiliary spillway pipes were debris free, but debris existed downstream of the main spillway).
2. Cut brush on the embankments and within 25 feet of the dam toe and abutments.
3. Mow and maintain a healthy cover of grass with a height of 3 to 12 inches.
4. Monitor for new animal burrows, sinkholes, or depressions, and repairs as necessary.
5. Monitor for increased beaver activity within the impoundment or downstream channel.
6. Monitor for increased leakage rates or embankment material migration through the downstream left masonry wall.

Maintenance and Minor Repair Recommendations

7. Repair bare areas on the dam crest. Seed areas and establish a healthy cover of grass.
8. Repair sinkholes/depressed areas on the dam crest behind masonry walls.
9. Replace missing capstones and chink areas on the downstream left masonry wall where stone is missing.
10. Remove the trees, stumps, and root systems on and from within 25 feet of the dam. Fill and compact the resultant voids and reestablish grass cover.
11. Investigate the extent of undermining and/or missing stones at the base of the downstream masonry face at the primary spillway and repair as necessary.
12. Fully remove beaver dam approximately 450 feet upstream of the dam to deter increased beaver activity and re-impoundment of the upstream portion of the pond.

Remedial Modifications Recommendations

1. Repair left upstream masonry wall and provided seepage control measures.
2. Grade the upstream slope of the embankment and provide adequate riprap armoring.

- Action Type: Planning, Pre-Disaster
- Priority Score: 2025 Score: 6 – Medium Priority
- Lead: MA DCR ODS
- Supporting: Town Administrator/Board of Selectmen
- Time Frame: Long Term
- Financing Options: MA DCR ODS funds
- Cost Estimate: High
- Benefit: Reduced impacts/costs associated with flooding/Improved Public Health, Safety and Welfare/Improved resilience
- Vulnerable Area: Dams/Public Health, Safety and Welfare/Property Protection
- Hazards Addressed: Flood-related/Geologic-related Hazards

Action #14

Upgrade the Mechanic Street Bridge (low and traps debris).

…2025 Risk Assessment

- Action Type: Planning, Pre-Disaster
- Priority Score: 2025 Score: 0 – Medium Priority
- Lead: Highway Department
- Supporting: Water/Sewer Department, Conservation Commission, Board of Health
- Time Frame: Long Term
- Financing Options: Municipal Operating Budget (Highway Department budget), FEMA Hazard Mitigation Grants Assistance
- Cost Estimate: High
- Benefit: Reduced impacts/costs associated with flooding/Improved resilience/Continuity of transportation network
- Vulnerable Area: Localized Areas Subject to Flooding/Public Health, Safety and Welfare/Property Protection/Transportation Network
- Hazards Addressed: Flood-related, Winter-related, Wind-related Hazards

Low Priority Action (s)

Action #15

The Town will coordinate with the Whitin Reservoir Watershed District to ensure the completion of recommended improvements identified in the most recent Phase I Inspection Report, to annually update the Emergency Action Plan (EAP) and to encourage the Whitin Reservoir Watershed District to collaborate on a range of specific actions that address reducing risk to/from Whitin Reservoir Dam, including:

- *Rehabilitating/Removing the dam*
- *Adopting/Enforcing land use ordinances in inundation zones*
- *Elevating structures in inundation zones*
- *Adding flood protection such as berms, floodwalls or floodproofing in inundation zones.*

…2025 Risk Assessment/MVP Summary of Findings 2020

Studies and Analyses

1. Complete an updated H&H analysis. Although previous H&H analyses have been completed for this structure (1980, 2007, during EAP development), there are inconsistencies between them with the peak flows and peak pool levels reported and all of them appear to have only evaluated PMF and the ½ PMF storm event. The previous analyses would be used to the extent practical to develop an updated analysis that would also include lower recurrent storm events (i.e. 50-year, 100-year, etc.) that would be used to calibrate the model. The updated analyses could then be used to develop and implement hydraulic modifications at the structure in order to accommodate the SDF, as discussed in remedial modification #2.
2. Continue to monitor and evaluate the observed seepage, leakage, and wet areas along the base of the downstream wall. Seepage and stability evaluations should be completed in accordance with current dam safety regulations. Pending the results of the seepage analysis, modifications may be required as discussed in remedial modifications #3.
3. Evaluate the hydraulic and structural capacity of the dike at maximum pool conditions based on survey elevations. Pending the results of the evaluations, modifications to the dike may be required.
4. Coordinate the completion of a site-specific risk and safety assessment to further evaluate, categorize, and determine the need for implementing a site safety improvement program.
5. Continue to monitor the leakage previously observed under the primary spillway; concrete scour at the primary spillway; and scour holes noted downstream of the spillways of the as part of routine monitoring.

Yearly & Recurrent Maintenance Recommendations

1. Continue regular monitoring and inspections of the dam. Included in the monitoring program should be continued regular monitoring of the cracks and depressions along the crest of the dam near the spillway culverts, the settlement at the crest near the right abutment, leakage under and through the spillway, leakage and seepage rates through the downstream stone masonry wall, possible movement of the upstream and downstream walls (utilizing survey monuments), and routine inspection of all other components of the structure. Complete formal inspections in accordance with current state

regulations. As the dam is currently classified as a high hazard potential dam, inspections are required every 2 years.

2. Regular maintenance activities should be performed to control and prevent growth of unwanted vegetation, including weeds and brush within the face of the masonry walls and vegetation within the approach and discharge channels of the primary and auxiliary spillways. Clearing of brush and removal of vegetation should continue to be performed at least once per year. Additional maintenance activities should be performed to address the following minor maintenance deficiencies observed during this inspection:
    a. The surface erosion at the left abutment and right abutment should be filled and vegetated.
    b. The isolated voids within the un-mortared sections of the upstream riprap should be filled with riprap.
3. Continue to routinely monitor and survey the upstream wall to check for indications of movement. Routinely monitor the utility poles located on the downstream side of the crest for indications of movement.
4. Continue to complete routine reviews and updates of the EAP. Complete periodic training of involved personnel.

<u>Minor Repair Recommendations</u>

1. Continue to seal cracks and patch depressions in the roadway in the area of the spillway culverts.
2. Continue to clear the tree and brush growth at the dam and dike.
3. Clear the unwanted vegetation and debris within the approach and discharge areas of the spillways.
4. Complete concrete repairs at the primary/auxiliary spillway. the scour holes within the downstream channel of the auxiliary and primary spillways.

- Action Type: Planning, Pre-Disaster
- Priority Score: 2025 Score: -2 – Low Priority
- Lead: Whitin Reservoir Watershed District
- Supporting: Town Administrator/Board of Selectmen
- Time Frame: Long Term
- Financing Options: Whitin Reservoir Watershed District funds, High Hazard Potential Dam Program funds
- Cost Estimate: High
- Benefit: Reduced impacts/costs associated with flooding/Improved Public Health, Safety and Welfare/Improved resilience
- Vulnerable Area: Dams/Public Health, Safety and Welfare/Property Protection
- Hazards Addressed: Flood-related/Geologic-related Hazards

Action #16

Old Mill Pond Dam and Douglas Mill Pond Dam recently had a Dam Breach Feasibility Study completed to evaluate considerations for removal of both dams (January 2024). The private owners wish to have both dams removed and are currently working with various partners to obtain funding necessary to do so. The Town will continue to collaborate with the private owners to secure funding for the removal of both dams.

…2025 Risk Assessment/Tighe & Bond coordination call

- Action Type: Planning, Pre-Disaster
- Priority Score: 2025 Score: -6 – Low Priority
- Lead: Private Dam Owner (s)
- Supporting: Town Administrator/Board of Selectmen
- Time Frame: Medium Term
- Financing Options: Narragansett Bay Estuary Program/EOEEA Dam and Seawall Program/Private dam owner funds/FEMA Hazard Mitigation Grants Assistance
- Cost Estimate: High
- Benefit: Reduced impacts/costs associated with flooding/Improved Public Health, Safety and Welfare/Improved Resilience
- Vulnerable Area: Dams/Public Health, Safety and Welfare/Property Protection
- Hazards Addressed: Flood-related/Geologic-related Hazards

PREPAREDNESS, COORDINATION, AND RESPONSE

High Priority Action (s)

Action #17

Evaluate the use of snow fences or 'living snow fences' (e.g., rows of trees or shrubs), to limit blowing and drifting snow over the following roadways:

- Main Street
- West Street
- Bigelow Road
- Church Street
- NW Main Street
- Wallis Street
- Riedell Road

…2025 Risk Assessment

- Action Type: Planning, Pre-Disaster
- Priority Score: 2025 Score: 15 – High Priority
- Lead: Highway Department

- Supporting: Town Administrator/Board of Selectmen
- Time Frame: Medium Term
- Financing Options: Municipal Operating Budget (Highway Department budget), FEMA Hazard Mitigation Grants Assistance
- Cost Estimate: Low
- Benefit: Reduced impacts/costs associated with impassable roadways/Improved resilience/Uninterrupted transportation network
- Vulnerable Area: Public Health, Safety and Welfare/Transportation Network
- Hazards Addressed: Winter-related Hazards

Medium Priority Action (s)

Action #18

Improve management of forested lands throughout the Town, whether DCR, Town, or privately-owned.

- *Develop and enact forest management plans including brush and dead-wood clearing programs, including public outreach to encourage action on private lands, to reduce fuel load in forest areas. Study potential for controlled burns.*
- *Increase tree trimming budget. Document street tree conditions throughout the Town and create a prioritized list for removal or pruning based on hazard level. Develop plan for storage and use of removed trees.*

…MVP Summary of Findings 2020

- Action Type: Planning, Pre-Disaster
- Priority Score: 2025 Score: 9 – Medium Priority
- Lead: Tree Warden
- Supporting: Town Administrator/Board of Selectmen
- Time Frame: Medium Term
- Financing Options: Municipal Operating Budget (Tree Warden budget), FEMA Hazard Mitigation Grants Assistance
- Cost Estimate: High
- Benefit: Minimized/Reduced impacts from fire damage/Improved resilience/Natural resource protection
- Vulnerable Area: Natural Resources/Public Health, Safety and Welfare/Property Protection
- Hazards Addressed: Wildfire/Brushfire-related Hazards

LOCAL PLANS AND REGULATIONS

High Priority Action (s)

Action #19

Use MA Drought Management Plan as a template for Town's own drought plan and integrate State's recommendations and actions according to Town's needs.

…2017 Plan

- Action Type: Planning, Pre-Disaster
- Priority Score: 2017 Score: Medium Priority/2025 Score: 10 – High Priority
- Lead: Fire/Emergency Management Department
- Supporting: Tree Warden
- Time Frame: Short Term
- Financing Options: Municipal Operating Budget (Fire Department budget), FEMA Hazard Mitigation Grant Assistance
- Cost Estimate: Moderate
- Benefit: Continuity of municipal services/Improved resilience
- Vulnerable Area: Natural Resources/Property Protection/Public Health, Safety and Welfare/Natural Resources
- Hazards Addressed: Drought-related/Wildfire and Brushfire-related Hazards

Action #20

Implement management recommendations to protect the natural resources located within the Douglas State Forest:

- *Review and implement MassDEP Wellhead Protection Tips and Guidance (MassDEP 1995, MassDEP 2011) within the Forest's Zone I Wellhead Protection Areas.*
- *Investigate relocating picnic facilities outside the Zone 1 Wellhead Protection Area at Wallum Lake Recreation Area or relocating well outside of high-use recreation areas.*
- *Install a secured perimeter fence around the wellhead at the Wallum Lake Recreation Area.*
- *Replace the existing privy at the Mid-State Trail shelter with a conforming on-site sewage disposal system, as permitted by Douglas Health Department, NHESP, MHC, and other regulators, as appropriate.*
- *Meet with representatives of MassWildlife, Rhode Island Department of Environmental Management, the Connecticut Department of Energy and Environmental Protection, and Indigenous peoples to identify common interests in the conservation of natural resources at Douglas State Forest, Mine Brook Wildlife Management Area, and Buck Hill Wildlife Management Area.*
- *Survey the state Endangered plant population, map the extent of the population and*

adjacent suitable habitat, and develop and implement a Habitat Management Plan to protect this species within Douglas State Forest.

- *Implement recommendations in the Program Accessibility Assessment (IHCD 2019).*
- *Fill or cap the open well adjacent to the campsite entrance.*

…Resource Management Plan Douglas State Forest

- Action Type: Planning, Pre-Disaster
- Priority Score: 2025 Score: 10 - High Priority
- Lead: MA DCR
- Supporting: Tree Warden
- Time Frame: Long Term
- Financing Options: MA DCR budget, Municipal Operating Budget (Tree Warden budget), FEMA Hazard Mitigation Grants Assistance
- Cost Estimate: High
- Benefit: Natural Resource Protection/Improved resilience
- Vulnerable Area: Natural Resources
- Hazards Addressed: Environmental-related/Changes to Groundwater-related Hazards

Medium Priority Action (s)

Action #21

Build the climate resilience of the Town.

Reduce flooding and stormwater concerns:

- *Install bioswales at sidewalks in new construction/developments.*
- *Assess the culverts near the Town's open space and recreation facilities and upgrade as necessary using stormwater best management practices.*
- *Educate the public on building within flood hazard areas.*
- *Educate the public on impacts of fertilizer runoff from properties within a certain distance of water resources.*

Strengthen the awareness of extreme temperatures and drought impacts:

- *Develop a public education campaign about insect-borne diseases and prevention (EEE and Lyme).*
- *Develop a public education campaign about drought and wildfire awareness.*
- *Install a local weather station to monitor temperature and precipitation changes.*

…Town of Douglas Open Space and Recreation Plan 2023/MVP Summary of Findings 2020

- Action Type: Planning, Pre-Disaster
- Priority Score: 2025 Score: 5 – Medium Priority
- Lead: Highway Department/Fire Department
- Supporting: Board of Health

- Time Frame: Medium Term
- Financing Options: Municipal Operating Budget (Highway/Fire Department budgets), FEMA Hazard Mitigation Grant Assistance, MVP Action grants
- Cost Estimate: High
- Benefit: Minimized/Reduced impacts from flooding and contamination/Improved resilience/Improved Public Health, Safety and Welfare
- Vulnerable Area: Localized Areas Subject to Flooding/Property Protection/Public Health, Safety and Welfare
- Hazards Addressed: Flood-related, Winter-related, Wind-related, Extreme Heat-related, Drought-related, Environmental-related/Changes in Groundwater-related Hazards

Action #22

Implement recommendations from the Town's Drinking Water System Risk & Resilience Assessment to help increase their Utility Resilience Index (URI):

- *Update the Emergency Response Plan and conduct annual trainings and functional exercises. The ERP should be updated according to the MassDEP Bureau of Resource Protection – Drinking Water Program "Emergency Response Plan 9ERP) Compliance Checklist", last updated November 14, 2013. In addition, the Water Department's plan must "comply with 310 CMR 22.04 (13) and the Massachusetts Guidelines and Policies for Public Water Systems, Chapter 12 – Emergency Response Planning Requirements including Appendix O – Handbook for Water Supply Emergencies." The Water Department should ensure the ERP addresses all the hazards discussed in this report including emergency response and preparedness procedures in the event of a cyber-attack.*
- *Join the Massachusetts Water/Wastewater Agency Response Network (MAWARN).*
- *Determine methods to receive critical parts and equipment in the event of a failure within 24 hours; joining MAWARN or developing relationships with additional vendors may help to reduce equipment procurement lead times.*
- *Conduct cross-training of employees to have at least 75% of staff response-capable in critical operations and maintenance positions and available as backup in the event of a pandemic illness.*
- *Consider the development of a Business Continuity Plan (BCP); the AWWA has developed a guidance document to assist water utilities with preparation of a BCP. The end goal of a BCP is to maintain operations – financially, managerially, and functionally, after any incident.*
- *Conduct a formal asset management program assessment of the drinking water system infrastructure according to the Government Accounting Standards Board (GASB) asset management standards.*

…Drinking Water System Risk and Resilience Assessment, 2021

- Action Type: Planning, Pre-Disaster
- Priority Score: 2025 Score: 5 – Medium Priority
- Lead: Water Department
- Supporting: Town Administrator/Board of Selectmen
- Time Frame: Short Term
- Financing Options: Municipal Operating Budget (Water Department budget), FEMA Hazard Mitigation Grants Assistance
- Cost Estimate: High
- Benefit: Natural Resource Protection/Improved resilience
- Vulnerable Area: Natural Resources/Municipal Services/Public Health, Safety and Welfare
- Hazards Addressed: Changes to Groundwater-related Hazards

5. PLAN IMPLEMENTATION, EVALUATION, AND REVISION

5.1 Implementation, Evaluation, and Revision of Plan

Implementation

The LHMT realized that assigning a time frame to each recommended mitigation action is important so that activities can be coordinated with other important governmental functions, such as committee meetings and budget hearings. Assigned time frames also provide input to a project plan used for tracking the progress of all activities. Once the 2025 Update receives FEMA's 'Approved Pending Adoption', the mitigation strategy will be put into motion and the Board of Selectmen will adopt the Plan (within one year of FEMA's approval). It is recognized that progress on plan implementation may vary depending upon available funding and capacity of staff to complete assigned tasks.

Once adopted by the Town of Douglas, this hazard mitigation plan will be incorporated throughout government operations and other local plans and processes (when created and/or updated) to take advantage of additional opportunities to address hazard mitigation/risk reduction in a manner that can support multiple community objectives. The LHMT will remain vigilant with helping to ensure that all new or updated plans are informed by and consistent with the goals and actions of this hazard mitigation plan. This integration includes but is not limited to the implementation or future updates to the following further described in Section 3 (Capability Assessment):

- Town of Douglas Master Plan (update in progress)
- Community Resilience Building Workshop Summary of Findings (2020)
- Open Space and Recreation Plan (2023)
- Douglas Comprehensive Emergency Management Plan
- Emergency Notifications
- Municipal Website

Additional opportunities to integrate the goals and actions of this plan into other plans, studies, reports, and processes shall continue to be identified through future meetings of the LHMT and through the annual review process described in this section.

Evaluation

The Town Administrator will bring the LHMT together annually during the month of May to review the status of the mitigation actions by initiating a 'Report Card' (action completed/partially completed, responsible department/agency, cost/funding mechanism). The Town Administrator and Douglas LHMT will also evaluate the 2025 Update's effectiveness annually by determining if any of the stated goals have been met and if completed actions have indeed mitigated the problem/vulnerability. Within two months of this meeting, a status report

will be given to the Douglas Planning Board and Board of Selectmen. Progress will be reviewed annually at advertised public hearings held by the Douglas Planning Board. It is advantageous that the annual review be conducted prior to the Town's annual budget process so any locally funded projects can be considered in the budget process.

Revision

As per 44 CFR S 201.6(d)(3), the 2025 Update will be reviewed and revised to reflect progress in local mitigation efforts and changes in priorities and resubmitted for approval within 5 years in order to continue to be eligible for mitigation project grant funding. In order to ensure that the 2025 Update remains current, the LHMT will meet annually. The 2025 Update will also be evaluated and updated after a disaster, or as funding opportunities arise for the actions and projects identified in the plan. Any updates will be reviewed and submitted to MEMA upon local approval to ensure that the state hazard mitigation strategy remains current.

5.2 Continued Public Involvement

The Town of Douglas will continue public involvement in the plan maintenance process by:

- The approved/adopted 2025 Update will be posted on the Town's website;
- The annual meeting of the LHMT to review the implementation of the 2025 Update will be posted/advertised as a public meeting as per Town guidelines; and
- The LHMT will include the public in the preparation of the five-year update using the same public participation process as in the development of this 2025 Update.

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Appendix B – Public Information and Outreach

Project Webpage

Project Kickoff Meeting: September 10, 2023

LHMT Meeting #1: April 10, 2024

LHMT Meeting #2: September 10, 2024

Public Workshop #1: February 12, 2025

LHMT Meeting #3: May 20, 2025

LHMT Meeting #4: June 24, 2025

Public Workshop #2: _____

On-Line Survey

Municipal Interviews

Whitin Reservoir Dam Emergency Action Plan Data:

- *Hydrologic/Hydraulic Studies*
- *Inundation Map*
- *Evacuation Contact List*

Table A-1 Critical Facilities

Site ID	Name	Type
1	Highway Department (Headquarters)	Municipal Facility
2	Douglas Food Pantry	Food Pantry
3	Douglas Adult Social Center	Municipal Facility, Alternate Shelter
4	Douglas Wastewater Treatment Facility	Water/Wastewater Infrastructure
7	Sewer Pump Station	Wastewater Infrastructure
12	Sewer Pump Station	Wastewater Infrastructure
13	Sewer Pump Station	Wastewater Infrastructure
14	Douglas High School	School, Large Employer, Primary Shelter
15	Douglas Middle School	School, Large Employer
16	Douglas Elementary School	School, Large Employer
17	Douglas Primary School	School
18	Douglas Fire Department (Headquarters)	Secondary Emergency Operations Center, Large Employer
19	Douglas Police Department	Primary Emergency Operations Center, Large Employer
20	Douglas Municipal Center/Town Hall	Town Hall, Public Safety Building, Primary Emergency Operations Center
22	Gilboa Pond Dam	Dam
23	Whitin Reservoir Dam	Dam
24	Dudley Pond Dam	Dam
25	Potter Road Dam	Dam
26	Wallis Pond Dam	Dam
27	Douglas Mill Pond Dam	Dam
28	Cedar Street Pond Dam	Dam
29	Lower Hunts Pond Dam	Dam
30	Hunts Pond Dam	Dam
31	Old Storage Pond Dam #1	Dam
32	Old Storage Pond Dam	Dam
33	Laurel Brook Trout Pond Dam	Dam
34	Railroad Pond Dam	Dam
35	Morse Pond Dam	Dam
36	Mill Pond Dam	Dam
37	Riddle Road Pond Dam	Dam
38	Chase Pond Dam	Dam
39	Wellman Pond Dam	Dam
56	Hemlock Street Bridge	Bridge
57	South Street Bridge	Bridge
58	West Street Bridge	Bridge
59	Mumford Street Bridge	Bridge
60	Cedar Street Bridge	Bridge
61	Stone Arch Bridge (Wallum Lake Road Bridge)	Bridge
62	North Street Bridge	Bridge
63	Mechanic Street Bridge	Bridge
64	Potter Road Bridge	Bridge
65	Lovett Bridge (Cook St. Bridge)	Bridge
66	West Street Bridge	Bridge

67	Manchaug Street Bridge	Bridge
68	Conservation Drive Bridge	Bridge
69	Gilboa Street Bridge	Bridge
70	South Street Bridge	Bridge
71	Main Street Bridge 19-21 Main St Centerville Brook	Bridge
72	Douglas Transfer Station	Municipal Facility

Table A-2 Vulnerable Populations

Site ID	Name	Type
2	Douglas Food Pantry	Food Pantry
14	Douglas High School	School, Large Employer, Primary Shelter
15	Douglas Middle School	School, Large Employer
16	Douglas Elementary School	School, Large Employer
17	Douglas Primary School	School
18	Douglas Fire Department (Headquarters)	Secondary Emergency Operations Center, Large Employer
19	Douglas Police Department	Primary Emergency Operations Center, Large Employer
21	Simon Fairfield Public Library	Municipal Facility
49	Blackstone Valley Children's Place	Daycare
50	Danielle Toupin	Daycare
51	Ingrid Vincent	Daycare
52	Classic Envelope Inc. / Supreme X / Resinate Inc.	Employment center
53	Open Sky Community Services	Employment center
54	The River Community Church	Place of Worship
55	Second Congregational Church	Place of Worship
73	Saint Denis Church	Place of Worship
74	Douglas United Methodist Church	Place of Worship
75	First Congregational Church of Douglas	Place of Worship

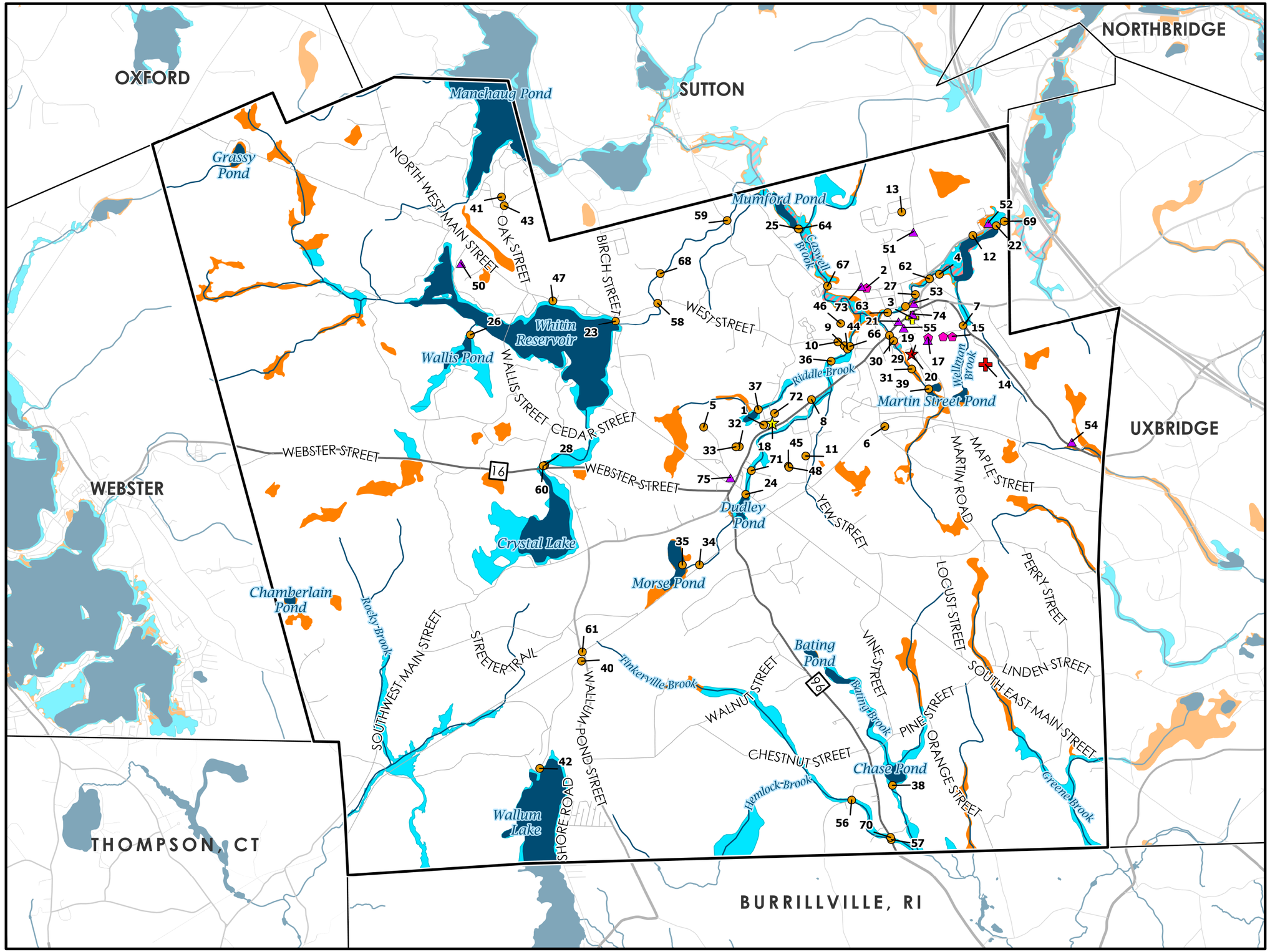


Figure 1
Flood Risks

Date: 6/18/2025
Data Sources: Bureau of Geographic Information (MassGIS), RIGIS, CT Department of Energy & Environmental Protection, Douglas LHMC

This map is for informational purposes and may not be suitable for legal, engineering, or surveying purposes.

Douglas Boundary

Surface Water Features

- Lakes and Ponds
- Rivers and Streams

Transportation

- Highway
- State Route
- Major Road
- Local Road

FEMA National Flood Hazard Layer

- 1% Annual Chance Flood Hazard
- Regulatory Floodway
- 0.2% Annual Chance Flood Hazard

Critical Facilities & Vulnerable Populations

- Primary Emergency Operations Center
- Secondary Emergency Operations Center
- Primary Shelter
- Alternate Shelter
- Critical Facility
- Critical Facility & Vulnerable Population
- Vulnerable Population

Miles
0 0.5 1

Horsley Witten Group
Sustainable Environmental Solutions

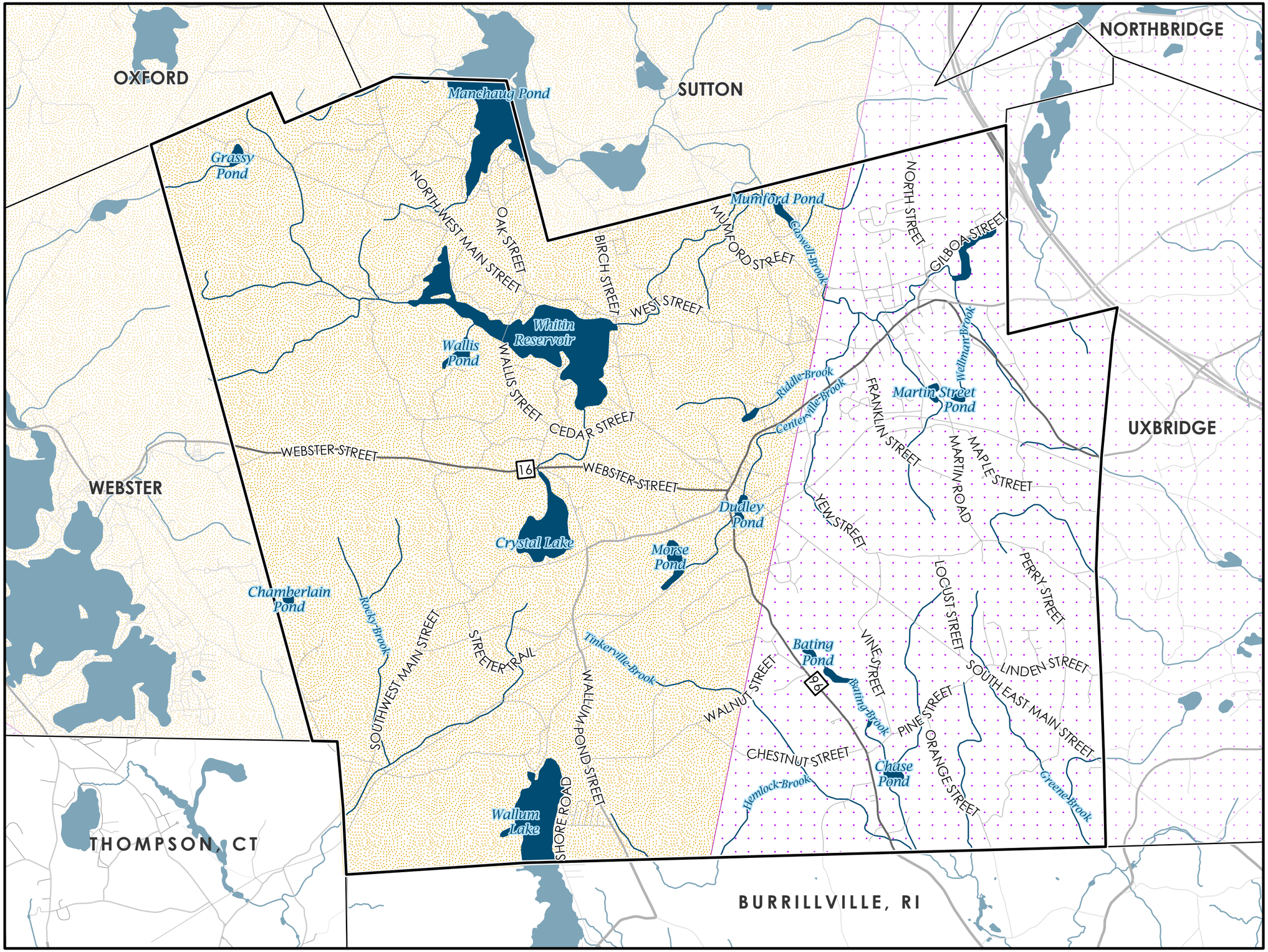


Figure 2
Average Annual Snowfall

Date: 3/31/2025
Data Sources: Bureau of Geographic Information (MassGIS), RIGIS, CT Department of Energy & Environmental Protection, Douglas LHMC

This map is for informational purposes and may not be suitable for legal, engineering, or surveying purposes.

Douglas Boundary

Surface Water
- Lakes and Ponds
- Rivers and Streams

Transportation
- Highway
- State Route
- Major Road
- Local Road

Average Annual Snowfall
- 36.1 - 48.0 inches (Zone G)
- 48.1 - 72.0 inches (Zone H)

Miles
0 0.5 1

Horsley Witten Group
Sustainable Environmental Solutions

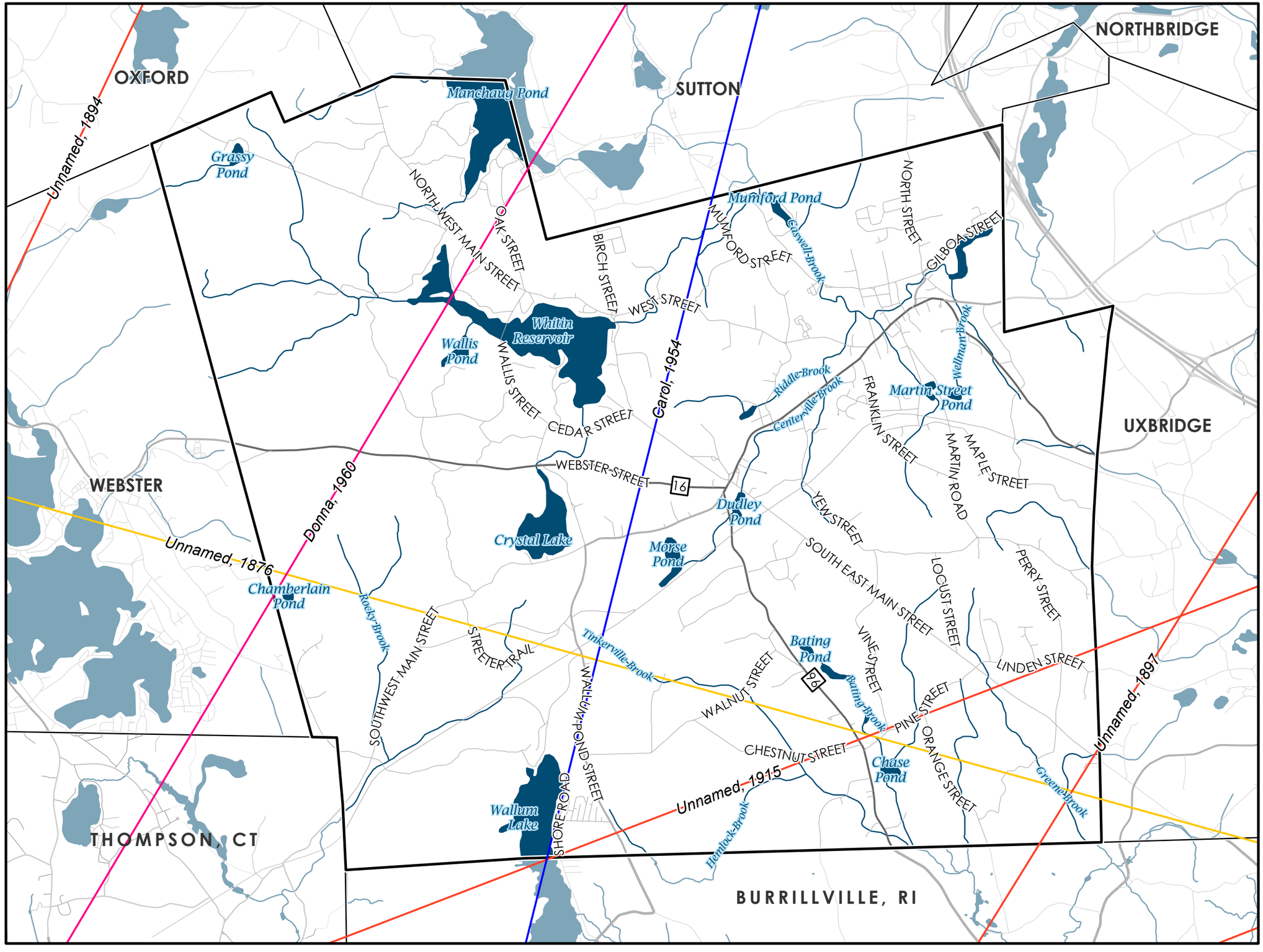


Figure 3
Historical Hurricane Tracks

Date: 3/31/2025
Data Sources: Bureau of Geographic Information (MassGIS), RIGIS, CT Department of Energy & Environmental Protection, NOAA, Douglas LHMC

This map is for informational purposes and may not be suitable for legal, engineering, or surveying purposes.

Douglas Boundary

Surface Water

- Lakes and Ponds
- Rivers and Streams

Transportation

- Highway
- State Route
- Major Road
- Local Road

Historical Hurricane Tracks

- Tropical Depression
- Tropical Storm
- Category 1
- Category 3

Miles
0 0.5 1

Horsley Witten Group
Sustainable Environmental Solutions

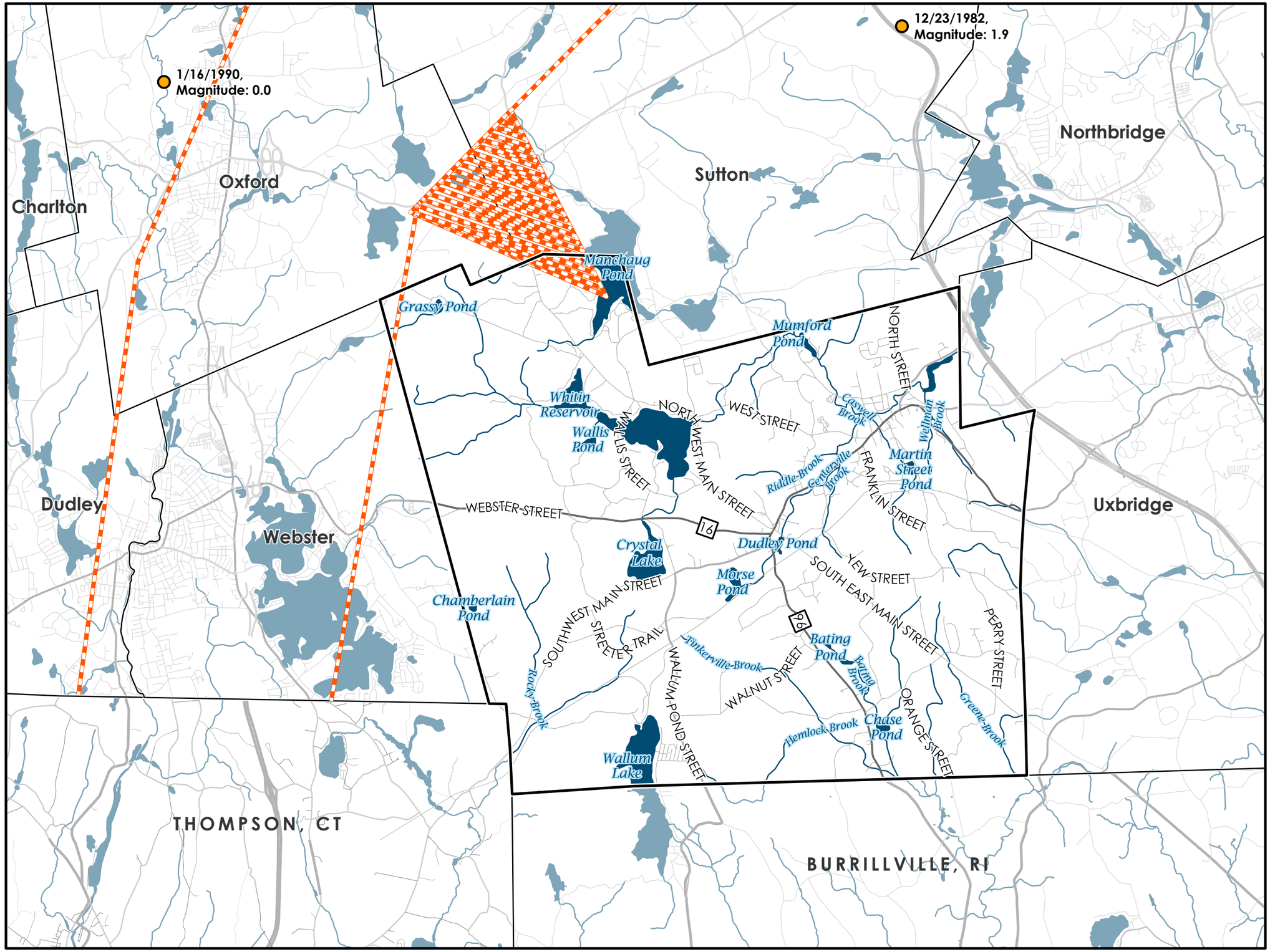


Figure 4
Earthquakes

Date: 3/31/2025
Data Sources: Bureau of Geographic Information (MassGIS), RIGIS, CT Department of Energy & Environmental Protection, Douglas LHMC

This map is for informational purposes and may not be suitable for legal, engineering, or surveying purposes.

