

Town of Dunstable

Hazard Mitigation Plan (HMP) 2024 Update and Municipal Vulnerability Preparedness (MVP) Summary of Findings Report

Submitted to MEMA and EEA, May 13, 2024
Adopted January 8, 2025

Town of Dunstable Massachusetts

MVP Municipal Vulnerability Preparedness

HOYLE TANNER

Weston & Sampson

U.S. Department of Homeland Security
FEMA Region 1
220 Binney Street
Cambridge, MA 02142

FEMA

January 22, 2025

Dawn Brantley, Director
Massachusetts Emergency Management Agency
400 Worcester Road
Framingham, Massachusetts 01702-5399

Director Brantley:

The U.S. Department of Homeland Security, Federal Emergency Management Agency (FEMA) Region 1 Mitigation Division has approved the *Town of Dunstable, MA, 2024 Hazard Mitigation Plan Update* effective **January 22, 2025** through **January 21, 2030** in accordance with the planning requirements of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act), as amended; the National Flood Insurance Act of 1968, as amended; the National Dam Safety Program Act, as amended; and Title 44 Code of Federal Regulations (CFR) Part 201.

With this plan approval, the Town of Dunstable, MA is eligible to apply to the Massachusetts Emergency Management Agency for mitigation grants administered by FEMA. Requests for funding will be evaluated according to the eligibility requirements identified for each of these programs. A specific mitigation activity or project identified in this community's plan may not meet the eligibility requirements for FEMA funding; even eligible mitigation activities or projects are not automatically approved.

The plan must be updated and resubmitted to the FEMA Region 1 Mitigation Division for approval every five years to remain eligible for FEMA mitigation grant funding.

Thank you for your continued commitment and dedication to risk reduction demonstrated by preparing and adopting a strategy for reducing future disaster losses. Should you have any questions, please contact Brigitte Ndikum-Nyada at (617) 378-7951 or brigitte.ndikum.nyada@fema.dhs.gov.

Sincerely,

CHRISTOPHER J MARKESICH Digitally signed by CHRISTOPHER J MARKESICH
Date: 2025.01.28 16:14:18 -05'00'

Christopher Markesich
Floodplain Management and Insurance Branch Chief
Mitigation Division | DHS, FEMA Region 1

cc: Jeffrey Zukowski, Hazard Mitigation Planner, MEMA
Marybeth Groff, CFM, Hazard Mitigation & Climate Adaptation Coordinator, MEMA
Beth Dubrawski, Hazard Mitigation Contract Specialist, MEMA
Dean Savramis, Mitigation Division Director, DHS, FEMA Region 1
Brigitte Ndikum-Nyada, Community Planner, DHS, FEMA Region 1

Local Mitigation Plan Review Tool

Cover Page

The Local Mitigation Plan Review Tool (PRT) demonstrates how the local mitigation plan meets the regulation in 44 CFR § 201.6 and offers states and FEMA Mitigation Planners an opportunity to provide feedback to the local governments, including special districts.

1. The Multi-Jurisdictional Summary Sheet is a worksheet that is used to document how each jurisdiction met the requirements of the plan elements (Planning Process; Risk Assessment; Mitigation Strategy; Plan Maintenance; Plan Update; and Plan Adoption).
2. The Plan Review Checklist summarizes FEMA's evaluation of whether the plan has addressed all requirements.

For greater clarification of the elements in the Plan Review Checklist, please see Section 4 of this guide. Definitions of the terms and phrases used in the PRT can be found in Appendix E of this guide.

Plan Information	
Jurisdiction(s)	Town of Dunstable, Massachusetts
Title of Plan	Town of Dunstable 2024 Hazard Mitigation Plan Update
New Plan or Update	Update
Single- or Multi-Jurisdiction	Single-jurisdiction
Date of Plan	5/13/2024
Local Point of Contact	
Name/Title	Jason Silva, Town Administrator
Agency	Town of Dunstable
Address	511 Main Street, Dunstable MA 01827
Phone Number	(978) 649-4514 Ext. 242
Email	jsilva@dunstable-ma.gov

Additional Point of Contact	
Title	Click or tap here to enter text.
Agency	Click or tap here to enter text.
Address	Click or tap here to enter text.
Phone Number	Click or tap here to enter text.
Email	Click or tap here to enter text.

Review Information	
State Review	
State Reviewer(s) and Title	Jeffrey Zukowski, Hazard Mitigation Planner
State Review Date	10/9/2024
State Review Date	12/18/2024
State Review Date	1/14/2025
FEMA Review	
FEMA Reviewer(s) and Title	Jennifer Gutierrez, CERC Planner Alexis Meehan, FEMA Region 1 Community Planner Brigitte Ndikum-Nyada, FEMA Region 1 Community Planner 1/16/25 – 1/28/25
Date Received in FEMA Region	10/9/2024
Date Received in FEMA Region	12/18/2024
Date Received in FEMA Region	1/14/2025
Plan Not Approved	11/21/2024 Requires Revisions
Plan Approvable Pending Adoption	12/18/2024
Plan Approved	1/22/2025

Plan Review Checklist

The Plan Review Checklist is completed by FEMA. States and local governments are encouraged, but not required, to use the PRT as a checklist to ensure all requirements have been met prior to submitting the plan for review and approval. The purpose of the checklist is to identify the location of relevant or applicable content in the plan by element/sub-element and to determine if each requirement has been "met" or "not met." FEMA completes the "required revisions" summary at the bottom of each element to clearly explain the revisions that are required for plan approval. Required revisions must be explained for each plan sub-element that is "not met." Sub-elements in each summary should be referenced using the appropriate numbers (A1, B3, etc.), where applicable. Requirements for each element and sub-element are described in detail in Section 4: Local Plan Requirements of this guide.