Douglas Boundary

Surface Water
- Lakes and Ponds
- Rivers and Streams

Transportation
- Highway
- State Route
- Major Road
- Local Road

Seismic Activity
- Fault Lines
- Earthquake Epicenter

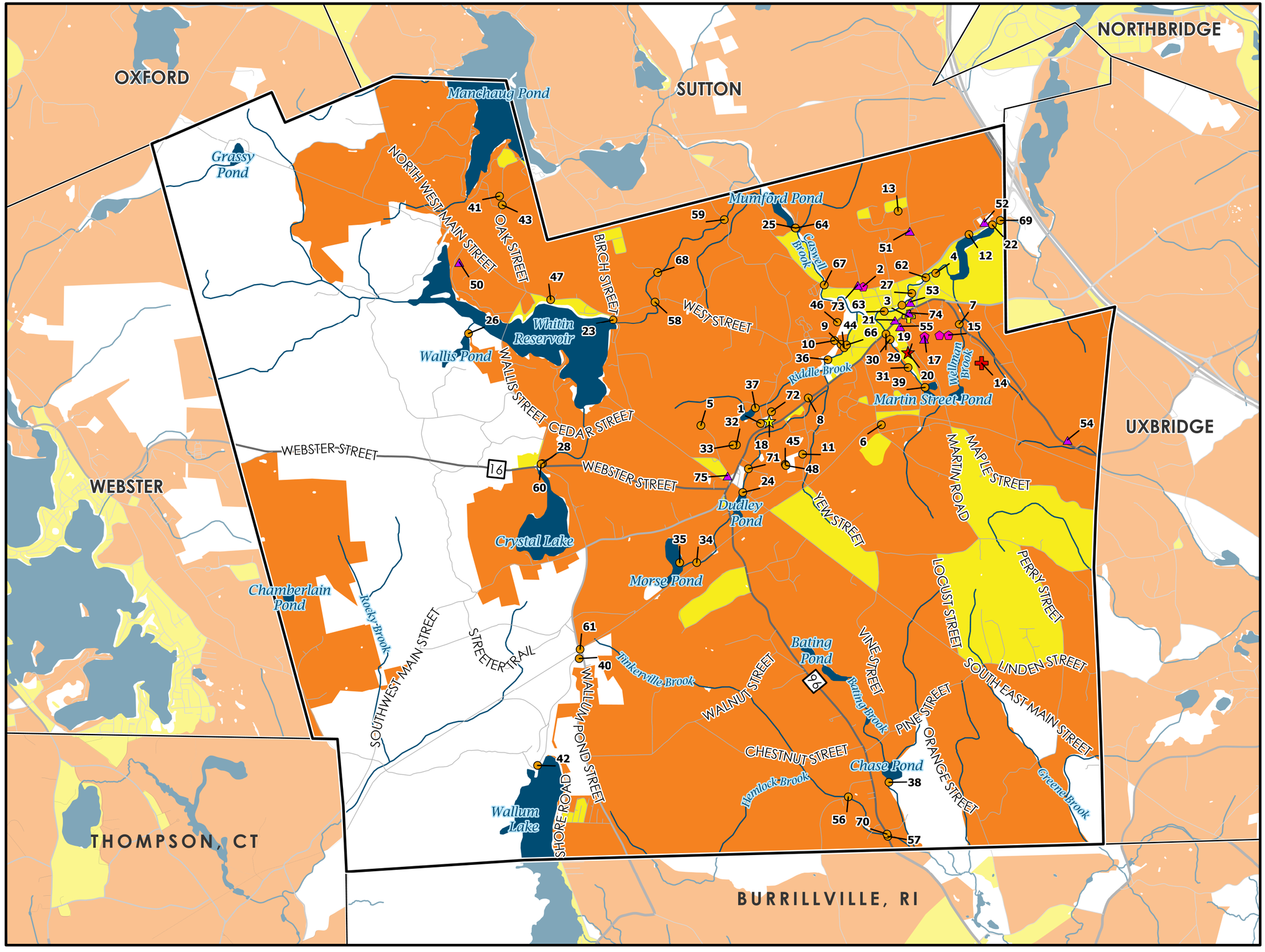
Miles
0 0.5 1

Horsley Witten Group
Sustainable Environmental Solutions

Figure 5
Wildland Urban Interface

Date: 6/18/2025
Data Sources: Bureau of Geographic Information (MassGIS), RIGIS, CT Department of Energy & Environmental Protection, U.S. Forest Service, Douglas LHMC

This map is for informational purposes and may not be suitable for legal, engineering, or surveying purposes.



Douglas Boundary

Surface Water
- Lakes and Ponds
- Rivers and Streams

Transportation
- Highway
- State Route
- Major Road
- Local Road

Wildland-Urban Interface (2020)
- Interface
- Intermix

Critical Facilities & Vulnerable Populations
- Primary Emergency Operations Center
- Secondary Emergency Operations Center
- Primary Shelter
- Alternate Shelter
- Critical Facility
- Critical Facility & Vulnerable Population
- Vulnerable Population

Miles
0 0.5 1

Horsley Witten Group
Sustainable Environmental Solutions

Figure 6
Critical Facilities & Vulnerable Populations

Date: 6/18/2025
Data Sources: Bureau of Geographic Information (MassGIS), RIGIS, CT Department of Energy & Environmental Protection, Douglas LHMC

This map is for informational purposes and may not be suitable for legal, engineering, or surveying purposes.

Douglas Boundary

Surface Water Features

- Lakes and Ponds
- Rivers and Streams

Transportation

- Highway
- State Route
- Major Road
- Local Road

Critical Facilities & Vulnerable Populations

- Primary Emergency Operations Center
- Secondary Emergency Operations Center
- Primary Shelter
- Alternate Shelter
- Critical Facility
- Critical Facility & Vulnerable Population
- Vulnerable Population

Miles
0 0.5 1

Horsley Witten Group
Sustainable Environmental Solutions

Project Webpage

Town of Douglas, MA
Hazard Mitigation Plan Update

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 Douglas Hazard Mitigation Plan Update

The Town of Douglas has hired the Horsley Witten Group, Inc. to assist with the development of the 2017 Hazard Mitigation Plan update.

Why is this important? Hazard mitigation planning enables municipalities to identify risks and vulnerabilities associated with natural hazards and develop long-term strategies for protecting people and property from future hazard events. Further information is available on FEMA's Hazard Mitigation Planning page: http://www.fema.gov/hazard-mitigation-planning.

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 financial assistance.

The approach for this plan development is premised on four primary methods, all geared towards meeting 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

Contacts

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Horsley Witten Group, Inc.
Project Manager
cpereira@horsleywitten.com
(401) 263-6048

Stay tuned for more information on how to get involved!

Project Kickoff Meeting: September 10, 2023

Horsley Witten Group
Sustainable Environmental Solutions

Memorandum of Meeting

To: Kelly Manning
From: Craig Pereira
Date: September 20, 2023
Re: Douglas, MA Hazard Mitigation Plan (HMP) Update—Kickoff Meeting

In attendance:
Kelly Manning – Assistant Fire Chief
Craig Pereira – Horsley Witten Group (HW), Project Manager

A kickoff meeting was held to discuss the rollout of the HMP update project for the Town of Douglas. The following items were discussed:

1. **Local Hazard Mitigation Committee (LHMC).** Craig asked if the LHMC has been assembled. Kelly has assembled the LHMC as part of the grant application (still working on including a resident on the LHMC).
    a. Kelly will forward the final list of names/titles/emails to Craig. Kelly will also identify several potential dates/times for LHMC meeting #1 approximately one month out (2-hour window, in person) and send to Craig for confirmation/scheduling purposes.

2. **Project Webpage**. Craig requested a project webpage be created and hosted on the Town's website, to serve as the repository for all information related to project meetings, presentations, public surveys, and draft plan materials. HW has developed the content to be included (attached). Kelly confirmed the Town can host the project webpage.
    a. Kelly will forward the Town's IT point of contact to coordinate with Craig on getting the webpage up and running.

3. **Interdepartmental Email**. Craig requested the Town send an interdepartmental email to all Town boards/commissions to announce the kickoff of the HMP update project *after the LHMC members are confirmed and the project webpage is live.* The email can direct individuals to the project webpage, and it should be conveyed that HW staff may contact Town staff individually as part of the data collection process.
    a. Kelly to send out the project kickoff interdepartmental email once the LHMC members are confirmed and the project webpage is live. Please copy Craig.

4. Hazards to be Profiled. Craig reviewed the hazards profiled under the 2017 HMP and noted several proposed revisions:
    a. Hazards to be categorized by type.
    b. Riverine/Flash Flooding to be added to Flood-related hazards.
    c. Hail to be added to Wind-related hazards.
    d. Extreme Temperatures-related hazards: previously rolled in together…MEMA has requested these both become standalone categories.
    e. Climate change: to be integrated into each hazard profiled via a "climate change impacts on" section within each hazard, rather than one static section.

    Kelly asked that Vector-borne and Beaver Activity be added to hazards to be profiled. Updated list of hazards to be profiled included in 'Proposed Plan Layout' (attached).

5. Dam Inventory. New to this HMP update will be the incorporation of FEMA's High Hazard Potential Dams Rehabilitation Grant Program requirements (officially effective April 19, 2023). Plan guidance calls for coordination by the local community with dam owners and the state dam safety office to determine any issues/risks associated with dam structures. Craig noted HW will need any Phase I Inspection reports, Emergency Action Plans, and Operation & Maintenance Plans (list provided in Data Needs Request document, attached). Kelly commented that there has been some discussion regarding one specific dam as of late. If the Town can't locate reports requested, Craig can do a public documents request to DCS/Office of Dam Safety.
    a. Kelly to follow up with dam inventory requested information and forward anything available to Craig.

6. Proposed Plan Layout. Craig noted that he reviewed the current plan and has developed a 'Proposed Plan Layout' document (attached) that is more aligned with FEMA's/MEMA's "Plan Review Tool" that needs to accompany the draft HMP submission. This will also be presented to the LHMC at meeting #1 for consideration.

7. Hazard Index Update. HW has already completed a review of the National Centers for Environmental Information (NCEI): Severe Events Database to document hazards, impacts, and damages that have occurred (January 1, 2015 – August 1, 2023) to inform the development of the draft Hazard Index Update during the first LHMC meeting. HW will need information from the Town about some hazards not included in the NCEI database, to be collected/discussed at the first LHMC meeting.

8. Capability Assessment. HW will initiate a review of existing plans, studies, and reports as part of the development of the draft Capability Assessment section of the 2024 update. Craig emphasized this is important for ensuring consistency between different plans and their respective actions. Craig also noted that the HMP update will incorporate all MVP/Climate Clearinghouse data as part of the capability assessment and will carry over the Town's MVP actions into the HMP update.

9. Data Needs Request Document. Craig reviewed the various data needs the Town should get started on while the LHMC gets organized to meet (attached):
    a. NFIP program/participation information.
    b. FEMA Region 1 repetitive loss properties.
    c. GIS Data: Parcel data set (shapefile) and Critical Facilities/Vulnerable Populations data set (shapefile).
    d. Dams information.
    e. 2017 Plan in native format.
        i. Kelly to provide requested data to Craig as available.

10. 2017 Plan Report Card. HW has developed the 2017 Plan Report Card (attached). This is required by FEMA and will be the focus of the first public workshop. It is intended to show the Town's progress on achieving the actions identified in the existing plan (responsible party/timeframe/funding mechanism). The 2017 Plan Report Card will document what has been accomplished, what should be carried forward into the HMP update, and what can be removed (identified as no longer relevant). Craig requested the Town begin completing the 2017 Plan Report Card and noted that outstanding questions and comments can be reviewed during the first LHMC meeting.
    a. Kelly to distribute 2017 Plan Report Card to LHMC members (according to the identified 'responsible party') to begin their audit.

LHMT Meeting #1: April 10, 2024

Douglas Hazard Mitigation Plan Update
Local Hazard Mitigation Team Meeting #1

Wednesday, April 10, 2024
Douglas Town Hall
29 Depot Street, East Douglas, MA 01516
9:30 AM – 11:30 AM

Virtual Option:

Join the meeting now

Meeting ID: 233 657 921 926
Passcode: VmjZQr

Agenda

1. Introductions

2. Project Coordination
    a. Scope of Work
    b. Schedule
    c. Public Outreach
        i. Project Webpage
        ii. Interdepartmental memo/email: Project Kickoff
    d. Data Collection
        i. HW FTP Access
        ii. Parcel Data Set with recent CAMA export
        iii. Critical Facilities/Vulnerable Populations
        iv. Dams (jurisdictional only)
            1. Phase 1 Inspection Reports
            2. Emergency Action Plans (High/Significant Hazard Dams
        v. NFIP Repetitive Flood Loss Data
            1. Flood Insurance Policies
            2. Repetitive Flood Loss Properties request to FEMA Region 1

3. 2017 Plan Report Card

4. Hazard Index
    a. Hazard Index 2017 vs 2024
        i. Hazards included
        ii. Ranking methodology 2017 Plan

5. Proposed Plan Layout

6. Agenda/Logistics for Public Workshop #1

Horsley Witten Group

Memorandum of Meeting

To: Douglas Local Hazard Mitigation Team (LHMT)

From: Craig Pereira

Date: April 10, 2024

Re: Douglas LHMT Meeting #1

In attendance:

Kelly Manning – Assistant Fire Chief
Kristin Harris – Board of Health.
Mark Dunleavy – Patrolman/IT
Nick Miglionico – Police Chief
Matt Wojcik – Town Administrator
Matthew Benoit – Director of Community Development
Robert Sullivan – System's Manager Water/Sewer Department.

Consultant Team
Gabriella Spitzer – Environmental Planner
Craig Pereira, Project Manager - Horsley Witten Group, Inc. (HW)

The first LHMT meeting was held on April 10, 2024, at the Douglas Municipal Center to discuss the Hazard Mitigation Plan Update. The following items were discussed:

1. Introductions
    a. Craig Pereira opened the meeting and asked everyone to introduce themselves and identify their role/position in Douglas.
2. Project Coordination
    a. Scope of Work (attached)
        i. Craig briefly reviewed the scope of work, identifying the primary tasks for each component.
    b. Schedule (attached)
        i. Craig briefly reviewed the proposed schedule. This effort is getting a late start; however, we should be able to push through and have a draft plan to MEMA by the first of the new year. The LHMT's responsiveness to data collection requests/review of draft materials will factor heavily on meeting the proposed schedule.
    c. Public Outreach
        i. Project Webpage

1. Craig will coordinate with Dave Vernaglia to get the project webpage up and running. To be hosted under the Community Development Department, with mention on the Town's landing page.

ii. Interdepartmental memo/email: Project Kickoff

1. Kelly Manning will send out an email to all Departments, Boards and Commissions once the project webpage is up and running. The email should announce the kickoff of the Hazard Mitigation Plan Update project, inform municipal officials that representatives from the Horsley Witten Group may be reaching out for information/data, and drive people to the project webpage. Kelly to copy Craig on this email.

d. Data Collection

1. LHMT members are asked to send large plans/studies/reports not publicly available to HW's FTP site for review by HW staff. (to be included in the Capability Assessment section of the 2024 update).
2. Robert Sullivan commented that there is a recent Risk and Resiliency Plan that is now available and will be forwarded to HW.
3. HW FTP Access

- Go to http:www.horsleywitten.com
- On the lower right-hand side of the webpage, click on 'Click here to send us your large files'
- Enter your email address
- Enter recipient at HW (Craig Pereira)
- Password is StormWater (case sensitive)
- Browse the files you would like to send
- Click on 'Send this File'

ii. Parcel Data Set with recent CAMA export

1. Previously received as part of the original data request.

iii. Critical Facilities/Vulnerable Populations

1. Appendix A from 2017 Plan (attached)
    a. Craig requested the Town's GIS data set for Critical Facilities/Vulnerable Populations for update by HW staff (managed by outside vendor (CIA). If unable to locate, a request should be made to MAPC for this data developed as part of the 2017 HMP.

b. Craig also requested the LHMT review the GIS data included as part of the 2017 plan and update to include name of facility, address, and map/lot.

iv. Dams (jurisdictional only)

1. Craig commented that the recently released federal guidance (April 19, 2023) requires a more robust summary of jurisdictional dams in the community. Craig has been working with Kelly to obtain what is readily available, identified below. For any outstanding data, Craig will submit a public records request with MA DCR Office of Dam Safety. Craig also commented that the HMP Update will cover publicly- and privately-owned dams…although the Town may not have jurisdiction over privately-owned dams, they will still be reviewed, summarized, and mitigation actions developed if not in compliance referenced as 'The Town will work with private dam owners to……' so they clearly understand their responsibilities.
2. Matt Wojick commented that regarding Whitin's Reservoir Dam: this area is a separate municipality within the Town of Douglas. More information is likely required by HW to better understand how to navigate this situation/relationship. Matt also stated that the Town opens up any beaver dams that have the potential to flood roadways.
3. Robert commented that there are two dams upstream of the WWTP that have received warnings. Any notifications/compliance records should be delivered as part of the public records request. Robert also stated there are several large-scale beaver dams associated with the Wallis Pond Dam and Morse Pond Dam.
4. Phase 1 Inspection Reports
    a. High Hazard dams (every two years)
        i. Whitin Reservoir Dam (received: February 12, 2024)
    b. Significant Hazard Dams (every 5 years)
        i. Dudley Pond Dam
        ii. Douglas Mill Pond Dam
        iii. Old Mill Pond Dam
        iv. Hunts Pond Dam

c. Low Hazard Dams (every 1 years)
    i. Gilboa Pond Dam (received: September 19, 2019)
    ii. Potter Road Dam
    iii. Wallis Pond Dam
    iv. Morse Pond Dam
    v. Riddle Road Pond Dam
5. Emergency Action Plans (High/Significant Hazard Dams
    a. Whitin Reservoir Dam
    b. Dudley Pond Dam
    c. Douglas Mill Pond Dam (received: December 2021)
    d. Old Mill Pond Dam (received: December 2021)
    e. Hunts Pond Dam

v. NFIP Repetitive Flood Loss Data
1. Flood Insurance Policies data
    a. Previously received from Joy Duperault.
2. Repetitive Flood Loss Properties
    a. Kelly has initiated this data request with FEMA Region.
        i. Craig commented that this LHMT should stay on top of this request, having experienced delays in the past.

3. 2017 Plan Report Card (recently updated version attached)
    a. Craig provided a brief summary of the status of the 2017 plan report card. Kelly provided Craig with an updated report card (via email during the meeting), since their last correspondence. Craig has updated the most recent version.
    b. All LHMT members should review and update where necessary. Items highlighted in yellow require attention, items highlighted in green represent 'no further action needed'. For those actions that have been partially completed, it is important that LHMT members provide what specifically was accomplished and what remains to be done so it can be appropriately accounted for in the 2024 update.

4. Hazard Index (updated attached)
    a. Hazard Index 2017 vs 2024
        i. Hazards to be profiled

1. Craig reviewed the hazards to be profiled and stated that the Town is required to profile all hazards included in the state HMP (recently released September 2023). Hazards not profiled due to limited frequency/severity need to be called out as such in the 2024 update.
2. Craig reviewed what the hazard index is intended to represent: a snapshot of conditions over the past 5 years and provided an overview of the scoring/ranking process including FEMA's Criteria Ranking (attached). Craig also discussed the data collected from NOAA's National Centers for Environmental Information/Severe Events Database (and its limitations). This data informed HW's draft completion of some of the hazards to be profiled (where known data exists) as compared to the remaining hazards to be scored/ranked by the LHMT. Hazards shown in blue font represent the hazards considered 'high risk' from the Town's 2020 MVP process (in a perfect world, these, along with the updated rankings should align, but not required).

ii. Ranking methodology 2017 Plan
    1. Craig provided an overview of an additional step in ranking from the 2017 plan (shown in red font)…and requested the LHMT move away from this approach. The LHMT has the flexibility to score/ranks hazards according to existing conditions/observations over the last 5 years and should not require 'being weighted' by a second process (LHMT agreed to move away from a second round of ranking/scoring. The previous second round of rankings were based on a scale of 1 to 5 as follows:
        a. 1 – Highest risk
        b. 2 – High risk
        c. 3 – Medium risk
        d. 4 – Low risk
        e. 5 – Lowest risk

iii. Craig walked the LHMT through ranking all the hazards to be profiled with the exception of Invasive Species: Aquatic Plant Species. Kelly will coordinate with Paul Cauette (Whitin's Water District) to rank this. The first ranking/score in the cell is from the 2017 HMP, while the ranking/score in parentheses is the updated 2024 rank/score.

1. All LHMT members should review the updated Hazard Index and provide feedback to Craig if anything should be modified.

5. Proposed Plan Layout (attached)
    a. Craig reviewed the prosed, revised plan layout to align the plan update with FEMA's Plan Review Tool that is required to accompany the draft updated plan to MEMA/FEMA. This shift will not only align the update with the Plan Review Tool, but it will also facilitate a better flow/read.
        i. All LHMT members should review this and provide feedback to Craig if anything should be modified.
6. General Comments:
    a. Gabriella Spitzer asked if there were any upcoming events we could piggyback on to spread the word regarding the project, and perhaps get the Online Survey distributed. Matt mentioned that Town Meeting is taking place on May 6, 2024. Craig commented that perhaps the Online Survey be developed earlier than LHMT #2 so a poster with QR code and survey link could be displayed at Town Meeting. Craig will work on this and coordinate with Kelly.
    b. Matt Benoit commented that the Town recently initiated an update to the Master Plan. This is great timing aligned with the HMP update. HW will coordinate with Matt to stay on top of the Master plan update process.

Criteria for Frequency Categorization:

Very Low (1):	events that occur less frequently than once in 100 years (less than 1% per year).
Low (2):	events that occur at least once in the next 100 years (1% to 10% per year).
Moderate (3):	events that occur at least once in the next 10 years (10% to 40% per year).
High (4):	events that occur at least once in the next year (40% to 70% probability).
Very High (5):	events that occur more than once in the next year (70% to 100% probability).

The criteria used for severity categorization, based on past hazard events includes:

Criteria for Severity Categorization (based on past hazard events):

Minor (1):	Very few injuries if any Minimal disruption on quality of life Shutdown of critical facilities and services temporary Minor property damage
Limited (2):	Injuries and/or illness do not result in permanent disability Complete shutdown of critical facilities for more than a day Property severely damaged/destroyed < 25%, > 10%
Critical (3):	Multiple injuries possible Complete shutdown of critical facilities for more than a week Property severely damaged/destroyed < 50%, > 25%
Catastrophic (4):	Multiple deaths/injuries possible Complete shutdown of facilities for 30 days or more Property severely damaged/destroyed > 50%

Criteria for Location/Land Area Affected:

Small:	Less than 10% of the town affected
Medium:	10 to 50% of the town affected
Large:	More than 50% of the town affected

Vulnerability: Index rating was then based on a scale of 1 – 5: (2nd round of ranking from 2018)

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

Douglas, MA Hazard Mitigation Plan (proposed layout)

Section 1: Introduction

Overview

- Hazard mitigation planning in general

Plan Purpose

- Benefits of hazard mitigation planning

Mission statement

- Create

Goals

- Create

Planning Process

- Overview of approach/process of the project
    - Local Hazard Mitigation Committee Meetings
    - Public Workshops
    - Municipal Interviews
    - Survey

Community Profile

- Geographic location
- History
- Demographics
- Government Structure

History of Disaster Declarations

- Federal Emergency and Major Disaster Declarations for the County

Recent Disaster Declarations

- Recent (2016 – forward) Federal Emergency and Major Disaster Declarations for the County

Section 2: Hazard Identification and Risk Assessment

Introduction

- Which hazards merit special attention
- What actions might be taken to reduce the impact(s) of those hazards
- What resources are likely to be needed

Hazard Identification

- Required to evaluate all hazards identified in the State Plan…anticipated list:
    - Riverine/Flash Flooding
    - Heavy Rain/Inland and Urban Flooding
    - Dam Failure
    - Beaver Activity
    - Blizzards/Heavy Snow/Winter Weather/Nor'easters
    - Ice Storms
    - Extreme Cold
    - Hurricanes/Tropical Storms
    - Tornadoes

    - High Winds
    - Lightning/Thunderstorms
    - Hail
    - Earthquakes
    - Drought
    - Extreme Heat
    - Brushfires/Wildfires
    - Invasive Species - Aquatic plant species
    - Invasive Species – Vector borne
    - Changes to Groundwater
- Not addressed:
    - Coastal Flooding
    - Coastal Erosion
    - Avalanche
    - Expansive Soils
    - Land Subsidence
    - Volcanoes
    - Tsunamis
- Climate Change will be included in each hazard as 'Climate change impacts on…'

Hazard Profiles

- Review of NOAA's National Centers for Environmental Information (http://www.ncdc.noaa.gov/) 'Storm Events' database and develop tables based on hazard type, date, level/description and damages to develop a Hazard Index (January 1, 2015 – August 1, 2023).
    - Flood Related
        - MVP Climate Change Projections on Precipitation to be added.
    - Winter Related
        - MVP Climate Change Projections on Extreme Cold Temperatures to be added.
    - Wind Related
        - Hail and TORRO Hail Intensity Scale to be added.
    - Geologic Related
    - Drought Related
    - Extreme Heat Related
        - MVP Climate Change Projections on Extreme Heat to be added.
    - Brushfire/Wildfire Related
    - Invasive Species Related
    - Changes to Groundwater-Related
- Evaluate the location/history/probability of future occurrence of hazards (consistent with the state plan)

Criteria for Frequency Categorization:

Very Low (1):	events that occur less frequently than once in 100 years (less than 1% per year).
Low (2):	events that occur at least once in the next 100 years (1% to 10% per year).
Moderate (3):	events that occur at least once in the next 10 years (10% to 40% per year).
High (4):	events that occur at least once in the next year (40% to 70% probability).
Very High (5):	events that occur more than once in the next year (70% to 100% probability).

Criteria for Location and Extent:

Small:	Less than 10% of the town affected
Medium:	10 to 50% of the town affected
Large:	More than 50% of the town affected

Criteria for Severity Categorization:

Minor (1):	Very few injuries if any
	Minimal disruption on quality of life
	Shutdown of critical facilities and services temporary
	Minor property damage
Limited (2):	Injuries and/or illness do not result in permanent disability
	Complete shutdown of critical facilities for more than a day
	Property severely damaged/destroyed < 25%, > 10%
Critical (3):	Multiple injuries possible
	Complete shutdown of critical facilities for more than a week
	Property severely damaged/destroyed < 50%, > 25%
Catastrophic (4):	Multiple deaths/injuries possible
	Complete shutdown of facilities for 30 days or more
	Property severely damaged/destroyed > 50%

- Mapping will also be updated
    - Environmental Justice areas to be added?
    - Critical Facilities/Vulnerable Populations
    - FEMA Flood Zones/Repetitive Flood Loss Areas
    - Snowfall, Hurricane/Tornado paths, etc.

Vulnerability

- Evaluates vulnerability of built environment, social and environment.

Development Trends

- Changes over time, future development plans (residential/commercial/industrial)

Economic Vulnerability

- Impacts of FEMA flood zones (Economic by land use type, land/building values)

Social Vulnerability

- Impacts to built/natural environment and that relationship to the social structure of the community
- Infrastructure/Emergency lifelines
- Evacuation/Populations at risk

Environmental Vulnerability

FEMA Disaster Grant Assistance

- Has the Town received any financial assistance from MEMA/FEMA/EOEEA/MVP?

Section 3: Capability Assessment

Introduction

- Documents local, state and federal department, agency and program capabilities in terms of pre- and post-disaster activities

Planning/Regulatory Capabilities

- Planning documents
- Regulations/Bylaws
- Building Code

Administrative Capabilities

- Emergency Management Plan
    - Emergency Operations Center/Shelter
- Municipal Website
- Coordination with Neighboring Communities
- Municipal Structure/Staff

Financial Capabilities

- Federal/State Grant Opportunities

National Flood Insurance Program

- NFIP/Compliance with NFIP

Existing Protection Matrix

- Summary of all above

Section 4: Mitigation Strategy

Introduction

Mitigation Activities

- Requires an action for every vulnerability identified in the plan

Mitigation Action Plan

- Categories
    - Public Education and Awareness
    - Property Protection
    - Natural Resource Protection
    - Structural Projects
    - Emergency Services
    - Planning and Prevention

- Time Frame
    - Short Term = 0 to 6 Months
    - Medium Term = 6 to 18 Months
    - Long Term = 18 Months to 5 Years

- Cost Estimate
    - Staff Time – municipal personnel time
    - Minimal – less than $50,000
    - Moderate – more than $50,000, but less than $100,000
    - Significant – over $100,000

- Prioritization of Actions (abbreviated Benefit/Cost Analysis)
  STAPLEE Criteria

- **S**ocial: Is the action compatible with present and future local community needs and values?
- **T**echnical: Is the action feasible with available local resources (or as supplement by outside resources as necessary)?
- **A**dministrative: Does the community have the administrative capacity to implement the action?
- **P**olitical: Is there strong public support to implement and maintain the action?
- **L**egal: Does the community have the legal authority to implement the action?
- **E**conomic: Is the action cost-effective?
- **E**nvironmental: Does the action impact environmental resources, and is the impact positive, negative, or neutral?

- Action Description
  - Action Type:
  - Priority Score:
  - Lead:
  - Supporting:
  - Time Frame:
  - Financing Options:
  - Cost Estimate:
  - Benefit:
  - Vulnerable Area:

Section 5: Plan Implementation/Maintenance

Implementation/Evaluation/Revision

- Implementation
  - Following municipal adoption

- Evaluation
  - Annually

- Revision
  - Every 5 years/after a major event

Continued Public Involvement

- Posted on Town's website
- Annual Town Meeting

Task 1: Convene/Coordinate with LHMT, Conduct Public Outreach, Document Planning Process	**July 17, 2023 - December 13, 2024**
Kickoff Meeting with Consultant and Town	September 20, 2023
Meeting #1 - LHMT	April 10, 2024
- Project Webpage	
- Data Collection	
Task 2: Perform Risk Assessment	**August 2023 - June 14, 2024**
- Hazard Identification/Profiles	
Coordination with Town Departments/Personnel	Week of May 13, 2024
Public Workshop #1	Week of June 3, 2024
Task 3: Facility Inventory/GIS Mapping	**June 17, 2024 - July 12, 2024**
- Risks/Critical Fac./Vulnerable Pops. Mapping	
Task 4: Perform Hazard Vulnerability Assessment	**July 15, 2024 - August 9, 2024**
Meeting #2 - LHMT	Week of July 15, 2024
- Vulnerability Analyses	
Task 5: Develop Goals and Objectives	**August 12, 2024 - August 30, 2024**
- Preliminary Mitigation Recommendations	
Task 6: Analyze Existing/Research New Strategies	**January 2024 - August 30, 2024**
- Plans, Policies and Problems Examination	
Task 7: Develop Comprehensive Range of Actions	**September 2, 2024 - September 27, 2024**
Meeting #3 - LHMT	Week of September 16, 2024
Task 8: Plan Maintenance/Implementation	**September 30, 2024 - October 11, 2024**
Task 9: Review, Revision, Approval and Adoption of Plan	**September 30, 2024 - January 3, 2025**
Meeting #4 - LHMT	Week of October 21, 2024
- Cost Benefit Review/Prioritization	
Public Comment Period	**November 18, 2024 - December 13, 2024**
Public Workshop #2/Select Board Public Hearing	Week of December 2, 2024
Final Deliverable to MEMA	***By January 3, 2025***

Table 2-2 2024 Douglas, MA

Natural Hazard	*Frequency (i.e. Very Low, Low, Moderate, High, Very High)*	*Location (i.e. small, medium, large)*	*Severity (i.e. Minor; Limited; Critical; Catastrophic)*	*2024 Hazard Index (i.e. ranked by combining frequency and severity; 10 - high, 1 - low)*
Flood-Related Hazards				
- Riverine/Flash Flooding[1]	Low (High/4)	Medium (Small)	Minor (Minor/1)	3/Medium (Moderate/5)
- Inland/Urban Flooding/Heavy Rain[1]	Low (Very High/5)	Medium (Medium)	Minor (Minor/1)	3/Medium (Moderate/6)
- Dam Failures[1]	Very Low (Very Low/1)	Small (Medium)	Limited (Limited/2)	3/Medium (Low/3)
- Beaver Activity[1]	(Very High/5)	(Medium)	(Minor/1)	(Moderate/6)
Winter-Related Hazards				
- Snow/Blizzard/Winter Storm/Nor' easter	Very High (Very High/5)	Large (Large)	Limited (Limited/2)	2/High (High/7)
- Ice[1]	Very High (Very High/5)	Large (Large)	Limited (Limited/2)	2/High (High/7)
- Extreme Cold	Very High (Moderate/3)	Large (Large)	Limited (Limited/2)	4/Low (Moderate/5)
Wind-Related Hazards				
- Hurricanes/Tropical Storms	Low (Moderate/3)	Large (Large)	Limited (Limited/2)	3/Medium (Moderate/5)
- Tornadoes	Very Low (Low/2)	Small (Medium)	Limited (Limited/2)	4/Low (Moderate/4)
- High Winds	Moderate (Very High/5)	Small (Large)	Limited (Limited/2)	2/Medium (High/7)
- Lightning/Thunderstorms	Moderate (Moderate/3)	Small (Medium)	Minor (Minor/1)	2/High (Moderate/4)
- Hail[1]	(High/4)	(Medium)	(Minor/1)	(Moderate/5)
Geologic-Related Hazards				
- Earthquakes[1]	Very Low (Very Low/1)	Large (Large)	Minor (Minor/1)	5/Highest (Low/2)
Extreme Heat-Related Hazards				
- Extreme Heat[1]	Moderate (Very High/5)	Large (Large)	Limited (Minor/1)	4/Low (Moderate/6)
Drought-Related Hazards				
- Drought	Very Low (Moderate/3)	Large (Large)	Minor (Minor/1)	4/High (Moderate/4)
Brushfire/Wildfire-Related Hazards				
- Brushfire/Wildfire[1]	Moderate (Very High/5)	Medium (Small)	Minor (Limited/2)	4/Medium (High/7)
Environmental-Related Hazards				
- Aquatic Plant Invasive Species[1]	(_)	(_)	(_)	(_)
- Vector Borne[1]	(Very High/5)	(Large)	(Minor/1)	(Moderate/6)
Changes to Groundwater-Related Hazards				
- Changes in Groundwater[1]	(Very Low/1)	(Small)	(Minor/1)	(Low/2)

Notes:

1: Ranked by Douglas LHMC (all others utilized NOAA Severe Events Database).

Blue Font: MVP priorities

Douglas Hazard Mitigation Plan Update

LHMT Meeting #1

Douglas Town Hall

29 Depot St. East Douglas, MA
April 10, 2024 9:30 AM - 11:30 AM

Name	Email Address
Craig Pereira	
Kelly Manning	
Kristin Harris	
Mark Dunleavy	
Nick Miglionico	
Matt Wojcik	
Gabriella Spitzer	
Matthew Benoit	
Robert Sullivan	

LHMT Meeting #2: September 10, 2024

Douglas Hazard Mitigation Plan Update
Local Hazard Mitigation Team Meeting #2

Tuesday, September 10, 2024
Douglas Town Hall
29 Depot Street, East Douglas, MA 01516
9:00 AM – 11:00 AM

Agenda

1. Re-Introductions

2. Draft Plan Update Progress
    a. Risk Assessment
    b. Capability Assessment
    c. Online Community Survey
    d. NFIP Data
3. Outstanding Data Needs
    a. Project Webpage
    b. 2017 Plan Report Card
    c. Hazard Index
    d. Flood-Related Hazards
    e. Winter-related Hazards
    f. Brushfire/Wildfire-related Hazards
    g. Environmental-related Hazards
    h. Capability Assessment
4. Today's Discussion
    a. Dams
    b. Critical Facilities/Vulnerable Populations
    c. Public Infrastructure/Emergency Lifelines
    d. Mission Statement
    e. Goals
    f. Actions for Continued Compliance with NFIP
    g. Development Trends
5. Next Steps
    a. Public Workshop #1

Horsley Witten Group

Memorandum of Meeting

To: Douglas Local Hazard Mitigation Team (LHMT)

From: Craig Pereira

Date: September 10, 2024

Re: Douglas LHMT Meeting #2

In attendance:

Kelly Manning – Assistant Fire Chief
Kristin Harris – Board of Health
Adam Furno – Superintendent, Highway Dept.
John Furno – Fire Chief
Nick Miglionico – Police Chief
Matthew Benoit – Director of Community Development
Robert Sullivan – System's Manager Water/Sewer Department
Ken Frasier – Building Commissioner

Consultant Team
Gabriella Spitzer – Environmental Planner
Craig Pereira, Project Manager - Horsley Witten Group, Inc. (HW)

The second LHMT meeting was held on September 10, 2024, at the Douglas Municipal Center to discuss the Hazard Mitigation Plan Update. The following items were discussed:

1. Re-introductions
    a. With some new folks in the room, Craig Pereira opened the meeting and asked everyone to re-introduce themselves and identify their role/position in Douglas.
2. Draft Plan Update Progress
    a. Risk Assessment
        i. Near complete, several outstanding data needs (addressed below)
    b. Capability Assessment
        i. Near complete, several outstanding data needs (addressed below)
    c. Online Community Survey
        i. 24 responses as of 9/6/24
        ii. How can we push this out more?
            1. All LHMT members should continue to push this out via departmental staff, social media, personal networks.
    d. NFIP Data
        i. Previously received, completed.
3. Outstanding Data Needs
    a. Project Webpage (PRIORITY)
        i. Hosted on Community Development's webpage

ii. Matt Benoit to work with Dave Vernaglia to get this up and running this week.

b. 2017 Plan Report Card (PRIORITY)
   i. Craig reviewed the outstanding actions with the group an finalized the Report Card (attached)

c. Hazard Index
   i. Invasive Species – Aquatic Plant/Vector-borne still to be ranked.
      1. Brandon Fanuef 5/15/ email…did not rank either for Frequency
      2. Property at Risk? …locations?
      3. Remediation efforts to date?

      Craig will draft an email for Kelly to convey to Brandon clarifying what is needed.

d. Flood-related Hazards
   i. Property at Risk: Craig reviewed the list below and asked that LHMT members review and confirm.
      1. Closely associated with areas adjacent to Whitin Reservoir, Gilboa Pond, Mumford River, Wellman Brook, and Tinkerville Brook…2017 Plan
      2. Wallis Street (west side of Whitin Reservoir)…2017 Plan
      3. North Street (at Mumford River)…2017 Plan
      4. Reidell Road, Northwest Main Street…Matt Benoit
      5. Culverted Streams…2020 MVP
         a. Whitin Reservoir Causeway
         b. Wallis Street (in between Whitin Reservoir and Bad Luck Lake)
         c. Charles Street (at Wellman Brook)
         d. Walnut Street (at Tinkerville Brook)
      6. Mechanic Street Bridge…2020 MVP
         a. Low and upgrade needed

      All LHMT members to review/confirm list above, add any additional areas since the 2017 Plan/2020 MVP.
      7. Beaver Activity
         a. Incidents since 2016?
         b. Remediation efforts to date?
         c. Protocol/Policy?

      Robert Sullivan to provide information.

e. Winter-related Hazards
   i. Property at Risk: Craig provided an inaccurate listing. The 2017 Plan only references 'the entire Town' as vulnerable with no specific roadways/areas listed.
      1. All LHMT members to provide input.

f. Brushfire/Wildfire-related Hazards
   i. Incidents since 2016, including mutual aid calls to other communities?
   ii. Property at Risk?
      1. Fire Department to provide information.

g. Environmental-related Hazards (Invasive Species – Aquatic Plants)
   i. Species impacting Douglas?
   ii. Remediation efforts to date?

iii. Locations/Concentrations?
1. Craig to coordinate with Brandon Fanuef via Kelly Manning.

h. Capability Assessment
i. Risk & Resiliency Plan
1. Robert Sullivan to provide.
ii. Old Mill Pond Dam/Douglas Mill Pond Dam – Dam Removal Feasibility Study
1. Kelly has requested a copy from Kris Houle.
iii. Asset Management Plan – Sewer. Robert also stated there is an Asset Management Plan – Water that remains ongoing.
1. Robert to provide Sewer plan.

4. Today's Discussion
a. Dams
i. Gray's Pond Dam…originally unknown. After some digging, Craig found the '*Modified River Flow Study'* Gomez & Sullivan Engineers and Environmental Scientists, November 2003 study which states this is also known as Potter Road Dam…although the 2017 Douglas HMP states the MA id numbers for both dams which are not one in the same (Gray's Pond Dam: 02761/Potter Road Dam: MA01172)?
1. All LHMT to review and confirm this is accurate.
ii. Meeks Upper Pond Dam (MA02766)/Old Storage Pond Dam (MA02767)…from 2017 Plan
1. Both private and non-jurisdictional
2. Breached?
a. Several LHMT members confirmed this structure is still in place.
b. Craig will reach back to MA DCR ODS again.
c. All LHMT members to provide additional details if known.
iii. Old Mill Pond Dam/Douglas Mill Pond Dam – Dam Removal Feasibility Study
1. August 8, 2024, site walk summary received from Kelly. Kelly has already coordinated with Kris Houle for a copy.

b. Critical Facilities/Vulnerable Populations
i. Review of data set: Craig displayed the list of critical facilities/vulnerable populations obtained from the 207 Plan/MA GIS and asked the LHMT if there were any sites missing (attached).
1. Craig identified Old Mill Pond Dam as not included in the data set.
2. Groundwater protection wells: several have multiple entries. According to MA GIS, there are multiple wells associated with several sites (Winding Brook Camping…also identified by LHMT as 'closed'/DCR Douglas State Forest/Lake Manchaug Camping).
3. Large Employers listed in 2017 Plan, can be added to list of Vulnerable Populations (places of assembly):

Company	**Location**	**No. of Employees**
Classic Envelope Inc.	Gilboa St #1	100-249
Douglas Elementary School	Davis St	50-99
Douglas High School	Davis St	50-99

Douglas Intermediate School	Davis St	50-99	
Alternatives Unlimited	North St	20-49	
Douglas Elementary School	Gleason Ct	20-49	
Douglas Fire Dept	Main St		20-49
Douglas Police Dept	Depot St	20-49	
Douglas Public Schools	Davis St	20-49	

Other than those facilities already included in the GIS data set, All LHMT to review/confirm list is current, provide map/lot or parcel id to be incorporated into GIS data set.

4. Daycares listed in 2017 Plan, with reference to Emergency Management Director maintaining this list:
    - Poulin, Cheryl A. 15 Arch St
    - Lauziere, Constance 7 C St
    - Gonzalez, Janet 80 S. E. Main St
    - Phillips, Kim 157 Monroe St
    - Thibodeau, Jeanette A. 32 Monroe St
    - Burch, Jane E. 22 Cross St
    - Nixon, Ann-Marie 93 Perry St
    - Hainey, Jo S. 14 Fairbanks Court
    - Potter, Laurette A. 280 South St
    - Lewis, Kristin L. 16 Linden St
    - Dariotis, Stamatia 6 Sunset Dr
    - Lathe, Kimberly 104 Perry St

    Douglas Emergency Management Director to confirm list is current, provide map/lot or parcel id to be incorporated into GIS data set.

c. Public Infrastructure/Emergency Lifelines
    i. Water/Sewer/Stormwater systems. Craig requested a writeup/summary for all three topics.
        1. Robert indicated that the Asset Management Plan – Sewer will have what is needed for the Sewer element (Craig to review once received).
        2. Craig will provide an example writeup/summary from another community to use as a guide for content.

d. Actions for Continued compliance with NFIP: Craig walked the LHMT through the table below to confirm what has been done/remains ongoing and what remains to be done.

Actions (Listed in order of priority)	Done/Ongoing	To be Done
Join the NFIP.	X	
Participate in NFIP training by State and/or FEMA.	X	

Establish mutual aid agreements with neighboring communities to address administering the NFIP following a major storm event.	X	
Address NFIP monitoring and compliance activities.	X	
Revise/adopt subdivision regulations and erosion control regulations to improve floodplain management in the community.	X	
Participate in the CRS.		X
Prepare, distribute, or make available NFIP, insurance and building code explanatory pamphlets or booklets.		X
Identify and become knowledgeable on non-compliant structures in the community.	X	
Identify and become knowledgeable of submit to rate structures.		X
Identify cause of submit to rate structure and analyze how to prevent non-compliant structures in the future.		X
Inspect foundations at time of completion before framing to determine if lowest floor is at or above BFE.	X	
Require use of elevation certificates.		X
Report any changes in the Special Flood hazard Area to FEMA within 180 days of change.		X
Identify and keep track of LOMA/LOMR in the community.	X	
Gain familiarity with community's Flood Insurance Rate Maps.	X	
Address repetitive loss structures.		X

e. Development Trends: Craig requested a list of residential (greater than 5 home subdivision only) and commercial development (including solar arrays) projects since 2016. Data needed includes:
    i. Name of development
    ii. Street address, Map/Lot or parcel ID
    iii. Number of homes included/any affordable (if residential)
    iv. Total SF (if commercial)
    v. Status: Approved/Under Review/Completed/Under Construction
f. Mission Statement development: Gabriella Spitzer walked the LHMT through a discussion regarding the development of a mission statement for the plan update, first asking the question, '***What are the outcomes that you want to achieve from the hazard mitigation planning process***?
    - Which hazards and stressors are you most concerned about?
    - How does hazard mitigation relate to other community plans and goals?
    - How is the community changing, and how does that relate to risks?