Plan updates must include information from the current planning process.

If some elements of the plan do not require an update, due to minimal or no changes between updates, the plan must document the reasons for that.

Multi-jurisdictional elements must cover information unique to all participating jurisdictions.

Element A: Planning Process

Element A Requirements	Location in Plan (section and/or page number)	Met / Not Met
A1. Does the plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement 44 CFR § 201.6(c)(1))		
A1-a. Does the plan document how the plan was prepared, including the schedule or time frame and activities that made up the plan's development, as well as who was involved?	Ch. 2, pp. 15-21; App. A; App. B	Met
A1-b. Does the plan list the jurisdiction(s) participating in the plan that seek approval, and describe how they participated in the planning process?	Ch. 2, pp. 16-17; App. A; App. B	Met
A2. Does the plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development as well as businesses, academia, and other private and non-profit interests to be involved in the planning process? (Requirement 44 CFR § 201.6(b)(2))		
A2-a. Does the plan identify all stakeholders involved or given an opportunity to be involved in the planning process, and how each stakeholder was presented with this opportunity?	Ch. 2, pp. 17-18	Met

Element A Requirements	Location in Plan (section and/or page number)	Met / Not Met
A3. Does the plan document how the public was involved in the planning process during the drafting stage and prior to plan approval? (Requirement 44 CFR § 201.6(b)(1))		
A3-a. Does the plan document how the public was given the opportunity to be involved in the planning process and how their feedback was included in the plan?	Ch. 2, p. 19; App. C; App. D	Met
A4. Does the plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement 44 CFR § 201.6(b)(3))		
A4-a. Does the plan document what existing plans, studies, reports and technical information were reviewed for the development of the plan, as well as how they were incorporated into the document?	Ch. 2, pp. 20-21; referenced throughout	Met

ELEMENT A REQUIRED REVISIONS
Required Revision**:** Click or tap here to enter text.

Element B: Risk Assessment

Element B Requirements	Location in Plan (section and/or page number)	Met / Not Met
B1. Does the plan include a description of the type, location, and extent of all natural hazards that can affect the jurisdiction? Does the plan also include information on previous occurrences of hazard events and on the probability of future hazard events? (Requirement 44 CFR § 201.6(c)(2)(i))		
B1-a. Does the plan describe all natural hazards that can affect the jurisdiction(s) in the planning area, and does it provide the rationale if omitting any natural hazards that are commonly recognized to affect the jurisdiction(s) in the planning area?	Ch. 4, pp. 40-41; Average/Extreme Temperatures: pp. 51-52; Changes in Groundwater: p. 64; Drought: pp. 69-70; Earthquakes: pp. 74-75; Flooding from Precipitation: pp. 83-84; Hurricanes/Tropical Cyclones: pp. 92-93; Invasive Species: pp. 97-98; Landslides/Mudflows: pp. 101-103; Other Severe Weather: pp. 106-107; Severe Winter Storms: pp. 112-114; Tornadoes: p. 120; Wildfires: p. 124	Met

Element B Requirements	Location in Plan (section and/or page number)	Met / Not Met
B1-b. Does the plan include information on the location of each identified hazard?	Ch. 4; Average/Extreme Temperatures: p. 52; Changes in Groundwater: pp. 64-65; Drought: p. 70; Earthquakes: pp. 75-76; Flooding from Precipitation: pp. 84-85; Hurricanes/Tropical Cyclones: p. 93; Invasive Species: p. 98; Landslides/Mudflows: pp. 103-104; Other Severe Weather: p. 107; Severe Winter Storms: p. 114; Tornadoes: p. 121; Wildfires: pp. 124-125	Met

Element B Requirements	Location in Plan (section and/or page number)	Met / Not Met
B1-c. Does the plan describe the extent for each identified hazard?	Ch. 4; Average/Extreme Temperatures: pp. 52-54; Changes in Groundwater: pp. 65-66; Drought: pp. 70-71; Earthquakes: pp. 76-70; Flooding from Precipitation: p. 85; Hurricanes/Tropical Cyclones: pp. 93-94; Invasive Species: pp. 98-99; Landslides/Mudflows: p. 104; Other Severe Weather: pp. 108-109; Severe Winter Storms: pp. 114-115; Tornadoes: p. 121; Wildfires: pp. 125-126	Met

Element B Requirements	Location in Plan (section and/or page number)	Met / Not Met
B1-d. Does the plan include the history of previous hazard events for each identified hazard?	Ch. 4; Average/Extreme Temperatures: pp. 54-58; Changes in Groundwater: p. 66; Drought: p. 71; Earthquakes: pp. 79-80; Flooding from Precipitation: p. 86; Hurricanes/Tropical Cyclones: p. 94; Invasive Species: p. 99; Landslides/Mudflows: p. 104; Other Severe Weather: p. 109; Severe Winter Storms: pp. 115-117; Tornadoes: p. 122; Wildfires: pp. 126-127	Met

Element B Requirements	Location in Plan (section and/or page number)	Met / Not Met
B1-e. Does the plan include the probability of future events for each identified hazard? Does the plan describe the effects of future conditions, including climate change (e.g., long-term weather patterns, average temperature and sea levels), on the type, location and range of anticipated intensities of identified hazards?	Ch. 4; Average/Extreme Temperatures: pp. 58-61; Changes in Groundwater: pp. 66-67; Drought: pp. 71-72; Earthquakes: p. 80; Flooding from Precipitation: pp. 86-88; Hurricanes/Tropical Cyclones: p. 95; Invasive Species: pp. 99-100; Landslides/Mudflows: p. 104; Other Severe Weather: pp. 109-110; Severe Winter Storms: pp.117-118; Tornadoes: p. 122; Wildfires: p. 127	Met
B1-f. For participating jurisdictions in a multi-jurisdictional plan, does the plan describe any hazards that are unique to and/or vary from those affecting the overall planning area?	N/A	Choose an item.

Element B Requirements	Location in Plan (section and/or page number)	Met / Not Met
B2. Does the plan include a summary of the jurisdiction's vulnerability and the impacts on the community from the identified hazards? Does this summary also address NFIP-insured structures that have been repetitively damaged by floods? (Requirement 44 CFR § 201.6(c)(2)(ii))		
B2-a. Does the plan provide an overall summary of each jurisdiction's vulnerability to the identified hazards?	Ch. 4; Average/Extreme Temperatures: pp. 62-64; Changes in Groundwater: pp. 67, 69; Drought: pp. 72, 74; Earthquakes: pp. 81, 83; Flooding from Precipitation: pp. 89-92; Hurricanes/Tropical Cyclones: pp. 95, 9; Invasive Species: pp. 100-101; Landslides/Mudflows: p. 105; Other Severe Weather: pp. 111-112; Severe Winter Storms; pp. 118-120; Tornadoes: pp.123-124; Wildfires: pp. 127-129	Met

Element B Requirements	Location in Plan (section and/or page number)	Met / Not Met
B2-b. For each participating jurisdiction, does the plan describe the potential impacts of each of the identified hazards on each participating jurisdiction?	Ch. 4; Average/Extreme Temperatures: pp. 62-64; Changes in Groundwater: p. 68; Drought: pp. 73-74; Earthquakes: pp. 81-82; Flooding from Precipitation: pp. 89-92; Hurricanes/Tropical Cyclones: pp. 95-97; Invasive Species: pp. 100-101; Landslides/Mudflows: p. 105; Other Severe Weather: pp. 111-112; Severe Winter Storms: p. 119; Tornadoes: pp. 123-124; Wildfires: pp. 127-128	Met
B2-c. Does the plan address NFIP-insured structures within each jurisdiction that have been repetitively damaged by floods?	Ch. 5, p. 135	Met

ELEMENT B REQUIRED REVISIONS
Required Revision: Click or tap here to enter text.

Element C: Mitigation Strategy

Element C Requirements	Location in Plan (section and/or page number)	Met / Not Met
C1. Does the plan document each participant's existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? (Requirement 44 CFR § 201.6(c)(3))		
C1-a. Does the plan describe how the existing capabilities of each participant are available to support the mitigation strategy? Does this include a discussion of the existing building codes and land use and development ordinances or regulations?	Ch. 5, pp. 136 - 144	Met
C1-b. Does the plan describe each participant's ability to expand and improve the identified capabilities to achieve mitigation?	Ch. 5, pp. 136 - 144	Met
C2. Does the plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement 44 CFR § 201.6(c)(3)(ii))		
C2-a. Does the plan contain a narrative description or a table/list of their participation activities?	Ch. 5, pp. 134-136	Met
C3. Does the plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement 44 CFR § 201.6(c)(3)(i))		
C3-a. Does the plan include goals to reduce the risk from the hazards identified in the plan?	Ch. 1, p. 14	Met
C4. Does the plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement 44 CFR § 201.6(c)(3)(ii))		
C4-a. Does the plan include an analysis of a comprehensive range of actions/projects that each jurisdiction considered to reduce the impacts of hazards identified in the risk assessment?	Ch. 6, pp. 150 - 152	Met
C4-b. Does the plan include one or more action(s) per jurisdiction for each of the hazards as identified within the plan's risk assessment?	Ch. 6, pp. 158 - 161	Met

Element C Requirements	Location in Plan (section and/or page number)	Met / Not Met
C5. Does the plan contain an action plan that describes how the actions identified will be prioritized (including a cost-benefit review), implemented, and administered by each jurisdiction? (Requirement 44 CFR § 201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))		
C5-a. Does the plan describe the criteria used for prioritizing actions?	Ch. 6, pp. 152 - 156	Met
C5-b. Does the plan provide the position, office, department or agency responsible for implementing/administrating the identified mitigation actions, as well as potential funding sources and expected time frame?	Ch. 6, pp. 160 - 161	Met
ELEMENT C REQUIRED REVISIONS		
Required Revision**:** Click or tap here to enter text.		

Element D: Plan Maintenance

Element D Requirements	Location in Plan (section and/or page number)	Met / Not Met
D1. Is there discussion of how each community will continue public participation in the plan maintenance process? (Requirement 44 CFR § 201.6(c)(4)(iii))		
D1-a. Does the plan describe how communities will continue to seek future public participation after the plan has been approved?	Ch. 7, pp. 165 - 166	Met
D2. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a five-year cycle)? (Requirement 44 CFR § 201.6(c)(4)(i))		
D2-a. Does the plan describe the process that will be followed to track the progress/status of the mitigation actions identified within the Mitigation Strategy, along with when this process will occur and who will be responsible for the process?	Ch. 7, pp. 162 - 163	Met