- When you think about what Douglas might look like in 5, 10, 20 years (or longer), what is most important? How do natural hazards relate to that?

LHMT responses included:

- Future weather projections and what that means (have not had a significant wildfire in a number of years)…
- Increased development causing more flooding…
- Infrastructure not sized/designed for future needs based on projections, also in need of upgrades…
- Continued growth causing developers to access land not suitable…balance development with natural resources (clear-cutting)…
- Not a lot of policies in place to mitigate development…
- State policies are over-riding town policies…
- Traffic and narrow bridges…
- 40B developments over-riding town regs…

Draft Mission Statement for consideration based on this discussion:

Douglas's population and land use are changing, and climate risks are growing. In that context, the mission of the Douglas Hazard Mitigation Plan is to plan effectively to reduce risks and protect the whole community.

All LHMT members to review and revise/wordsmith as necessary.

g. Goals development. Gabriella Spitzer walked the LHMT through a discussion regarding the development of over-arching goals for the plan update, first stating, 'The mitigation actions/strategies in the HMP come from two places: directly responding to the risks in the risk assessment and the overall goals the committee sets for how to address those the risks.'

Gabriella also provided the following considerations:

Reduce Impacts of Hazards	Vision for How/Methods

• Protect health, safety, and wellbeing
• Reduce public and private property damages
• Minimize economic losses from hazards and disruption
• Minimize social distress from hazards and disruption
• Protect the town's heritage, culture, history and/or natural environment
	• Reduce risks through:
	  ○ Developing or strengthening structures and infrastructure
	  ○ Public education and outreach
	  ○ Natural system protection and use of green infrastructure methods
	  ○ Planning and regulations
	• Community engagement and awareness

LHMT responses included:

- Funding is always a primary concern
- Infrastructure to be addressed
- Heritage/History preservation to be included

Draft goals for consideration based on this discussion:

1. Protect the public's health, safety and welfare.
2. Minimize social distress and economic losses/business disruptions from hazards.
3. Reduce property damage caused by natural hazards and their downstream impacts, including dam failure.

4. Provide an ongoing forum for the education and awareness of natural hazard mitigation issues, programs, policies, projects, and resources.
5. Adapt to/mitigate for the existing and projected impacts of climate change towards a sustainable, resilient community.
6. Protect the community's assets, including the town's cultural, historical, and natural/environmental assets from hazards.

All LHMT members to review and revise/wordsmith as necessary.

5. Next Steps
    a. Public Workshop #1
        i. The LHMT discussed potential dates for the first public workshop and recommended it be part of the Planning Board's bi-weekly agenda/meeting to ensure participation.
        ii. Tentative Date: October 23, 2024, 7 PM.
            1. Matt Benoit will get this on the Planning Board's agenda.
        iii. As the date gets closer, Craig will develop a flyer for posting/distribution.
    b. For transferring large files to the HW Team:

HW FTP Access:

- Go to http:www.horsleywitten.com
- On the lower right-hand side of the webpage, click on 'Click here to send us your large files'
- Enter your email address
- Enter recipient at HW (Craig Pereira)
- Password is StormWater (case sensitive)
- Browse the files you would like to send
- Click on 'Send this File'

Town of Douglas, MA
Hazard Mitigation Plan Update

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 Douglas Hazard Mitigation Plan Update

The Town of Douglas has hired the Horsley Witten Group, Inc. to assist with the development of the 2017 Hazard Mitigation Plan update.

Why is this important? Hazard mitigation planning enables municipalities to identify risks and vulnerabilities associated with natural hazards and develop long-term strategies for protecting people and property from future hazard events. Further information is available on FEMA's Hazard Mitigation Planning page: http://www.fema.gov/hazard-mitigation-planning.

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 financial assistance.

The approach for this plan development is premised on four primary methods, all geared towards meeting 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

Contacts

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Stay tuned for more information on how to get involved!

Horsley Witten Group
Sustainable Environmental Solutions
55 Dorrance Street • Suite 200 • Providence, RI 02903
401-272-1717 • horsleywitten.com

2017 Plan Report Card

STRUCTURE & INFRASTRUCTURE

Tree trimming and tree wire installation needed across town to protect utility wires. Repeat every four years.

Priority: High
Type of Activity: Structure & Infrastructure
Implementation Responsibility: National Grid/Town of Douglas/Private Property Owners
Funding Resources: Utility/Local/Private
Cost: High
Timeframe: 1-2 years

Completed Yes or No: Partially completed (50%)…carry forward remaining 50% into 2024 Update
Month/Year: 2/2024
Responsible Party: Town/National Grid
Funding mechanism/Grant amount: Local funding and National Grid

Identify/Resolve issues causing flooding on Wallis St. on west side of Whitin Reservoir (100-year flood zone).

Priority: Medium
Type of Activity: Structure & Infrastructure
Implementation Responsibility: Highway Dept./Water and Sewer Dept./ Conservation/Board of Health
Funding Resources: Local
Cost: More information required
Timeframe: 1-2 years

Completed Yes or No: Not completed, carry forward into 2024 Update
Month/Year:
Responsible Party:
Funding mechanism/Grant amount:

Identify/Resolve issues causing flooding on Wallis St. near stream between Whitin Reservoir and Bad Luck Lake. Upgrade undersized, old, stone culvert.

Priority: Medium

Type of Activity: Structure & Infrastructure
Implementation Responsibility: Highway Dept./Water and Sewer Dept./ Conservation/Board of Health
Funding Resources: Local
Cost: Low
Timeframe: 1-2 years

Completed Yes or No: Not completed, carry forward into 2024 Update
Month/Year:
Responsible Party:
Funding mechanism/Grant amount: Town has applied for funding twice

Identify/Resolve issues causing flooding on Walnut Street (100-year flood zone).

Priority: Medium
Type of Activity: Structure & Infrastructure
Implementation Responsibility: Highway Dept./Water and Sewer Dept./ Conservation/Board of Health
Funding Resources: Local
Cost: Low
Timeframe: 1-2 years

Completed Yes or No: Not completed, carry forward into 2024 Update
Month/Year:
Responsible Party:
Funding mechanism/Grant amount:

Identify/Resolve issues causing flooding on Charles St. (100-year flood zone). Upgrade undersized culvert.

Priority: Medium
Type of Activity: Structure & Infrastructure
Implementation Responsibility: Highway Dept./Water and Sewer Dept./ Conservation/Board of Health
Funding Resources: Local
Cost: Low
Timeframe: ongoing

Completed Yes or No: Not completed, carry forward into 2024 Update
Month/Year:
Responsible Party:
Funding mechanism/Grant amount:

Identify/Resolve issues causing flooding on North Street and Gilboa Street (100-year flood zone). Upgrade drainage system.

Priority: Medium
Type of Activity: Structure & Infrastructure
Implementation Responsibility: Highway Dept./Water and Sewer Dept./
Conservation/Board of Health
Funding Resources: Local
Cost: Low
Timeframe: 1-2 years

Completed Yes or No: Completed
Month/Year: 11/2023
Responsible Party: Highway Dept./Water/Sewer Dept.
Funding mechanism/Grant amount: MassWorks grant/EDA grant

Obtain 60kw generator for Water Booster Station at 102 Main Street.

Priority: High
Type of Activity: Structure & Infrastructure
Implementation Responsibility: Emergency Management
Funding Resources: HMGP/PDM/State grants
Cost: More information required
Timeframe: 1-2 years

Completed Yes or No: Not completed, carry forward into 2024 update
Month/Year:
Responsible Party:
Funding mechanism/Grant amount:

Obtain portable generator for: Water Pump Station at 29 West Street for chemical feed and monitoring equipment purposes, and also the Sewer Pump Station at 120 Gilboa Street.

Priority: High
Type of Activity: Structure & Infrastructure
Implementation Responsibility: Emergency Management
Funding Resources: HMGP/PDM/State grants
Cost: More information required
Timeframe: 1-2 years

Completed Yes or No: Partially completed…Part of agreement with CRG Warehouse, awaiting occupancy permit to start project. Sewer pump station is completed, chemical feed/monitoring is needed for backup…carry this portion into 2024 update
Month/Year:
Responsible Party:
Funding mechanism/Grant amount:

The Town should investigate the cause of losing pressure in hydrants, and back

system up, to ensure adequate fire-fighting capabilities.

Priority: High
Type of Activity: Structure & Infrastructure
Implementation Responsibility: Fire Dept.
Funding Resources: Local
Cost: More information required
Timeframe: 3-5 years

Completed Yes or No: Partially completed…high-hazard areas have been addressed: Gilboa Street. Other areas are ongoing (Depot St., Caswell Court, Upper North St.)…remove
Month/Year: September 2023
Responsible Party:
Funding mechanism/Grant amount: EDA grant

Establish a private/ham radio frequency to communicate available resources, evacuation, and other pertinent information to residents quickly and effectively if power goes down.

Priority: Medium
Type of Activity: Structure & Infrastructure
Implementation Responsibility: Emergency Management
Funding Resources: Local
Cost: Low
Timeframe: 1-2 years

Completed Yes or No: Not completed, carry forward into 2024 Update
Month/Year:
Responsible Party:
Funding mechanism/Grant amount:

PREPAREDNESS, COORDINATION, AND RESPONSE

As Douglas is at the end of National Grid's electric distribution system and therefore takes longer to restore power, create a plan to distribute water to residents in the event of a prolonged power outage.

Priority: High
Type of Activity: Preparedness, Coordination, and Response
Implementation Responsibility: Emergency Management
Funding Resources: Local
Cost: Low
Timeframe: 1-2 years

Completed Yes or No: Completed

Month/Year: 4/2020
Responsible Party: Fire Dept./Civil Defense
Funding mechanism/Grant amount:

Continue to participate in National Flood Insurance Program (NFIP) or other training offered by the State and/or FEMA that addresses flood hazard planning and management.

Priority: High
Type of Activity: Preparedness, Coordination, and Response
Implementation Responsibility: Highway Dept./Emergency Management
Funding Resources: Local
Cost: Low
Timeframe: Ongoing

Completed Yes or No: completed
Month/Year:
Responsible Party:
Funding mechanism/Grant amount:

Investigate Community Rating System (CRS) benefits and requirements and decide whether to participate.

Priority: Low
Type of Activity: Preparedness, Coordination, and Response
Implementation Responsibility: Highway Dept./Emergency Management/Planning Dept.
Funding Resources: Local
Cost: Low
Timeframe: 1-2 years

Completed Yes or No: not completed, carry forward
Month/Year:
Responsible Party:
Funding mechanism/Grant amount:

Road information coordination and planning for snow removal.

Priority: High
Type of Activity: Preparedness, Coordination, and Response
Implementation Responsibility: Highway Dept./MassDOT/Mass State Police/CMRPC
Funding Resources: Local/HMGP/PDM/State grants/Private contracts
Cost: Low
Timeframe: ongoing

Completed Yes or No: Completed
Month/Year: 2020
Responsible Party: Highway Dept.
Funding mechanism/Grant amount: Chapter 90 funding

Evacuation Plan updates.

Priority: High
Type of Activity: Preparedness, Coordination, and Response
Implementation Responsibility: Emergency Management/Highway Dept./CMRPC/MassDOT
Funding Resources: Local/Homeland Security via MEMA and CRHSAC
Cost: Low
Timeframe: 1-2 years

Completed Yes or No: not completed, remove…routes to remain fluid based on type of event/time of event/severity of event.
Month/Year:
Responsible Party:
Funding mechanism/Grant amount:

Maintain fire access roads in Douglas Forest and isolated areas.

Priority: High
Type of Activity: Preparedness, Coordination, and Response
Implementation Responsibility: Fire Dept./Highway Dept.
Funding Resources: Local/AFG grants for equipment
Cost: Low
Timeframe: ongoing

Completed Yes or No: Not completed, carry forward into 2024 Update
Month/Year:
Responsible Party:
Funding mechanism/Grant amount:

EDUCATION & AWARENESS

Provide information to residents and businesses on severe snowstorms, ice storms, nor'easters, severe thunderstorms, high winds, tornadoes, lightning, and flooding, hurricanes, tropical storms, and microbursts. Information should include evacuation procedures and encourage the acquisition of additional gasoline, water, and other resources should traffic prevent proper evacuation. Incorporate this information into school programs for students to bring home information to parents.

Priority: High

Type of Activity: Education and Awareness
Implementation Responsibility: Emergency Management
Funding Resources: Local
Cost: Low
Timeframe: Ongoing

Completed Yes or No: Completed
Month/Year: 8/2022
Responsible Party: Fire Dep[t./Civil Defense
Funding mechanism/Grant amount:

Provide information to residents and businesses on droughts, and water conservation through low-impact landscaping and other measures (to conserve water for firefighting). Integrate lessons from Mass Audubon. Incorporate into school programs for students to bring home information to parents.

Priority: High
Type of Activity: Education and Awareness
Implementation Responsibility: Water and Sewer Depts./Conservation
Funding Resources: Local
Cost: Low
Timeframe: Ongoing

Completed Yes or No: Not completed, carry forward into 2024 Update
Month/Year:
Responsible Party:
Funding mechanism/Grant amount:

Provide information to residents and businesses, possibly through town-wide mailings, about proper brush and tree clearance, and other firefighting measures.

Priority: High
Type of Activity: Education and Awareness
Implementation Responsibility: Emergency Management
Funding Resources: Local/AFG and FP & S grants
Cost: Low
Timeframe: < 1 year

Completed Yes or No: Not completed, carry forward into 2024 Update
Month/Year:
Responsible Party:
Funding mechanism/Grant amount:

Provide information to residents and businesses on earthquakes, building code construction standards, shelters, and other pertinent information.

Priority: High
Type of Activity: Education and Awareness
Implementation Responsibility: Emergency Management
Funding Resources: Local
Cost: Low
Timeframe: ongoing

Completed Yes or No: completed remains ongoing…remove. Town has education series November 2024 on emergency planning…Kelly to provide statement
Month/Year:
Responsible Party:
Funding mechanism/Grant amount:

Provide information to animal-owning residents about Central Mass Disaster Animal Response Team's resources, including evacuation best practices, in case of an emergency.

Priority: Low
Type of Activity: Education and Awareness
Implementation Responsibility: DPS/Utilities
Funding Resources: Local
Cost: Low
Timeframe: 1-2 years

Completed Yes or No: Completed
Month/Year: 10/2022
Responsible Party: Fire Dept./CMDART
Funding mechanism/Grant amount:

Provide information to residents and businesses on generator safety and usage in the event of a power outage.

Priority: High
Type of Activity: Education and Awareness
Implementation Responsibility: Fire Dept./DPW
Funding Resources: Local AFG and FP & S grants
Cost: Low
Timeframe: 1-2 years

Completed Yes or No: Completed
Month/Year: 8/2022
Responsible Party: Fire Dept.
Funding mechanism/Grant amount:

LOCAL PLAN AND REGULATIONS

Use MA Drought Management Plan as a template for Town's own drought plan, and integrate State's recommendations and actions according to Town's needs.

Priority: Medium
Type of Activity: Local Plan and Regulation
Implementation Responsibility: Highway Dept./Water Dept./Conservation
Funding Resources: Local
Cost: Low
Timeframe: 1-2 years

Completed Yes or No: not completed…carry forward
Month/Year:
Responsible Party:
Funding mechanism/Grant amount:

Review and update local plans and development review processes (planning, zoning, stormwater management, conservation, etc.) to ensure new construction will not be affected by hazards.

Priority: Medium
Type of Activity: Local Plans and Regulation
Implementation Responsibility: All Town departments
Funding Resources: Local
Cost: Low
Timeframe: ongoing

Completed Yes or No: Not completed, anticipated for May 2024
Month/Year: May 2024
Responsible Party: Community Development
Funding mechanism/Grant amount: MS4 funding

Monitor implementation of Hazard Mitigation Plan.

Priority: High
Type of Activity: Local Plan and Regulation
Implementation Responsibility: All Town departments
Funding Resources: Local
Cost: Low
Timeframe: ongoing

Completed Yes or No: completed, remains ongoing
Month/Year:
Responsible Party:
Funding mechanism/Grant amount:

Public Workshop #1: February 12, 2025

Town of Douglas, MA
Hazard Mitigation Plan Update

Public Workshop #1

Wednesday, February 12, 2025 7:00 PM

In Person:
Douglas Municipal Center—Resource Room
29 Depot Street
Douglas, MA 01516

Virtual/Zoom Option:

https://us02web.zoom.us/j/83149473611
Meeting ID: 831 4947 3611

About the Douglas Hazard Mitigation Plan Update

The Town of Douglas is currently developing an update to the 2017 Hazard Mitigation Plan. This plan is important because it helps the Town plan and receive funding for projects that reduce the risk of injury or damage to property from natural hazard events such as flooding, winter storms, and hurricanes. 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 financial assistance.

Community Survey Now Open!

Access the survey two ways…
Click on the link to take the survey:
https://www.surveymonkey.com/r/DouglasHazardMitigationPlanCommunitySurvey

Click on the QR Code to take the survey:

Contacts

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Douglas, MA

Hazard Mitigation Plan Update

Public Workshop #1 – February 12, 2025
Douglas Municipal Center – Resource Room
7:00 PM

Craig Pereira, CFM, NCI

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WELCOME!

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Tonight's Agenda

- Hazard Mitigation Planning Overview
- Federal/State Guidance
- Hazard Mitigation Process
  - Risk Assessment
  - Goals
  - Projects/Actions
  - Implementation
- Hazard Index
- 2017 Plan Report Card
- Project Schedule

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Douglas Local Hazard Mitigation Team (LHMT)

- Matthew Benoit – Director of Community Development
- Mark Dunleavy – Patrolman/Information Technology
- Kristin Harris – Board of Health
- Kelly Manning – Assistant Fire Chief/Project Manager
- Nick Miglionico – Police Chief
- Robert Sullivan – System's Manager Water/Sewer Department
- Matt Wojcik – Town Administrator
- Gabriella Spitzer – Environmental Planner, Horsley Witten Group, Inc.
- Craig Pereira – Project Manager, Horsley Witten Group, Inc.

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Why Hazard Mitigation Planning?

Disaster Mitigation Act of 2000, Interim Final Rule, 44 CFR Parts 201 and 206 states, "All communities must have an approved Multiple Hazards Mitigation Plan in order to qualify for future federal disaster mitigation grants".

Hazard Mitigation:
"Reduction or elimination of long-term risk to life, property, and the environment"

Natural Hazard:
"Any event or physical condition that has the potential to cause fatalities, injuries, property damage, infrastructure damage, and agricultural loss, damage to the environment, interruption of business, or other types of harm and/or loss"

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Federal and State Guidance

Federal

- FEMA's *Local Mitigation Planning Policy Guide* (April 19, 2023)
  - Climate Change
  - Environmental Justice/Socially-Vulnerable Populations
  - High-Hazard Potential Dam Program
  - Hazards…

State

- *ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan*
- *2022 Massachusetts Climate Change Assessment, Volume II Statewide Report*
- *2022 Massachusetts Climate Change Assessment, Volume III Regional Report*

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ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan

Considers the exposure and vulnerability of state assets, human populations, lifelines, critical facilities, economic activity, natural resources, and other infrastructure/resources across five sectors:

- Human Sector
- Governance Sector
- Infrastructure Sector
- Natural Environment Sector
- Economy Sector

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2022 Massachusetts Climate Change Assessment, Volume II Statewide Report

Includes an analysis of the most significant impacts that climate change poses to the Commonwealth across the five sectors and based on three factors:

- Magnitude of consequence: How large of a climate effect is expected?
- Disproportionality of exposure: Will populations in environmental justice areas be disproportionately affected?
- Need for effective adaptation: is enough currently being done to adapt to this impact?

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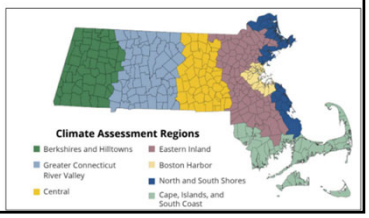
2022 Massachusetts Climate Change Assessment, Volume III Regional Report

Subdivides the state into seven climate regions and summarizes the highest urgency climate impacts across the five sectors.

- Douglas falls within the Central Region
- Particularly vulnerable to climate stressors including:
  - Increasing temperatures
  - More extreme precipitation



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2022 Massachusetts Climate Change Assessment, Volume III Regional Report

Human Sector

- **Reduction in Food Safety and Security** due to production and supply chain issues, as well as spoilage during power outages
- **Health and Cognitive Effects from Extreme Heat**, including premature death and learning loss.

Infrastructure Sector

- **Damage to Electric Transmission and Distribution Infrastructure** associated with heat stress and extreme events.
- **Loss of Urban Tree Cover** due to heat, drought, and increased pests.

Natural Environment Sector

- **Freshwater Ecosystem Degradation** due to warming waters, drought, and increased runoff.
- **Forest Health Degradation** from warming temperatures, changing precipitation, increasing wildfire frequency, and increasing pest occurrence.

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2022 Massachusetts Climate Change Assessment, Volume III Regional Report

Governance Sector

- **Increase in Costs of Responding to Climate Migration**, including planning for abrupt changes in local populations.
- **Increase in Demand for State and Municipal Government Services**, including emergency response, food assistance, and state-sponsored health care.

Economy Sector

- **Reduced Ability to Work**, particularly outdoor workers during extreme heat, as well as commute delays due to damaged infrastructure.
- **Decrease in Agricultural Productivity** as crop yields are impacted by precipitation patterns, extreme weather, pests, and other climate factors.

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Mitigation Process

- **Assess Risks**
- Establish Goals
- Identify Projects/Actions
- Update/Maintain Plan

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Assess Risks
Natural Hazards Affecting Douglas, MA

Flood-Related Hazards
- Riverine/Flash Flooding
- Inland/Urban Flooding/Heavy Rain
- Dam Failures
- Beaver Activity

Winter-Related Hazards
- Blizzards/Heavy Snow/Nor' easters
- Ice Storms
- Extreme Cold

Wind-Related Hazards
- Hurricanes/Tropical Storms
- Tornadoes
- High Winds
- Lightning/Thunderstorms
- Hail

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Assess Risks
Natural Hazards Affecting Douglas, MA

Geologic-Related Hazards
- Earthquakes

Extreme Heat-Related Hazards
- Extreme Heat

Drought-Related Hazards
- Drought

Brushfire/Wildfire-Related Hazards
- Brushfires/Wildfires

Environmental-Related Hazards
- Invasive Species (aquatic plant species)
- Vector-borne

Changes in Groundwater-Related Hazards
- Changes in Groundwater

Climate Change:
As an overarching hazard affecting all hazard types, each hazard profile will include a 'climate change impacts on' section

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Assess Risks
Natural Hazard Profiles/Hazard Index

Flood-Related Hazards
- Riverine/Flash Flooding: Moderate
- Urban Flooding/Heavy Rain: Moderate
- Dam Failures: Low
- Beaver Activity: Moderate

Winter-Related Hazards
- Blizzards/Snow/Nor' easters: High
- Ice: High
- Extreme Cold: Moderate

Wind-Related Hazards
- Hurricanes/Tropical Storms: Moderate
- Tornadoes: Moderate
- High Winds: High
- Lightning/Thunderstorms: Moderate
- Hail: Moderate

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Assess Risks
Natural Hazard Profiles/Hazard Index

Geologic-Related Hazards
- Earthquakes: Low

Extreme Heat-Related Hazards
- Extreme Heat: Moderate

Drought-Related Hazards
- Drought: Moderate

Brushfire/Wildfire-Related Hazards
- Brushfires/Wildfires: High

Environmental-Related Hazards
- Invasive Species: Low
- Vector-borne: Moderate

Changes in Groundwater-Related Hazards
- Changes in Groundwater: Low

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2025 Hazard Index

Natural Hazard	*Frequency (i.e. Very Low, Low, Moderate, High, Very High)*	*Location (i.e. small, medium, large)*	*Severity (i.e. Minor, Limited, Critical, Catastrophic)*	*2024 Hazard Index (i.e. ranked by combining frequency and severity: 10 - high, 1 - low)*
Flood-Related Hazards				
- Riverine/Flash Flooding[4]	Low (High4)	Medium (Small)	Minor (Minor1)	3Medium (Moderate5)
- Inland/Urban Flooding/Heavy Rain[4]	Low (Very High5)	Medium (Medium)	Minor (Minor1)	3Medium (Moderate6)
- Dam Failures[3]	Very Low (Very Low1)	Small (Medium)	(Limited2)	3Medium (Low3)
- Beaver Activity[3]	(Very High5)	(Medium)	(Minor1)	(Moderate6)
Winter-Related Hazards				
- Snow/Blizzard/Winter Storm/Nor' easter	Very High (Very High5)	Large (Large)	Limited (Limited2)	2High (High7)
- Ice[4]	Very High (Very High5)	Large (Large)	(Limited2)	2High (High7)
- Extreme Cold	Very High (Moderate3)	Large (Large)	(Limited2)	4Low (Moderate5)
Wind-Related Hazards				
- Hurricanes/Tropical Storms	Low (Moderate3)	Large (Large)	(Limited2)	3Medium (Moderate5)
- Tornadoes	Very Low (Low2)	Small (Medium)	(Limited2)	4Low (Moderate4)
- High Winds	Moderate (Very High5)	Small (Large)	(Limited2)	2Medium (High7)
- Lightning/Thunderstorms	Moderate (Moderate2)	Small (Medium)	Minor (Minor1)	2High (Moderate4)
- Hail[4]	(High4)	(Medium)	(Minor1)	(Moderate5)
Geologic-Related Hazards				
- Earthquakes[3]	Very Low (Very Low1)	Large (Large)	Minor (Minor1)	5Highest (Low2)
Hazards				
- Extreme Heat[4]	Moderate (Very High5)	Large (Large)	Limited (Minor1)	4Low (Moderate6)
Drought-Related Hazards				
- Drought	Very Low (Moderate3)	Large (Large)	Minor (Minor1)	4High (Moderate4)
Hazards				
- Brushfire/Wildfire[4]	Moderate (Very High5)	Medium (Small)	Minor (Limited2)	4Medium (High7)
Hazards				
- Aquatic Plant Invasive Species[4]	(Low2)	(Small)	(Minor1)	(Low3)
- Vector Borne[4]	(Very High5)	(Large)	(Minor1)	(Moderate6)
Changes to Groundwater-Related Hazards				
- Changes in Groundwater[4]	(Very Low1)	(Small)	(Minor1)	(Low2)

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Assess Risks
Risk and Vulnerability Assessment - Assets

Economic Assets
- Businesses/Large Employers
- Historic Assets

Social Assets
- Vulnerable Populations
- Cultural Locations

Natural Resources
- Lifeline and Utility Systems
- Wetlands
- Conservation/Recreation Sites

Essential Buildings/Critical Facilities
- Municipal Buildings
- Hazardous Facilities
- Roadways/Bridges
- GIS Mapping/Overlay Analyses

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Mitigation Process

- Assess Risks
- **Establish Goals**
- Identify Projects/Actions
- Update/Maintain Plan

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Revisit Goals + Mission Statement

Douglas LHMC developed a mission statement for the 2025 update…

"Douglas's population and land use are changing, and climate risks are growing. In that context, the mission of the Douglas Hazard Mitigation Plan is to plan effectively to reduce risks and protect the whole community"

Douglas LHMC developed over-arching goals to support the mission statement…

1. Protect the public's health, safety and welfare.
2. Minimize social distress and economic losses/business disruptions from hazards.
3. Reduce property damage caused by natural hazards and their downstream impacts, including dam failure.
4. Provide an ongoing forum for the education and awareness of natural hazard mitigation issues, programs, policies, projects, and resources.
5. Adapt to/mitigate for the existing and projected impacts of climate change towards a suitable, resilient community.
6. Protect the community's assets, including the Town's cultural, historical, and natural/environmental assets from hazards.

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Mitigation Process

- Assess Risks
- Establish Goals
- **Identify Projects/Actions**
- Update/Maintain Plan

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Identify Projects/Actions
Mitigation Measures (Categories)

- Planning and Prevention
- Property Protection
- Natural Resource Protection
- Structural Projects
- Emergency Services
- Public Education and Awareness

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Identify Projects/Actions
Mitigation Actions

Mitigation actions will be developed based on:

- Review of existing plans, studies, and reports
- The Town's identified risks and vulnerabilities
- Public input
- Municipal coordination

Mitigation actions will include:

- Brief description of the intended action
- Responsible party (primary/supporting)
- Proposed time frame for completion
- Potential funding mechanism

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Identify Projects/Actions
Prioritization of Actions – STAPLEE Method

- **Social:** is the action socially acceptable?
- **Technical:** is the action technically feasible and provide appropriate level of protection?
- **Administrative:** does the Town have the capability to complete the action?
- **Political:** will the community support or oppose the action?
- **Legal:** does the Town have the legal authority to complete the action?
- **Economic:** is the action cost-effective?
- **Environmental:** will the action affect the natural environment?

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Mitigation Process

- Assess Risks
- Establish Goals
- Identify Projects/Actions
- **Implementation/Update/Maintain Plan**

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Implementation/Update/Maintain the Plan

- Town's Capability
- Plan Adoption
- Incorporation into other Municipal Documents
- Annual Review/Meeting
- Update after Disaster/5 Years (planning horizon)

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2017 Plan Report Card

STRUCTURE AND INFRASTRUCTURE

Tree trimming and tree wire installation needed across town to protect utility wires. Repeat every four years.
…partially completed (50%) of system, carry remaining 50% into 2025 Update

Identify/Resolve issues causing flooding on Wallis Street on the west side of Whitin Reservoir.
…not completed, carry forward into 2025 Update

Identify/Resolve issues causing flooding on Wallis Street near stream between Whitin Reservoir and Bad Luck Lake. Upgrade undersized, old stone culvert.
…not completed, carry forward into 2025 Update

Identify/Resolve issues causing flooding on Walnut Street (100-year flood zone).
…not completed, carry forward into 2025 Update

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2017 Plan Report Card

STRUCTURE AND INFRASTRUCTURE

Identify/Resolve issues causing flooding on Charles Street (100-year flood zone). Upgrade undersized culvert.
…not completed, carry forward into 2025 Update

Identify/Resolve issues causing flooding on North Street Gilboa Street (100-year flood zone). Upgrade drainage system.
…completed

Obtain 60 kw generator for Water Booster Station at 102 Main Street.
…not completed, carry forward into 2025 Update

Obtain portable generator for Water Pump Station at 29 West Street for chemical feed and monitoring equipment purposes, and also the Sewer Pump Station at 120 Gilboa Street.
…partially completed (sewer pump station is completed), carry forward chemical feed/ monitoring needed for backup into 2025 Update

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2017 Plan Report Card

STRUCTURE AND INFRASTRUCTURE

The Town should investigate the cause of losing pressure in hydrants, and back system up, to ensure adequate fire-fighting capabilities.
…partially completed (high-hazard areas), other locations currently ongoing (Depot St./Caswell Court/Upper North St.)

Establish a private/ham radio frequency to communicate available resources, evacuation, and other pertinent information to residents quickly and effectively if power goes down.
…not completed, carry forward into 2025 Update

PREPAREDNESS, COORDINATION AND RESPONSE

As Douglas is at the end of National Grid's electric distribution system and therefore takes longer to restore power, create a plan to distribute water to residents in the event of a prolonged power outage.
…completed

Continue to participate in the National Flood Insurance Program (NFIP) or other training offered by the State and/or FEMA that addresses flood hazard planning and management.
…completed

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2017 Plan Report Card

PREPAREDNESS, COORDINATION AND RESPONSE

Investigate Community Rating System (CRS) benefits and requirements and decide whether to participate.
…not completed, carry forward into 2025 Update

Road information coordination and planning for snow removal.
…not completed, carry forward into 2025 Update

Consider updating Stormwater and Drainage Standards for Site Plan Review, Development Impact Statements, and Subdivision Control Regulations.
…completed

Evacuation plan updates.
…not completed, remove (routes to remain fluid based on type of event/timing of event/severity of event

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2017 Plan Report Card

PREPAREDNESS, COORDINATION AND RESPONSE

Maintain fire access roads in Douglas Forest and isolated areas.
…not completed, carry forward into 2025 Update

EDUCATION AND AWARENESS

Provide information to residents and businesses on severe snowstorms, ice storms, nor'easters, severe thunderstorms, high winds, tornadoes, lightning, flooding, hurricanes, tropical storms, and microbursts. Information should include evacuation procedures and encourage the acquisition of additional gasoline, water, and other resources should traffic prevent proper evacuation. Incorporate this information into school programs for students to bring home information to parents.
…completed

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2017 Plan Report Card

EDUCATION AND AWARENESS

Provide information to residents and businesses on droughts, and water conservation through low-impact landscaping and other measures (to conserve water for firefighting). Integrate lessons from Mass Audubon. Incorporate into school programs for students to bring home information to parents.
…not completed, carry forward into 2025 Update

Provide information to residents and businesses, possibly through town-wide mailings, about proper brush and tree clearance, and other firefighting measures.
…not completed, carry forward into 2025 Update

Provide information to residents and businesses on earthquakes, building code construction standards, shelters, and other pertinent information.
…completed

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2017 Plan Report Card

EDUCATION AND AWARENESS

Provide information to animal-owning residents about Central Mass Disaster Animal Response Team's resources, including evacuation best practices, in case of an emergency.
…completed

Provide information to residents and businesses on generator safety and usage in the event of a power outage.
…completed

LOCAL PLANS AND REGULATIONS

Use MA Drought Management Plan as a template for Town's own drought plan and integrate State's recommendations and actions according to Town's needs.
…not completed, carry forward into 2025 Update

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7016 Plan Report Card

LOCAL PLANS AND REGULATIONS

Review and update local plans and development review processes (planning, zoning, stormwater management, conservation, etc.) to ensure new construction will not be affected by hazards.
…not completed, carry forward into 2025 Update

Monitor implementation of Hazard Mitigation Plan.
…completed

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Project Schedule

Draft update available for public comment: **Summer 2025**

Draft update to MEMA: **Fall 2025**

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Online Community Survey

Community Survey Now Open!
…access two ways:
- Click on the link to take the survey
https://www.surveymonkey.com/r/DouglasHazardMitigationPlanCommunitySurvey

- Click on the QR Code to take the survey

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Contact Us

Kelly Manning, Assistant Fire Chief
- kmanning@douglas-ma.gov

Craig Pereira, Project Manager
- cpereira@horsleywitten.com
- (401) 263-6048

THANK YOU!

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Douglas Hazard Mitigation Plan Update

Public Workshop #1

Douglas Municipal Center - Resource Room

29 Depot St. Douglas, MA 01516
Wednesday, February 12, 2025

Name	Email Address
Craig Pereira	
Jacob Schultzberg	
Meg Schlesman	
Mike Derose	
Rich Preston	
Jacob Gniadek	
Michael Znicker	
Michael Greco	
Willis Drew	
Paul Caouette	
Agniessika Podstawka	
Ken Frasier	
Kelly Manning	
Tony Berthod	
John Furno	
Tyler Desautels	
Maury LeBlanc	
Matt Benoit	

LHMT Meeting #3: May 20, 2025

Douglas Hazard Mitigation Plan Update
Local Hazard Mitigation Team Meeting #3

Tuesday, May 20, 2025
Douglas Town Hall
29 Depot Street, East Douglas, MA 01516
9:00 AM – 11:00 AM

Agenda

1. Outstanding Data Needs
    a. Interviews:
        i. Paul Caouette (Whitin Reservoir Watershed District)
        ii. Tony Berthold (Old Mill Pond Dam/Douglas Mill Pond Dam)
    b. Beaver Activity
        i. Walnut St. identified…other areas?
    c. Reports:
        i. Whitin Reservoir Flow Agreement
        ii. Risk and Resiliency Plan
        iii. Asset Management Plan
        iv. Statewide Public Works Mutual Aid System (CEMP references participation)
        v. Public Infrastructure/Emergency Lifelines Summaries
            1. Water
            2. Wastewater
            3. Stormwater
        vi. Master Plan Update:
            1. Draft goals/objectives/actions?

2. Upstream Dams outside of Douglas, potential to impact Douglas: Review…
    a. Eames Pond Dam
    b. Slaters Pond Dam
    c. Robinson Pond Dam
    d. Stump Pond Dam
    e. Upper Meadow Pond Dam
    f. Lackey Pond Dam

3. Vulnerability Overlay Analysis (sent to LHMT 4/10/25)
    a. Critical Facilities/Vulnerable Populations…accurate?
    b. Data to be scrubbed (public-facing v. internal-facing):
        i. Water infrastructure
        ii. Community groundwater resources
        iii. Non-community groundwater resources
        iv. Communications
    c. Summary of Findings

4. Today's Discussion
    a. Hazard Mitigation Actions for Consideration

i. From 2017 Plan:
    1. Categories
    2. Cost Estimate
    3. Time Frame
    4. Prioritization preferences?
        a. 2017 Plan?
        b. STAPLEE Review Score Sheet
        c. STAPLEE Criteria Worksheet

b. Does not include:
    i. Whitin Reservoir Flow Agreement
    ii. Risk and Resiliency Plan
    iii. Asset Management Plan
    iv. Public Infrastructure/Emergency Lifelines Summaries
        1. Water
        2. Wastewater
        3. Stormwater
    v. Master Plan Update:
        1. Draft goals/objectives/actions?
    vi. Illicit Discharge Plan

5. Next Steps
    a. Review Hazard Mitigation Actions for Consideration
        i. Accurate?
        ii. Anything completed?
        iii. Anything Missing?
    b. LHMT Meeting #4 Prioritization of final list of actions
    c. Public Workshop #2

Horsley Witten Group

Memorandum of Meeting

To: Douglas Local Hazard Mitigation Team (LHMT)

From: Craig Pereira

Date: May 20, 2025

Re: Douglas LHMT Meeting #3

In attendance:

Kelly Manning – Assistant Fire Chief
Kristin Harris – Board of Health
John Furno – Fire Chief
Robert Sullivan – System's Manager Water/Sewer Department
Ken Frasier – Building Commissioner
Matt Wojcik – Town Administrator

Consultant Team
Craig Pereira, Project Manager - Horsley Witten Group, Inc. (HW)

The third LHMT meeting was held on May 20, 2025, at the Douglas Municipal Center to discuss the Hazard Mitigation Plan Update. The following items were discussed:

1. Outstanding Data Needs
    a. Interviews:
        i. Paul Caouette (Whitin Reservoir Watershed District)
        ii. Tony Berthold (Old Mill Pond Dam/Douglas Mill Pond Dam)
            1. Craig to schedule/conduct both interviews.
    b. Beaver Activity
        i. Walnut St. identified…other areas?
            1. Additional areas include Webster St./Northwest Main St./South St.
    c. Reports:
        i. Whitin Reservoir Flow Agreement…received
        ii. Risk and Resiliency Plan…received
        iii. Asset Management Plan…received
        iv. Statewide Public Works Mutual Aid System (CEMP references participation)
            1. Kelly to provide this information to Craig.

v. Public Infrastructure/Emergency Lifelines Summaries
    1. Water
    2. Wastewater
    3. Stormwater
        a. Robert Sullivan has the example from another community and will pull these summaries together.

vi. Master Plan Update:
    1. Draft goals/objectives/actions?
        a. Craig will coordinate with Jen Couture (a new Planner is starting this week) to see if any progress on draft goals/objectives/actions are available.

vii. MS4/Stormwater Bylaw: Robert mentioned the Town just passed this bylaw. Robert to provide copy to Craig for inclusion in the Capability Assessment section of the Update.

2. Upstream Dams outside of Douglas, potential to impact Douglas: Review…
    a. Eames Pond Dam
    b. Slaters Pond Dam
    c. Robinson Pond Dam
    d. Stump Pond Dam
    e. Upper Meadow Pond Dam
    f. Lackey Pond Dam
        i. Craig commented that due to the number of upstream dams that may potentially impact Douglas, a second Public Records Request was made to DCR ODS to review the inundation areas for the above referenced dams. All inundation areas for above listed dams (dry- and wet-weather failure scenarios) trail-off into wooded areas. Summary discussion was added to the dam profile section. No further action required.

3. Vulnerability Overlay Analysis (sent to LHMT 4/10/25)
    a. Critical Facilities/Vulnerable Populations…accurate?
    b. Data to be scrubbed (public-facing v. internal-facing?):
        i. Water infrastructure
        ii. Community groundwater resources
        iii. Non-community groundwater resources
        iv. Communications
    c. Summary of Findings

i. Craig reviewed the Vulnerability/Overlay Analyses and mapping previously sent on April 10, 2025. Craig also stated that although the majority of the GIS data utilized for the HMP update is publicly available on MassGIS, does the LHMT/Town wish to scrub/hide certain data so as to make it more challenging to identify critical facilities/vulnerable populations including water infrastructure, Community/Non-Community groundwater resources, communications, etc.? Craig suggested that as with other clients, he can produce two versions of the GIS data/mapping…a public-facing version which does not include the Critical Facilities/Vulnerable Populations data tables, and an internal-facing version which does include the two data tables. The LHMT decided it would be best to include the two versions.

ii. All LHMT members to review the Vulnerability /Overlay Analyses and mapping for accuracy, making note of any necessary revisions to Craig (attached).

4. Today's Discussion
    a. Hazard Mitigation Actions for Consideration
        i. From 2017 Plan:
            1. Categories
            2. Cost Estimate
            3. Time Frame
            4. Prioritization preferences?
                a. 2017 Plan?
                b. STAPLEE Review Score Sheet
                c. STAPLEE Criteria Worksheet
        ii. Craig reviewed the Mitigation Strategy from the 2017 plan and commented that it was challenging to understand how the LHMT from 2017 developed/prioritized the mitigation actions and asked if anyone on the LHMT today participated in the 2017 process…the backup data (STAPLEE worksheets) are not included in the 2017 Plan and the plan states, 'priorities were broadly derived from FEMA's STAPLEE criteria'. Craig then presented two versions for prioritizing actions from FEMA for consideration (both attached) and suggested the 'STAPLEE Criteria Worksheet' for ease of use.
            1. Matt commented that perhaps Trish Settles (CMRPC) can provide the appendices from the 2017 plan? Craig will follow up.

2. All LHMT members to review both and decide on a preference.

b. Does not include review of:
   i. Whitin Reservoir Flow Agreement
   ii. Risk and Resiliency Plan
   iii. Asset Management Plan
   iv. Public Infrastructure/Emergency Lifelines Summaries
      1. Water
      2. Wastewater
      3. Stormwater
   v. Master Plan Update:
      1. Draft goals/objectives/actions?
   vi. Illicit Discharge Plan

5. Next Steps
   a. Review Hazard Mitigation Actions for Consideration
      i. Accurate?
      ii. Anything completed?
      iii. Anything Missing?
         1. LHMT members mentioned that Douglas is located at the 'end of the line' for electric/internet/fiber services…and that a mitigation action should be included to remediate this situation…especially as it relates to communications.
         2. Craig will coordinate with Bob Moran (National Grid staff person) also on the Douglas Master Plan Update committee.
   b. Craig reviewed the draft list of mitigation actions for consideration, stating that more work still needs to happen on this topic. Craig will continue to add to this list as interviews/data are received.
      i. All LHMT members to review the attached list of actions including the standardized bullet list that follows each action, for accuracy and completeness.
   c. LHMT Meeting #4 Prioritization of final list of actions
      i. Tentatively scheduled for June 17, 2025, 9 am – 11 am…Kelly to reserve the meeting space.
   d. Public Workshop #2
      i. Anticipated mid-summer with draft plan/Plan Review Tool to MEMA by end of summer.