Element D Requirements	Location in Plan (section and/or page number)	Met / Not Met
D2-b. Does the plan describe the process that will be followed to evaluate the plan for effectiveness? This process must identify the criteria that will be used to evaluate the information in the plan, along with when this process will occur and who will be responsible.	Ch. 7, p. 163	Met
D2-c. Does the plan describe the process that will be followed to update the plan, along with when this process will occur and who will be responsible for the process?	Ch. 7, pp. 163 - 164	Met
D3. Does the plan describe a process by which each community will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement 44 CFR § 201.6(c)(4)(ii))		
D3-a. Does the plan describe the process the community will follow to integrate the ideas, information and strategy of the mitigation plan into other planning mechanisms?	Ch. 7, pp. 164 - 165	Met
D3-b. Does the plan identify the planning mechanisms for each plan participant into which the ideas, information and strategy from the mitigation plan may be integrated?	Sec. 7.4Ch. 7, pp. 164 - 165	Met
D3-c. For multi-jurisdictional plans, does the plan describe each participant's individual process for integrating information from the mitigation strategy into their identified planning mechanisms?	N/A	Choose an item.

ELEMENT D REQUIRED REVISIONS
Required Revision**:** Click or tap here to enter text.

Element E: Plan Update

Element E Requirements	Location in Plan (section and/or page number)	Met / Not Met
E1. Was the plan revised to reflect changes in development? (Requirement 44 CFR § 201.6(d)(3))		
E1-a. Does the plan describe the changes in development that have occurred in hazard-prone areas that have increased or decreased each community's vulnerability since the previous plan was approved?	Ch. 3, pp 28 - 30	Met
E2. Was the plan revised to reflect changes in priorities and progress in local mitigation efforts? (Requirement 44 CFR § 201.6(d)(3))		
E2-a. Does the plan describe how it was revised due to changes in community priorities?	Ch. 1, p. 14; Ch. 6, p. 146; App. A	Met
E2-b. Does the plan include a status update for all mitigation actions identified in the previous mitigation plan?	Ch. 6, pp. 146 - 150	Met
E2-c. Does the plan describe how jurisdictions integrated the mitigation plan, when appropriate, into other planning mechanisms?	Ch. 6, p. 146	Met
ELEMENT E REQUIRED REVISIONS		
Required Revision: Click or tap here to enter text.		

Element F: Plan Adoption

Element F Requirements	Location in Plan (section and/or page number)	Met / Not Met
F1. For single-jurisdictional plans, has the governing body of the jurisdiction formally adopted the plan to be eligible for certain FEMA assistance? (Requirement 44 CFR § 201.6(c)(5))		
F1-a. Does the participant include documentation of adoption?	Signed Adoption Certificate is on file. Formal Approval is 1/22/2025	Met

Element F Requirements	Location in Plan (section and/or page number)	Met / Not Met
F2. For multi-jurisdictional plans, has the governing body of each jurisdiction officially adopted the plan to be eligible for certain FEMA assistance? (Requirement 44 CFR § 201.6(c)(5))		
F2-a. Did each participant adopt the plan and provide documentation of that adoption?	N/A	Choose an item.
ELEMENT F REQUIRED REVISIONS		
Required Revision: Click or tap here to enter text.		

Element G: High Hazard Potential Dams (Optional)

HHPD Requirements	Location in Plan (section and/or page number)	Met / Not Met
HHPD1. Did the plan describe the incorporation of existing plans, studies, reports and technical information for HHPDs?		
HHPD1-a. Does the plan describe how the local government worked with local dam owners and/or the state dam safety agency?	Click or tap here to enter text.	Choose an item.
HHPD1-b. Does the plan incorporate information shared by the state and/or local dam owners?	Click or tap here to enter text.	Choose an item.
HHPD2. Did the plan address HHPDs in the risk assessment?		
HHPD2-a. Does the plan describe the risks and vulnerabilities to and from HHPDs?	Click or tap here to enter text.	Choose an item.
HHPD2-b. Does the plan document the limitations and describe how to address deficiencies?	Click or tap here to enter text.	Choose an item.
HHPD3. Did the plan include mitigation goals to reduce long-term vulnerabilities from HHPDs?		
HHPD3-a. Does the plan address how to reduce vulnerabilities to and from HHPDs as part of its own goals or with other long-term strategies?	Click or tap here to enter text.	Choose an item.

HHPD Requirements	Location in Plan (section and/or page number)	Met / Not Met
HHPD3-b. Does the plan link proposed actions to reducing long-term vulnerabilities that are consistent with its goals?	Click or tap here to enter text.	Choose an item.
HHPD4-a. Did the plan include actions that address HHPDs and prioritize mitigation actions to reduce vulnerabilities from HHPDs?		
HHPD4-a. Does the plan describe specific actions to address HHPDs?	Click or tap here to enter text.	Choose an item.
HHPD4-b. Does the plan describe the criteria used to prioritize actions related to HHPDs?	Click or tap here to enter text.	Choose an item.
HHPD4-c. Does the plan identify the position, office, department or agency responsible for implementing and administering the action to mitigate hazards to or from HHPDs?	Click or tap here to enter text.	Choose an item.
HHPD Required Revisions		
Required Revision: Click or tap here to enter text.		

Element H: Additional State Requirements (Optional)

Element H Requirements	Location in Plan (section and/or page number)	Met / Not Met
This space is for the State to include additional requirements.		
Click or tap here to enter text.	Click or tap here to enter text.	Choose an item.

Plan Assessment

These comments can be used to help guide your annual/regularly scheduled updates and the next plan update.

Element A. Planning Process

Strengths

- The planning process narrative is detailed. There are details on the events and meetings that were part of the plan's development.
- The outreach strategy gave the public a number of ways to take part and give feedback. It was in-depth.
- The main body of the plan refers to the appendices. This makes it easy for the reader to find the materials that expand on what is in the plan.

Opportunities for Improvement

- Find more ways to directly engage underserved and vulnerable populations. For instance, hold meetings outside of normal working hours. Offer a virtual or in-person option for attending meetings. Share meeting materials in common languages spoken in the planning area. Hold meetings in the areas where vulnerable groups of people live.
- Mark the updated portions of the plan clearly. This helps readers learn how the community's risks, strategies and concerns have changed over time.

Element B. Risk Assessment

Strengths

- The plan clearly lays out why certain hazards were not in the analysis.
- The hazard profiles are well-defined. There is a lot of detail about the context of the hazard and the risk it presents.
- The plan notes that, due to climate change, the history of hazard events may not predict future risks well. The plan assesses each hazard's risks and vulnerabilities with this in mind.
- The plan includes a community profile. The profile has demographic information, development trends, and landscape features. This makes community assets and vulnerabilities clear.
- The plan has a thorough hazard identification and risk assessment. When there were no quantitative data at the local level, the plan used data from the county or state and added a qualitative discussion.
- The potential impacts weigh how future conditions will affect the way hazard events take place. Climate change, changes in population, and land use and development changes are weighed for each hazard.

Opportunities for Improvement

- Problem statements could help sum up the vulnerabilities laid out in the risk assessment. They could also lead to potential actions to include in the mitigation strategy that are specific to each hazard. This would connect the two sections of the plan.

Element C. Mitigation Strategy

Strengths

- The plan gives a detailed description of the community's programs, plans and policies to reduce risks.
- The plan assesses current capabilities. It looks at how to expand them to further reduce risk.
- The mitigation goals are unique to the community.
- Mitigation actions directly address the vulnerabilities named in the risk assessment.
- Actions are detailed. The plan includes clear information on funding, resources, time frames and personnel.
- The plan names a range of resources that could help carry out the mitigation strategy. This raises the chances for success.

Opportunities for Improvement

- Add action steps to grow each capacity.
- The plan lists other plans that can account for mitigation. Add more details. These can include who oversees the plan and when future updates to the planning mechanism will take place.
- Integrate and align the plan's goals with the goals of other community plans. This will make sure all active planning efforts are aligned.
- Align the plan's mitigation actions with the established actions of the community's other planning efforts. Many transportation or land use planning efforts tie directly to mitigation. Their inclusion in the plan will inspire a more wide-ranging approach to address risk.
- The range of actions weighed should include specific activities that will directly benefit underserved and vulnerable populations in the planning area.

Element D. Plan Maintenance

Strengths

- The plan details how the planning team will include the public when it carries out the plan.
- The plan proposes a mitigation action tracking system. This will make it easy to monitor progress. It is easy to know which actions are advancing and which may have run into a hurdle.
- The steps to update the plan are described clearly. This will make the plan update process easy.
- The plan includes a number of plans and strategies that will factor in hazard mitigation.

Opportunities for Improvement

- Describe how the planning team will directly engage with underserved and vulnerable populations during the next five years. An equitable public outreach strategy does not end when the plan is adopted.
- Include more details on how the Core Team will know the plan has worked.
- Discuss the strength of the last plan’s maintenance strategy. Did the community face any hardships during the monitoring, evaluating and updating efforts? Were any strong elements carried over in the plan update? Explain how the last plan’s maintenance efforts shaped those planned for the next five years.
- Give more details on how information about hazard mitigation will be included in other plans.

Element E. Plan Update

Strengths

- The plan clearly describes changes in the community's development since the last update.
- The plan includes a projection of planned or potential future development.
- Progress on mitigation actions is clear and in-depth.
- The plan documents how the assessment of actions changed. It also spells out why the community changed its assessments.
- Priorities are based on the current conditions and vision of the community. This way, the plan is truly the community's plan.

Opportunities for Improvement

- Explain more clearly how recent, current and planned development has or has not affected the community's risk and vulnerability.
- Expand on the changes the community has seen since the last plan was developed. Discuss how the needs of underserved communities or gaps in social equity have shifted in the planning area.
- Discuss how mitigation activities have increased the community's resilience and how they support other long-term planning goals.
- Add lessons learned about carrying out mitigation actions. This would strengthen the plan. A short narrative on some "success stories" would also help.
- Give more details on how hazard mitigation information from the last plan was included in other plans.

Element G. HHPD Requirements (Optional)

Strengths

- [insert comments]

Opportunities for Improvement

- [insert comments]

Element H. Additional State Requirements (Optional)

Strengths

- [insert comments]

Opportunities for Improvement

- [insert comments]

B. Resources for Implementing Your Approved Plan

Refer to the 2023 ResilientMass Plan | Mass.gov ResilientMass Action Tracker and State's Climate Action Page to learn about hazards relevant to Massachusetts and the State's efforts and action plan.

Technical Assistance:

FEMA

- Climate Resilience in Action | FEMA.gov: This page showcases efforts happening across the country, every day, to strengthen our communities. Together, we can build a climate resilient nation.
- Hazard Mitigation Assistance Mitigation Action Portfolio
- FEMA Climate Change: Provides resources that address climate change.
- FEMA Hazard Mitigation Planning Online Webliography: This compilation of government and private online sites is a useful source of information for developing and implementing hazard mitigation programs and plans in New England.
- FEMA Library: FEMA publications can be downloaded from the library website. These resources may be especially useful in public information and outreach programs. Topics include building and construction techniques, NFIP policies, and integrating historic preservation and cultural resource protection with mitigation.
- FEMA RiskMAP: Technical assistance is available through RiskMAP to assist communities in identifying, selecting, and implementing activities to support mitigation planning and risk reduction. Attend RiskMAP discovery meetings that may be scheduled in the state, especially any in neighboring communities with shared watersheds boundaries.