Part 2: Prioritize Actions – Quantitative Method
Method C – Simple Score

Criterion:	Cost	Benefit
Social: Is the action compatible with present and future local community needs and values? - Is the proposed action socially acceptable to the community? - Are there equity issues involved that would mean that one segment of a community is treated unfairly? - Will the action cause social disruption?		
Technical: Is the action feasible with available local resources (or as supplement by outside resources as necessary)? - Will the proposed action work? - Will it create more problems than it solves? - Does it solve a problem or a symptom? - Is it the most useful action in light of other community goals?		
Administrative: Does the community have the administrative capacity to implement the action? - Can the community implement the action? - Is there someone to coordinate and lead the effort? - Is there sufficient funding, staff, and technical support available? - Are there ongoing administrative requirements that need to be met?		
Political: Is there strong public support to implement and maintain the action? - Is the action politically acceptable? - Is there public support both to implement and to maintain the project?		
Legal: Does the community have the legal authority to implement the action? - Are there legal side effects (taking)? - Is the action allowed via Comprehensive Plan, or does it need to be amended? - Will the community be liable for the action? - Will the activity be challenged?		
Economic: Is the action cost-effective? - What are the costs and benefit of the action? - Do the benefits exceed the costs? - Are initial, maintenance, and administrative costs taken into account? - Has funding been secured for the proposed action? - What burden will this action place on the tax base of local economy? - Does the action contribute to other community goals?		
Environmental: Does the action impact environmental resources, and is the impact positive, negative, or neutral? - Will the action need environmental regulatory approvals? - Will it meet local and state regulatory requirements?		
Sub-total		
Priority/Total Score		

Ranking Descriptions:
Very Beneficial: 2
Favorable: 1
Not Applicable: 0
Not Favorable: -1

Criteria:
+: Favorable
-: Less Favorable
N: Not Applicable

Department:

	STAPLEE Criteria																												
	SOCIAL		TECHNICAL			ADMINISTRATIVE			POLITICAL			LEGAL			ECONOMIC				ENVIRONMENTAL					TOTAL		PRIORITY SCORE
ACTION	Community Acceptance: Is action socially acceptable?	Effect on Segment of Population: Equity issues?	Technical Feasibility: Will action work?	Long-Term Solution: Does action solve problem or symptom?	Secondary Impacts: Will action create more problems than it solves?	Staffing: Someone to coordinate action?	Funding Allocated: Is there enough funding available?	Maintenance/Operations: Are there ongoing requirements?	Political Support: Is action politically acceptable?	Local Champion: Is there a local chapion?	Public Support: Is there public support to implement action?	State Authority: Is the state authorized to implement the action?	Existing Local Authority: Does the City have the authority to implement the action?	Political Legal Challenge: Will the action be challenged?	Benefit of Action: Do benefits exceed costs?	Cost of Action: Do costs exceed benefits?	Contributes to Economic Goals: Does action contribute to economic development goals?	Outside Funding Required: Does action require outside funding to implement?	Effect on Land/Water: Does action affect the environment?	Effect on Endangered Species: Are endangered/threatened species affected?	Effect on HAZMAT Waste Sites: Will action impact HAZMAT sites?	Consistent with Environmental Goals: Is action consistent with local environmental goals?	Consistent with Federal Laws: Will action require regulatory approvals?	Plus	Minus	

Categories:

- Structure and Infrastructure
  - Bricks/mortar infrastructure and building improvements
- Preparedness, Coordination and Response
  - Ensure framework exists to facilitate administration/enforcement/collaboration activities
- Education and Awareness Program
  - Raise awareness/generate support
- Local Plans and Regulations
  - Review/Update local bylaws/ordinances/regulations

Cost Estimate:

- Staff Time – municipal personnel time
- Low – less than $50,000
- Moderate – more than $50,000, but less than $100,000
- High – over $100,000

Time Frame:

- Short Term: less than 1 year
- Medium Term: 1 – 2 years
- Long Term: 3 – 5 years

STRUCTURE AND INFRASTRUCTURE

Action __
Develop an implementation strategy to address property and streets subject to flooding.
…2025 Risk Assessment/MVP Summary of Findings (North St. bridge area)
Determine what mitigation activities…maintenance (catch basin cleaning) v. monitoring (State roads/beaver-related activity) v. structural/replacement (undersized pipes/culvert replacement) v. pavement management (roadway crown/ponding) can alleviate the problem while creating the most benefit to the community for each street (e.g., address those roads that are part of the Town's evacuation route first, then main thoroughfares, etc.).

Streets/Properties Subject to Flooding

Maintenance

(Included here to illustrate a comprehensive review of flooding issues, however, not applicable for funding under any hazard mitigation grant programs)

Example

- Specific Flooding Area: ……
- Flooding Cause: ……

Monitoring

Walnut Street

- Specific Flooding Area: Walnut Street
- Flooding Cause: Beaver-related activity

Northwest Main Street

- Specific Flooding Area: Northwest Main Street
- Flooding Cause: Beaver-related activity

Structural/Replacement

Wallis Street

- Specific Flooding Area: near stream between Whitin Reservoir and Bad Luck Lake, west side of Whitin Reservoir
- Flooding Cause: Upgrade undersized, old stone culvert

Charles Street

- Specific Flooding Area: Charles Street
- Flooding Cause: Upgrade undersized culvert

North Street

- Specific Flooding Area: area associated with the No. 37 Bridge
- Flooding Cause: bridge still not replaced and impacted whenever Mumford River swells, due to low arch over the water and narrow roadway (also evacuation route). Replace spillway and install a culvert.

Pavement Management

Example

- Specific Flooding Area: …….
- Flooding Cause: …….

- Action Type: Planning, Pre-Disaster
- Priority Score: 2017 Score: Medium Priority/2025 Score: __
- Lead: Highway Department
- Supporting: Water/Sewer Department, Conservation Commission, Board of Health
- Time Frame: Medium Term
- Financing Options: Municipal Operating Budget (Highway Department budget), FEMA Hazard Mitigation Grants Assistance
- Cost Estimate: High
- Benefit: Reduced impacts/costs associated with flooding/Improved resilience
- Vulnerable Area: Localized Areas Subject to Flooding/Public Health, Safety and Welfare/Property Protection/Transportation Network
- Hazards Addressed: Flood-related, Winter-related, Wind-related Hazards

Action __

Conduct a townwide culvert capacity study to identify improvements and prepare for projected increases in precipitation/flooding:

- *Create a priority list of those in need of 'rightsizing' and replacement:*
    - *along the entire length of the Whitin Reservoir causeway (when water levels rise): elevate the causeway and widen roadway for increased capacity*
    - *Wallis Street (between Whitin Reservoir and Bad Luck Pond): currently a 3-sided culvert, replace with box culvert*
    - *Charles Street at Wellman Brook (Charles St. and Northeast Main St.)*
    - *Walnut Street and Tinkerville Brook*
    - *North Street (replace culvert that was removed as part of the spillway removal.*

…2025 Risk Assessment/MVP Summary of Findings 2020

- Action Type: Planning, Pre-Disaster
- Priority Score: 2025 Score: __
- Lead: Highway Department
- Supporting: Water/Sewer Department, Conservation Commission, Board of Health
- Time Frame: Long Term
- Financing Options: Municipal Operating Budget (Highway Department budget), FEMA Hazard Mitigation Grants Assistance, MVP Action Grants
- Cost Estimate: High
- Benefit: Reduced impacts/costs associated with flooding/Improved resilience/Continuity of transportation network
- Vulnerable Area: Localized Areas Subject to Flooding/Public Health, Safety and Welfare/Property Protection/Transportation Network
- Hazards Addressed: Flood-Related, Winter-related, Wind-related Hazards

Action __
Upgrade the Mechanic Street Bridge (low and traps debris).
…2025 Risk Assessment

- Action Type: Planning, Pre-Disaster
- Priority Score: 2025 Score: __
- Lead: Highway Department
- Supporting: Water/Sewer Department, Conservation Commission, Board of Health
- Time Frame: Long Term
- Financing Options: Municipal Operating Budget (Highway Department budget), FEMA Hazard Mitigation Grants Assistance
- Cost Estimate: High
- Benefit: Reduced impacts/costs associated with flooding/Improved resilience/Continuity of transportation network
- Vulnerable Area: Localized Areas Subject to Flooding/Public Health, Safety and Welfare/Property Protection/Transportation Network
- Hazards Addressed: Flood-Related, Winter-related, Wind-related Hazards

Action __
Obtain 60 kw generator for Water Booster Station at 102 Main Street.
…2017 Plan

- Action Type: Planning, Pre-Disaster
- Priority Score: 2017 Score: High Priority/2025 Score: __
- Lead: Water/Sewer Department
- Supporting: Town Administrator
- Time Frame: Moderate Term
- Financing Options: Municipal Operating Budget (Water/Sewer Department budget), FEMA Hazard Mitigation Grant Assistance
- Cost Estimate: Moderate
- Benefit: Continuity of services (uninterrupted water supply)/Improved resilience
- Vulnerable Area: Municipal Services/Power Supply/Public Health Safety and Welfare
- Hazards Addressed: All Hazards

Action __
Obtain portable generator for: Water Pump Station at 29 West Street for chemical feed and monitoring equipment purposes, and also the Sewer Pump Station at 120 Gilboa Street.
…2017 Plan

- *Partially completed (Sewer pump station permanent standby generator in place. Part of agreement with CRG Warehouse, awaiting occupancy permit to start project (chemical feed/monitoring is needed for backup) and order portable generator.*

- Action Type: Planning, Pre-Disaster
- Priority Score: 2017 Score: High Priority/2025 Score: __
- Lead: Water/Sewer Department
- Supporting: Town Administrator
- Time Frame: Moderate Term
- Financing Options: Municipal Operating Budget (Water/Sewer Department budget), FEMA Hazard Mitigation Grant Assistance
- Cost Estimate: Moderate
- Benefit: Continuity of services (uninterrupted water supply/quality)/Improved resilience
- Vulnerable Area: Municipal Services/Power Supply/Public Health, Safety and Welfare
- Hazards Addressed: All Hazards

- Hazards Addressed: Wildfire/Brushfire-related Hazards

Action __
Establish a private/ham radio frequency to communicate available resources, evacuation, and other pertinent information to residents quickly and effectively if power goes down.

…2017 Plan

- Action Type: Planning, Pre-Disaster
- Priority Score: 2017 Score: Medium Priority/2025 Score: __
- Lead: Fire/Emergency Management Department
- Supporting: Police Department, National Grid
- Time Frame: Moderate Term
- Financing Options: Municipal Operating Budget (Fire Department budget), FEMA Hazard Mitigation Grants Assistance
- Cost Estimate: Low
- Benefit: Continuity of emergency services/Improved Public Health, Safety and Welfare/Improved resilience
- Vulnerable Area: Emergency Services/Public Health, Safety and Welfare
- Hazards Addressed: All Hazards

Action __
Old Mill Pond Dam and Douglas Mill Pond Dam are undergoing a dam breach feasibility study for consideration for removal. (Hayward Landing/February 12, 2025 public workshop).
…2025 Risk Assessment

- *Status of this?*

- Action Type: Planning, Pre-Disaster
- Priority Score: 2025 Score: __
- Lead: Private Dam Owner (s)
- Supporting: Town Administrator/Board of Selectmen
- Time Frame: Long Term
- Financing Options: Private dam owner funds
- Cost Estimate: High
- Benefit: Reduced impacts/costs associated with flooding/Improved Public Health, Safety and Welfare/Improved resilience
- Vulnerable Area: Dams/Public Health, Safety and Welfare/Property Protection
- Hazards Addressed: Flood-Related Hazards

Action __
The Town will coordinate with the Whitin Reservoir Watershed District to ensure the completion of recommended improvements identified in the most recent Phase I Inspection Report, to annually update the Emergency Action Plan (EAP) and to encourage the Whitin Reservoir Watershed District to collaborate on a range of specific actions that address reducing risk to/from Whitin Reservoir Dam, including:

- *Rehabilitating/Removing the dam*
- *Adopting/Enforcing land use ordinances in inundation zones*
- *Elevating structures in inundation zones*
- *Adding flood protection such as berms, floodwalls or floodproofing in inundation zones.*

…2025 Risk Assessment/MVP Summary of Findings 2020

Studies and Analyses

1. Complete an updated H&H analysis. Although previous H&H analyses have been completed for this structure (1980, 2007, during EAP development), there are inconsistencies between them with the peak flows and peak pool levels reported and all of them appear to have only evaluated PMF and the ½ PMF storm event. The previous analyses would be used to the extent practical to develop an updated analysis that would also include lower recurrent storm events (i.e. 50-year, 100-year, etc.) that would be used to calibrate the model. The updated analyses could then be used to develop and implement hydraulic modifications at the structure in order to accommodate the SDF, as discussed in remedial modification #2.
2. Continue to monitor and evaluate the observed seepage, leakage, and wet areas along the base of the downstream wall. Seepage and stability evaluations should be completed in accordance with current dam safety regulations. Pending the results of the seepage analysis, modifications may be required as discussed in remedial modifications #3.
3. Evaluate the hydraulic and structural capacity of the dike at maximum pool conditions based on survey elevations. Pending the results of the evaluations, modifications to the dike may be required.
4. Coordinate the completion of a site-specific risk and safety assessment to further evaluate, categorize, and determine the need for implementing a site safety improvement program.
5. Continue to monitor the leakage previously observed under the primary spillway; concrete scour at the primary spillway; and scour holes noted downstream of the spillways of the as part of routine monitoring.

Yearly & Recurrent Maintenance Recommendations

1. Continue regular monitoring and inspections of the dam. Included in the monitoring program should be continued regular monitoring of the cracks and depressions along the crest of the dam near the spillway culverts, the settlement at the crest near the right abutment, leakage under and through the spillway, leakage and seepage rates through the downstream stone masonry wall, possible movement of the upstream and downstream walls (utilizing survey monuments), and routine inspection of all other components of the structure. Complete formal inspections in accordance with current state regulations. As the dam is currently classified as a high hazard potential dam, inspections are required every 2 years.
2. Regular maintenance activities should be performed to control and prevent growth of unwanted vegetation, including weeds and brush within the face of the masonry walls and vegetation within the approach and discharge channels of the primary and auxiliary spillways. Clearing of brush and removal of vegetation should continue to be performed at least once per year. Additional maintenance activities should be performed to address the following minor maintenance deficiencies observed during this inspection:

a. The surface erosion at the left abutment and right abutment should be filled and vegetated.
b. The isolated voids within the un-mortared sections of the upstream riprap should be filled with riprap.

3. Continue to routinely monitor and survey the upstream wall to check for indications of movement. Routinely monitor the utility poles located on the downstream side of the crest for indications of movement.
4. Continue to complete routine reviews and updates of the EAP. Complete periodic training of involved personnel.

Minor Repair Recommendations

1. Continue to seal cracks and patch depressions in the roadway in the area of the spillway culverts.
2. Continue to clear the tree and brush growth at the dam and dike.
3. Clear the unwanted vegetation and debris within the approach and discharge areas of the spillways.
4. Complete concrete repairs at the primary/auxiliary spillway. the scour holes within the downstream channel of the auxiliary and primary spillways.
   - Action Type: Planning, Pre-Disaster
   - Priority Score: 2025 Score: __
   - Lead: Whitin Reservoir Watershed District
   - Supporting: Town Administrator/Board of Selectmen
   - Time Frame: Long Term
   - Financing Options: Whitin Reservoir Watershed District funds, High Hazard Potential Dam Program funds
   - Cost Estimate: High
   - Benefit: Reduced impacts/costs associated with flooding/Improved Public Health, Safety and Welfare/Improved resilience
   - Vulnerable Area: Dams/Public Health, Safety and Welfare/Property Protection
   - Hazards Addressed: Flood-Related Hazards

Action __
The Town will coordinate with the Whitin Reservoir Watershed District to remediate the functionality of the emergency spillway at the northwest corner of the reservoir, address the management of water levels, and address the localized drainage issues impacting the crest of the dam (Paul Caouette/February 12, 2025 public workshop).
…2025 Risk Assessment

- Action Type: Planning, Pre-Disaster
- Priority Score: 2025 Score: __
- Lead: Whitin Reservoir Watershed District
- Supporting: Town Administrator/Board of Selectmen
- Time Frame: Long Term
- Financing Options: Whitin Reservoir Watershed District funds

- Cost Estimate: High
- Benefit: Reduced impacts/costs associated with flooding/Improved Public Health, Safety and Welfare/Improved resilience
- Vulnerable Area: Dams/Public Health, Safety and Welfare/Property Protection
- Hazards Addressed: Flood-Related Hazards

Action __
The Town will ensure the completion of recommended improvements identified in the most recent Phase I Inspection Report and to also develop an Operations and Maintenance Manual for Gilboa Pond Dam.
…2025 Risk Assessment

Studies and Analyses

1. No studies or analyses are recommended. No hydrologic or hydraulic analyses are known to have been done for the dam, but, in consideration of the dam's low hazard potential classification, no hydrologic or hydraulic analyses are warranted.

Recurrent Maintenance Recommendations

1. Keep large debris clear from the upstream side of the dam.
2. Monitor the condition of the concrete gate structure and make repairs if and when the structure's integrity or functionality becomes jeopardized.
3. Monitor the condition of the downstream face by taking photos annually from similar vantage points and comparing to prior years' photos.
4. Monitor the river back immediately downstream of the right abutment of the dam, especially during and after high-flow events, to make sure the integrity of the dam is not threatened.
5. Although it is not 'required', an Operation and Maintenance Manual should be developed for the dam.

Minor Repair Recommendations

1. No minor repairs are recommended at this time.

Remedial Modifications Recommendations

1. No remedial modifications are recommended at this time.

- Action Type: Planning, Pre-Disaster
- Priority Score: 2025 Score: __
- Lead: Fire/Emergency Management Department
- Supporting: Town Administrator/Board of Selectmen
- Time Frame: Long Term
- Financing Options: Municipal Operating Budget (Fire Department budget), FEMA Hazard Mitigation Grants Assistance

- Cost Estimate: High
- Benefit: Reduced impacts/costs associated with flooding/Improved Public Health, Safety and Welfare/Improved resilience
- Vulnerable Area: Dams/Public Health, Safety and Welfare/Property Protection
- Hazards Addressed: Flood-Related Hazards

Action __
The Town will coordinate with the private dam owner to complete an updated Phase I Inspection Report, then ensure the completion of the recommended improvements from the updated Phase I Inspection Report for Riddle Road Pond Dam.
…2025 Risk Assessment

- Action Type: Planning, Pre-Disaster
- Priority Score: 2025 Score: __
- Lead: Private Dam Owner (s)
- Supporting: Town Administrator/Board of Selectmen
- Time Frame: Long Term
- Financing Options: Private dam owner funds
- Cost Estimate: High
- Benefit: Reduced impacts/costs associated with flooding/Improved Public Health, Safety and Welfare/Improved resilience
- Vulnerable Area: Dams/Public Health, Safety and Welfare/Property Protection
- Hazards Addressed: Flood-Related Hazards

Action __
The Town will coordinate with MA DCR ODS to ensure the completion of recommended improvements identified in the most recent Phase I Inspection Reports/Follow-Up Inspection Reports for the following:
- *Wallis Pond Dam (recommended improvements)*
- *Morse Pond Dam (recommended improvements/Operations and Maintenance Manual development*

…2025 Risk Assessment/MVP Summary of Findings 2020

Wallis Pond Dam:
Studies and Analyses
1. A detailed H & H analysis with survey should be completed by a qualified consulting engineer to assess the potential for overtopping and the need for additional spillway capacity.
2. An Operations and Maintenance (O & M) Manual should be developed and implemented for this dam. The O & M Manual should contain explicit schedules and instructions for maintenance activities to be performed on the dam an it's appurtenances, as well as operational procedures to be followed under both routine and flood conditions.

Recurrent Maintenance Recommendations

1. Remove debris from the primary spillway, auxiliary spillway pipes, approach, and discharge areas. (during 2024 inspection auxiliary spillway pipes were debris free, but debris existed downstream of the main spillway).
2. Cut brush on the embankments and within 25 feet of the dam toe and abutments.
3. Mow and maintain a healthy cover of grass with a height of 3 to 12 inches.
4. Monitor for new animal burrows, sinkholes, or depressions, and repairs as necessary.
5. Monitor for increased beaver activity within the impoundment or downstream channel.
6. Monitor for increased leakage rates or embankment material migration through the downstream left masonry wall.

Maintenance and Minor Repair Recommendations

1. Repair bare areas on the dam crest. Seed areas and establish a healthy cover of grass.
2. Repair sinkholes/depressed areas on the dam crest behind masonry walls.
3. Replace missing capstones and chink areas on the downstream left masonry wall where stone is missing.
4. Remove the trees, stumps, and root systems on and from within 25 feet of the dam. Fill and compact the resultant voids and reestablish grass cover.
5. Investigate the extent of undermining and/or missing stones at the base of the downstream masonry face at the primary spillway and repair as necessary.
6. Fully remove beaver dam approximately 450 feet upstream of the dam to deter increased beaver activity and re-impoundment of the upstream portion of the pond.

Remedial Modifications Recommendations

1. Repair left upstream masonry wall and provided seepage control measures.
2. Grade the upstream slope of the embankment and provide adequate riprap armoring.

Morse Pond Dam:

Studies and Analyses

1. Prepare a formal Operation & Maintenance Manual.
2. Prepare an Emergency Action Plan.
3. Perform a detailed hydrologic/hydraulic analysis.
4. Investigate wet areas at the toe.

Recurrent Maintenance Recommendations

1. Control vegetation on the dam and areas within 20 ft of any part of the dam.
2. Remove debris from the spillway as needed.
3. Perform regular inspections of the dam especially before and after rain events.

Minor Repair Recommendations

1. No minor repairs are recommended at this time until remedial measures are undertaken.

Remedial Modifications Recommendations

1. Remove all stumps on the crest and slopes of the dam from previous tree removal efforts.
2. Remove all woody vegetation and trees on the entire dam and abutments and within 20 ft of any part of the dam.
3. Regrade dam crest and slopes and plant grass.
4. Provide slope erosion at waterline on upstream side of dam.

- Action Type: Planning, Pre-Disaster
- Priority Score: 2025 Score: __
- Lead: MA DCR ODS
- Supporting: Town Administrator/Board of Selectmen
- Time Frame: Long Term
- Financing Options: MA DCR ODS funds
- Cost Estimate: High
- Benefit: Reduced impacts/costs associated with flooding/Improved Public Health, Safety and Welfare/Improved resilience
- Vulnerable Area: Dams/Public Health, Safety and Welfare/Property Protection
- Hazards Addressed: Flood-Related Hazards

Action __

Ensure that critical facilities are adequately protected against flood-related hazards....2025 Risk Assessment

- *Douglas Wastewater Treatment Facility: 100-Year Flood Zone*

- *Hemlock Street Bridge: 100-Year Flood Zone*
- *South Street Bridge: 100-Year Flood Zone*
- *Cedar Street Bridge: 100-Year Flood Zone*
- *Mechanic Street Bridge: 100-Year Flood Zone*
- *Potter Road Bridge: 100-Year Flood Zone*
- *Lovett Bridge (Cook St. Bridge) : 100-Year Flood Zone*
- *West Street Bridge: 100-Year Flood Zone*
- *Manchaug Street Bridge: 100-Year Flood Zone*
- *South Street Bridge: 100-Year Flood Zone*
- *Main St. Bridge: 100-Year Flood Zone*

- *Gilboa Pond Dam: 100-Year Flood Zone*
- *Whitin Reservoir Dam: 100-Year Flood Zone*
- *Dudley Pond Dam: 100-Year Flood Zone*
- *Potter Road Dam: 100-Year Flood Zone*
- *Wallis Pond Dam: 100-Year Flood Zone*
- *Douglas Mill Pond Dam: 100-Year Flood Zone*

- *Cedar Street Pond Dam: 100-Year Flood Zone*
- *Lower Hunts Pond Dam: 100-Year Flood Zone*
- *Hunts Pond Dam: 100-Year Flood Zone*
- *Mill Pond Dam: 100-Year Flood Zone*
- *Riddle Road Pond Dam: 100-Year Flood Zone*
- *Chase Pond Dam: 100-Year Flood Zone*
- *Old Storage Pond Dam #1: 500-Year Flood Zone*
- *Morse Pond Dam: 500-Year Flood Zone*
- *Wellman Pond Dam: 500-Year Flood Zone*

  - Action Type: Planning, Pre-Disaster
  - Priority Score: 2025 Score: __
  - Lead: Fire/Emergency Management Department
  - Supporting: Highway Department/Private Property Owners
  - Time Frame: Long Term
  - Financing Options: Municipal Operating Budget (Fire Department/Highway Department budgets), Private property owner (s) funds, FEMA Hazard Mitigation Grants Assistance
  - Cost Estimate: High
  - Benefit: Minimized/Reduced impacts and costs/Continuity of municipal services/Protection of property
  - Vulnerable Area: Municipally-owned Infrastructure/Property Protection/Resilience/Critical Facilities and Vulnerable Populations
  - Hazards Addressed: Flood-related/Winter-related/Wind-related Hazards

Action __
Ensure that vulnerable populations are adequately protected against flood-related hazards.
…2025 Risk Assessment

- *Classic Envelope Inc. (major employer): 100-Year Flood Zone*
- *Alternatives Unlimited (major employer): 500-Year Flood Zone*

  - Action Type: Planning, Pre-Disaster
  - Priority Score: 2025 Score: __
  - Lead: Private Business Owners
  - Supporting: Town Administrator/Board of Selectmen
  - Time Frame: Long Term
  - Financing Options: Private business owner (s) funds
  - Cost Estimate: Moderate
  - Benefit: Minimized/Reduced impacts and costs/Protection of property/Improved public health, safety and welfare
  - Vulnerable Area: Major Employers/Property Protection/Public Health, Safety and Welfare/Resilience/Critical Facilities and Vulnerable Populations
  - Hazards Addressed: Flood-related/Winter-related/Wind-related Hazards

Action __
Implement the recommendations from the Town of Douglas Sewer Asset Management Plan CWSRF No. 7070 Draft associated with operations at the Town's Wastewater Treatment Facility (WWTF)/Sewer Pump stations:

- *Improvements to Sludge Pump Station*
- *Replace the Colonial Street Pump Station*
- *GIS Expansion*
- *CCTV Inspections*
- *Updates to Asset Management Plan*

…Town of Douglas Sewer Asset Management Plan CWSRF No. 7070 Draft

- Action Type: Planning, Pre-Disaster
- Priority Score: 2025 Score: __
- Lead: Sewer Department
- Supporting: Town Administrator/Board of Selectmen
- Time Frame: Long Term
- Financing Options: Municipal Operating Budget (Sewer Department budget), FEMA Hazard Mitigation Grants Assistance
- Cost Estimate: High
- Benefit: Continuity of Municipal Services/Natural Resource Protection/Improved resilience
- Vulnerable Area: Natural Resources/Municipal Services/Public Health, Safety and Welfare
- Hazards Addressed: All Hazards

PREPAREDNESS, COORDINATION, AND RESPONSE

Action __
Evaluate the use of snow fences or 'living snow fences' e.g., (rows of trees or shrubs), to limit blowing and drifting snow over the following roadways:

- Main Street
- West Street
- Bigelow Road
- Church Street
- NW Main Street
- Wallis Street
- Riedell Road

…2025 Risk Assessment

- Action Type: Planning, Pre-Disaster
- Priority Score: 2025 Score: __
- Lead: Highway Department
- Supporting: Town Administrator/Board of Selectmen

- Time Frame: Medium Term
- Financing Options: Municipal Operating Budget (Highway Department budget), FEMA Hazard Mitigation Grants Assistance
- Cost Estimate: Low
- Benefit: Reduced impacts/costs associated with impassable roadways/Improved resilience/Uninterrupted transportation network
- Vulnerable Area: Public Health, Safety and Welfare/Transportation Network
- Hazards Addressed: Winter-related Hazards

Action __

Reduce impacts caused by winter storms and severe storms:

- *Develop best management practices for treating roads during ice and snowstorms with organic matter, particularly for the following roadways:*
    - Main Street
    - Sunset Drive
    - North Street
    - Gilboa Street
    - Davis Street
    - Mumford Street
    - Cross Street
    - Conservation Drive
    - Johnson Court
    - West Street
    - Grove Street
    - West St at NW Main Street
    - Birch Street
    - Oak Street
    - NW Main Street
    - Ledgestone Road
    - Ledgewood Drive
    - Wallis Street
    - SW Main Street
    - High Street
    - Hilltop Drive
    - Reid Road
    - Birch Hill Road
    - Wallum Lake Road
    - Walnut Street
    - Hemlock Street
    - Chestnut Street
    - Old Farm Road
    - SE Main Street
    - Linden Street

    - Fairbanks Court
    - Perry Street
    - Yew Street
    - Webster Street

…2025 Risk Assessment/Town of Douglas Open Space and Recreation Plan 2023

- Action Type: Planning, Pre-Disaster
- Priority Score: 2025 Score: __
- Lead: Highway Department
- Supporting: Town Administrator/Board of Selectmen
- Time Frame: Medium Term
- Financing Options: Municipal Operating Budget (Highway Department budget), FEMA Hazard Mitigation Grants Assistance
- Cost Estimate: Low
- Benefit: Reduced impacts/costs associated with impassable roadways/Improved resilience/Uninterrupted transportation network
- Vulnerable Area: Public Health, Safety and Welfare/Transportation Network
- Hazards Addressed: Winter-related Hazards

Action __
Improve management of forested lands throughout the Town, whether DCR, Town, or privately-owned.

- *Develop and enact forest management plans including brush and dead-wood clearing programs, including public outreach to encourage action on private lands, to reduce fuel load in forest areas. Study potential for controlled burns.*
- *Increase tree trimming budget. Document street tree conditions throughout the Town and create a prioritized list for removal or pruning based on hazard level. Develop plan for storage and use of removed trees.*

…MVP Summary of Findings 2020

- Action Type: Planning, Pre-Disaster
- Priority Score: 2025 Score: __
- Lead: Tree Warden
- Supporting: Town Administrator/Board of Selectmen
- Time Frame: Medium Term
- Financing Options: Municipal Operating Budget (Tree Warden budget), FEMA Hazard Mitigation Grants Assistance
- Cost Estimate: High
- Benefit: Minimized/Reduced impacts from fire damage/Improved resilience/Natural resource protection
- Vulnerable Area: Natural Resources/Public Health, Safety and Welfare/Property Protection
- Hazards Addressed: Wildfire/Brushfire-related Hazards

EDUCATION AND AWARENESS

LOCAL PLANS AND REGULATIONS

Action __
Use MA Drought Management Plan as a template for Town's own drought plan and integrate State's recommendations and actions according to Town's needs.
…2017 Plan

- Action Type: Planning, Pre-Disaster
- Priority Score: 2017 Score: Medium Priority/2025 Score: __
- Lead: Fire/Emergency Management Department
- Supporting: Tree Warden
- Time Frame: Short Term
- Financing Options: Municipal Operating Budget (Fire Department budget), FEMA Hazard Mitigation Grant Assistance
- Cost Estimate: Moderate
- Benefit: Continuity of municipal services/Improved resilience
- Vulnerable Area: Natural Resources/Property Protection/Public Health, Safety and Welfare/Natural Resources
- Hazards Addressed: Drought-related/Wildfire and Brushfire-related Hazards

Action __
Preserve the rural character of the Town.

Retain private forests and trees:

- *Develop forest management best practices on Town lands and promote with private landowners.*
- *Develop and implement a Tree Protection Bylaw, or something similar, to prevent clear-cutting of residential, commercial, and industrial parcels.*
- *Develop an outreach program to educate the public on the benefits of the Community Preservation Act.*

Maintain historic character and scenic resources:

- *Adopt the Community Preservation Act.*

Prioritize open space preservation:

- *Strengthen open space preservation and tree protection in Zoning Bylaw and Regulations.*
- *Establish a land bank for future acquisitions.*
- *Work with the Town Planner and Assessor to identify parcels that may provide access to recreational resources and/or that are contiguous with other open space parcels through the disposition of tax title properties meeting localized recreational needs.*

- *Prioritize parcels under Chapter 61 for future acquisition.*

…Town of Douglas Open Space and Recreation Plan 2023

- Action Type: Planning, Pre-Disaster
- Priority Score: 2025 Score: __
- Lead: Tree Warden
- Supporting: Planning Board/Open Space Committee/Conservation Commission
- Time Frame: Long Term
- Financing Options: Municipal Operating Budget (Tree Warden budget), FEMA Hazard Mitigation Grants Assistance
- Cost Estimate: Moderate
- Benefit: Natural Resource Protection/Improved resilience
- Vulnerable Area: Natural Resources
- Hazards Addressed: All Hazards

Action __

Build the climate resiliency of the Town.

Reduce flooding and stormwater concerns:

- *Install bioswales at sidewalks in new construction/developments.*
- *Assess the culverts near the Town's open space and recreation facilities, and upgrade as necessary using stormwater best management practices.*
- *Educate the public on building within flood hazard areas.*
- *Educate the public on impacts of fertilizer runoff from properties within a certain distance of water resources.*

Strengthen the awareness of extreme temperatures and drought impacts:

- *Develop a public education campaign about insect-borne diseases and prevention (EEE and Lyme).*
- *Develop a public education campaign about drought and wildfire awareness.*
- *Install a local weather station to monitor temperature and precipitation changes.*

…Town of Douglas Open Space and Recreation Plan 2023/MVP Summary of Findings 2020

- Action Type: Planning, Pre-Disaster
- Priority Score: 2025 Score: __
- Lead: Highway Department/Fire Department
- Supporting: Board of Health
- Time Frame: Medium Term
- Financing Options: Municipal Operating Budget (Highway/Fire Department budgets), FEMA Hazard Mitigation Grant Assistance, MVP Action grants
- Cost Estimate: High
- Benefit: Minimized/Reduced impacts from flooding and contamination/Improved resilience/Improved Public Health, Safety and Welfare
- Vulnerable Area: Localized Areas Subject to Flooding/Property Protection/Public Health, Safety and Welfare

- Hazards Addressed: Flood-related, Winter-related, Wind-related, Extreme Heat-related, Drought-related, Invasive Species-related Hazards

Action __
Implement management recommendations to protect the natural resources located within the Douglas State Forest:

- *Review and implement MassDEP Wellhead Protection Tips and Guidance (MassDEP 1995, MassDEP 2011) within the Forest's Zone I Wellhead Protection Areas.*
- *Investigate relocating picnic facilities outside the Zone 1 Wellhead Protection Area at Wallum Lake Recreation Area or relocating well outside of high-use recreation areas.*
- *Install a secured perimeter fence around the wellhead at the Wallum Lake Recreation Area.*
- *Replace the existing privy at the Mid-State Trail shelter with a conforming on-site sewage disposal system, as permitted by Douglas Health Department, NHESP, MHC, and other regulators, as appropriate.*
- *Meet with representatives of MassWildlife, Rhode Island Department of Environmental Management, the Connecticut Department of Energy and Environmental Protection, and Indigenous peoples to identify common interests in the conservation of natural resources at Douglas State Forest, Mine Brook Wildlife Management Area, and Buck Hill Wildlife Management Area.*
- *Survey the state Endangered plant population, map the extent of the population and adjacent suitable habitat, and develop and implement a Habitat Management Plan to protect this species within Douglas State Forest.*
- *Implement recommendations in the Program Accessibility Assessment (IHCD 2019).*
- *Fill or cap the open well adjacent to the campsite entrance.*

…Resource Management Plan Douglas State Forest

- Action Type: Planning, Pre-Disaster
- Priority Score: 2025 Score: __
- Lead: MA DCR
- Supporting: Tree Warden
- Time Frame: Long Term
- Financing Options: MA DCR budget, Municipal Operating Budget (Tree Warden budget), FEMA Hazard Mitigation Grants Assistance
- Cost Estimate: High
- Benefit: Natural Resource Protection/Improved resilience
- Vulnerable Area: Natural Resources
- Hazards Addressed: All Hazards

Action __
Implement recommendations from the Town's Drinking Water System Risk & Resilience Assessment to help increase their Utility Resilience Index (URI):

- *Update the Emergency Response Plan and conduct annual trainings and functional*

exercises. The ERP should be updated according to the MassDEP Bureau of Resource Protection – Drinking Water Program "Emergency Response Plan 9ERP) Compliance Checklist", last updated November 14, 2013. In addition, the Water Department's plan must "comply with 310 CMR 22.04 (13) and the Massachusetts Guidelines and Policies for Public Water Systems, Chapter 12 – Emergency Response Planning Requirements including Appendix O – Handbook for Water Supply Emergencies." The Water Department should ensure the ERP addresses all the hazards discussed in this report including emergency response and preparedness procedures in the event of a cyber attack.

- *Join the Massachusetts Water/Wastewater Agency Response Network (MAWARN).*
- *Determine methods to receive critical parts and equipment in the event of a failure within 24 hours; joining MAWARN or developing relationships with additional vendors may help to reduce equipment procurement lead times.*
- *Conduct cross-training of employees to have at least 75% of staff response-capable in critical operations and maintenance positions and available as backup in the event of a pandemic illness.*
- *Consider the development of a Business Continuity Plan (BCP); the AWWA has developed a guidance document to assist water utilities with preparation of a BCP. The end goal of a BCP is to maintain operations – financially, managerially, and functionally, after any incident.*
- *Conduct a formal asset management program assessment of the drinking water system infrastructure according to the Government Accounting Standards Board (GASB) asset management standards.*

…Drinking Water System Risk and Resilience Assessment, 2021

- Action Type: Planning, Pre-Disaster
- Priority Score: 2025 Score: __
- Lead: Water Department
- Supporting: Town Administrator/Board of Selectmen
- Time Frame: Short Term
- Financing Options: Municipal Operating Budget (Water Department budget), FEMA Hazard Mitigation Grants Assistance
- Cost Estimate: High
- Benefit: Natural Resource Protection/Improved resilience
- Vulnerable Area: Natural Resources/Municipal Services/Public Health, Safety and Welfare
- Hazards Addressed: All Hazards

Figure 1
Flood Risks

Date: 4/4/2025
Data Sources: Bureau of Geographic Information (MassGIS), RIGIS, CT Department of Energy & Environmental Protection, Douglas LHMC

This map is for informational purposes and may not be suitable for legal, engineering, or surveying purposes.

Douglas Boundary

Surface Water Features

- Lakes and Ponds
- Rivers and Streams

Transportation

- Highway
- State Route
- Major Road
- Local Road

Critical Facilities & Vulnerable Populations

- Primary Emergency Operations Center
- Secondary Emergency Operations Center
- Primary Shelter
- Alternate Shelter
- Critical Facility
- Critical Facility & Vulnerable Population
- Vulnerable Population

FEMA National Flood Hazard Layer

- 1% Annual Chance Flood Hazard
- Regulatory Floodway
- 0.2% Annual Chance Flood Hazard

N

Miles
0 0.5 1

Horsley Witten Group
Sustainable Environmental Solutions

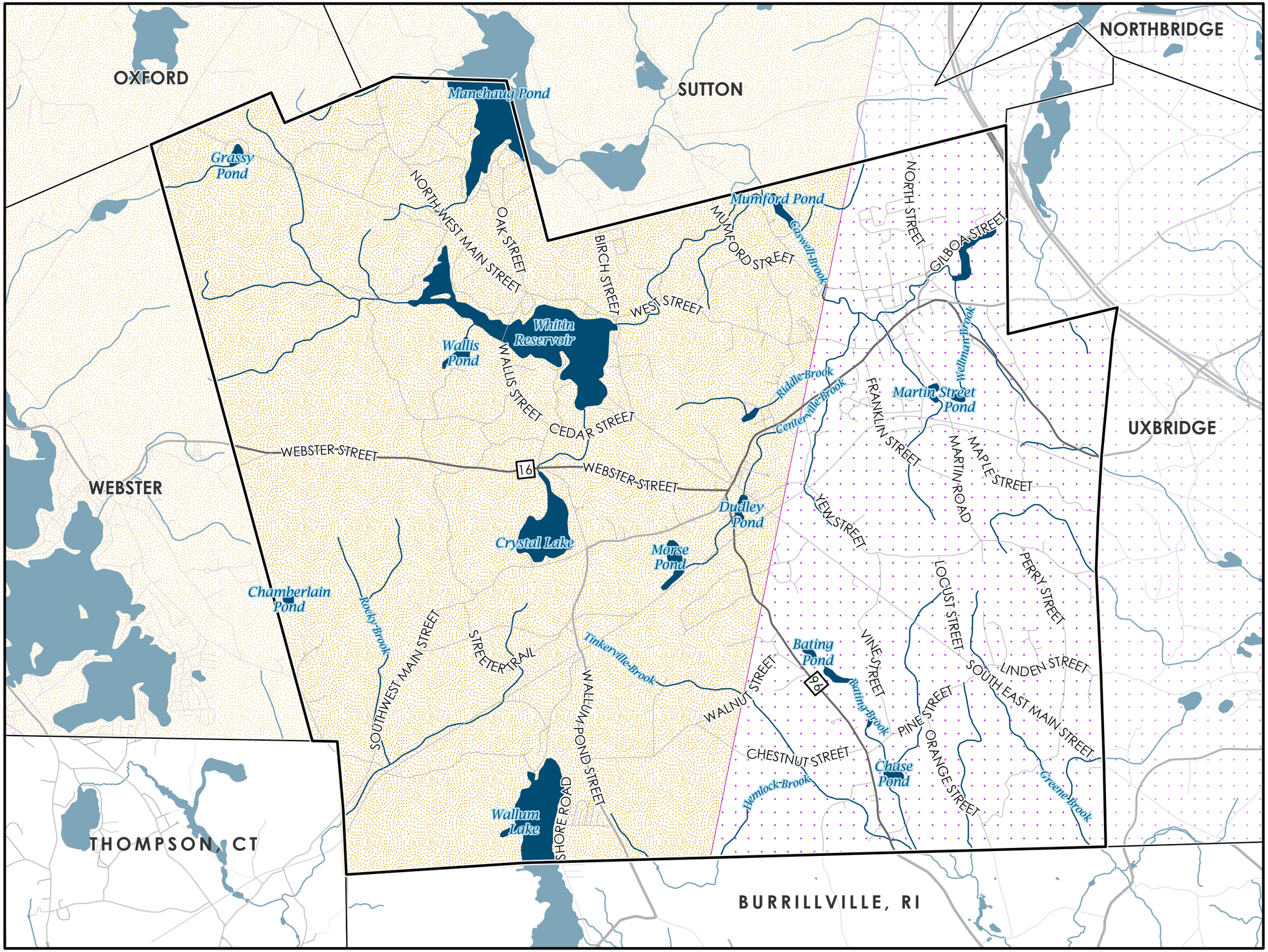

Figure 2
Average Annual Snowfall

Date: 3/31/2025
Data Sources: Bureau of Geographic Information (MassGIS), RIGIS, CT Department of Energy & Environmental Protection, Douglas LHMC

This map is for informational purposes and may not be suitable for legal, engineering, or surveying purposes.