Other Federal

- EPA Resilience and Adaptation in New England (RAINE): A collection of vulnerability, resilience and adaptation reports, plans, and webpages at the state, regional, and community levels. Communities can use the RAINE database to learn from nearby communities about building resiliency and adapting to climate change.
- EPA Soak Up the Rain: Soak Up the Rain is a public outreach campaign focused on stormwater quality and flooding. The website contains helpful resources for public outreach and easy implementation projects for individuals and communities.
- NOAA C-CAP Land Cover Atlas: This interactive mapping tool allows communities to see their land uses, how they have changed over time, and what impact those changes may be having on resilience.
- NOAA Sea Grant: Sea Grant's mission is to provide integrated research, communication, education, extension, and legal programs to coastal communities that lead to the responsible use of the nation's ocean, coastal and Great Lakes resources through informed personal, policy and management decisions. Examples of the resources available help communities plan, adapt, and recovery are the Community Resilience Map of Projects and the National Sea Grant Resilience Toolkit
- NOAA Sea Level Rise Viewer and Union for Concerned Scientists Inundation Mapper: These interactive mapping tools help coastal communities understand how their hazard risks may be changing. The "Preparing for Impacts" section of the inundation mapper addresses policy responses to protect communities.

- NOAA U.S. Climate Resilience Toolkit: This resource provides scientific tools, information, and expertise to help manage climate-related risks and improve resilience to extreme events. The "Steps to Resilience" tool may be especially helpful in mitigation planning and implementation.

State

- Massachusetts Emergency Management Agency: The Massachusetts State Hazard Mitigation Officer (SHMO) and State Mitigation Planner(s) can provide guidance regarding grants, technical assistance, available publications, and training opportunities.
- Massachusetts Climate Change Assessment | Mass.gov The MA Climate Change Assessment is a statewide analysis detailing how Massachusetts people, environments, and infrastructure may be affected by climate change and related hazards through the end of the century. This assessment will directly inform the first five-year update to the State Hazard Mitigation and Climate Adaptation Plan (SHMCAP) that will be released in Fall 2023.
- Massachusetts Departments of Conservation and Recreation and Environmental Protection can provide technical assistance and resources to communities seeking to implement their hazard mitigation plans.
- MA Mapping Portal: Interactive mapping tool with downloadable data

Not for Profit

- Kresge Foundation Online Library: Reports and documents on increasing urban resilience, among other topics.
- Naturally Resilient Communities: A collaboration of organizations put together this guide to nature-based solutions and case studies so that communities can learn which nature-based solutions can work for them.
- Rockefeller Foundation Resilient Cities: Helping cities, organizations, and communities better prepare for, respond to, and transform from disruption.

Funding Sources:

- Massachusetts Coastal Resilience Grant Program: Funding for coastal communities to address coastal flooding, erosion, and sea level rise.
- Massachusetts Municipal Vulnerability Preparedness program: Provides support for communities to plan for climate change and resilience and implement priority projects.
- Massachusetts Water Quality Grants: Clean water grants that can be used for river restoration or other kinds of hazard mitigation implementation projects.
- Federal Grants Resource Center and Grants.gov: Lists of grant opportunities from federal agencies (HUD, DOT/FHWA, EPA, etc.) to support rural development, sustainable communities and smart growth, climate change and adaptation, historic preservation, risk analyses, wildfire mitigation, conservation, Federal Highways pilot projects, etc.
- FEMA Hazard Mitigation Assistance (HMA): FEMA's Hazard Mitigation Assistance provides funding for projects under the Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM), and Flood Mitigation Assistance (FMA). States, federally recognized tribes, local governments, and some not-for-profit organizations are eligible applicants.
- GrantWatch: The website posts current foundation, local, state, and federal grants on one website, making it easy to consider a variety of sources for grants, guidance, and partnerships. Grants listed include The Partnership for Resilient Communities, the Institute for Sustainable Communities, the Rockefeller Foundation Resilience, The Nature Conservancy, The Kresge Climate-Resilient Initiative, the Threshold Foundation's Thriving Resilient Communities funding, the RAND Corporation, and ICLEI Local Governments for Sustainability.
  USDA Natural Resource Conservation Service (NRCS) and Rural Development Grants: NRCS provides conservation technical assistance, financial assistance, and conservation innovation grants. USDA Rural.

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Appendix C ..... Public Outreach and Engagement

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1



1. Introduction

The Town of Dunstable prepared this Hazard Mitigation Plan and Municipal Vulnerability Preparedness Summary of Findings Report (HMP-MVP) to create an action roadmap to reduce the impacts of natural hazards and climate change within the community. This Chapter further discusses HMP-MVP components and local goals for hazard mitigation.