Douglas Boundary

Surface Water
- Lakes and Ponds
- Rivers and Streams

Transportation
- Highway
- State Route
- Major Road
- Local Road

Average Annual Snowfall
- 36.1 - 48.0 inches (Zone G)
- 48.1 - 72.0 inches (Zone H)

Miles
0 0.5 1

Horsley Witten Group
Sustainable Environmental Solutions

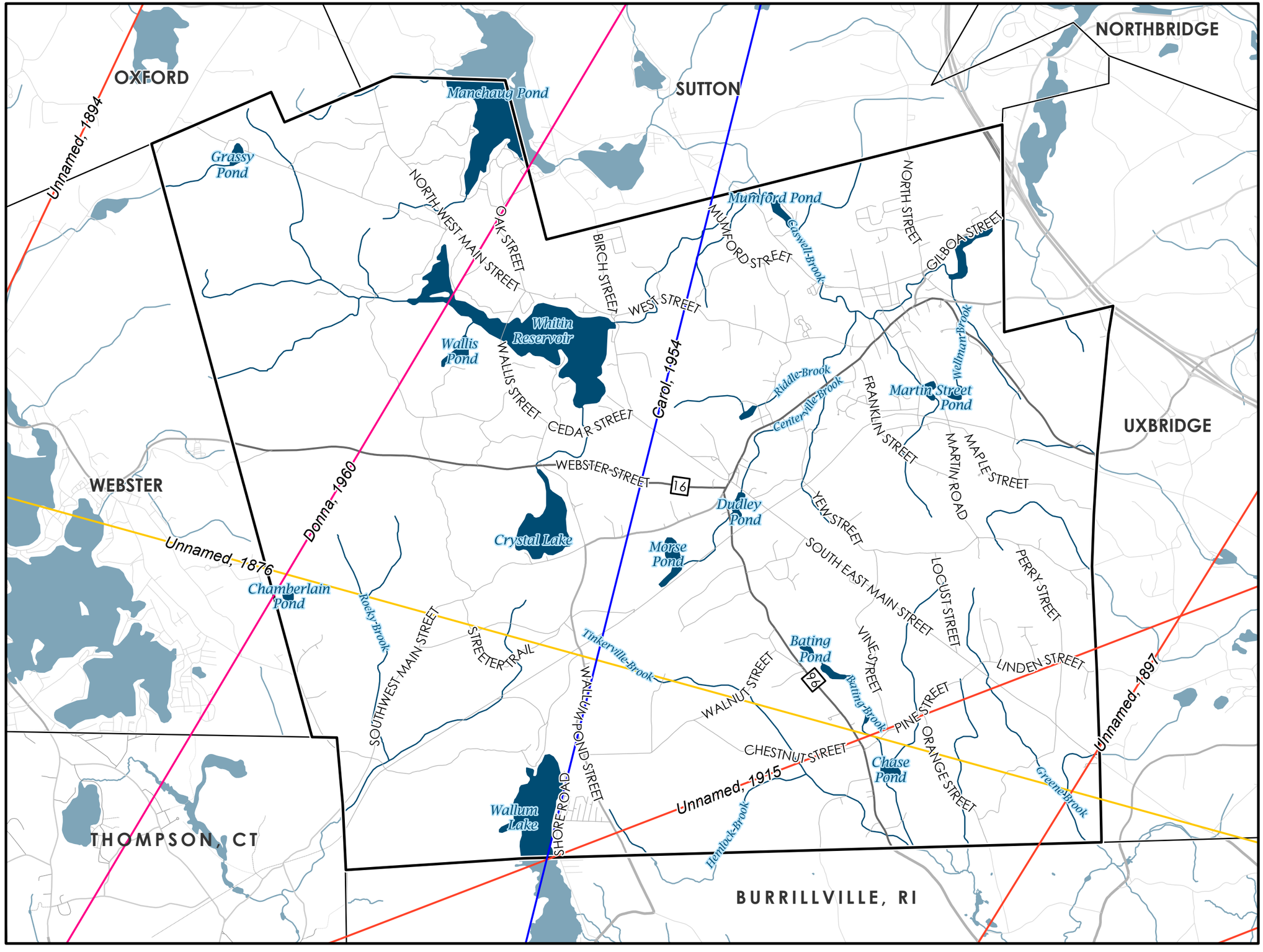

Figure 3
Historical Hurricane Tracks

Date: 3/31/2025
Data Sources: Bureau of Geographic Information (MassGIS), RIGIS, CT Department of Energy & Environmental Protection, NOAA, Douglas LHMC

This map is for informational purposes and may not be suitable for legal, engineering, or surveying purposes.

Douglas Boundary

Surface Water

- Lakes and Ponds
- Rivers and Streams

Transportation

- Highway
- State Route
- Major Road
- Local Road

Historical Hurricane Tracks

- Tropical Depression
- Tropical Storm
- Category 1
- Category 3

Miles
0 0.5 1

Horsley Witten Group
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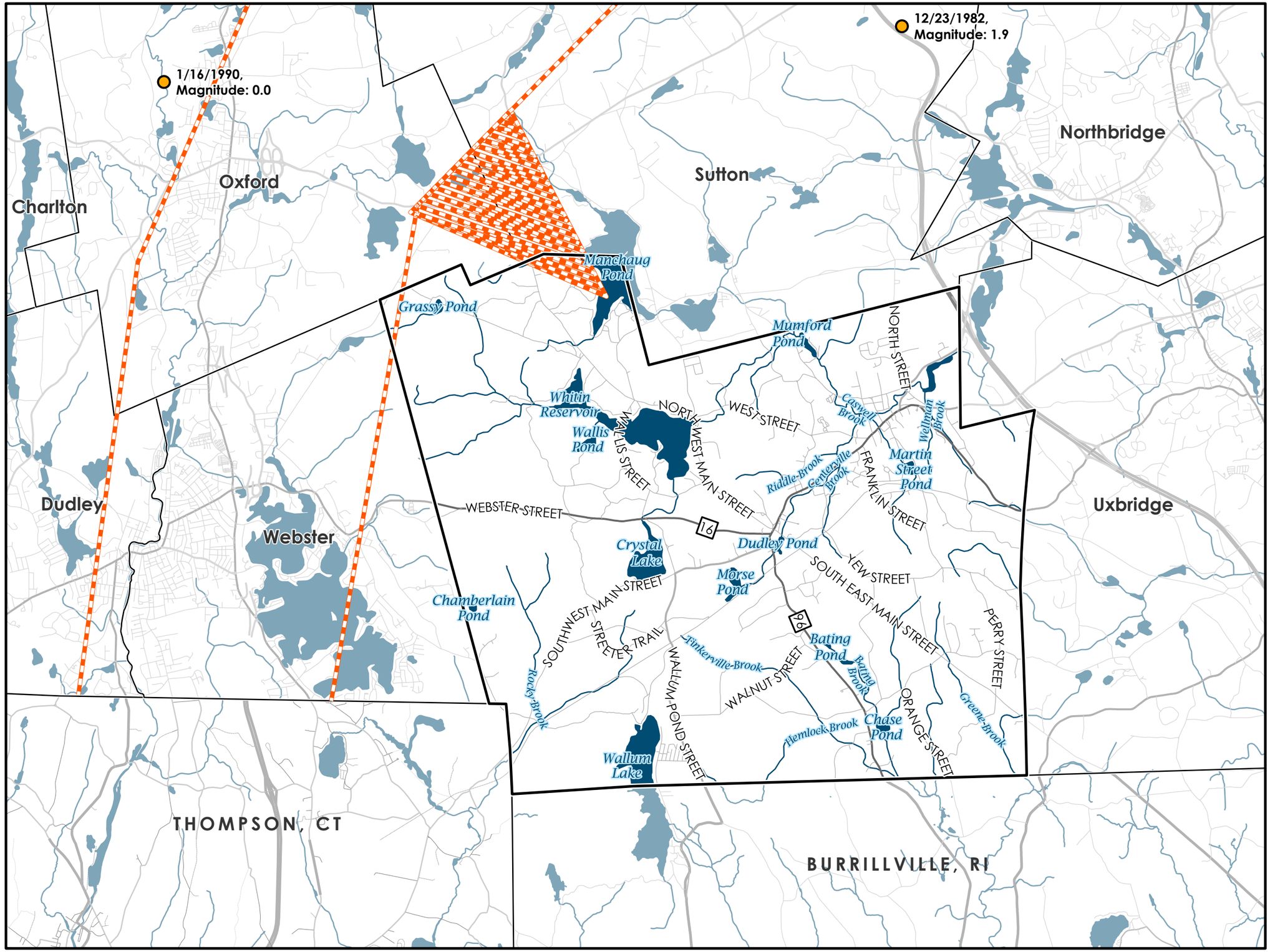

Figure 4
Earthquakes

Date: 3/31/2025
Data Sources: Bureau of Geographic Information (MassGIS), RIGIS, CT Department of Energy & Environmental Protection, Douglas LHMC

This map is for informational purposes and may not be suitable for legal, engineering, or surveying purposes.

Douglas Boundary

Surface Water
- Lakes and Ponds
- Rivers and Streams

Transportation
- Highway
- State Route
- Major Road
- Local Road

Seismic Activity
- Fault Lines
- Earthquake Epicenter

Miles
0 0.5 1

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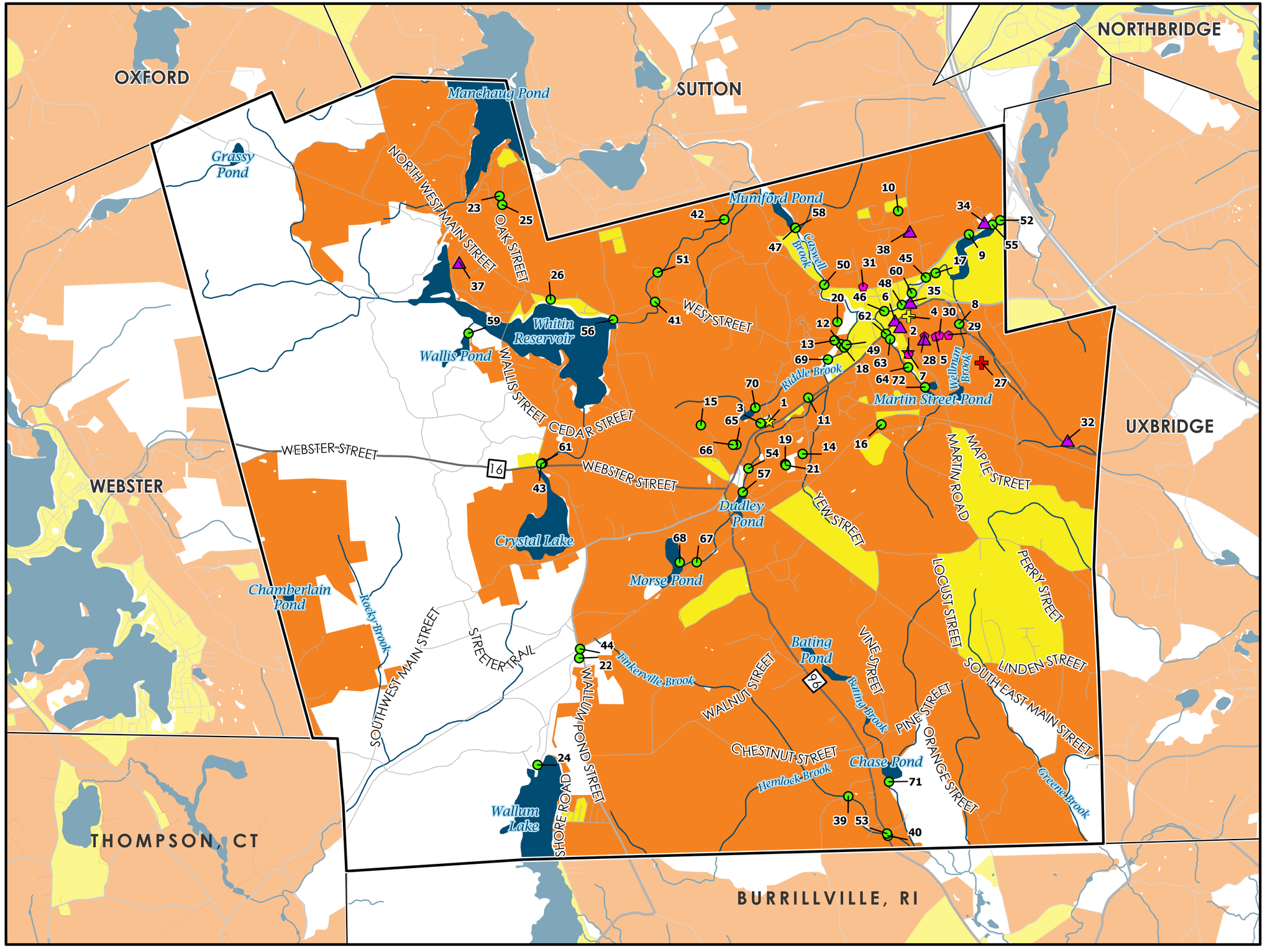
Figure 5
Wildland Urban Interface

Date: 4/4/2025
Data Sources: Bureau of Geographic Information (MassGIS), RIGIS, CT Department of Energy & Environmental Protection, U.S. Forest Service, Douglas LHMC

This map is for informational purposes and may not be suitable for legal, engineering, or surveying purposes.



Douglas Boundary

Surface Water
- Lakes and Ponds
- Rivers and Streams

Transportation
- Highway
- State Route
- Major Road
- Local Road

Wildland-Urban Interface (2020)
- Interface
- Intermix

Critical Facilities & Vulnerable Populations
- Primary Emergency Operations Center
- Secondary Emergency Operations Center
- Primary Shelter
- Alternate Shelter
- Critical Facility
- Critical Facility & Vulnerable Population
- Vulnerable Population

Miles
0 0.5 1

Horsley Witten Group
Sustainable Environmental Solutions

Figure 6
Critical Facilities & Vulnerable Populations

Date: 4/4/2025
Data Sources: Bureau of Geographic Information (MassGIS), RIGIS, CT Department of Energy & Environmental Protection, Douglas LHMC

This map is for informational purposes and may not be suitable for legal, engineering, or surveying purposes.

Douglas Boundary

Surface Water Features

- Lakes and Ponds
- Rivers and Streams

Transportation

- Highway
- State Route
- Major Road
- Local Road

Critical Facilities & Vulnerable Populations

- Primary Emergency Operations Center
- Secondary Emergency Operations Center
- Primary Shelter
- Alternate Shelter
- Critical Facility
- Critical Facility & Vulnerable Population
- Vulnerable Population

Miles
0 0.5 1

Horsley Witten Group
Sustainable Environmental Solutions

Flood Hazard Areas

FEMA Flood Zones

The various ponds and rivers/streams located throughout the community represent those areas subject to inundation by the 100-year flood zone, while other low-lying areas are subject to inundation by the 500-year flood zone.

A, AE/100-Year Flood Zone

The A/AE zone or 100-year flood zone (has a 1% chance of flooding occurring each year) is a regulatory standard used by federal agencies and most states to administer floodplain management programs and is also used by the NFIP as the basis for insurance requirements nationwide. Below is a breakdown of the number of parcels (by land use type), critical facilities, and vulnerable populations susceptible to inundation in the A, AE/100-Year Flood Zone:

Parcels affected: (731 parcels in total)

- Chapter 61/61A/61B Property: 19
- Commercial – Office Building: 2
- Commercial – Outdoor Recreational Properties: 1
- Commercial – Retail Trade: 1
- Commercial – Retail Trade (Automotive/Marine Craft/Other): 1
- Commercial – Storage warehouses/Distribution Facilities: 4
- Exempt Property – Charitable: 3
- Exempt Property – Lands held by other Towns/Cities/Districts (Vacant): 3
- Exempt Property – Municipal/County (Improved): 8
- Exempt Property – Municipal/County (Vacant): 11
- Exempt Property – Other: 1
- Exempt Property – Religious Groups: 2
- Exempt Property – State: 39
- Industrial – Electric Generation Plants: 2
- Industrial – Manufacturing/Processing: 2
- Multiple-Use Property: 2
- Residential – Apartments: 5
- Residential – Residences: 534
- Unknown: 12
- Vacant – Developable Land: 33
- Vacant – Potentially Developable Land: 2
- Vacant – Undevelopable Land: 45

Critical Facilities/Vulnerable Populations/Environmental Justice Populations

Critical facilities are those public or private facilities that possess added value to the community and deserve additional consideration when determining mitigation strategies to protect these resources from natural hazard risks. Vulnerable populations are those public or private facilities that are host to vulnerable residents – children in day care or schools, seniors living in congregate care settings, or disabled residents living independently in the community. The list of critical facilities and vulnerable populations was updated by the LHMT and Consultant with modifications/revisions (Figure 6, Appendix A). Several of the Town's critical facilities/vulnerable populations are located in high hazard areas including FEMA Flood Zones.

The US Environmental Protection Agency defines Environmental Justice (EJ) as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Within the context of natural hazards and their mitigation, potential EJ concerns may arise from income-related factors, discrimination (overt or institutional), cultural isolation and barriers, language isolation, lack of transportation access, and disability (especially among the elderly). There are no EJ areas/communities identified in Douglas.

Critical Facilities affected:

- Douglas Wastewater Treatment Facility
- Hemlock Street Bridge
- South Street Bridge
- Cedar Street Bridge
- Mechanic Street Bridge
- Potter Road Bridge
- Lovett Bridge (Cook St. Bridge)
- West Street Bridge
- Manchaug Street Bridge
- South Street Bridge
- Main St. Bridge
- Gilboa Pond Dam
- Whitin Reservoir Dam
- Dudley Pond Dam
- Potter Road Dam
- Wallis Pond Dam
- Douglas Nill Pond Dam
- Cedar Street Pond Dam
- Lower Hunts Pond Dam
- Hunts Pond Dam
- Mill Pond Dam

- Riddle Road Pond Dam
- Chase Pond Dam

Vulnerable Populations affected:

- Classic Envelope Inc.

Table ___ Total Vulnerability FEMA A/AE/100-Year Flood Zone Summary

Land Use (by Land Use Code)	No. of Parcels Impacted	Total Value
Chapter 61, 61A, or 61B Property	18	$864,462
Commercial - Office Building	2	$1,828,300
Commercial - Outdoor Recreational Properties	1	$506,100
Commercial - Retail Trade	1	$317,500
Commercial - Retail Trade (Automotive, Marine Craft and Other Engine Propelled Vehicles, Sales and Service)	1	$1,408,200
Commercial - Storage Warehouses and Distribution Facilities	4	$3,065,200
Exempt Property - Charitable	3	$315,600
Exempt Property - Lands held by other Towns, Cities, or Districts (Vacant)	3	$766,600
Exempt Property - Municipal/County (Improved)	8	$26,319,800
Exempt Property - Municipal/County (Vacant)	11	$1,682,400
Exempt Property - Other	1	$4,186,400
Exempt Property - Religious Groups	2	$176,500
Exempt Property - State	39	$6,812,100
Industrial - Electric Generation Plants	2	$266,100
Industrial - Manufacturing and Processing	2	$166,630,600
Multiple-Use Property	2	$1,132,900
Residential - Apartments	5	$15,103,400
Residential - Residences	534	$229,928,200
Unknown	12	$8,653,677
Vacant - Developable Land	33	$5,751,000
Vacant - Potentially Developable Land	2	$353,400
Vacant - Undevelopable Land	45	$1,142,300
Total	**731**	**$477,210,739**

Source: Douglas Tax Assessor CAMA data, Massachusetts Property Tax Use Code.

X/500-Year Flood Zone

The X zone or 500-year flood zone is a flood that has a 0.2% chance of occurring each year.

Below is a breakdown of the number of parcels (by land use type), critical facilities, and vulnerable populations impacted by the X flood zone:

Parcels affected: (258 parcels in total)

- Chapter 61/61A/61B Property: 209
- Commercial – Retail Trade (Automotive/Marine Craft/Other): 1
- Exempt Property – Charitable: 1
- Exempt Property – Lands held by other Towns/Cities/Districts (Vacant): 1
- Exempt Property – Municipal/County (Improved): 1
- Exempt Property – Municipal/County (Vacant): 6
- Exempt Property – Religious Groups: 2
- Exempt Property – State: 22
- Industrial – Manufacturing/Processing: 3
- Industrial Mining/Quarrying: 1
- Residential – Residences: 156
- Unknown: 10
- Vacant – Developable Land: 16
- Vacant – Potentially Developable Land: 1
- Vacant – Undevelopable Land: 17

Critical Facilities affected:

- Old Storage Pond Dam #1
- Morse Pond Dam
- Wellman Pond Dam

Vulnerable Populations affected:

- Alternatives Unlimited

Table ___ Total Vulnerability FEMA X/500-Year Flood Zone Summary

Land Use (by Land Use Code)	No. of Parcels Impacted	Total Value
Chapter 61, 61A, or 61B Property	20	$206,610
Commercial - Retail Trade (Automotive, Marine Craft and Other Engine Propelled Vehicles, Sales and Service)	1	$716,700
Exempt Property - Charitable	1	$867,200
Exempt Property - Lands held by other Towns, Cities, or Districts (Vacant)	1	$25,900
Exempt Property - Municipal/County (Improved)	1	$245,000
Exempt Property - Municipal/County (Vacant)	6	$1,457,100
Exempt Property - Religious Groups	2	$2,393,000
Exempt Property - State	22	$5,307,600

Industrial - Manufacturing and Processing	3	$1,818,100
Industrial - Mining and Quarrying	1	$2,143,200
Residential - Residences	156	$76,932,100
Unknown	10	$2,276,295
Vacant - Developable Land	16	$3,120,300
Vacant - Potentially Developable Land	1	$169,400
Vacant - Undevelopable Land	17	$581,000
Grand Total	**258**	**$98,259,505**

Source: Douglas Tax Assessor CAMA data, Massachusetts Property Tax Use Code.

Douglas Hazard Mitigation Plan Update

LHMT Meeting #3

Douglas Town Hall

29 Depot St. East Douglas, MA 01516

May 20, 2025 9:00 AM - 11:00 AM

Name	Email Address
Craig Pereira	
Kelly Manning	
Ken Frasier	
Kristin Harris	
John Furno	
Robert Sullivan	
Matt Wojcik	

LHMT Meeting #4: June 24, 2025

Douglas Hazard Mitigation Plan Update
Local Hazard Mitigation Team Meeting #4

Tuesday, June 24, 2025
Douglas Town Hall
29 Depot Street, East Douglas, MA 01516
9:00 AM – 11:00 AM

Agenda

1. Outstanding Data Needs
    a. Reports:
        i. Public Infrastructure/Emergency Lifelines Summaries
            1. Water
            2. Wastewater
            3. Stormwater

2. Vulnerability Overlay Analysis (sent to LHMT 4/10/25…updated 6/18/25)
    a. Critical Facilities/Vulnerable Populations…edits:
        i. Critical Facilities added:
            1. Douglas Transfer Station
            2. Douglas Food Pantry
        ii. Vulnerable Populations added:
            1. First Congregation Church
            2. Douglas United Methodist Church
        iii. Vulnerable Populations edited:
            1. Site 35: name updated to Open Sky Community Services
            2. Site 34: name update to Classic Envelope Inc./Supreme X/Resinate, Inc.

3. Today's Discussion
    a. Hazard Mitigation Actions for Consideration
        i. STAPLEE Criteria Worksheet Overview
        ii. STAPLEE Rankings

4. Next Steps
    a. Draft Plan (recognizing all dates provided below are estimated and not confirmed)
        i. Draft HMP Update ready: July 14, 2025
        ii. LHMT Review of draft: July 14, 2025 (2 weeks)
        iii. All departments/Boards/Commissions review of draft: July 28, 2025 (2 weeks)
        iv. Select Board review: August 11, 2025 (2 weeks)
        v. Public Comment Period: August 25, 2025 (2 weeks)
            1. Public Workshop #2/Public Hearing: week of September 1, 2025…this should take place during the Public Comment Period and perhaps scheduled during a Select Board meeting so we have a guaranteed, captive audience.
        vi. MEMA Submission: by September 15, 2025 (requires a 45-60 que)

vii. FEMA Submission: by October 20, 2025 (requires a 45-60 day que)

Horsley Witten Group

Memorandum of Meeting

To: Douglas Local Hazard Mitigation Team (LHMT)

From: Craig Pereira

Date: June 24, 2025

Re: Douglas LHMT Meeting #4

In attendance:

Kelly Manning – Assistant Fire Chief
Kristin Harris – Board of Health
John Charbonneau – Community Development Director
Ken Frasier – Building Commissioner
Matt Wojcik – Town Administrator

Consultant Team
Craig Pereira, Project Manager - Horsley Witten Group, Inc. (HW)

The fourth LHMT meeting was held on June 24, 2025, at the Douglas Municipal Center to discuss the Hazard Mitigation Plan Update. The following items were discussed:

1. Outstanding Data Needs. Craig reviewed remaining outstanding data needs.
    a. Reports:
        i. Public Infrastructure/Emergency Lifelines Summaries
            1. Water
            2. Wastewater
            3. Stormwater

    Craig has the beginnings of the water system and wastewater system summaries taken directly from the Town's Open Space and Recreation Plan (2023) however, more data is needed and the existing data should be confirmed. Bob Sullivan/other LHMT members to review drafted summaries, in addition to the examples from another community to get a sense for what is needed and provide what is available.

2. Vulnerability Overlay Analysis (sent to LHMT 4/10/25…updated 6/18/25). Craig reviewed the edits that were made to the critical facilities/vulnerable populations data sets and mapping.
    a. Critical Facilities/Vulnerable Populations…edits:

i. Critical Facilities added:
   1. Douglas Transfer Station
   2. Douglas Food Pantry

ii. Vulnerable Populations added:
   1. First Congregation Church
   2. Douglas United Methodist Church

iii. Vulnerable Populations edited:
   1. Site 35: name updated to Open Sky Community Services
   2. Site 34: name update to Classic Envelope Inc./Supreme X/Resinate, Inc.

3. Today's Discussion
   a. Hazard Mitigation Actions for Consideration
      i. STAPLEE Criteria Worksheet Overview. Craig provided an overview on the FEMA worksheet to get the group started.
      ii. STAPLEE Rankings. Craig walked the LHMT through the ranking exercise.
         1. Craig has provided a summary table of where the ranked mitigation actions landed as far as priority, along with the 'Hazard Mitigation Actions for Consideration document'.
            a. All LHMT should review the ranking summary tables and updated 'Hazard Mitigation Actions for Consideration' (actions and standardized bulleted list after each action. Anything that needs to be added, edited please provide to Craig.

4. General Comments
   a. Matt Wojcik commented that there was a recent inspection completed for Riddle Road Pond Dam.
      i. Matt to provide an electronic copy to Craig of the Phase I Inspection Report.

5. Next Steps
   a. Draft Plan (recognizing all dates provided below are estimated and not confirmed)
      i. Draft HMP Update ready: July 14, 2025
      ii. LHMT Review of draft: July 14, 2025 (2 weeks)
      iii. All departments/Boards/Commissions review of draft: July 28, 2025 (2 weeks)

iv. Select Board review: August 11, 2025 (2 weeks)
v. Public Comment Period: August 25, 2025 (2 weeks)
    1. Public Workshop #2/Public Hearing: At September 10, 2025, Planning Board meeting. This will take place during the Public Comment Period and scheduled during the Planning Board meeting so we have a guaranteed, captive audience.
vi. MEMA Submission: by September 15, 2025 (requires a 45-60 que)
vii. FEMA Submission: by October 20, 2025 (requires a 45-60 day que)

Craig will coordinate with Kelly regarding email coordination/notice of availability of draft 2025 Update.

Categories:

- Structure and Infrastructure
  - Bricks/mortar infrastructure and building improvements
- Preparedness, Coordination and Response
  - Ensure framework exists to facilitate administration/enforcement/collaboration activities
- Education and Awareness Program
  - Raise awareness/generate support
- Local Plans and Regulations
  - Review/Update local bylaws/ordinances/regulations

Cost Estimate:

- Staff Time – municipal personnel time
- Low – less than $50,000
- Moderate – more than $50,000, but less than $100,000
- High – over $100,000

Time Frame:

- Short Term: less than 1 year
- Medium Term: 1 – < 3 years
- Long Term: > 3 – 5 years

STRUCTURE AND INFRASTRUCTURE

Action #1

Develop an implementation strategy to address property and streets subject to flooding.

…2025 Risk Assessment/MVP Summary of Findings (North St. bridge area)

Determine what mitigation activities…maintenance (catch basin cleaning) v. monitoring (State roads/beaver-related activity) v. structural/replacement (undersized pipes/culvert replacement) v. pavement management (roadway crown/ponding) can alleviate the problem while creating the most benefit to the community for each street (e.g., address those roads that are part of the Town's evacuation route first, then main thoroughfares, etc.).

Streets/Properties Subject to Flooding

Maintenance

(Included here to illustrate a comprehensive review of flooding issues, however, not applicable for funding under any hazard mitigation grant programs)

Monitoring

Walnut Street (in the area of 55 Walnut St.)

- Specific Flooding Area: Walnut Street
- Flooding Cause: Beaver-related activity

Northwest Main Street (in the area of 59 Northwest Main St.)

- Specific Flooding Area: Northwest Main Street
- Flooding Cause: Beaver-related activity

Structural/Replacement

Wallis Street

- Specific Flooding Area: near stream between Whitin Reservoir and Bad Luck Lake, west side of Whitin Reservoir (in the area of 32 Wallis St.)
- Flooding Cause: Upgrade undersized, old stone culvert

Charles Street

- Specific Flooding Area: Charles Street (in the area of 7 Charles St.)
- Flooding Cause: Upgrade undersized culvert

North Street

- Specific Flooding Area: area associated with the No. 37 Bridge
- Flooding Cause: bridge still not replaced and impacted whenever Mumford River swells, due to low arch over the water and narrow roadway (also evacuation route). Replace spillway and install a culvert.

Birch Street

- Specific Flooding Area: drainage and water runoff draining in a northerly direction onto crest of Whitin Reservoir Dam (in winter, an icing of roadway issue)
- Flooding Cause: Upgrade undersized culvert

NW Main Street

- Specific Flooding Area: drainage water moving in a southerly direction onto Whitin Reservoir Dam crest and spilling from roadway into spillway approach area affecting residents along the area of NW Main St. (Icing is prevalent during winter months. Runoff begins outside of District bounds but dumps into Whitin Reservoir (sand and salt emptying into Whitin Reservoir).
- Flooding Cause: Upgrade undersized culvert

Pavement Management

- Action Type: Planning, Pre-Disaster
- Priority Score: 2017 Score: Medium Priority/2025 Score: 8 - Medium Priority
- Lead: Highway Department
- Supporting: Water/Sewer Department, Conservation Commission, Board of Health
- Time Frame: Medium Term
- Financing Options: Municipal Operating Budget (Highway Department budget), FEMA Hazard Mitigation Grants Assistance

- Cost Estimate: High
- Benefit: Reduced impacts/costs associated with flooding/Improved resilience
- Vulnerable Area: Localized Areas Subject to Flooding/Public Health, Safety and Welfare/Property Protection/Transportation Network
- Hazards Addressed: Flood-related, Winter-related, Wind-related Hazards

Action #2

Insufficient drainage infrastructure at the Fire Station and DPW Garage in Douglas is causing severe flooding which affects emergency vehicle response ability to enter and exit the fire station and causes road closures and also direct significantly sedimented stormwater into Centerville Brook and its associated wetlands where the stormwater ends up. The Town will continue to partner with the Blackstone Watershed Collaborative towards this effort, as well as other non-profits to accomplish the goals of the community. This project seeks to:

- *maintain and expand an existing bioretention area at the fire station*
- *design and install two new bioretention areas at the fire station (one with a swale leading to it)*
- *address sediment at the DPW Garage by paving an existing impervious packed-dirt parking lot*
- *covering an existing sand pile, and*
- *installing a subsurface infiltration trench under the parking area through a sediment vault and perforated pipes*
- *Lastly, the project will include public education by designing and installing signage at this highly-visible site explaining nature-based solutions and co-benefits.*

…2025 Risk Assessment/Blackstone Watershed Collaborative coordination

- Action Type: Planning, Pre-Disaster
- Priority Score: 2025 Score: 9 – Medium Priority
- Lead: Highway Department
- Supporting: Conservation Commission, Blackstone Watershed Collaborative
- Time Frame: Medium Term
- Financing Options: Municipal Operating Budget (Highway Department budget), FEMA Hazard Mitigation Grants Assistance, MVP Action Grants
- Cost Estimate: High
- Benefit: Reduced impacts/costs associated with flooding/Improved resilience/Continuity of transportation network
- Vulnerable Area: Localized Areas Subject to Flooding/Public Health, Safety and Welfare/Property Protection/Transportation Network
- Hazards Addressed: Flood-Related, Winter-related, Wind-related Hazards

Action #3

Conduct a townwide culvert capacity study to identify improvements and prepare for projected increases in precipitation/flooding. As a starting point, the Town should consider the 25 culverts previously assessed/entered into the NAACC database via technical assistance provided in 2024

by the Blackstone Watershed Collaborative.

- *Create a priority list of those in need of 'rightsizing' and replacement:*
    - *along the entire length of the Whitin Reservoir causeway (when water levels rise): elevate the causeway and widen roadway for increased capacity*
    - *Wallis Street (between Whitin Reservoir and Bad Luck Pond): currently a 3-sided culvert, replace with box culvert*
    - *Charles Street at Wellman Brook (Charles St. and Northeast Main St.)*
    - *Walnut Street and Tinkerville Brook*
    - *North Street (replace culvert that was removed as part of the spillway removal.*

…2025 Risk Assessment/MVP Summary of Findings 2020/Blackstone River Watershed Needs Assessment Report

- Action Type: Planning, Pre-Disaster
- Priority Score: 2025 Score: 6 – Medium Priority
- Lead: Highway Department
- Supporting: Water/Sewer Department, Conservation Commission, Board of Health
- Time Frame: Long Term
- Financing Options: Municipal Operating Budget (Highway Department budget), FEMA Hazard Mitigation Grants Assistance, MVP Action Grants
- Cost Estimate: High
- Benefit: Reduced impacts/costs associated with flooding/Improved resilience/Continuity of transportation network
- Vulnerable Area: Localized Areas Subject to Flooding/Public Health, Safety and Welfare/Property Protection/Transportation Network
- Hazards Addressed: Flood-Related, Winter-related, Wind-related Hazards

Action #4

The Town of Douglas recently submitted an application to the Division of Ecological Restoration/MA Dept. of Fish and Game Culvert Replacement Municipal Assistance Grant Program (along with a letter of support from the Blackstone Watershed Collaborative) for the creation of a 60% permit-ready design for the replacement of the Webster Street and Wallis Streets culverts (also part of a primary evacuation route). This effort will leverage previous investments made on the stream through the replacement of the Cedar Street crossing (2021), and open 2.96 stream miles by connecting Whitin Reservoir (an area of Biomap critical natural landscape and a Coldwater Fishery), and Badluck Lake (an area of Biomap core habitat, critical natural landscape, aquatic core, rare species core, and regional connectivity). The Town will continue to partner with the Blackstone Watershed Collaborative towards this effort, as well as other non-profits to accomplish the goals of the community.

…2025 Risk Assessment/Tighe & Bond coordination call/Blackstone River Watershed Needs Assessment Report

- Action Type: Planning, Pre-Disaster
- Priority Score: 2025 Score: 6 – Medium Priority

- Lead: Highway Department
- Supporting: Conservation Commission
- Time Frame: Long Term
- Financing Options: Municipal Operating Budget (Highway Department budget), FEMA Hazard Mitigation Grants Assistance
- Cost Estimate: High
- Benefit: Reduced impacts/costs associated with flooding/Improved resilience/Continuity of transportation network and evacuation route
- Vulnerable Area: Localized Areas Subject to Flooding/Public Health, Safety and Welfare/Property Protection/Transportation Network
- Hazards Addressed: Flood-Related Hazards

Action #5
Upgrade the Mechanic Street Bridge (low and traps debris).
…2025 Risk Assessment

- Action Type: Planning, Pre-Disaster
- Priority Score: 2025 Score: 0 – Medium Priority
- Lead: Highway Department
- Supporting: Water/Sewer Department, Conservation Commission, Board of Health
- Time Frame: Long Term
- Financing Options: Municipal Operating Budget (Highway Department budget), FEMA Hazard Mitigation Grants Assistance
- Cost Estimate: High
- Benefit: Reduced impacts/costs associated with flooding/Improved resilience/Continuity of transportation network
- Vulnerable Area: Localized Areas Subject to Flooding/Public Health, Safety and Welfare/Property Protection/Transportation Network
- Hazards Addressed: Flood-Related, Winter-related, Wind-related Hazards

Action #6
The LHMT expressed concerns that the Town of Douglas is located at the 'end of the line' regarding National Grid's service line. This often results in limited service reliability and delays in reconnection. Discussions with National Grid centered around the importance for the Town of Douglas to effectuate the continuity of electrical services for their critical facilities, specifically related to public infrastructure.

- *Water Booster Station (102 Main Street)…portable 60 kw generator*
- *Water Pump (Turbine) Station (29 West Street)…portable generator for chemical feed and monitoring equipment/genset (generator and engine combination). Part of agreement with CRG Warehouse, awaiting occupancy permit to start project (chemical feed/monitoring is needed for backup) and order portable generator.*

…2017 Plan/2025 Risk Assessment

- Action Type: Planning, Pre-Disaster
- Priority Score: 2017 Score: High Priority/2025 Score: 10 – Medium Priority
- Lead: Water/Sewer Department
- Supporting: Town Administrator
- Time Frame: Medium Term
- Financing Options: Municipal Operating Budget (Water/Sewer Department budget), FEMA Hazard Mitigation Grant Assistance
- Cost Estimate: Moderate
- Benefit: Continuity of services (uninterrupted water supply)/Improved resilience
- Vulnerable Area: Municipal Services/Power Supply/Public Health Safety and Welfare
- Hazards Addressed: All Hazards

Action #7

The LHMT expressed concerns that the Town of Douglas is located at the 'end of the line' regarding National Grid's service line. This often results in limited service reliability and delays in reconnection. Discussions with National Grid centered around the importance for the Town of Douglas to effectuate the continuity of electrical services for their critical facilities.

- *Adult Social Center (331 Main Street)…also secondary shelter location*
- *Douglas Food Pantry (St. Denis Church/23 Manchaug Street)*

…2025 Risk Assessment

- Action Type: Planning, Pre-Disaster
- Priority Score: 2025 Score: 10 – Medium Priority
- Lead: Fire/Emergency Management Department
- Supporting: Police Department
- Time Frame: Medium Term
- Financing Options: Municipal Operating Budget (Fire Department budget), FEMA Hazard Mitigation Grants Assistance
- Cost Estimate: High
- Benefit: Continuity of emergency services/Improved Public Health, Safety and Welfare/Improved resilience
- Vulnerable Area: Emergency Services/Public Health, Safety and Welfare
- Hazards Addressed: All Hazards

Action #8

Establish a private/ham radio frequency to communicate available resources, evacuation, and other pertinent information to residents quickly and effectively if power goes down.

…2017 Plan

- Action Type: Planning, Pre-Disaster
- Priority Score: 2017 Score: Medium Priority/2025 Score: 6 – Medium Priority
- Lead: Fire/Emergency Management Department
- Supporting: Police Department, National Grid

- Time Frame: Medium Term
- Financing Options: Municipal Operating Budget (Fire Department budget), FEMA Hazard Mitigation Grants Assistance
- Cost Estimate: Low
- Benefit: Continuity of emergency services/Improved Public Health, Safety and Welfare/Improved resilience
- Vulnerable Area: Emergency Services/Public Health, Safety and Welfare
- Hazards Addressed: All Hazards

Action #9
Old Mill Pond Dam and Douglas Mill Pond Dam recently had a Dam Breach Feasibility Study completed to evaluate considerations for removal of both dams (January 2024). The private owners wish to have both dams removed and are currently working with various partners to obtain funding necessary to do so. The Town will continue to collaborate with the private owners to secure funding for the removal of both dams.
…2025 Risk Assessment/Tighe & Bond coordination call

- Action Type: Planning, Pre-Disaster
- Priority Score: 2025 Score:-6 – Low Priority
- Lead: Private Dam Owner (s)
- Supporting: Town Administrator/Board of Selectmen
- Time Frame: Medium Term
- Financing Options: Narragansett Bay Estuary Program/EOEEA Dam and Seawall Program/Private dam owner funds/FEMA Hazard Mitigation Grants Assistance
- Cost Estimate: High
- Benefit: Reduced impacts/costs associated with flooding/Improved Public Health, Safety and Welfare/Improved Resilience
- Vulnerable Area: Dams/Public Health, Safety and Welfare/Property Protection
- Hazards Addressed: Flood-Related Hazards

Action #10
The Town will coordinate with the Whitin Reservoir Watershed District to ensure the completion of recommended improvements identified in the most recent Phase I Inspection Report, to annually update the Emergency Action Plan (EAP) and to encourage the Whitin Reservoir Watershed District to collaborate on a range of specific actions that address reducing risk to/from Whitin Reservoir Dam, including:
- *Rehabilitating/Removing the dam*
- *Adopting/Enforcing land use ordinances in inundation zones*
- *Elevating structures in inundation zones*
- *Adding flood protection such as berms, floodwalls or floodproofing in inundation zones.*

…2025 Risk Assessment/MVP Summary of Findings 2020

<u>Studies and Analyses</u>

1. Complete an updated H&H analysis. Although previous H&H analyses have been completed for this structure (1980, 2007, during EAP development), there are inconsistencies between them with the peak flows and peak pool levels reported and all of them appear to have only evaluated PMF and the ½ PMF storm event. The previous analyses would be used to the extent practical to develop an updated analysis that would also include lower recurrent storm events (i.e. 50-year, 100-year, etc.) that would be used to calibrate the model. The updated analyses could then be used to develop and implement hydraulic modifications at the structure in order to accommodate the SDF, as discussed in remedial modification #2.
2. Continue to monitor and evaluate the observed seepage, leakage, and wet areas along the base of the downstream wall. Seepage and stability evaluations should be completed in accordance with current dam safety regulations. Pending the results of the seepage analysis, modifications may be required as discussed in remedial modifications #3.
3. Evaluate the hydraulic and structural capacity of the dike at maximum pool conditions based on survey elevations. Pending the results of the evaluations, modifications to the dike may be required.
4. Coordinate the completion of a site-specific risk and safety assessment to further evaluate, categorize, and determine the need for implementing a site safety improvement program.
5. Continue to monitor the leakage previously observed under the primary spillway; concrete scour at the primary spillway; and scour holes noted downstream of the spillways of the as part of routine monitoring.

<u>Yearly & Recurrent Maintenance Recommendations</u>

1. Continue regular monitoring and inspections of the dam. Included in the monitoring program should be continued regular monitoring of the cracks and depressions along the crest of the dam near the spillway culverts, the settlement at the crest near the right abutment, leakage under and through the spillway, leakage and seepage rates through the downstream stone masonry wall, possible movement of the upstream and downstream walls (utilizing survey monuments), and routine inspection of all other components of the structure. Complete formal inspections in accordance with current state regulations. As the dam is currently classified as a high hazard potential dam, inspections are required every 2 years.
2. Regular maintenance activities should be performed to control and prevent growth of unwanted vegetation, including weeds and brush within the face of the masonry walls and vegetation within the approach and discharge channels of the primary and auxiliary spillways. Clearing of brush and removal of vegetation should continue to be performed at least once per year. Additional maintenance activities should be performed to address the following minor maintenance deficiencies observed during this inspection:
    a. The surface erosion at the left abutment and right abutment should be filled and vegetated.

b. The isolated voids within the un-mortared sections of the upstream riprap should be filled with riprap.

3. Continue to routinely monitor and survey the upstream wall to check for indications of movement. Routinely monitor the utility poles located on the downstream side of the crest for indications of movement.
4. Continue to complete routine reviews and updates of the EAP. Complete periodic training of involved personnel.

Minor Repair Recommendations

1. Continue to seal cracks and patch depressions in the roadway in the area of the spillway culverts.
2. Continue to clear the tree and brush growth at the dam and dike.
3. Clear the unwanted vegetation and debris within the approach and discharge areas of the spillways.
4. Complete concrete repairs at the primary/auxiliary spillway. the scour holes within the downstream channel of the auxiliary and primary spillways.

- Action Type: Planning, Pre-Disaster
- Priority Score: 2025 Score:-2 – Low Priority
- Lead: Whitin Reservoir Watershed District
- Supporting: Town Administrator/Board of Selectmen
- Time Frame: Long Term
- Financing Options: Whitin Reservoir Watershed District funds, High Hazard Potential Dam Program funds
- Cost Estimate: High
- Benefit: Reduced impacts/costs associated with flooding/Improved Public Health, Safety and Welfare/Improved resilience
- Vulnerable Area: Dams/Public Health, Safety and Welfare/Property Protection
- Hazards Addressed: Flood-Related Hazards

Action #11

The Town will ensure the completion of recommended improvements identified in the most recent Phase I Inspection Report and to also develop an Operations and Maintenance Manual for Gilboa Pond Dam.

…2025 Risk Assessment

Studies and Analyses

1. No studies or analyses are recommended. No hydrologic or hydraulic analyses are known to have been done for the dam, but, in consideration of the dam's low hazard potential classification, no hydrologic or hydraulic analyses are warranted.

Recurrent Maintenance Recommendations

1. Keep large debris clear from the upstream side of the dam.
2. Monitor the condition of the concrete gate structure and make repairs if and when the structure's integrity or functionality becomes jeopardized.
3. Monitor the condition of the downstream face by taking photos annually from similar vantage points and comparing to prior years' photos.
4. Monitor the river back immediately downstream of the right abutment of the dam, especially during and after high-flow events, to make sure the integrity of the dam is not threatened.
5. Although it is not 'required', an Operation and Maintenance Manual should be developed for the dam.

Minor Repair Recommendations

1. No minor repairs are recommended at this time.

Remedial Modifications Recommendations

1. No remedial modifications are recommended at this time.

- Action Type: Planning, Pre-Disaster
- Priority Score: 2025 Score: 14 – High Priority
- Lead: Fire/Emergency Management Department
- Supporting: Town Administrator/Board of Selectmen
- Time Frame: Long Term
- Financing Options: Municipal Operating Budget (Fire Department budget), FEMA Hazard Mitigation Grants Assistance
- Cost Estimate: High
- Benefit: Reduced impacts/costs associated with flooding/Improved Public Health, Safety and Welfare/Improved resilience
- Vulnerable Area: Dams/Public Health, Safety and Welfare/Property Protection
- Hazards Addressed: Flood-Related Hazards

Action #12

The Town will coordinate with the private dam owners for the Morse Pond Dam and Riddle Road Pond Dam accordingly:

- *Morse Pond Dam*
    - *Recommended improvements identified in the January 17, 2020 Phase I Inspection Report*
    - *Operations and Maintenance Manual development*
- *Riddle Road Pond Dam*
    - *Determine if purchase of the site is the preferred alternative, followed by the identification of next steps (remove/replace, repair/maintain, or decommission)*
    - *If the Town's decision is not to purchase, coordinate with the private owner to ensure the recommended improvements from the 2009 Phase I Inspection Report are completed.*

…2025 Risk Assessment

Morse Pond Dam:

Studies and Analyses

1. Prepare a formal Operation & Maintenance Manual.
2. Prepare an Emergency Action Plan.
3. Perform a detailed hydrologic/hydraulic analysis.
4. Investigate wet areas at the toe.

Recurrent Maintenance Recommendations

1. Control vegetation on the dam and areas within 20 ft of any part of the dam.
2. Remove debris from the spillway as needed.
3. Perform regular inspections of the dam especially before and after rain events.

Minor Repair Recommendations

1. No minor repairs are recommended at this time until remedial measures are undertaken.

Remedial Modifications Recommendations

1. Remove all stumps on the crest and slopes of the dam from previous tree removal efforts.
2. Remove all woody vegetation and trees on the entire dam and abutments and within 20 ft of any part of the dam.
3. Regrade dam crest and slopes and plant grass.
4. Provide slope erosion at waterline on upstream side of dam.

Riddle Road Pond Dam:

Studies and Analyses

1. Conduct preliminary hydrologic and hydraulic analysis (H&H) to determine spillway capacity and corresponding impoundment levels. This will allow the owner to determine an impoundment level that will provide adequate freeboard for the design flood (50-year event).
2. Investigate the condition of the low-level outlet gate.

Recurrent Maintenance Recommendations

1. Regularly mow.
2. Fill low spots, ruts, areas of erosion and runoff with suitable fill. Reseed areas of thin vegetation with grassy cover.
3. Remove debris from all outlets and downstream channels.
4. Remove brush within 10 feet of the dam area, including downstream toe. Apply herbicide to stumps or use other suitable means to discourage re-growth.
5. Monitor seepage and leakage to look for changing conditions.

Minor Repair Recommendations

1. Remove all trees and wood vegetation from the embankment (do not remove stumps); and within 10 feet of the toe to facilitate inspection and monitoring of seepage conditions.
2. Establish and maintain an adequate vegetative ground cover on the downstream embankment. A conservation mix containing native species of grass and wild flowers would be appropriate.
3. If the beavers persist in blocking the outlet and raising the water level it may be necessary to install "beaver deceivers".

- Action Type: Planning, Pre-Disaster
- Priority Score: 2025 Score: 12 – Medium Priority
- Lead: Private Dam Owner (s)
- Supporting: Town Administrator/Board of Selectmen
- Time Frame: Long Term
- Financing Options: Private dam owner funds
- Cost Estimate: High
- Benefit: Reduced impacts/costs associated with flooding/Improved Public Health, Safety and Welfare/Improved resilience
- Vulnerable Area: Dams/Public Health, Safety and Welfare/Property Protection
- Hazards Addressed: Flood-Related Hazards

Action #13
The Town will coordinate with MA DCR ODS to ensure the completion of recommended improvements identified in the most recent Phase I Inspection Reports/Follow-Up Inspection Reports for the following:

- *Wallis Pond Dam (recommended improvements)*

…2025 Risk Assessment/MVP Summary of Findings 2020

Wallis Pond Dam:

Studies and Analyses

1. A detailed H & H analysis with survey should be completed by a qualified consulting engineer to assess the potential for overtopping and the need for additional spillway capacity.
2. An Operations and Maintenance (O & M) Manual should be developed and implemented for this dam. The O & M Manual should contain explicit schedules and instructions for maintenance activities to be performed on the dam and its appurtenances, as well as operational procedures to be followed under both routine and flood conditions.

Recurrent Maintenance Recommendations

1. Remove debris from the primary spillway, auxiliary spillway pipes, approach, and discharge areas. (during 2024 inspection auxiliary spillway pipes were debris free, but debris existed downstream of the main spillway).
2. Cut brush on the embankments and within 25 feet of the dam toe and abutments.
3. Mow and maintain a healthy cover of grass with a height of 3 to 12 inches.
4. Monitor for new animal burrows, sinkholes, or depressions, and repairs as necessary.
5. Monitor for increased beaver activity within the impoundment or downstream channel.
6. Monitor for increased leakage rates or embankment material migration through the downstream left masonry wall.

Maintenance and Minor Repair Recommendations

1. Repair bare areas on the dam crest. Seed areas and establish a healthy cover of grass.
2. Repair sinkholes/depressed areas on the dam crest behind masonry walls.
3. Replace missing capstones and chink areas on the downstream left masonry wall where stone is missing.
4. Remove the trees, stumps, and root systems on and from within 25 feet of the dam. Fill and compact the resultant voids and reestablish grass cover.
5. Investigate the extent of undermining and/or missing stones at the base of the downstream masonry face at the primary spillway and repair as necessary.
6. Fully remove beaver dam approximately 450 feet upstream of the dam to deter increased beaver activity and re-impoundment of the upstream portion of the pond.

Remedial Modifications Recommendations

1. Repair left upstream masonry wall and provided seepage control measures.
2. Grade the upstream slope of the embankment and provide adequate riprap armoring.

- Action Type: Planning, Pre-Disaster
- Priority Score: 2025 Score: 6 – Medium Priority
- Lead: MA DCR ODS
- Supporting: Town Administrator/Board of Selectmen
- Time Frame: Long Term
- Financing Options: MA DCR ODS funds
- Cost Estimate: High
- Benefit: Reduced impacts/costs associated with flooding/Improved Public Health, Safety and Welfare/Improved resilience
- Vulnerable Area: Dams/Public Health, Safety and Welfare/Property Protection
- Hazards Addressed: Flood-Related Hazards

Action #14

Ensure that critical facilities are adequately protected against flood-related hazards.…2025 Risk

Assessment

- *Douglas Wastewater Treatment Facility: 100-Year Flood Zone*

- *Hemlock Street Bridge: 100-Year Flood Zone*
- *South Street Bridge: 100-Year Flood Zone*
- *Cedar Street Bridge: 100-Year Flood Zone*
- *Mechanic Street Bridge: 100-Year Flood Zone*
- *Potter Road Bridge: 100-Year Flood Zone*
- *Lovett Bridge (Cook St. Bridge) : 100-Year Flood Zone*
- *West Street Bridge: 100-Year Flood Zone*
- *Manchaug Street Bridge: 100-Year Flood Zone*
- *South Street Bridge: 100-Year Flood Zone*
- *Main St. Bridge: 100-Year Flood Zone*

- *Gilboa Pond Dam: 100-Year Flood Zone*
- *Whitin Reservoir Dam: 100-Year Flood Zone*
- *Dudley Pond Dam: 100-Year Flood Zone*
- *Potter Road Dam: 100-Year Flood Zone*
- *Wallis Pond Dam: 100-Year Flood Zone*
- *Douglas Mill Pond Dam: 100-Year Flood Zone*
- *Cedar Street Pond Dam: 100-Year Flood Zone*
- *Lower Hunts Pond Dam: 100-Year Flood Zone*
- *Hunts Pond Dam: 100-Year Flood Zone*
- *Mill Pond Dam: 100-Year Flood Zone*
- *Riddle Road Pond Dam: 100-Year Flood Zone*
- *Chase Pond Dam: 100-Year Flood Zone*
- *Old Storage Pond Dam #1: 500-Year Flood Zone*
- *Morse Pond Dam: 500-Year Flood Zone*
- *Wellman Pond Dam: 500-Year Flood Zone*

  - Action Type: Planning, Pre-Disaster
  - Priority Score: 2025 Score: 8 – Medium Priority
  - Lead: Fire/Emergency Management Department
  - Supporting: Highway Department/Private Property Owners
  - Time Frame: Long Term
  - Financing Options: Municipal Operating Budget (Fire Department/Highway Department budgets), Private property owner (s) funds, FEMA Hazard Mitigation Grants Assistance
  - Cost Estimate: High
  - Benefit: Minimized/Reduced impacts and costs/Continuity of municipal services/Protection of property
  - Vulnerable Area: Municipally-owned Infrastructure/Property Protection/Resilience/Critical Facilities and Vulnerable Populations

- Hazards Addressed: Flood-related/Winter-related/Wind-related Hazards

Action #15
Ensure that vulnerable populations are adequately protected against flood-related hazards.
…2025 Risk Assessment

- *Classic Envelope Inc. (major employer): 100-Year Flood Zone*
- *Open Sky Community Services (major employer): 500-Year Flood Zone*

- Action Type: Planning, Pre-Disaster
- Priority Score: 2025 Score: 7 – Medium Priority
- Lead: Private Business Owners
- Supporting: Town Administrator/Board of Selectmen
- Time Frame: Long Term
- Financing Options: Private business owner (s) funds
- Cost Estimate: Moderate
- Benefit: Minimized/Reduced impacts and costs/Protection of property/Improved public health, safety and welfare
- Vulnerable Area: Major Employers/Property Protection/Public Health, Safety and Welfare/Resilience/Critical Facilities and Vulnerable Populations
- Hazards Addressed: Flood-related/Winter-related/Wind-related Hazards

Action #16
Implement the recommendations from the Town of Douglas Sewer Asset Management Plan CWSRF No. 7070 Draft associated with operations at the Town's Wastewater Treatment Facility (WWTF)/Sewer Pump stations:

- *Improvements to Sludge Pump Station*
- *Replace the Colonial Street Pump Station*
- *GIS Expansion*
- *CCTV Inspections*
- *Updates to Asset Management Plan*

…Town of Douglas Sewer Asset Management Plan CWSRF No. 7070 Draft

- Action Type: Planning, Pre-Disaster
- Priority Score: 2025 Score: 11 – Medium Priority
- Lead: Sewer Department
- Supporting: Town Administrator/Board of Selectmen
- Time Frame: Long Term
- Financing Options: Municipal Operating Budget (Sewer Department budget), FEMA Hazard Mitigation Grants Assistance
- Cost Estimate: High
- Benefit: Continuity of Municipal Services/Natural Resource Protection/Improved resilience

- Vulnerable Area: Natural Resources/Municipal Services/Public Health, Safety and Welfare
- Hazards Addressed: All Hazards

PREPAREDNESS, COORDINATION, AND RESPONSE

Action #17
Evaluate the use of snow fences or 'living snow fences' e.g., (rows of trees or shrubs), to limit blowing and drifting snow over the following roadways:

- Main Street
- West Street
- Bigelow Road
- Church Street
- NW Main Street
- Wallis Street
- Riedell Road

…2025 Risk Assessment

- Action Type: Planning, Pre-Disaster
- Priority Score: 2025 Score: 15 – High Priority
- Lead: Highway Department
- Supporting: Town Administrator/Board of Selectmen
- Time Frame: Medium Term
- Financing Options: Municipal Operating Budget (Highway Department budget), FEMA Hazard Mitigation Grants Assistance
- Cost Estimate: Low
- Benefit: Reduced impacts/costs associated with impassable roadways/Improved resilience/Uninterrupted transportation network
- Vulnerable Area: Public Health, Safety and Welfare/Transportation Network
- Hazards Addressed: Winter-related Hazards

Action #18…removed by LHMT
Reduce impacts caused by winter storms and severe storms:

- *Develop best management practices for treating roads during ice and snowstorms with organic matter, particularly for the following roadways:*
  - Main Street
  - Sunset Drive
  - North Street
  - Gilboa Street
  - Davis Street
  - Mumford Street
  - Cross Street
  - Conservation Drive

- Johnson Court
- West Street
- Grove Street
- West St at NW Main Street
- Birch Street
- Oak Street
- NW Main Street
- Ledgestone Road
- Ledgewood Drive
- Wallis Street
- SW Main Street
- High Street
- Hilltop Drive
- Reid Road
- Birch Hill Road
- Wallum Lake Road
- Walnut Street
- Hemlock Street
- Chestnut Street
- Old Farm Road
- SE Main Street
- Linden Street
- Fairbanks Court
- Perry Street
- Yew Street
- Webster Street

- Action Type: Planning, Pre-Disaster
- Priority Score: 2025 Score: __
- Lead: Highway Department
- Supporting: Town Administrator/Board of Selectmen
- Time Frame: Medium Term
- Financing Options: Municipal Operating Budget (Highway Department budget), FEMA Hazard Mitigation Grants Assistance
- Cost Estimate: Low
- Benefit: Reduced impacts/costs associated with impassable roadways/Improved resilience/Uninterrupted transportation network
- Vulnerable Area: Public Health, Safety and Welfare/Transportation Network
- Hazards Addressed: Winter-related Hazards

Action #19
Improve management of forested lands throughout the Town, whether DCR, Town, or privately-

owned.

- *Develop and enact forest management plans including brush and dead-wood clearing programs, including public outreach to encourage action on private lands, to reduce fuel load in forest areas. Study potential for controlled burns.*
- *Increase tree trimming budget. Document street tree conditions throughout the Town and create a prioritized list for removal or pruning based on hazard level. Develop plan for storage and use of removed trees.*

…MVP Summary of Findings 2020

- Action Type: Planning, Pre-Disaster
- Priority Score: 2025 Score: 9 – Medium Priority
- Lead: Tree Warden
- Supporting: Town Administrator/Board of Selectmen
- Time Frame: Medium Term
- Financing Options: Municipal Operating Budget (Tree Warden budget), FEMA Hazard Mitigation Grants Assistance
- Cost Estimate: High
- Benefit: Minimized/Reduced impacts from fire damage/Improved resilience/Natural resource protection
- Vulnerable Area: Natural Resources/Public Health, Safety and Welfare/Property Protection
- Hazards Addressed: Wildfire/Brushfire-related Hazards

Action #20…removed by LHMT
The Town should consider hiring a municipal Engineer.
…Paul Caouette Interview

- Action Type: Planning, Pre-Disaster
- Priority Score: 2025 Score: __
- Lead: Building Department
- Supporting: Town Administrator/Board of Selectmen
- Time Frame: Long Term
- Financing Options: Municipal Operating Budget (Building Department budget), FEMA Hazard Mitigation Grants Assistance
- Cost Estimate: High
- Benefit: Improved Public Health, Safety and Welfare/Uninterrupted municipal services
- Vulnerable Area: Public Health, Safety and Welfare/Municipal Services
- Hazards Addressed: All Hazards

EDUCATION AND AWARENESS

Action #21…removed by LHMT
Protect the Town's natural resources.

Fortify surface and groundwater resources from adverse impacts:

- *Identify priority preservation areas around the Town's water supply wells and within groundwater protection districts.*
- *Identify priority protection areas critical to preserving private water supply wells in areas of high risk due to land use or development threats.*

Retain the native ecosystem and reduce urban pollution.

- *Identify and keep track of changes in insect deer and plant/tree populations.*

…Town of Douglas Open Space and Recreation Plan 2023

- Action Type: Planning, Pre-Disaster
- Priority Score: 2025 Score: __
- Lead: Water/Sewer Department
- Supporting: Planning Board/Open Space Committee/Conservation Commission
- Time Frame: Long Term
- Financing Options: Municipal Operating Budget (Water/Sewer Department budget), FEMA Hazard Mitigation Grants Assistance
- Cost Estimate: High
- Benefit: Natural Resource Protection/Improved resilience
- Vulnerable Area: Natural Resources
- Hazards Addressed: All Hazards

LOCAL PLANS AND REGULATIONS

*Action #22_*
Use MA Drought Management Plan as a template for Town's own drought plan and integrate State's recommendations and actions according to Town's needs.
…2017 Plan

- Action Type: Planning, Pre-Disaster
- Priority Score: 2017 Score: Medium Priority/2025 Score:10 – Medium Priority
- Lead: Fire/Emergency Management Department
- Supporting: Tree Warden
- Time Frame: Short Term
- Financing Options: Municipal Operating Budget (Fire Department budget), FEMA Hazard Mitigation Grant Assistance
- Cost Estimate: Moderate
- Benefit: Continuity of municipal services/Improved resilience
- Vulnerable Area: Natural Resources/Property Protection/Public Health, Safety and Welfare/Natural Resources
- Hazards Addressed: Drought-related/Wildfire and Brushfire-related Hazards

Action #23…removed by LHMT
Preserve the rural character of the Town.

Retain private forests and trees:

- *Develop forest management best practices on Town lands and promote with private landowners.*
- *Develop and implement a Tree Protection Bylaw, or something similar, to prevent clear-cutting of residential, commercial, and industrial parcels.*
- *Develop an outreach program to educate the public on the benefits of the Community Preservation Act.*

Maintain historic character and scenic resources:

- *Adopt the Community Preservation Act.*

Prioritize open space preservation:

- *Strengthen open space preservation and tree protection in Zoning Bylaw and Regulations.*
- *Establish a land bank for future acquisitions.*
- *Work with the Town Planner and Assessor to identify parcels that may provide access to recreational resources and/or that are contiguous with other open space parcels through the disposition of tax title properties meeting localized recreational needs.*
- *Prioritize parcels under Chapter 61 for future acquisition.*

..Town of Douglas Open Space and Recreation Plan 2023

- Action Type: Planning, Pre-Disaster
- Priority Score: 2025 Score: __
- Lead: Tree Warden
- Supporting: Planning Board/Open Space Committee/Conservation Commission
- Time Frame: Long Term
- Financing Options: Municipal Operating Budget (Tree Warden budget), FEMA Hazard Mitigation Grants Assistance
- Cost Estimate: Moderate
- Benefit: Natural Resource Protection/Improved resilience
- Vulnerable Area: Natural Resources
- Hazards Addressed: All Hazards

Action #24

Build the climate resilience of the Town.

Reduce flooding and stormwater concerns:

- *Install bioswales at sidewalks in new construction/developments.*
- *Assess the culverts near the Town's open space and recreation facilities and upgrade as necessary using stormwater best management practices.*
- *Educate the public on building within flood hazard areas.*
- *Educate the public on impacts of fertilizer runoff from properties within a certain distance of water resources.*

Strengthen the awareness of extreme temperatures and drought impacts:

- *Develop a public education campaign about insect-borne diseases and prevention*

(EEE and Lyme).
- *Develop a public education campaign about drought and wildfire awareness.*
- *Install a local weather station to monitor temperature and precipitation changes.*

…Town of Douglas Open Space and Recreation Plan 2023/MVP Summary of Findings 2020

- Action Type: Planning, Pre-Disaster
- Priority Score: 2025 Score: 5 – Medium Priority
- Lead: Highway Department/Fire Department
- Supporting: Board of Health
- Time Frame: Medium Term
- Financing Options: Municipal Operating Budget (Highway/Fire Department budgets), FEMA Hazard Mitigation Grant Assistance, MVP Action grants
- Cost Estimate: High
- Benefit: Minimized/Reduced impacts from flooding and contamination/Improved resilience/Improved Public Health, Safety and Welfare
- Vulnerable Area: Localized Areas Subject to Flooding/Property Protection/Public Health, Safety and Welfare
- Hazards Addressed: Flood-related, Winter-related, Wind-related, Extreme Heat-related, Drought-related, Invasive Species-related Hazards

Action #25

Implement management recommendations to protect the natural resources located within the Douglas State Forest:

- *Review and implement MassDEP Wellhead Protection Tips and Guidance (MassDEP 1995, MassDEP 2011) within the Forest's Zone I Wellhead Protection Areas.*
- *Investigate relocating picnic facilities outside the Zone 1 Wellhead Protection Area at Wallum Lake Recreation Area or relocating well outside of high-use recreation areas.*
- *Install a secured perimeter fence around the wellhead at the Wallum Lake Recreation Area.*
- *Replace the existing privy at the Mid-State Trail shelter with a conforming on-site sewage disposal system, as permitted by Douglas Health Department, NHESP, MHC, and other regulators, as appropriate.*
- *Meet with representatives of MassWildlife, Rhode Island Department of Environmental Management, the Connecticut Department of Energy and Environmental Protection, and Indigenous peoples to identify common interests in the conservation of natural resources at Douglas State Forest, Mine Brook Wildlife Management Area, and Buck Hill Wildlife Management Area.*
- *Survey the state Endangered plant population, map the extent of the population and adjacent suitable habitat, and develop and implement a Habitat Management Plan to protect this species within Douglas State Forest.*
- *Implement recommendations in the Program Accessibility Assessment (IHCD 2019).*
- *Fill or cap the open well adjacent to the campsite entrance.*

…Resource Management Plan Douglas State Forest

- Action Type: Planning, Pre-Disaster
- Priority Score: 2025 Score: 10 - Medium Priority
- Lead: MA DCR
- Supporting: Tree Warden
- Time Frame: Long Term
- Financing Options: MA DCR budget, Municipal Operating Budget (Tree Warden budget), FEMA Hazard Mitigation Grants Assistance
- Cost Estimate: High
- Benefit: Natural Resource Protection/Improved resilience
- Vulnerable Area: Natural Resources
- Hazards Addressed: All Hazards

Action #26
Implement recommendations from the Town's Drinking Water System Risk & Resilience Assessment to help increase their Utility Resilience Index (URI):

- *Update the Emergency Response Plan and conduct annual trainings and functional exercises. The ERP should be updated according to the MassDEP Bureau of Resource Protection – Drinking Water Program "Emergency Response Plan 9ERP) Compliance Checklist", last updated November 14, 2013. In addition, the Water Department's plan must "comply with 310 CMR 22.04 (13) and the Massachusetts Guidelines and Policies for Public Water Systems, Chapter 12 – Emergency Response Planning Requirements including Appendix O – Handbook for Water Supply Emergencies." The Water Department should ensure the ERP addresses all the hazards discussed in this report including emergency response and preparedness procedures in the event of a cyber attack.*
- *Join the Massachusetts Water/Wastewater Agency Response Network (MAWARN).*
- *Determine methods to receive critical parts and equipment in the event of a failure within 24 hours; joining MAWARN or developing relationships with additional vendors may help to reduce equipment procurement lead times.*
- *Conduct cross-training of employees to have at least 75% of staff response-capable in critical operations and maintenance positions and available as backup in the event of a pandemic illness.*
- *Consider the development of a Business Continuity Plan (BCP); the AWWA has developed a guidance document to assist water utilities with preparation of a BCP. The end goal of a BCP is to maintain operations – financially, managerially, and functionally, after any incident.*
- *Conduct a formal asset management program assessment of the drinking water system infrastructure according to the Government Accounting Standards Board (GASB) asset management standards.*

…Drinking Water System Risk and Resilience Assessment, 2021

- Action Type: Planning, Pre-Disaster

- Priority Score: 2025 Score: 5 – Medium Priority
- Lead: Water Department
- Supporting: Town Administrator/Board of Selectmen
- Time Frame: Short Term
- Financing Options: Municipal Operating Budget (Water Department budget), FEMA Hazard Mitigation Grants Assistance
- Cost Estimate: High
- Benefit: Natural Resource Protection/Improved resilience
- Vulnerable Area: Natural Resources/Municipal Services/Public Health, Safety and Welfare
- Hazards Addressed: All Hazards

Criteria:
+: Favorable
-: Less Favorable
N: Not Applicable

Department:

	STAPLEE Criteria																								
	SOCIAL		TECHNICAL			ADMINISTRATIVE			POLITICAL			LEGAL			ECONOMIC				ENVIRONMENTAL					TOTAL		PRIORITY SCORE
ACTION	Community Acceptance: Is action socially acceptable?	Effect on Segment of Population: Equity issues?	Technical Feasibility: Will action work?	Long-Term Solution: Does action solve problem or symptom?	Secondary Impacts: Will action create more problems than it solves?	Staffing: Someone to coordinate action?	Funding Allocated: Is there enough funding available?	Maintenance/Operations: Are there ongoing requirements?	Political Support: Is action politically acceptable?	Local Champion: Is there a local champion?	Public Support: Is there public support to implement action?	State Authority: Is the state authorized to implement the action?	Existing Local Authority: Does the Town have the authority to implement the action?	Political Legal Challenge: Will the action be challenged?	Benefit of Action: Do benefits exceed costs?	Cost of Action: Do costs exceed benefits?	Contributes to Economic Goals: Does action contribute to economic development goals?	Outside Funding Required: Does action require outside funding to implement?	Effect on Land/Water: Does action affect the environment?	Effect on Endangered Species: Are endangered/threatened species affected?	Effect on HAZMAT Waste Sites: Will action impact HAZMAT sites?	Consistent with Environmental Goals: Is action consistent with local environmental goals?	Consistent with Federal Laws: Will action require regulatory approvals?	Plus	Minus	
1	+	+	+	+	-	+	-	-	+	+	+	N	+	+	-	+	+	-	+	N	N	+	-	14	6	**8**
2	+	+	+	+	+	+	-	-	+	+	+	N	+	+	-	+	+	-	+	N	+	-	-	15	6	**9**
3	+	+	+	+	+	+	-	-	+	+	+	-	-	+	-	-	+	-	+	N	-	+	+	14	8	**6**
4	+	+	+	+	+	+	-	-	+	+	+	-	-	+	-	-	+	-	+	N	-	+	+	14	8	**6**
5	+	N	+	+	-	+	-	-	-	-	-	+	+	-	-	+	-	+	+	N	N	+	-	10	10	**0**
6	+	N	+	+	+	+	+	+	+	+	+	N	+	N	+	-	+	-	-	N	N	N	N	13	3	**10**
7	+	N	+	+	+	+	+	+	+	+	+	N	+	N	+	-	+	-	-	N	N	N	N	13	3	**10**

Criteria:
+: Favorable
-: Less Favorable
N: Not Applicable

Department:

	STAPLEE Criteria																						TOTAL		PRIORITY SCORE
	SOCIAL		TECHNICAL			ADMINISTRATIVE			POLITICAL			LEGAL			ECONOMIC				ENVIRONMENTAL							
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8	+	N	+	+	+	+	+	-	+	+	N	N	+	N	+	-	-	-	N	N	N	N	N	10	4	**6**
9	-	-	+	+	+	+	-	-	-	+	-	N	-	-	-	+	N	-	-	N	-	+	-	7	-13	**-6**
10	+	N	+	+	+	+	-	-	-	+	-	N	N	-	+	-	+	-	+	N	N	+	-	10	8	**-2**
11	+	N	+	+	+	+	+	-	+	+	+	N	N	N	-	+	+	+	+	N	+	+	N	16	2	**14**
12	+	N	+	+	N	+	N	-	+	+	N	+	+	+	+	-	-	N	+	N	N	+	-	11	5	**6**
13	+	N	+	+	N	+	N	-	+	+	N	+	-	+	+	-	-	N	+	N	N	+	-	11	5	**6**
14	+	N	+	+	+	+	-	-	+	+	+	N	+	+	+	-	+	-	-	N	-	+	+	14	6	**8**

Criteria:
+: Favorable
-: Less Favorable
N: Not Applicable

Department:

	STAPLEE Criteria																					TOTAL		PRIORITY SCORE
	SOCIAL		TECHNICAL			ADMINISTRATIVE			POLITICAL			LEGAL			ECONOMIC				ENVIRONMENTAL							
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15	+	+	+	+	N	+	-	N	+	+	+	N	-	+	+	-	+	-	N	N	N	N	N	11	4	**7**
16	+	+	+	+	+	+	-	-	+	+	+	N	+	+	+	-	+	-	+	N	+	+	-	16	5	**11**
17	+	N	+	+	N	+	+	N	+	+	+	N	+	+	+	+	N	N	+	N	N	+	+	15	0	**15**
18	R	E	M	O	V	E	D																			
19	+	N	+	+	N	+	-	-	+	+	+	+	+	+	+	-	N	-	+	+	N	+	-	14	5	**9**
20	R	E	M	O	V	E	D																			
21	R	E	M	O	V	E	D																			

Criteria:
+: Favorable
-: Less Favorable
N: Not Applicable

Department:

	STAPLEE Criteria																						TOTAL		PRIORITY SCORE
	SOCIAL		TECHNICAL			ADMINISTRATIVE			POLITICAL			LEGAL			ECONOMIC				ENVIRONMENTAL							
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22	+	N	+	+	+	+	-	N	+	+	+	N	+	N	+	-	+	-	+	+	N	+	-	14	4	**10**
23	R	E	M	O	V	E	D																			
24	+	N	+	+	-	+	-	-	+	+	+	N	+	-	+	-	+	-	+	-	-	+	+	13	8	**5**
25	+	N	+	+	+	+	-	-	+	+	+	+	+	+	+	-	+	+	-	-	-	+	+	16	6	**10**
26	+	N	+	+	N	+	-	-	+	+	+	N	+	+	-	+	+	-	-	N	-	+	-	12	7	**5**

Douglas Hazard Mitigation Plan Update

LHMT Meeting #4

Douglas Town Hall

29 Depot St. East Douglas, MA 01516
June 24, 2025 9:00 AM - 11:00 AM

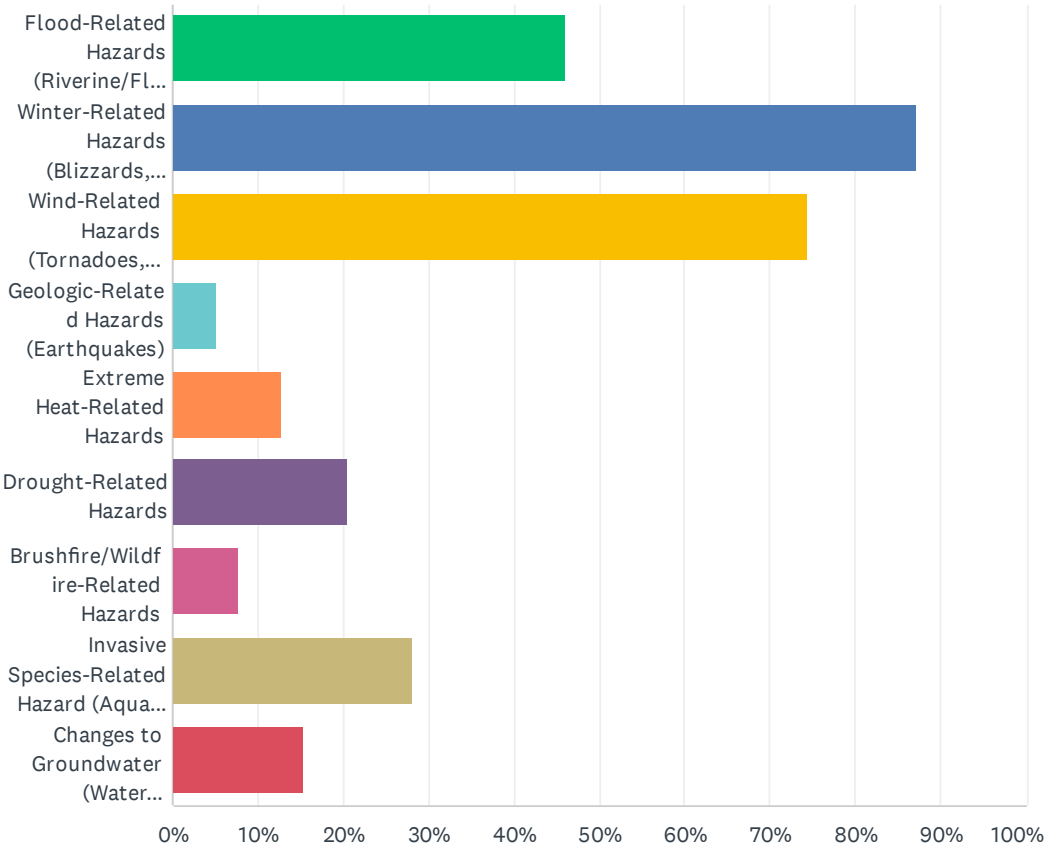
Name	Email Address
Craig Pereira	
Matt Wojcik	
Ken Frasier	
Kristin Harris	
John Charbonneau	
Kelly Manning	

Public Workshop #2: _____

On-Line Survey

Q1 Which of the following hazard events have you or has anyone in your household and/or business experienced in the past 20 years within the Town of Douglas? (Check all that apply)

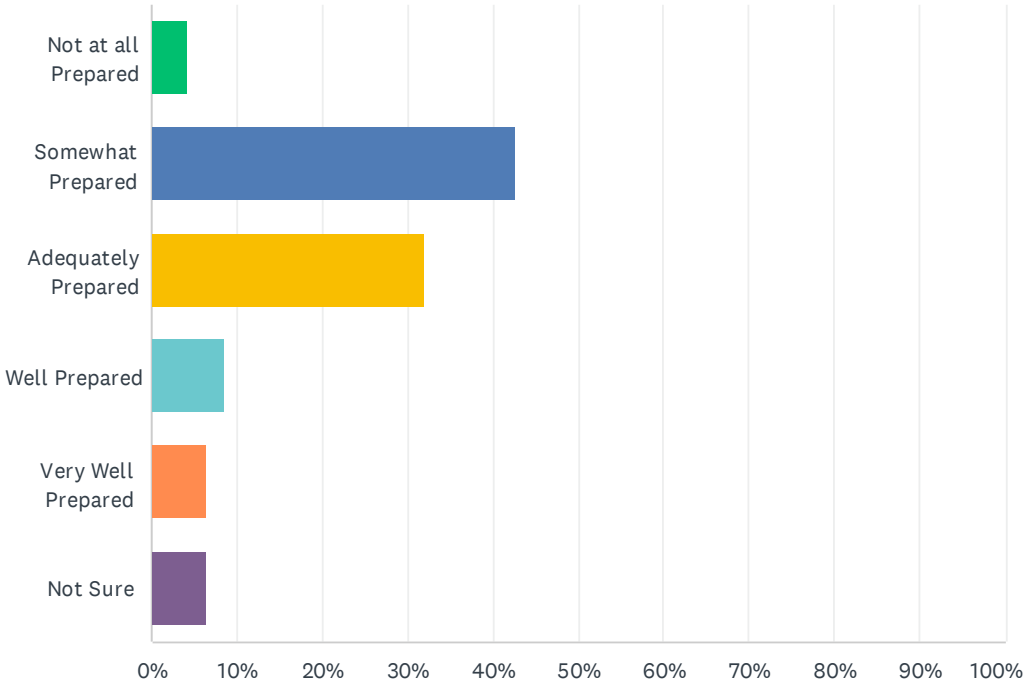
Answered: 39 Skipped: 8



ANSWER CHOICES	RESPONSES	
Flood-Related Hazards (Riverine/Flash Flooding, Inland/Urban Flooding, Heavy Rain, Dam Failure, Beaver Activity)	46.15%	18
Winter-Related Hazards (Blizzards, Ice, Heavy Snow, Extreme Cold)	87.18%	34
Wind-Related Hazards (Tornadoes, High Winds, Hurricanes, Lightning/Thunderstorms, Hail)	74.36%	29
Geologic-Related Hazards (Earthquakes)	5.13%	2
Extreme Heat-Related Hazards	12.82%	5
Drought-Related Hazards	20.51%	8
Brushfire/Wildfire-Related Hazards	7.69%	3
Invasive Species-Related Hazard (Aquatic Plant Species, Vector Borne)	28.21%	11
Changes to Groundwater (Water Quantity, Water Quality)	15.38%	6
Total Respondents: 39		

Q2 In your opinion, how prepared is your household and/or business to deal with a natural hazard event?