1.1. What is Hazard Mitigation Planning?

Hazard mitigation planning is an iterative process that seeks to reduce the impact of natural hazards on people and property. Dunstable has assessed a variety of natural hazards that pose a risk to the health and welfare of residents, identified specific vulnerabilities associated with those hazards including potential future impacts due to climate change, and identified local capabilities and specific mitigation actions to protect homes, businesses, and the critical infrastructure that keeps the town running. This process is tailored to address the issues affecting Dunstable residents now and into the future and is crucial to building community resilience. Below are some key words necessary for understanding this Hazard Mitigation Plan. These definitions come from the Federal Emergency Management Agency (FEMA) or the 2023 ResilientMass Plan:

- **Natural Hazards** are a source of harm or difficulty created by a meteorological, environmental, or geological event (such as extreme wind events, tornadoes, winter weather as well as earthquakes, flooding, and fires). (FEMA)
- **Hazard mitigation** is any sustained action taken to reduce or eliminate the long-term risk to human life and property from hazards. An example of hazard mitigation is elevating or strengthening a bridge to reduce damage, disruption, or loss from a flood or earthquake. It also includes developing regulations to require new construction to include new methods and procedures to reduce risks from current hazards and increasing risks from climate change. (2023 ResilientMass Plan)

- **Vulnerability** is a description of which community "assets" (people, structures, systems, natural resources, cultural resources, historic resources, the economy, and activities that have value to the community) are at risk from the effects of a natural hazard. (FEMA)
- **Impacts** are the consequences or effects of each hazard on the participant's assets identified in the vulnerability assessment. For example, impacts could be described by referencing historical disaster damages with an estimate of potential future losses (such as percentage of damage vs. total exposure). (FEMA)
- **Climate Change** refers to "changes in average weather conditions that persist over multiple decades or longer. Climate change encompasses both increases and decreases in temperature, as well as shifts in precipitation, changing risk of certain types of severe weather events, and changes to other features of the climate system." (FEMA, U.S. Global Change Research Program, 4th National Climate Assessment).
- **Resilience** is the capacity of individuals, communities, businesses, institutions, and governments to adapt to changing conditions and prepare for, withstand, and rapidly recover from disruptions to everyday life, such as hazard events. (2023 ResilientMass Plan)

1.2. What is a Municipal Vulnerability Preparedness Plan?

A Municipal Vulnerability Preparedness (MVP) plan identifies priority action items to address vulnerabilities and utilize strengths in preparation for climate change. In 2017, the Massachusetts Executive Office of Energy and Environmental Affairs (EEA) initiated the state's MVP grant program to help communities become more resilient to the impacts of climate change. The program has two grant phases:

1. The first grant phase is the **Planning Grant**, which funds the vulnerability analyses, engagement, and planning processes. Municipalities convene a team of municipal staff, engage stakeholders in a Community Resilience Building (CRB) Workshop, and engage community members in developing the plan. The Community Resilience Building Workshop was developed by the Nature Conservancy and provides a process for developing resilience action plans with stakeholder input. **The Community Resilience Building Workshop's central objectives are to:**
    a. **Define top local natural and climate-related hazards of concern**
    b. **Identify existing and future strengths and vulnerabilities**
    c. **Develop prioritized actions for the Community**
    d. **Identify immediate opportunities to collaboratively advance actions to increase resilience**
2. The second phase of the MVP program is the **Action Grant**, which funds the implementation of priority climate adaptation actions described in the MVP plan. The MVP

Action Grant offers financial resources to communities that are seeking to advance priority climate adaptation actions to address climate change impacts resulting from extreme weather, sea level rise, inland and coastal flooding, severe heat, and other climate impacts.

1.3. Combining Hazard Mitigation and Municipal Vulnerability Preparedness Planning in Dunstable

The Town of Dunstable received an MVP Planning Grant from the Executive Office of Energy and Environmental Affairs (EEA) to simultaneously undertake the MVP Community Resilience Building process in coordination with preparing an approved HMP. This combined approach enabled Dunstable to consider the impacts of climate change in addition to historic hazard events as part of its planning process. Also, many of the required steps of the MVP process satisfy FEMA requirements for updating an HMP. For example, an MVP requires convening a Core Team and hosting a CRB Workshop and Public Listening Session, which are not required specifically by FEMA, but do meet the public input needs of the hazard mitigation planning process (see Figure 1.1). The Town prepared this joint MVP-HMP in accordance with FEMA guidelines for hazard mitigation planning (Title 44 Code of Regulations (CFR) 201.6) and with EEA's requirements for MVP plans. By completing a joint HMP-MVP, Dunstable was able to fulfill the requirements and enhance the impact of both processes.