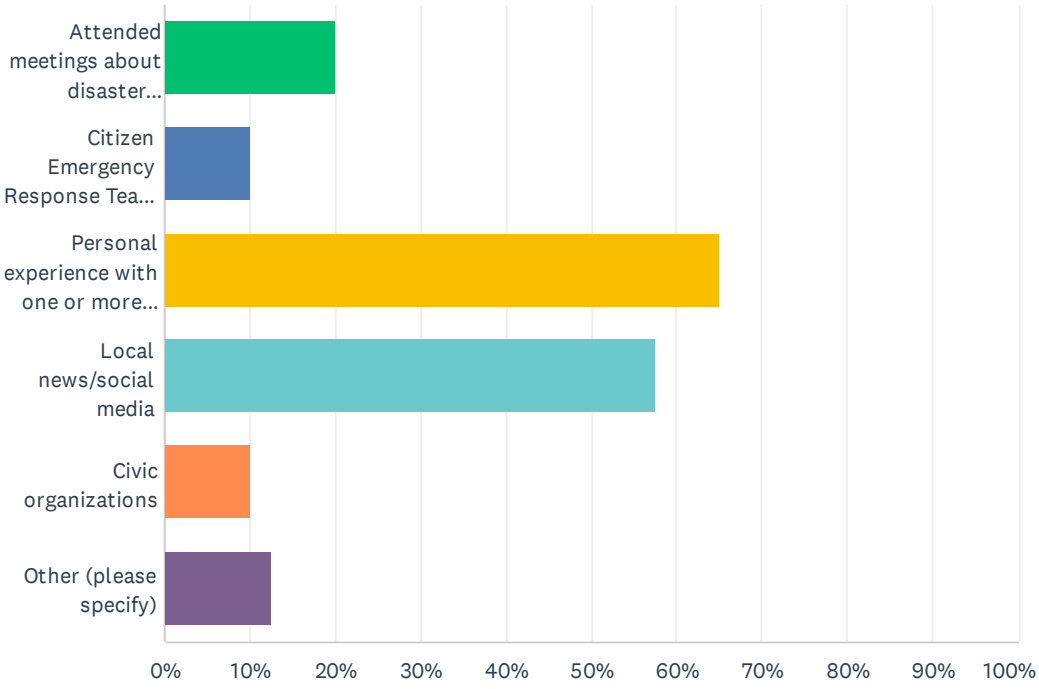
Answered: 47 Skipped: 0



ANSWER CHOICES	RESPONSES	
Not at all Prepared	4.26%	2
Somewhat Prepared	42.55%	20
Adequately Prepared	31.91%	15
Well Prepared	8.51%	4
Very Well Prepared	6.38%	3
Not Sure	6.38%	3
TOTAL		47

Q3 Which of the following steps has provided you with useful information to help you prepare for a hazard event? (Check all that apply)

Answered: 40 Skipped: 7

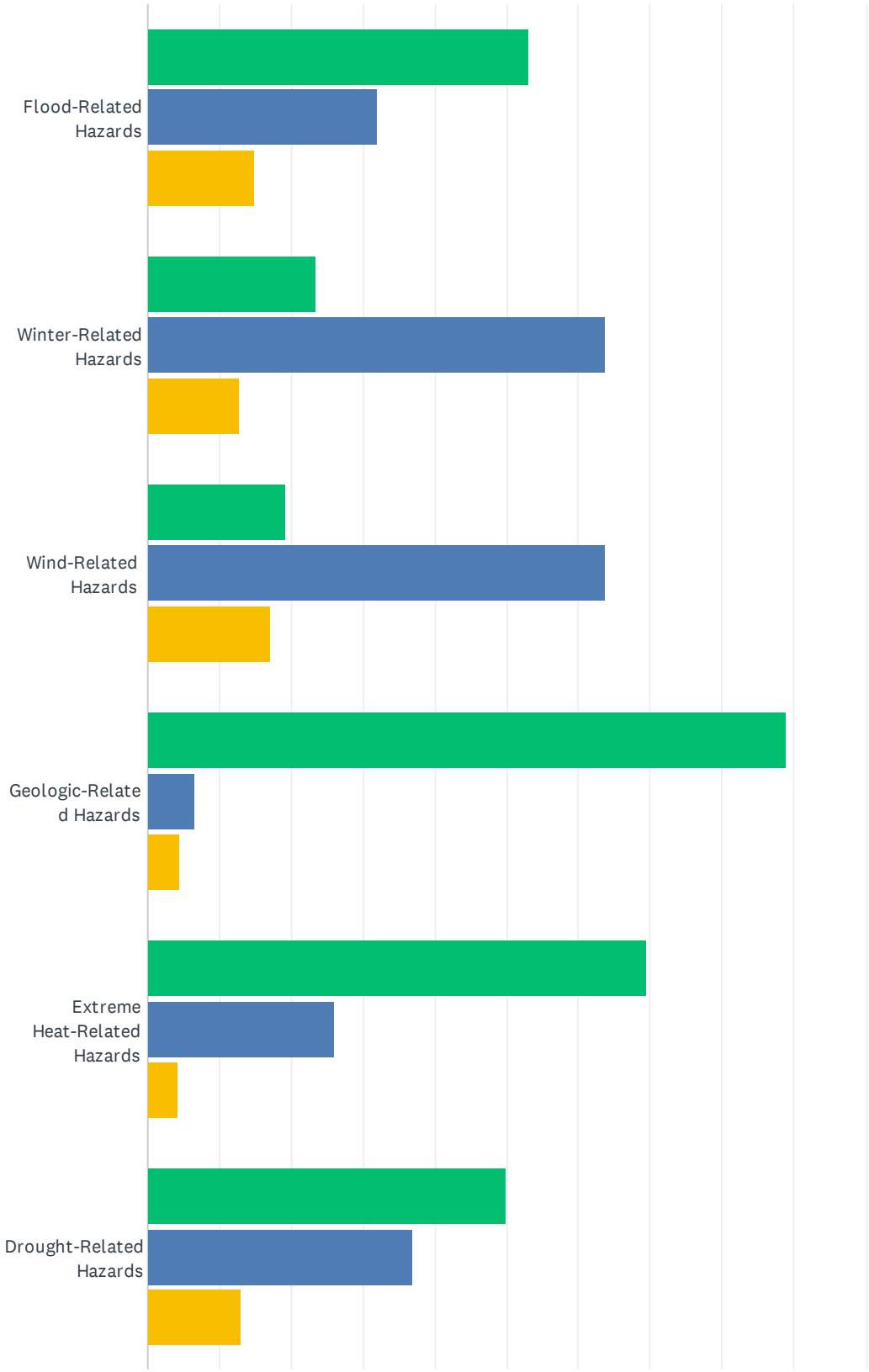


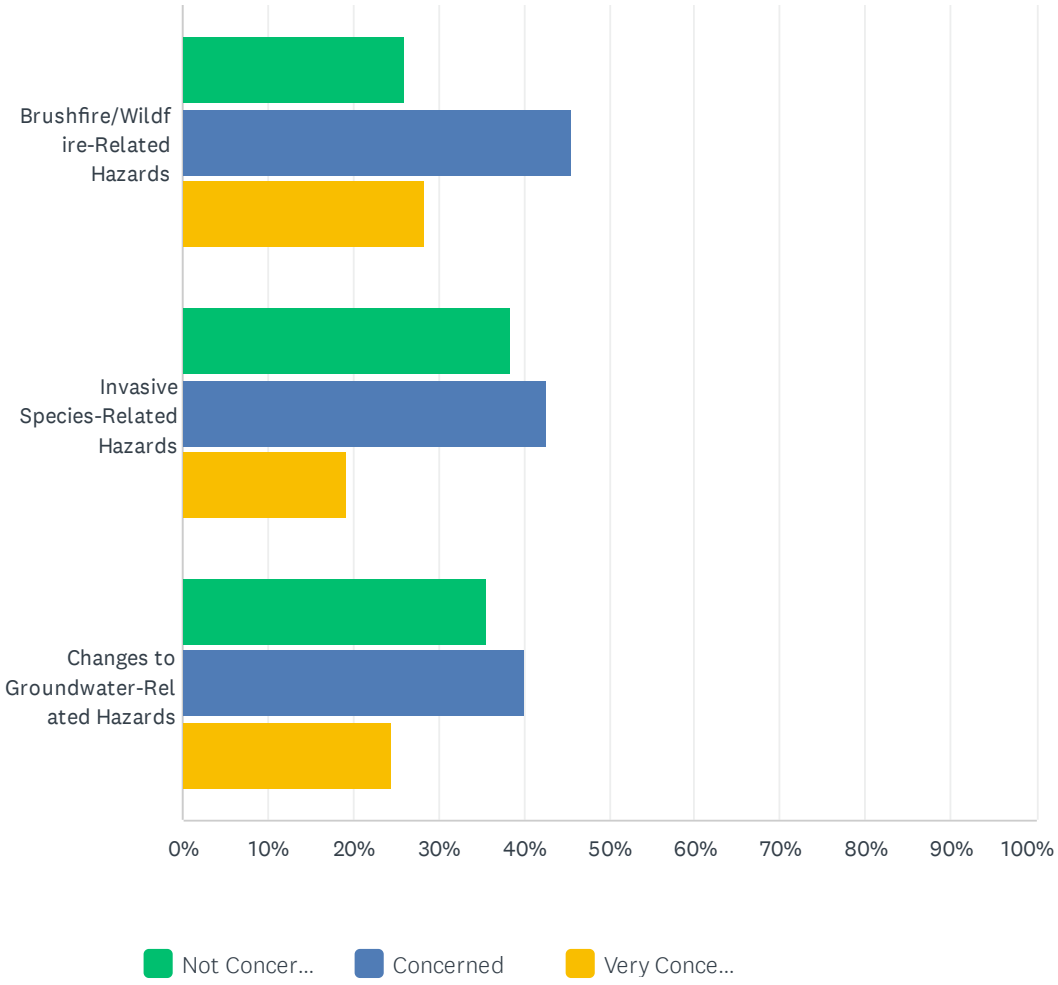
ANSWER CHOICES	RESPONSES	
Attended meetings about disaster preparedness	20.00%	8
Citizen Emergency Response Team (CERT) Training	10.00%	4
Personal experience with one or more natural hazards/disasters	65.00%	26
Local news/social media	57.50%	23
Civic organizations	10.00%	4
Other (please specify)	12.50%	5
Total Respondents: 40		

#	OTHER (PLEASE SPECIFY)	DATE
1	Fire department provided emergency back pack	9/26/2024 7:38 AM
2	OSHA training	9/23/2024 3:03 PM
3	Prior CERT training also an RN	9/23/2024 2:25 PM
4	None	5/6/2024 3:57 PM
5	Common sense	5/3/2024 1:19 PM

Q4 How concerned are you about the following hazards in the Town of Douglas? (Check one response for each hazard)

Answered: 47 Skipped: 0

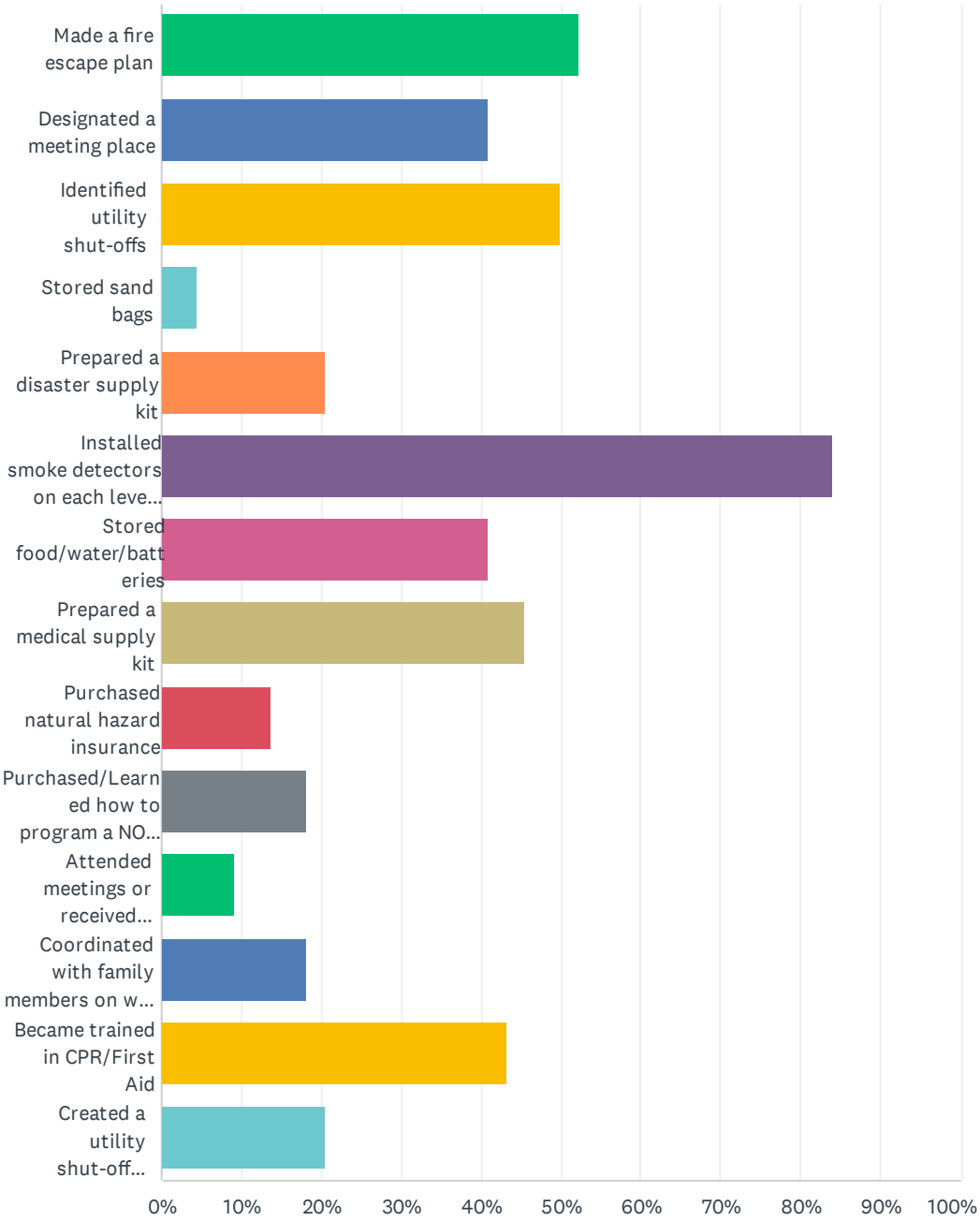




	NOT CONCERNED	CONCERNED	VERY CONCERNED	TOTAL
Flood-Related Hazards	53.19% 25	31.91% 15	14.89% 7	47
Winter-Related Hazards	23.40% 11	63.83% 30	12.77% 6	47
Wind-Related Hazards	19.15% 9	63.83% 30	17.02% 8	47
Geologic-Related Hazards	88.89% 40	6.67% 3	4.44% 2	45
Extreme Heat-Related Hazards	69.57% 32	26.09% 12	4.35% 2	46
Drought-Related Hazards	50.00% 23	36.96% 17	13.04% 6	46
Brushfire/Wildfire-Related Hazards	26.09% 12	45.65% 21	28.26% 13	46
Invasive Species-Related Hazards	38.30% 18	42.55% 20	19.15% 9	47
Changes to Groundwater-Related Hazards	35.56% 16	40.00% 18	24.44% 11	45

Q5 Which of the following steps has your household and/or business taken to prepare for a hazard event? (Check all that apply)

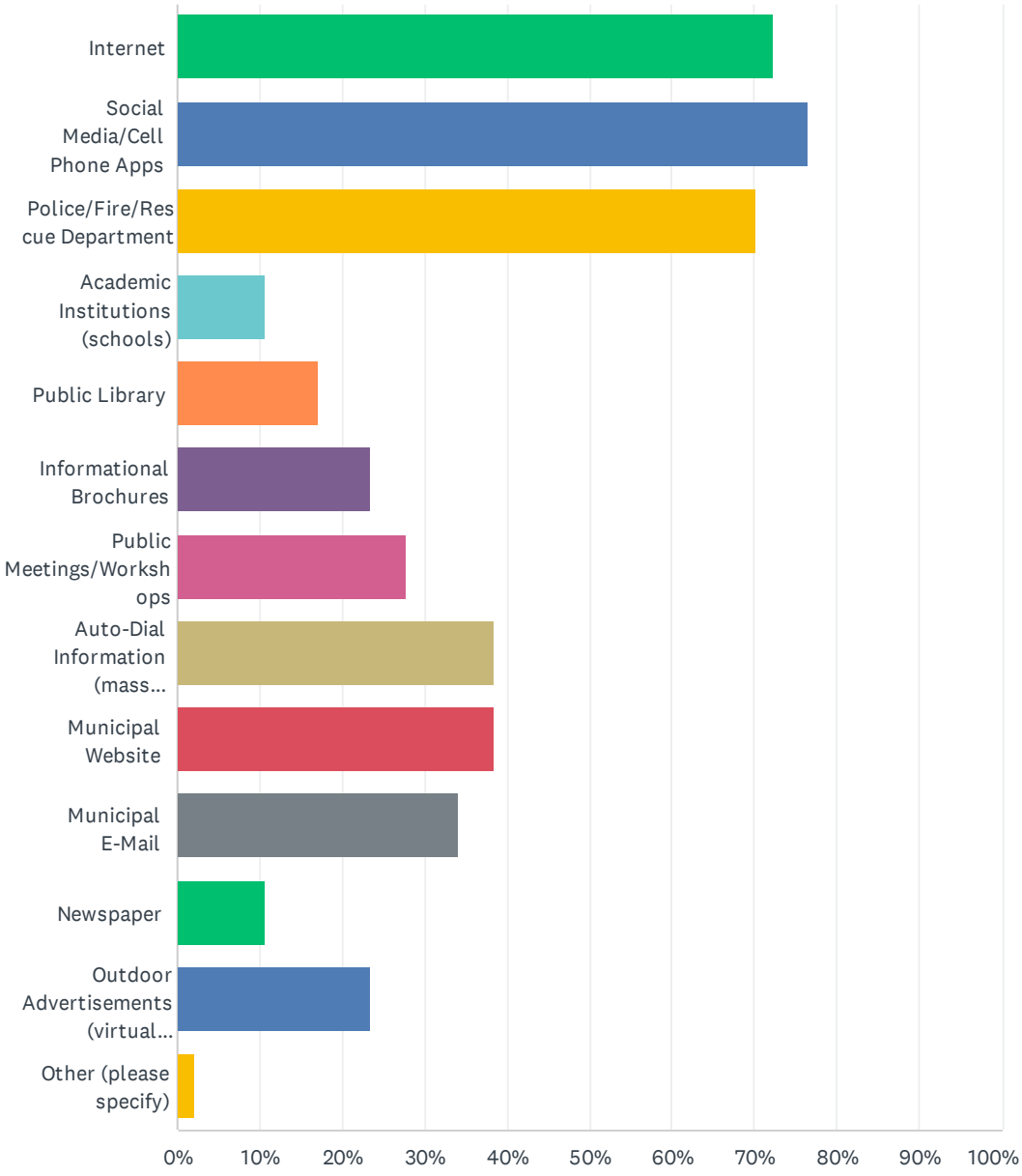
Answered: 44 Skipped: 3



ANSWER CHOICES	RESPONSES	
Made a fire escape plan	52.27%	23
Designated a meeting place	40.91%	18
Identified utility shut-offs	50.00%	22
Stored sand bags	4.55%	2
Prepared a disaster supply kit	20.45%	9
Installed smoke detectors on each level of the house/business	84.09%	37
Stored food/water/batteries	40.91%	18
Prepared a medical supply kit	45.45%	20
Purchased natural hazard insurance	13.64%	6
Purchased/Learned how to program a NOAA Weather Radio	18.18%	8
Attended meetings or received hazard-related information	9.09%	4
Coordinated with family members on what to do in case of emergency	18.18%	8
Became trained in CPR/First Aid	43.18%	19
Created a utility shut-off procedure	20.45%	9
Total Respondents: 44		

Q6 In your opinion, which of the following methods do you think are most effective for providing hazard and disaster information? (Check all that apply)

Answered: 47 Skipped: 0

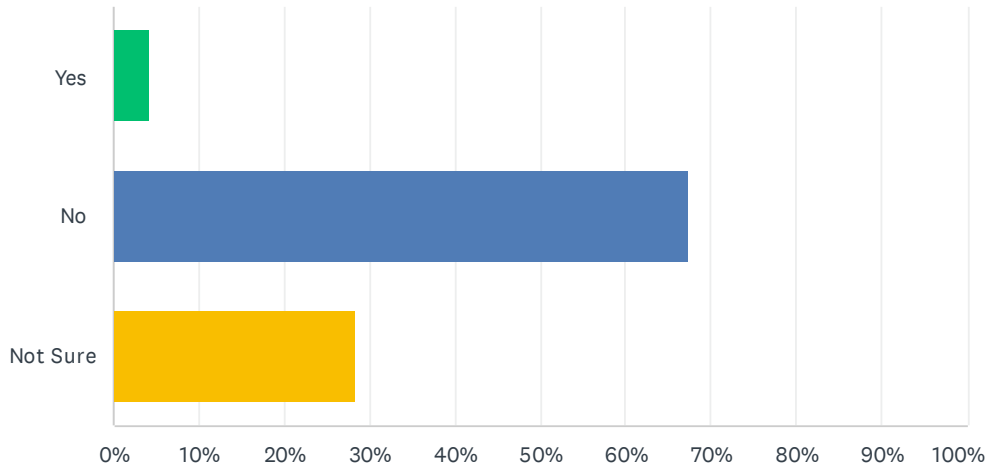


ANSWER CHOICES	RESPONSES	
Internet	72.34%	34
Social Media/Cell Phone Apps	76.60%	36
Police/Fire/Rescue Department	70.21%	33
Academic Institutions (schools)	10.64%	5
Public Library	17.02%	8
Informational Brochures	23.40%	11
Public Meetings/Workshops	27.66%	13
Auto-Dial Information (mass notification system)	38.30%	18
Municipal Website	38.30%	18
Municipal E-Mail	34.04%	16
Newspaper	10.64%	5
Outdoor Advertisements (virtual message boards)	23.40%	11
Other (please specify)	2.13%	1
Total Respondents: 47		

#	OTHER (PLEASE SPECIFY)	DATE
1	'	5/11/2024 6:09 AM

Q7 Is your property located in or near a FEMA designated floodplain?

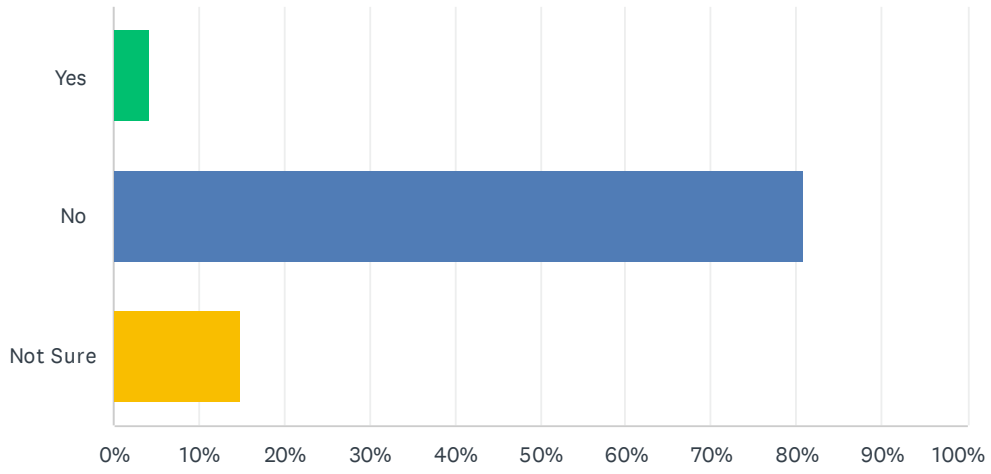
Answered: 46 Skipped: 1



ANSWER CHOICES	RESPONSES	
Yes	4.35%	2
No	67.39%	31
Not Sure	28.26%	13
TOTAL		46

Q8 Do you have flood insurance?

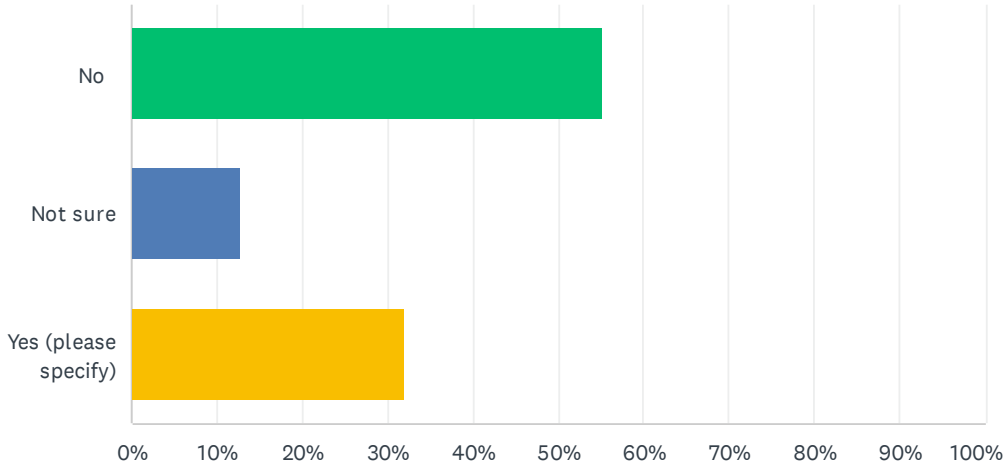
Answered: 47 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes	4.26%	2
No	80.85%	38
Not Sure	14.89%	7
TOTAL		47

Q9 In the past, has your home/business been damaged by a hazard event (e.g., flood waters entering your home/business, pipes freezing during periods of extreme cold temperatures, tree down on utility lines)?

Answered: 47 Skipped: 0



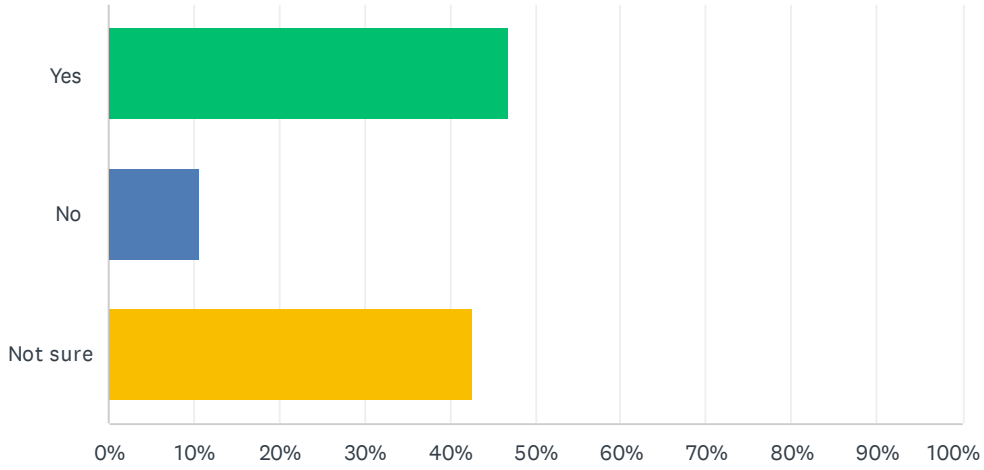
ANSWER CHOICES	RESPONSES	
No	55.32%	26
Not sure	12.77%	6
Yes (please specify)	31.91%	15
TOTAL		47

#	YES (PLEASE SPECIFY)	DATE
1	flood waters in home	3/20/2025 7:32 AM
2	tree down on lines, branch came through roof	2/12/2025 1:43 PM
3	When trees go down	2/4/2025 3:54 PM
4	Tree down on utility lines causing lost power - at least once a winter. Also, three different times in the last 5 years a member of my family has had a tree down across South Street immediately before/after driving past	11/19/2024 5:55 PM
5	Dead trees owned by the town and were notified months before fell and took out power lines	9/26/2024 6:17 AM
6	2012 snow storm	9/23/2024 2:25 PM
7	Power outages due to downed trees and power lines	9/23/2024 1:51 PM
8	Trees down on utility lines	5/11/2024 5:08 PM
9	Wind and ice	5/6/2024 4:30 PM
10	Frozen pipes	5/6/2024 4:06 PM
11	Tree on power lines	5/6/2024 4:05 PM
12	Multiple power outages from downed trees	5/6/2024 3:55 PM

13	Ice dams on roof leading to leaks	5/6/2024 6:01 AM
14	Hurricane power outage	5/3/2024 1:19 PM
15	Tree on electric lines	5/3/2024 1:12 PM

Q10 Do you believe your household or business is equipped and resilient enough to handle a disaster?

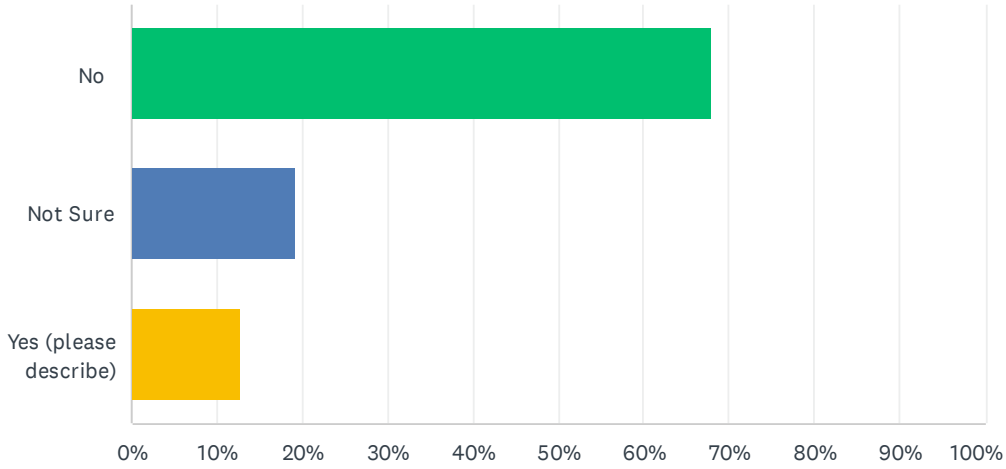
Answered: 47 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes	46.81%	22
No	10.64%	5
Not sure	42.55%	20
TOTAL		47

Q11 Do you have any special access or functional needs within your household and/or business that would require early warning or specialized response during disasters? If yes, please describe.

Answered: 47 Skipped: 0

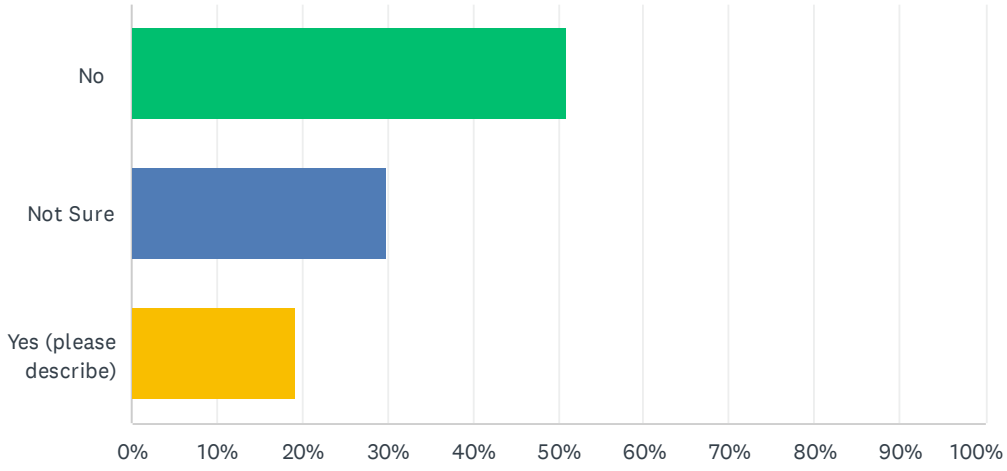


ANSWER CHOICES	RESPONSES	
No	68.09%	32
Not Sure	19.15%	9
Yes (please describe)	12.77%	6
TOTAL		47

#	YES (PLEASE DESCRIBE)	DATE
1	Mobility	2/4/2025 3:54 PM
2	Farm animals	9/26/2024 6:17 AM
3	Need C-Pap for sleep apnea	9/23/2024 2:25 PM
4	Elders with mobility challenges. Memory impairments. CPAP use.	5/15/2024 11:42 AM
5	Animals & elderly neighbors	5/6/2024 3:59 PM
6	Disabled child	5/3/2024 1:12 PM

Q12 Are you familiar with any special needs your neighbor(s) may have in the event of a natural hazard event/disaster? (May include limited mobility, chronic/severe medical conditions, memory impairments, etc.). If yes, please describe.

Answered: 47 Skipped: 0

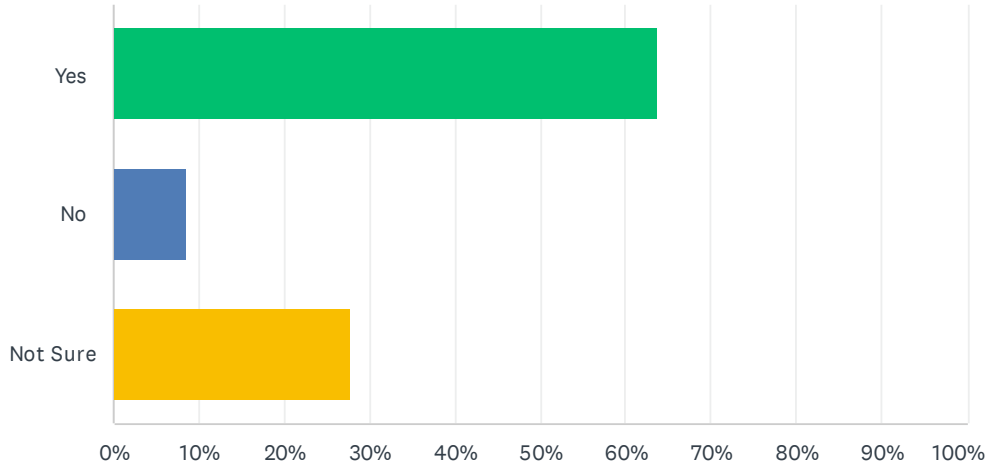


ANSWER CHOICES	RESPONSES	
No	51.06%	24
Not Sure	29.79%	14
Yes (please describe)	19.15%	9
TOTAL		47

#	YES (PLEASE DESCRIBE)	DATE
1	Have a handful of residents with limited mobility issues	2/12/2025 8:17 AM
2	Yes, memory and mobility needs of neighbors.	9/24/2024 9:23 AM
3	Mobility - Elderly	9/24/2024 8:18 AM
4	Limited mobility	9/24/2024 3:52 AM
5	Oxygen needed as well as mobility issues	9/11/2024 12:07 PM
6	None	5/10/2024 3:40 AM
7	Medications & mobility	5/6/2024 3:59 PM
8	Limited mobility	5/4/2024 7:00 AM
9	No	5/3/2024 1:12 PM

Q13 Are you interested in making your home, business or neighborhood more resistant to hazards?

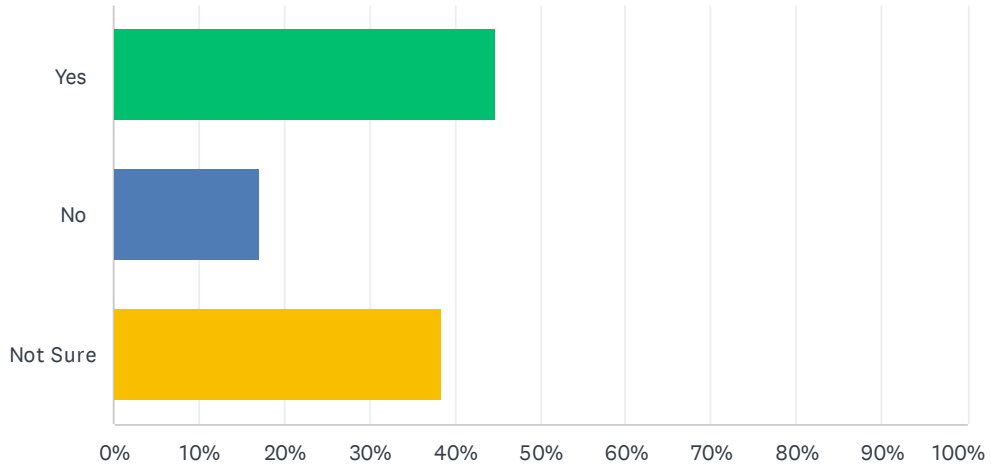
Answered: 47 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes	63.83%	30
No	8.51%	4
Not Sure	27.66%	13
TOTAL		47

Q14 Would you be willing to spend your own money on your current home and/or business to help protect it from impacts of potential future natural disasters within the community? Examples could include: Elevating a flood-prone home; Elevating utilities in flood-prone basements; Strengthening your roof, siding, doors, or windows to withstand high winds; Removing trees/low branches.

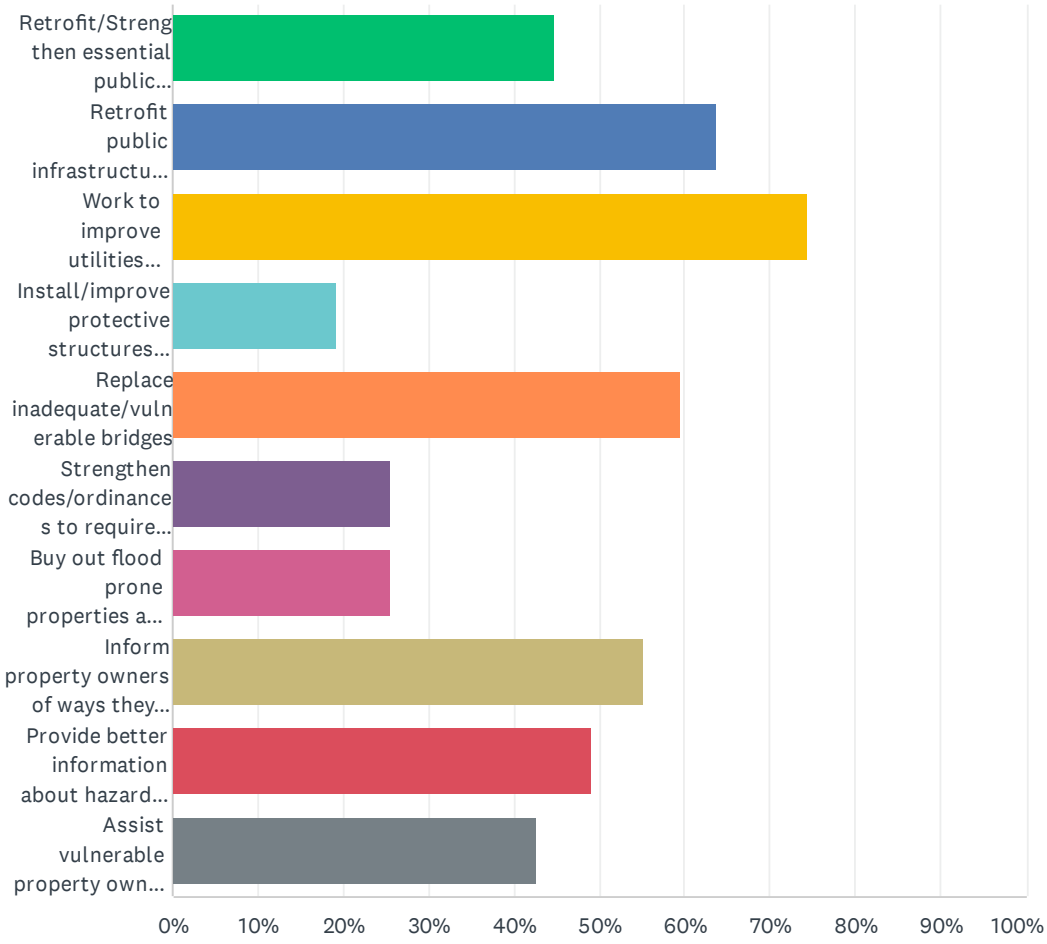
Answered: 47 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes	44.68%	21
No	17.02%	8
Not Sure	38.30%	18
TOTAL		47

Q15 In your opinion, what types of projects do you believe local, county, state or federal government agencies could be doing to reduce the damage and disruption of natural hazard events/disasters in Douglas? (Select your top three choices)

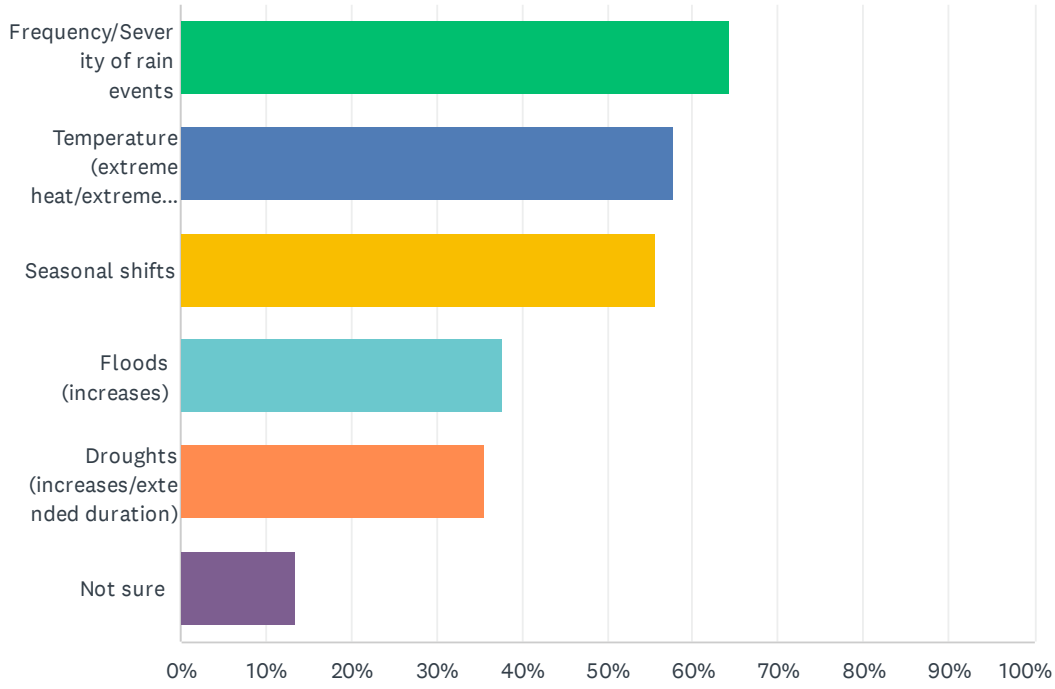
Answered: 47 Skipped: 0



ANSWER CHOICES	RESPONSES	
Retrofit/Strengthen essential public facilities such as police, fire/emergency, schools	44.68%	21
Retrofit public infrastructure, such as elevating roadways and improving drainage systems	63.83%	30
Work to improve utilities resiliency (electric, communications, water/wastewater facilities)	74.47%	35
Install/improve protective structures (floodwalls)	19.15%	9
Replace inadequate/vulnerable bridges	59.57%	28
Strengthen codes/ordinances to require higher hazard risk management standards and/or provide greater control over development in high hazard areas	25.53%	12
Buy out flood prone properties and maintain as open space	25.53%	12
Inform property owners of ways they can reduce the damage caused by natural events	55.32%	26
Provide better information about hazard risks and high hazard areas	48.94%	23
Assist vulnerable property owners with securing funding to make their properties more resilient	42.55%	20
Total Respondents: 47		

Q16 Have you noticed particular changes in the environment in the past 10 years? (Check all that apply)

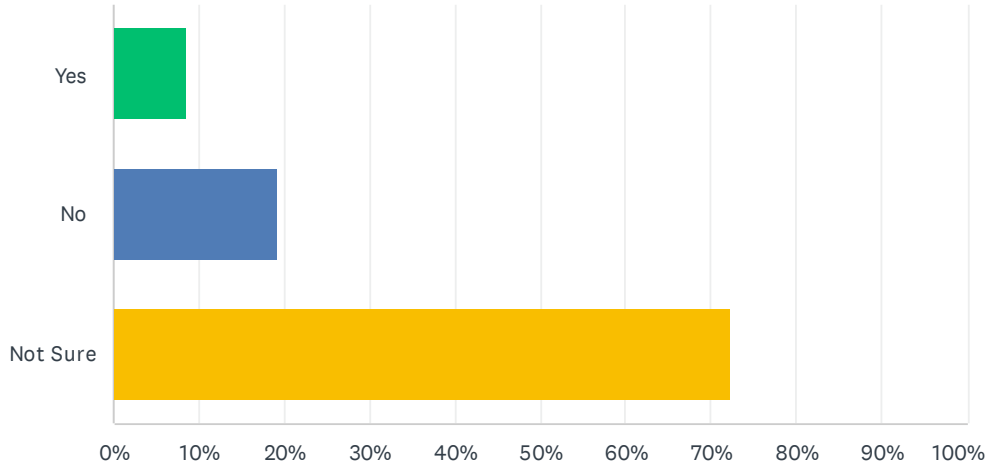
Answered: 45 Skipped: 2



ANSWER CHOICES	RESPONSES	
Frequency/Severity of rain events	64.44%	29
Temperature (extreme heat/extreme cold)	57.78%	26
Seasonal shifts	55.56%	25
Floods (increases)	37.78%	17
Droughts (increases/extended duration)	35.56%	16
Not sure	13.33%	6
Total Respondents: 45		

Q17 In your opinion, has the Town done enough to prepare for the projected future impacts of climate change?

Answered: 47 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes	8.51%	4
No	19.15%	9
Not Sure	72.34%	34
TOTAL		47

Q18 What type(s) of natural hazards should the Town be focusing on? (What would you like to hear more about?)

Answered: 23 Skipped: 24

#	RESPONSES	DATE
1	Droughts, Floods and Forest Fires	3/20/2025 7:32 AM
2	snow, high winds	2/12/2025 1:43 PM
3	Loss of electricity-flooding	2/12/2025 8:17 AM
4	Taking down hazardous trees. Repairing roads and water overflows that have been constantly ignored in spite of being reported.	2/4/2025 3:54 PM
5	Proactively monitoring/removing aged/diseased roadside trees. Actively protecting wetlands that are being overdeveloped, causing water to reroute and wildlife to die or relocate closer to existing homes.	11/19/2024 5:55 PM
6	Tree removal to protect electrical lines	9/26/2024 7:38 AM
7	All of them that is their job	9/26/2024 6:17 AM
8	Weather related issues such as flooding, high winds etc. Focus on invasive species and how a lack of native botanical species impacts groundwater and flooding etc.	9/24/2024 9:23 AM
9	Flooding and Roadway Drainage	9/24/2024 3:52 AM
10	Wind and water event protection	9/23/2024 6:29 PM
11	Trees on the streets over hanging and power lines	9/23/2024 2:25 PM
12	Climate cgange	9/12/2024 7:11 AM
13	Flooding, sediment and erosion control, fire.	5/19/2024 6:23 AM
14	Infrastructure, emergency response, stormwater management	5/15/2024 11:42 AM
15	Stormwater management	5/6/2024 7:00 PM
16	Floods. Bridges. Communication	5/6/2024 4:30 PM
17	All in #16	5/6/2024 4:05 PM
18	What are the current prep plans & how they can be improved. What can a home owner do to prepare &/or assist.	5/6/2024 3:59 PM
19	Removing dead trees along road ways	5/6/2024 3:57 PM
20	Flooding, raising water table	5/6/2024 3:46 PM
21	Many in the town have well water. Tips for managing through droughts would be helpful. Also, consideration of excessive building in areas where home owners have wells must be considered	5/6/2024 6:01 AM
22	Extreme weather, drainage, protecting against forest fire.	5/3/2024 1:19 PM
23	Clear trees from power lines along roads.	5/3/2024 1:12 PM

Q19 Additional comments?

Answered: 5 Skipped: 42

#	RESPONSES	DATE
1	Good Survey	3/20/2025 7:32 AM
2	Hayward Landing recently updated its Emergency Action Plan for the Douglas Mill Pond Dam and Old Mill Pond Dams as required by the Office of Dam Safety on 09/09/2024 A copy was provided to the Douglas Fire Department.	2/12/2025 8:17 AM
3	Disaster evac routes as Douglas is a highway evac nightmare	2/4/2025 3:54 PM
4	The DHD could do a lot more around town meaning quality wise instead of quick fixes!!	9/26/2024 6:17 AM
5	Form a committee to asses the towns vulnerability to natural disaster events.	9/23/2024 6:29 PM

Municipal Interviews

Memorandum of Meeting

To: Douglas LHMT
From: Craig Pereira
Date: June 9, 2025
Re: Douglas Hazard Mitigation Plan Update Stakeholder Interview: Tony Berthod/Stefanie Covino

In attendance:
Stefanie Covino – Blackstone Watershed Collaborative, Executive Director
Tony Berthod – Hayward Landing Apartments, Area Manager
Craig Pereira – Horsley Witten Group (HW), Project Manager

Craig Pereira conducted a coordination call with the Whitin Reservoir Watershed District regarding the Douglas Hazard Mitigation Plan Update project. The following items were discussed:

- Craig Pereira provided an overview of what's been heard to date (interview with Kris Houle on 5/28/25)
    - Received/Reviewed and incorporated into the Douglas HMP Update:
        - Follow up Inspection Reports (April 25, 2025) for Old Mill Pond Dam/Douglas Mill Pond Dam
        - Dam Breach Feasibility Study (January 25, 2024)
        - Owners interested in pursuing dam removal of both (no rehabilitation)
            - March 2025: Blackstone Watershed Collaborative secured grant funding (Narragansett Bay Estuary Program) for field data collection and to develop permit-ready designs (60% Design)
            - April 2025: Project Team applied for grant funding from EOEEA Dam and Seawall Program for permitting process and to develop dam removal final designs (full design/permitting)…currently awaiting award determination.
            - May 13, 2025: Tighe & Bond conducted a resident information session (update)
            - HW has included a mitigation action in the Douglas HMP Update: The Town of Douglas will continue to collaborate with private owners to secure funding for the removal of both dams.
- Tony Berthod mentioned a retaining wall replacement project that is ongoing.
    - This is for their parking lot along the river, to install bafflers/catch basins to stop debris from entering the river.
    - Upcoming June 16th meeting with Conservation Commission/Nancy Marshall (who proposed the NOI)…Tony to provide Nancy's contact information for additional information.

  - Aries Engineering is working on this project…project summary received from Aries Engineering 6/10/25
  - HW has included a summary of this pending project in the Capability Assessment section of the draft HMP Update.
- Stefanie Covino mentioned several projects of interest:
  - Flooding in front of Fire Station…Stefanie mentioned she just got off a call with Adam Furno regarding flooding issues associated with the Fire Station.
    - From the 'Lead Observers in the NAACC Protocol' training conducted in 2024, the Collaborative has adopted Douglas as a pilot project for stormwater BMPs, culvert assessment and replacement, and dam removal.
      - Collaborative encouraged Douglas to apply to the SNEP Network Stormwater Planning Series to help them learn how to design a stormwater retrofit BMP at the Douglas Fire Station (pilot project)…an area that frequently floods in close proximity to a gas station.
      - Spring 2025, Collaborative assisted Douglas in applying for an MVP Action grant for construction of this BMP.
  - MVP 2.0 project…Stefanie mentioned the Mumford River Valley 2.0 Project
    - Coordinated with Uxbridge (David Tapscott – BOH)…survey is out right now (survey actually closed), one of two flooding projects (potential seed project) under consideration…the potential to reduce flooding from dam removal (H & H Analysis)
  - SNEP Network/MVP Action Grant application…Stefanie mentioned this stormwater planning services project developing stormwater mitigation measures
    - An MVP application for three bioretention areas…proposed design/installation of two new bioretention areas and a retrofit of the existing bioretention, plus an underground storage/infiltration. Paving of DPW yard and covering the existing sand pile (erosion). Also mentioned the salt area that currently leaks and should be addressed.
      - HW has included a mitigation action to support this
  - DER Culvert Replacement Project…Stefanie mentioned a replacement plan project application to DER associated with Webster Street and Wallis Street, and the fact that Route 116 is a primary evacuation route.
    - BWC support letter received (5/9/2025) Douglas' application to DER's Culvert Replacement Municipal Assistance Grant Program to support 60% permit-ready designs for replacement of Webster St./Wallis St. culvert.
    - HW has included a mitigation action in the Douglas HMP Update: The Town of Douglas will continue to partner with the Blackstone Watershed Collaborative towards this effort, as well as other non-profits to accomplish the goals of the community.

- Culvert Assessments…Stefanie mentioned there have been a number of culvert assessments conducted more recently.
  - Stefanie to provide additional details.
  - HW updated the comprehensive culvert study from the 2017 Plan to include the 2024 culvert assessments completed by the Blackstone Watershed Collaborative via the NAACC database.

Memorandum of Meeting

To: Douglas LHMT
From: Craig Pereira
Date: June 5, 2025
Re: Douglas Hazard Mitigation Plan Update Stakeholder Interview: National Grid

In attendance:
Jean Tinlin – National Grid/Community Engagement Office
Robert Moran – National Grid/Community Engagement Manager
Craig Pereira – Horsley Witten Group (HW), Project Manager

Craig Pereira conducted a coordination call with National Grid regarding the Douglas Hazard Mitigation Plan Update project. The following items were discussed:

- Outage Maps
    - National Grid already provides, default estimate is 2 hours for service return
    - Perhaps post this link on the Town's website?
- AMI Project:
    - Smart Meters coming to MA
        - Will collect customer usage data and alarm information and transmit to National Grid via AMI Field Area Network (FAN)
        - Deployment Approach. 2 phases of work over 6 – 9 month period.
            - Surveys performed to determine where devices will go, followed by installation of device on existing poles.
            - Smart meters will be installed approx.. 3 to 6 months following installation of FAN devices.
            - Received engagement/communication approach.
        - grid is making automated metering infrastructure…improvements will improve data…meters will speak to the bounds where outages are (transparency)
        - They can provide timeline lines on poles…then meters…forthcoming (2026)
- Ownership issues/confusion?
    - Electric set/telephone set….provision of supply. All poles set by electric…joint owners in poles (setting)…Verizon is removal party.
- S19 ACR Project (transmission line project):
    - Will upgrade aging electric transmission line
    - 4 towns project (Webster/Oxford/Sutton/Millbury), but involves Douglas (small portion where the line runs through it)…just touches Douglas.
    - Will improve reliability in the region.
- System goes to state line and does not cross…Town is at the end of the line and nothing the Grid can do about this situation

  - There is a 2-mile gap along route 16 with no poles…there are also solely owned telephone poles through portions.
  - Grid won't expand/build until customer base is established
- There is a cycle pruning schedule rolling in place for maintenance along roadways (tree mitigation schedule…4 – 5 years is the cycle)
- DPW Director works with Grid…even on private property.
- Solar and battery power development increasing…can't run solar during outages…misconception, need utility power
- Emergency generation/battery support is critical for the Town regarding continuity of services
- Water station on West St….new infrastructure there, set new poles at the one out in the woods…the 20 West St. pump station has a 600 volt electric service…grid hasn't offered since 60s…old service, meter is inside (billing/metering problems)…don't always have equipment on hand for replacement. Service equipment that customer owns is just as old as transformer…upgrades impacted by updated codes…financial impacts to customers…a risk

Memorandum of Meeting

To: Douglas LHMT
From: Craig Pereira
Date: May 30, 2025
Re: Douglas Hazard Mitigation Plan Update Stakeholder Interview: Paul Caouette/Whitin Reservoir Watershed District

In attendance:
Paul Caouette – Whitin Reservoir Watershed District
Craig Pereira – Horsley Witten Group (HW), Project Manager

Craig Pereira conducted a coordination call with the Whitin Reservoir Watershed District regarding the Douglas Hazard Mitigation Plan Update project. The following items were discussed:

Flooding issues on the west side of the reservoir impacting Wallis Street (undersized/old stone culvert):

- The result of an uncontrolled dam behind Whitin Reservoir proper that impacts Whitin Reservoir during times of high flows (3'' – 4'' of precipitation and/or back-to-back storms) and an upstream beaver impoundment issue on Cedar Street at Bad Luck Pond (outside of the District's boundaries).

Emergency Spillway at NW corner of reservoir no longer functioning:

- Not accurate…all gates have been upgraded and are maintained in accordance with the O&M for the Whitin Reservoir and are fully operational for the use and maintenance of water levels.
- Saddle dyke was added in the early 80's to the backside of east Cove of the reservoir to control unregulated flows from this low topographical area. Is part of O&M Manual as well as included in the biannual Phase I Dam Inspection.

Water levels not consistently managed:

- Not accurate…District invested (two years ago) in a remote monitoring system (HOBO RX 2300) which sounds alarms during periods of excessive rainfall (rise in impoundment), as well as when water levels drop. This system is used daily for monitoring and maintaining appropriate water levels for the current season, and more frequently (multiple times a day) during storm events for real time water level management.

Hazard Mitigation Actions for Consideration:

- Two drainage areas impacting the District (crest of the Whitin Reservoir Dam and NW Main St. roadway)
    - Birch St. drainage and water runoff draining in a northerly direction onto crest of dam…in winter, an icing issue
    - NW Main St. drainage water moving in a southerly direction, onto dam crest and spilling from roadway into spillway approach area, current road drain unable to handle current storm volumes, affecting residents along that area of NW Main St. Icing prevalent during freezing weather (both may be an MS4 issue). Some amounts of runoff is not part of the watershed but dumps into Whitin Reservoir.

- Not a big problem for the District, although sand/salt does empty into Whitin Reservoir.

Paul's personal input (not that of the District):

- NW Main Street impoundment…headed north on NW Main Street, before the Wallis St./NW Main St. split, there is a swamp expanding which could flood NW Main St.
- Town to consider hiring an Engineer.

Whitin Reservoir Dam Emergency Action Plan Data:

- *Hydrologic/Hydraulic Studies*
- *Inundation Map*
- *Evacuation Contact List*

8.2 Hydrologic / Hydraulic Studies

HYDROLOGY

Whitins Reservoir Dam is a large size, Class I (High) hazard potential structure, and in accordance with Massachusetts Law, the spillway design flood (SDF) for the site is one half of the probable maximum flood (1/2 PMF). The precipitation associated with the ½ PMF storm event was determined through HMR 52, to be 18.10 inches for the 8.9 square mile drainage area

A rudimentary H&H analysis was completed for this structure utilizing the computer program HEC-1 assuming a HMR 52 storm distribution.

Top of Dam Elevation (ft, NGVD 29)	600
Initial Water Surface Elevation (ft)	596
Precipitation (in.)	18.1
Curve Number	58
Lag time	7
Peak Routed Outflow (cfs)	4371
Peak Routed Elevation (ft)	601.4

This analysis assumed an operational structure.

DAM BREAK ANALYSIS

A dam break analysis was completed for the Whitin Reservoir Dam utilizing the FLDWAV computer program, under a sunny day scenario and during a ½ PMF storm event. In developing the model, 15 manual cross sections were utilized to extrapolate a total of 430 sections over 5.5 river miles from the base of the dam to the embankment supporting Rt 146. The selected sections are depicted on the attached figure and summarized in the table below.

TABLE 8.2: Model Sections

Section	*Description*	*River mile*	*Bed Elevation (NGVD 29)*	*Length (mi)*
1	Dam	0.0	562	0
2	Toe of Dam	0.01	562.19	0.1
3	Near West Street	0.5	523	0.49
4	Near Conservation Road	0.7	516.1	0.2
5	Near Mumford Road	1.6	422.9	0.9
6	Near Manchaug Street	1.9	390	0.3
7	Confluence with Mumford River	2.1	383.8	0.2
8	Near Potter Road	2.7	378	0.6

9	Near Manchaug Street	3.2	373	0.5
10	Near Mechanic Street	3.9	365	0.7
11	Near Cook Street	4.0	363	0.1
12	Near North Street	4.3	333	0.3
13	In Gilboa Pond	4.7	328	0.4
14	Near Gilboa Road	5.2	326	0.5
15	Near Rt 146	5.5	317	0.3

The sunny day failure assumed a normal pool elevation and a piping type failure with an initiation point near the base of the dam and an upward propagating failure.

The dam failure during the ½ pmf storm event assumed an overtopping failure that occurs near the peak of the routed elevation. The breach was assumed to open to a width of 30 feet in a half hour period of time. Based upon the analyses, the estimated flows and elevations are as tabulated below.

TABLE 8.3: Dam Failure Flow Data

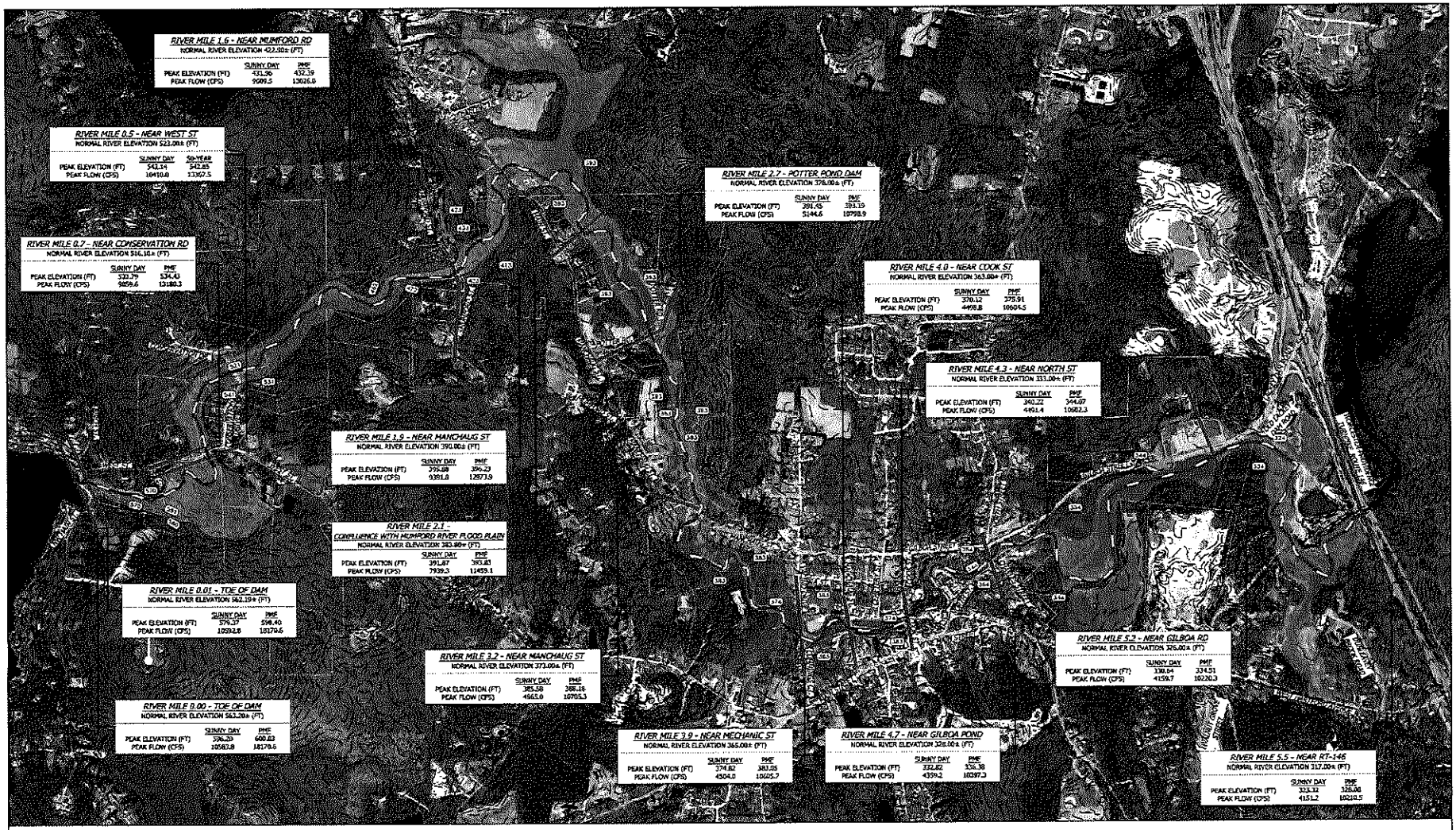
Section	*River Mile*	*Elevation*	*Max Discharge*	*Max Elevation*	*Depth*	*Max Discharge*	*Max Elevation*	*Depth*
			Sunny Day Failure			*½ PMF Storm Failure*		
1	0.0	562	10592.8	596.2	33	18170.6	600.3	37
2	0.01	562.19	10592.8	579.37	17	18170.6	598.4	36
3	0.5	523	10410.0	542.14	19	13302.4	542.85	18.5
4	0.7	516.1	9859.6	533.79	17.5	13180.3	534.43	18.5
5	1.6	422.9	9609.5	431.96	9	13026.0	432.39	9.5
6	1.9	390	9391.8	395.88	6	12973.9	396.23	6.5
7	2.1	383.8	7939.3	391.87	8	11459.1	393.83	10
8	2.7	378	5144.6	391.45	13.5	10798.9	393.19	15.5
9	3.2	373	4965.0	385.58	12.5	10705.3	388.18	15.5
10	3.9	365	4504.0	374.82	10	10605.7	383.05	18
11	4.0	363	4498.8	370.12	7	10604.5	375.91	13
12	4.3	333	4491.4	340.22	7.5	10602.3	344.07	11
13	4.7	328	4359.2	332.82	5	10397.3	336.38	8.5
14	5.2	326	4159.7	330.64	4.5	10220.3	334.51	8.5
15	5.5	317	4151.2	323.32	6.5	10210.5	328.08	11

The floodwave associated with the sunny day and ½ pmf storm event failure is anticipated to move through the study reach area in 1.8 and 1.7 hours, respectively, from the commencement of the breach, with times to peak approximately one half hour after first arrival.

The calculated flows do not account for base flows within the Mumford River.

For the Sunny Day failure it is assumed that the Potter Road Dam breaches, and that the embankment at RT 146 creates a backwater pond with water rising to the level of the roadway.

For the ½ PMF Failure it is assumed that the Potter Road Dam breaches, the channel geometry at Mechanic Street creates a restriction and the embankment at RT146 creates a backwater pond, with water overtopping the road surface at the location of the culvert.



INUNDATION AREA

SCALE: 1"=300'±

LEGEND

- RIVER
- SUNNY DAY MODELED INUNDATION AREA
- 50-YEAR STORM MODELED INUNDATION AREA
- RIVER MILE SECTION

NOTES

1. ORTHOPHOTO IMAGERY AND GIS CONTOUR DATA WAS OBTAINED FROM THE "MASSACHUSETTS OFFICE OF GEOGRAPHIC INFORMATION (MASSGIS)" WEBSITE http://www.mass.gov/mgis/massgis.htm.

GRAPHIC SCALE 1"=700'

700' 350' 0 700' 1400' 2800'

DRAFT

PARE

PARE CORPORATION
ENGINEERS · SCIENTISTS · PLANNERS
10 LINCOLN ROAD, SUITE 103
FOXBORO, MA 02035
508-543-1150

SCALE ADJUSTMENT GUIDE

BAR IS ONE INCH ON ORIGINAL DRAWING.

WHITIN RESERVOIR DAM

EMERGENCY ACTION PLAN
MA00200 / 3-14-77-7
DOUGLAS, MASSACHUSETTS
WHITINS RESERVOIR WATERSHED DISTRICT

REVISIONS

PROJECT NO.:	10156.00
DATE:	JULY 2012
SCALE:	As Noted
DESIGNED BY:	JMB
CHECKED BY:	JMB
DRAWN BY:	JMG
APPROVED BY:	JMB

INNUNDATION MAP

SHEET NO.: 8-1

UPDATES/REVIEWS

Developed: August 2012
Revised: 4/2016

WHITIN RESERVOIR DAM
Douglas, Massachusetts

EVACUATION CONTACT LIST

DOUGLAS, MASSACHUSETTS

PARCEL ID	STREET	OWNER	PHONE	NOTIFY DURING FAIR WEATHER BREACH
MANCHAUG STREET				
119-7	0 MANCHAUG ST	BAILLARGEON ROBERT J		
143-20	0 MANCHAUG ST	ROMAN CATHOLIC BISHOP OF WORCESTER		
136-14	0 MANCHAUG ST	TOWN OF DOUGLAS		
119-6	0 MANCHAUG ST	LEGER CATHERINE A		
143-32	0 MANCHAUG ST	BACA JOHN R		
136-13	0 MANCHAUG ST	TOWN OF DOUGLAS		
142-2	2 MANCHAUG ST	TOWN OF DOUGLAS		
142-29	36 MANCHAUG ST	DANSEREAU ROBERT A		
142-30	40 MANCHAUG ST	CODY CHARLES J		
143-14	42 MANCHAUG ST	BUMA SCOTT		
143-15	44 MANCHAUG ST	WHEELER DANIEL P		
143-16	48 MANCHAUG ST	BURNS JR STEPHEN S		
143-17	50 MANCHAUG ST	KARACIUS DONNA		
143-31	51 MANCHAUG ST	GILES SANDRA L		
143-18	52 MANCHAUG ST	STRATTON DANIEL		
143-19	54 MANCHAUG ST	CAHILL PATRICK		
143-30	57 MANCHAUG ST	BURROWS DANIEL L		
143-21	62 MANCHAUG ST	CEMETARY ST DENIS		
143-29	63 MANCHAUG ST	BURROWS TIMOTHY D		
143-28	73 MANCHAUG ST	PROVIDENCE 538 LLC		
143-27	77 MANCHAUG ST	CALLWOOD LISTON R		
143-26	81 MANCHAUG ST	ALLEN BRETT W		
136-15	89 MANCHAUG ST	WIRES BRUCE C		
136-4	113 MANCHAUG ST	ROBERTS JONATHAN H		
135-22	123 MANCHAUG ST	KAGELS RAYMOND		
135-21	127 MANCHAUG ST	TORROCCO LINDA C		
135-20	129 MANCHAUG ST	CORTESE DAVID P		
119-15	131 MANCHAUG ST	DESCOTEAUX THOMAS H		
119-14	135 MANCHAUG ST	GRAZULIS KAREN A		
119-13	139 MANCHAUG ST	ROBERTS RICHARD B		
119-12	141 MANCHAUG ST	MORIN JEAN		
119-4	142 MANCHAUG ST	ROBERTS RICHARD B		
119-11	147 MANCHAUG ST	LEVEILLE WADE P		
119-10	149 MANCHAUG ST	STEWART PAUL B		
119-9	153 MANCHAUG ST	SHINE RUSSELL A		
119-8	161 MANCHAUG ST	KEARNEY PAUL		
GILBOA STREET				
142-85	27 GILBOA ST	JENKINS RAYMOND WILLIAM		
142-84	31 GILBOA ST	CORKRAN SADIE M		
142-83	35 GILBOA ST	OUILLETTE JR GEORGE		
141-9	37 GILBOA ST	BOMBARA JOHN A		
141-8	39 GILBOA ST	MENN FRANK C		
141-19	43 GILBOA ST	INTERFACE MA HOLDINGS INC		
141-18	53 GILBOA ST	GOODWIN JR ROY M		
138-45.1	65 GILBOA ST	FORESIGHT ENTERPRISES CORP		
138-45	67 GILBOA ST	KIBBE JR ALVIN N TEE		
138-41-001	102 GILBOA ST	FALCONER DAVID A		
138-41-002	104 GILBOA ST	RUDICK GENEVIEVE L		
138-44	105 GILBOA ST	INTERFACE MA HOLDINGS INC		
138-42	106 GILBOA ST	MCCALLUM ALYCIA		
138-42	108 GILBOA ST	TUBO BENJAMIN		

138-43	120 GILBOA ST	PERRY CHRISTOPHER	[redacted]
139-1	123 GILBOA ST	TOWN OF DOUGLAS	

A STREET

142-14	26 A ST	SAVIANO JAMES P	[redacted]
142-13	24 A ST	BOUSQUET NICHOLAS	-

CUMMINGS COURT

163-67	0 CUMMINGS CT	MICHNA JOHN M LE	-
163-64	0 CUMMINGS CT	TOWN OF DOUGLAS CONSERVATION COMMISSION	[redacted]
163-66	0 CUMMINGS CT	CENEDELLA STEPHEN O	-
163-63	12 CUMMINGS CT	CRAWFORD JOHN E	[redacted]
163-65	16 CUMMINGS CT	BIROS STEPHEN A	[redacted]
163-69	17 CUMMINGS CT	BOURGEOIS ELIZABETH	-
163-68	18 CUMMINGS CT	MICHNA KENNETH	[redacted]

YACINO DRIVE

142-11	3 YACINO DR	YACINO JOSEPH A	-
142-10	5 YACINO DR	YACINO FRANK R	[redacted]
142-9	7 YACINO DR	YACINO MICHAEL D	[redacted]

WEST STREET

145-3.1	0 WEST ST	BOMBARA JOHN P	[redacted]
163-52	13 WEST ST	SURETTE ALTHEA	[redacted]
163-52	13 WEST ST	CROTEAU ANNA T	[redacted]
163-52	13 WEST ST	GRONDIN ANNE B	[redacted]
163-52	13 WEST ST	JONES ARTHUR W	[redacted]
163-52	13 WEST ST	MATEER BARBARA	-
163-52	13 WEST ST	FALLONE BLANCHE	[redacted]
163-52	13 WEST ST	BIGELOW C	[redacted]
163-52	13 WEST ST	WHITTLER CAROL	[redacted]
163-52	13 WEST ST	FULONE CAROLINE R	[redacted]
163-52	13 WEST ST	TROTT CAROLINE C	[redacted]
163-52	13 WEST ST	PIWCIO CHARLOTTE A	[redacted]
163-52	13 WEST ST	DAIGLE J D	[redacted]
163-52	13 WEST ST	MOONEY D	[redacted]
163-52	13 WEST ST	SIMMONS E D	[redacted]
163-52	13 WEST ST	PIERCE DENIS M	[redacted]
163-52	13 WEST ST	CASWELL DIANA M	[redacted]
163-52	13 WEST ST	MANYAK E	[redacted]
163-52	13 WEST ST	CARTER EARL	[redacted]
163-52	13 WEST ST	CASSISTA EDMUND P	[redacted]
163-52	13 WEST ST	LAMOTHE EDWARD J	[redacted]
163-52	13 WEST ST	DESJOURDY EILEEN M	[redacted]
163-52	13 WEST ST	LAMOTHE EVELYN P	[redacted]
163-52	13 WEST ST	TOUGAS EVELYN C	[redacted]
163-52	13 WEST ST	MORRELL FLORIDA	[redacted]
163-52	13 WEST ST	DEMARCO FRANCIS	[redacted]
163-52	13 WEST ST	BOURN G	[redacted]
163-52	13 WEST ST	CYR GEORGE	[redacted]
163-52	13 WEST ST	ZIBRID H	-
163-52	13 WEST ST	ZIDRID HANA	[redacted]
163-52	13 WEST ST	DURANT IN	[redacted]
163-52	13 WEST ST	VERDON JEAN E	[redacted]
163-52	13 WEST ST	DESJOURDY JOHN	[redacted]
163-52	13 WEST ST	FARRAR JOHN F	[redacted]
163-52	13 WEST ST	PIWCIO JOSEPH	[redacted]
163-52	13 WEST ST	PRINCE JULIA	[redacted]
163-52	13 WEST ST	ROUSSEAU LEVITA	[redacted]
163-52	13 WEST ST	POWERS LINDA	[redacted]
163-52	13 WEST ST	BUTTS LORETTA A	[redacted]
163-52	13 WEST ST	FITTS LORRAINE T	[redacted]
163-52	13 WEST ST	HAWKSLEY MADELINE	[redacted]
163-52	13 WEST ST	BURROWS MANUEL L	[redacted]
163-52	13 WEST ST	KERR MARCIA A	[redacted]
163-52	13 WEST ST	PELOQUIN MARY E	[redacted]
163-52	13 WEST ST	GAUTIER MARY J	[redacted]

163-52	13 WEST ST	BESAW MICHAEL I	[redacted]
163-52	13 WEST ST	JOHNSON MILDRED	[redacted]
163-52	13 WEST ST	MCGEE PATRICIA	[redacted]
163-52	13 WEST ST	PICHIE PAUL J	[redacted]
163-52	13 WEST ST	LUNEAU PHILLIP	[redacted]
163-52	13 WEST ST	GAUTHIER R	[redacted]
163-52	13 WEST ST	WHITTIER RICHARD	[redacted]
163-52	13 WEST ST	WHITE RICHARD	[redacted]
163-52	13 WEST ST	HEEPS RITA M	-
163-52	13 WEST ST	GAUTIER ROBERT J	[redacted]
163-52	13 WEST ST	CLAUDIO ROSA	[redacted]
163-52	13 WEST ST	ROSE ROY V	[redacted]
163-52	13 WEST ST	CHAMBERLAND S	[redacted]
163-52	13 WEST ST	GARABEDIAN SADIE	[redacted]
163-52	13 WEST ST	COLONAIR SHARON	[redacted]
163-52	13 WEST ST	ZANNOTTI SHEILA M	[redacted]
163-52	13 WEST ST	GORSKI SHIRLEY	[redacted]
163-52	13 WEST ST	PETITT SUZANNE	[redacted]
163-52	13 WEST ST	BRUNELLE SYLVIA	-
163-52	13 WEST ST	FULONE T	[redacted]
163-52	13 WEST ST	HETU THERESA L	[redacted]
163-52	13 WEST ST	FURNO THOMAS	[redacted]
163-52	13 WEST ST	HOCHKIS-BLAKE WENDY	[redacted]
163-52	13 WEST ST	PYBAS WILLIAM K	[redacted]
163-50	15 WEST ST	MILLER ANDREW J	[redacted]
163-50	15 WEST ST	VIROSTEK ERIC C	[redacted]
162-42	25 WEST ST	PYBAS W	[redacted]
162-41	29 WEST ST	TOWN OF DOUGLAS	[redacted]
160-1	152 WEST ST	BLOEM STEVEN N	-
145-1	164 WEST ST	BLOEM SHERRI L	-
160-2	170 WEST ST	KOOPMAN THEODORE S	-
145-2	176 WEST ST	POSTMA JULIE A	-
145-3	180 WEST ST	DEMERY STEVEN M	[redacted]
145-7	195 WEST ST	STELMACH MAUREEN P	[redacted]
145-6	199 WEST ST	SMITH ELLEN	[redacted]
160-3	206 WEST ST	GRAY RUSSELL J	[redacted]
159-1	212 WEST ST	MICHAELSON III PHILIP	[redacted]
159-2	218 WEST ST	WHITIN RESERVOIR WATERSHED DISTRICT	-

POTTER ROAD

136-10	9 POTTER RD	BAGAGLIO STACEY L	[redacted]
136-9	11 POTTER RD	MERCURE DENNIS J	[redacted]
136-8	17 POTTER RD	MERCURE DENNIS J	[redacted]
136-5	20 POTTER RD	MERCURE DENNIS J	[redacted]
118-1	22 POTTER RD	OPPERWALL PETER T	[redacted]
136-6	34 POTTER RD	OPPERWALL CHRISTINE	[redacted]

MUMFORD STREET

135-12	0 MUMFORD ST	EVENINGSIDE REALTY CORPORATION	-
135-9	72 MUMFORD ST	LEBOEUF MARK J + JEANINE M	[redacted]
119-5	77 MUMFORD ST	TOWN OF DOUGLAS	[redacted]
135-11	82 MUMFORD ST	BERTHELETTE DONALD	[redacted]
135-13	88 MUMFORD ST	BLAIR REBECCA L	-
135-14	90 MUMFORD ST	DYER WILLIAM R	-
119-5.4	95 MUMFORD ST	MINICHIELLO FRANK	[redacted]

CONSERVATION DRIVE

145-8	2 CONSERVATION DR	KENNEDY DANIEL T	[redacted]
145-9	6 CONSERVATION DR	KULLBERG DOUGLAS A	[redacted]
145-10	10 CONSERVATION DR	KANE JR JAMES P	[redacted]
145-11	14 CONSERVATION DR	PICARD ROBERT R	[redacted]
145-27	17 CONSERVATION DR	MASOUD JENNIFER M	[redacted]
145-12	18 CONSERVATION DR	LATIMER RICHARD DANA	[redacted]
145-26	21 CONSERVATION DR	MAIELLA PATRICK G	[redacted]
145-13	22 CONSERVATION DR	EVENINGSIDE REALTY CORPORATION	-
145-25	25 CONSERVATION DR	EVENINGSIDE REALTY CORPORATION	-

145-24	29 CONSERVATION DR	FOLEY JAMES P	[redacted]
145-15	30 CONSERVATION DR	COVELL JONATHAN M	[redacted]
145-23	33 CONSERVATION DR	BANACK MICHELLE	[redacted]
WHITIN HEIGHTS			
160-4	0 WHITIN HEIGHTS	SWENSON ROY E + GAIL B TRS	[redacted]
MECHANIC STREET			
163-86	12A 12B MECHANIC ST	AHERN CHRISTINE M	-
CHARLES STREET			
141-20	29 CHARLES ST	TOWN OF DOUGLAS	[redacted]
NORTH STREET			
141-6	28 NORTH ST	GIVEN TODD E	-
141-5	26 NORTH ST	POLSKY A	[redacted]
141-5	26 NORTH ST	CORSETTI A	[redacted]
141-5	26 NORTH ST	GRYBOWSKI A	[redacted]
141-5	26 NORTH ST	CHAUDHURY ABHIJIT W	[redacted]
141-5	26 NORTH ST	RIZZO ADRIA M	[redacted]
141-5	26 NORTH ST	MARTIN ALEX A	[redacted]
141-5	26 NORTH ST	LEARY ALYSSA	-
141-5	26 NORTH ST	SCOTT AMANDA	[redacted]
141-5	26 NORTH ST	HATFIELD AMNDA	[redacted]
141-5	26 NORTH ST	KEHOE AMY V	[redacted]
141-5	26 NORTH ST	DAVIS ANDREW	[redacted]
141-5	26 NORTH ST	SANTOSPAGO ARNOLD	[redacted]
141-5	26 NORTH ST	CHAUDHURY BANANI	[redacted]
141-5	26 NORTH ST	ROBINSON BARBARA	-
141-5	26 NORTH ST	ESTRELLARAMOS BENJAMIN	[redacted]
141-5	26 NORTH ST	BERGSTROM BETH M	[redacted]
141-5	26 NORTH ST	CORDON BRANNON	[redacted]
141-5	26 NORTH ST	HALL BRIAN	[redacted]
141-5	26 NORTH ST	CROWLEY BRITTANY	[redacted]
141-5	26 NORTH ST	CHRISTMAN BRYAN C	[redacted]
141-5	26 NORTH ST	GEORGES C	[redacted]
141-5	26 NORTH ST	GAIEWSKI CAITLIN	-
141-5	26 NORTH ST	YOUNG CANDACE L	[redacted]
141-5	26 NORTH ST	HAVALOTTI CAROLYN	[redacted]
141-5	26 NORTH ST	FOX CHRIS	[redacted]
141-5	26 NORTH ST	PONTBRIAND CHRISTINALEE	[redacted]
141-5	26 NORTH ST	LOMBARDI CLAIRE	[redacted]
141-5	26 NORTH ST	BRUNNETT COIEY G	[redacted]
141-5	26 NORTH ST	HARDING CRAIG	[redacted]
141-5	26 NORTH ST	FLOWERS CYNTHIA	[redacted]
141-5	26 NORTH ST	KIREYCZYK D	[redacted]
141-5	26 NORTH ST	PADULA DANA S	[redacted]
141-5	26 NORTH ST	HOWELL DAVID R	[redacted]
141-5	26 NORTH ST	SHOUP DAVID	-
141-5	26 NORTH ST	NARDREAU DAVID A	[redacted]
141-5	26 NORTH ST	CABRAL DAVID W	[redacted]
141-5	26 NORTH ST	VACILEK DAVID J	[redacted]
141-5	26 NORTH ST	WORMLY DAVID	[redacted]
141-5	26 NORTH ST	CLIFFORD DAVID	[redacted]
141-5	26 NORTH ST	SENECAL DAVID M	[redacted]
141-5	26 NORTH ST	FSCHKE DENNIS	[redacted]
141-5	26 NORTH ST	HISOIRE DOROTHY	[redacted]
141-5	26 NORTH ST	KELLY EILEEN A	[redacted]
141-5	26 NORTH ST	MENSAH ELSA	[redacted]
141-5	26 NORTH ST	FLINTON EUNICE D	[redacted]
141-5	26 NORTH ST	HIDALGO F	[redacted]
141-5	26 NORTH ST	GILCHRIST FALLON	[redacted]
141-5	26 NORTH ST	RODRIGUEZ FRANCES A	[redacted]
141-5	26 NORTH ST	MURPHY GREGORY	[redacted]
141-5	26 NORTH ST	RICCI HELENA	[redacted]
141-5	26 NORTH ST	CASUCCI I	[redacted]
141-5	26 NORTH ST	MILIOTO J	[redacted]

141-5	26 NORTH ST	FLAVIN JAMES	[redacted]
141-5	26 NORTH ST	RICARD JANE P	[redacted]
141-5	26 NORTH ST	SHOUP JANET E	[redacted]
141-5	26 NORTH ST	OLSON JANICE W	[redacted]
141-5	26 NORTH ST	KINSMAN JANICE	[redacted]
141-5	26 NORTH ST	HALL JEAN S	[redacted]
141-5	26 NORTH ST	LANGUIRAND JEFFREY	[redacted]
141-5	26 NORTH ST	HOFFMAN JEFFREY M	[redacted]
141-5	26 NORTH ST	DICKSON JENNIFER W	[redacted]
141-5	26 NORTH ST	MASON JILL	[redacted]
141-5	26 NORTH ST	SNISSNS JJ	[redacted]
141-5	26 NORTH ST	HANLON JOANNE	[redacted]
141-5	26 NORTH ST	EDMAN JOHN E	[redacted]
141-5	26 NORTH ST	COHEN JONATHAN F	[redacted]
141-5	26 NORTH ST	BURNS JR T	[redacted]
141-5	26 NORTH ST	GILPIN JUDITH	[redacted]
141-5	26 NORTH ST	DEARY JUSTIN P	[redacted]
141-5	26 NORTH ST	FISHER K	[redacted]
141-5	26 NORTH ST	HAMM KARA M	[redacted]
141-5	26 NORTH ST	CHANDLER KAREN	[redacted]
141-5	26 NORTH ST	PALINKAS KAREN A	[redacted]
141-5	26 NORTH ST	WOELLER KARI L	[redacted]
141-5	26 NORTH ST	IWANOW KATHERINE	[redacted]
141-5	26 NORTH ST	BENNETT KELLY	[redacted]
141-5	26 NORTH ST	RILEY KENNETH	[redacted]
141-5	26 NORTH ST	HART KEVIN	[redacted]
141-5	26 NORTH ST	LAING LAURA J	[redacted]
141-5	26 NORTH ST	GOODWIN LINDA	[redacted]
141-5	26 NORTH ST	PONTBRIAND LISA M	[redacted]
141-5	26 NORTH ST	NORKUS LISA	[redacted]
141-5	26 NORTH ST	CARDONA LISA	[redacted]
141-5	26 NORTH ST	FORSBERG LOIS	[redacted]
141-5	26 NORTH ST	FINNEGAN LORRAINE	[redacted]
141-5	26 NORTH ST	KELL LOUIS	[redacted]
141-5	26 NORTH ST	SHOUP LYNDA D	[redacted]
141-5	26 NORTH ST	ASHLEY M	[redacted]
141-5	26 NORTH ST	FOLEY M	[redacted]
141-5	26 NORTH ST	KAISER M	[redacted]
141-5	26 NORTH ST	GUY M L	[redacted]
141-5	26 NORTH ST	HIDALGO MARIA	[redacted]
141-5	26 NORTH ST	KUNCEWICZ MARIANNE	[redacted]
141-5	26 NORTH ST	CENTENO MARIE	[redacted]
141-5	26 NORTH ST	ROBINSON MARY B	[redacted]
141-5	26 NORTH ST	OFCARCIK MATHEW	[redacted]
141-5	26 NORTH ST	THOMPSON MATTHEW	[redacted]
141-5	26 NORTH ST	GRYBOWSKI MATTHEW J	[redacted]
141-5	26 NORTH ST	CORDON MELANIE	[redacted]
141-5	26 NORTH ST	BELLEVILLE MICHAEL R	[redacted]

CROSS STREET

135-6	0 CROSS ST	MAWN JR PATRICK J	

NORTHEAST MAIN STREET

141-67	436 440 NORTHEAST MAIN ST	BOSMA MARLENE J TR	

COOK STREET

142-135	3 COOK ST	THOMPSON ANNE	[redacted]
		NASUTI CARLO	[redacted]
		TILLET CHARLES	[redacted]
		LOGAN CHARLES K	[redacted]
		WEBBER DANIELLE	[redacted]
		FRABOTTA DONALD J	[redacted]
		THATCHER DOROTHY M	[redacted]
		KAMINSKI EDWARD	[redacted]
		TRANSK ELIZABETH	[redacted]
		BROWN FREDERICK	[redacted]

		WILLIS IRENE	[redacted]
		MEZZONI J	-
		KEARNEY JUDY	[redacted]
		QUILLIA MARALYN M	[redacted]
		QUILLIA NORMAN V	[redacted]
		GIGANTE PAMELA	[redacted]
		GEOFFREY PATRICIA	[redacted]
		LACASSE PETER	[redacted]
		BLAINE RITA	[redacted]
		RICHARD ROBERT R	[redacted]
		GIGANTE STEVEN D	[redacted]
		KAMFONIK VIVIAN	[redacted]
B STREET			
142-1	8 B ST	JACKMAN GERALD E	-
WHITIN RESERVOIR			
159-18	0 WHITIN RESERVOIR	WHITIN RESERVOIR WATERSHED DISTRICT	-

Appendix C – Correspondences

Availability of Draft Plan – Adjacent Communities

Availability of Draft Plan – Municipal Departments/Boards/Commissions

Public Comments