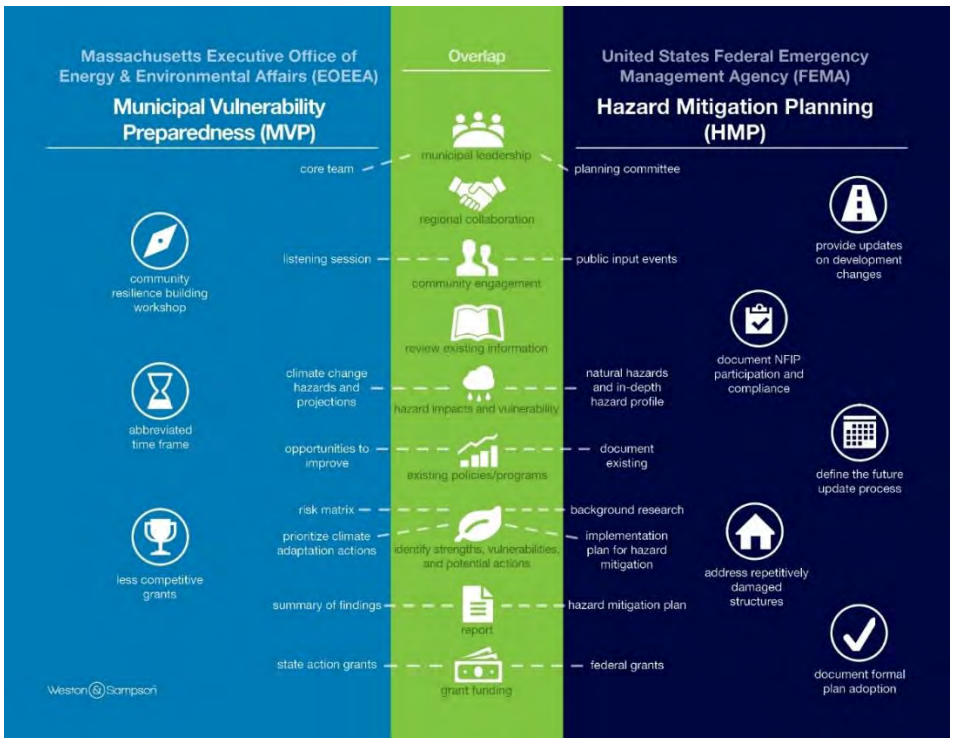


Figure 1.1: Comparison of the MVP and HMP Processes

1.4. Benefits of Hazard Mitigation Planning

Completing the HMP-MVP provides many benefits to Dunstable:

1. **Increasing public awareness of natural hazards that may affect the community reduces overall risk.** By providing education and outreach, individuals are able to understand how natural hazards may affect their lives and what the region, the Town, and they as individuals can do and are doing to minimize impacts of those hazards.
2. **Proactive planning creates efficiency beyond town limits.** Developing an HMP allows state and local governments to work together and combine hazard risk reduction with other community goals and plans.
3. **The community's greatest vulnerabilities can be prioritized to receive resources.** Developing a plan of hazard mitigation measures considers a prioritization process that reflects the cost and benefit of safety, property protection, technical, political, legal, environmental, economic, social, administrative, and other community objectives, quantitatively and/or qualitatively.
4. **The implementation of an HMP saves taxpayer money.** According to FEMA, one dollar spent on federal hazard mitigation grants saves an average of six dollars on disaster response (NIBS, 2019).
5. **Maintaining a FEMA compliant HMP also makes the municipality eligible for federal grant funding (FEMA, 2020).** Hazard mitigation funding is available through the Federal Emergency Management Agency (FEMA). To be eligible for FEMA Grants, local governments must prepare an HMP that meets the requirements established in the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended by the Disaster Mitigation Act of 2000. The HMP also ensures that federally funded projects reflect a community's priorities and offer solutions to specific threats. Please refer to Chapter 5 for more information on FEMA grants and other potential funding sources.
6. Undertaking the MVP Community Resilience Building Process and **obtaining Community Designation makes Dunstable eligible for funding MVP action grant funding.**
7. In addition, by obtaining Community Designation under the MVP Program, **Dunstable receives increased standing for other state grants.**

1.5. Dunstable's Natural Hazard Mitigation & Climate Adaptation Goals

Dunstable's Core Team (documented in Chapter 2 Section 2.2.1) established the goals and objectives for natural hazard mitigation planning in Dunstable. This effort included a review and update of the goals listed in the 2015 Hazard Mitigation Plan. The goals were restructured to better represent Dunstable's local priorities (as the previous goals were from a regional HMP) and provide simplified messaging.

1. **Protect Health and Safety:** Ensure that people, structures, systems, natural/cultural/historic resources and the overall health and safety of Dunstable are protected from natural hazards.
2. **Increase Outreach and Education:** Increase awareness and support for natural hazard mitigation among private organizations, businesses, and area residents through outreach and education.
3. **Increase Response Capacity:** Increase Dunstable's community's capacity for responding to a natural hazard event.
4. **Protect Priority Populations:** Implement a broad range of mitigation measures that protect the Town's priority populations.
5. **Consider the Economy:** Develop a mitigation strategy that considers area businesses and protects the economic vitality of the Town.
6. **Integrate Climate Change:** Implement mitigation strategies to protect the community from the impacts of climate change.
7. **Encourage Smart Development:** Discourage future development in hazard prone areas, such as flood plains.
8. **Increase Coordination:** Increase coordination between the Federal, State, regional and local levels of government.
9. **Keep the Plan Relevant:** Update and maintain the Plan as resources permit.
10. **Be Sustainable:** Encourage sustainability of the Town.

2



2. Planning Process

The Dunstable HMP-MVP was informed by data review and analysis, input received from the Core Team during and outside of the Core Team meetings, input from the CRB Workshop held with targeted stakeholders, and input from public engagement activities.

2.1. Overview of Plan Development

The HMP-MVP planning process proceeded according to the timeline shown in Table 2-1

Table 2.1: HMP Planning Timeline

Task	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Kickoff	X											
Engagement		X	X	X	X	X	X	X	X	X	X	X
CRB Workshops				X								
Asset Inventory		X	X	X								
Hazard Profiles				X	X	X	X					
Vulnerability & Impact Assessment				X	X	X	X					
Goals & Capabilities		X				X						
Actions & Priorities				X	X	X	X	X	X			
Public Review										X		
Adoption											>>	>>

2.2. Engagement and Outreach

Input and feedback from three groups was a core component of developing the plan. These three groups included:

- **Core Team:** A group of Town staff who met regularly to consult on the HMP-MVP planning process.
- **Stakeholders:** A team of representatives of a wide variety of groups and experiences to participate in Community Resilience Building Workshops and provide targeted review the draft HMP-MVP.
- **General Public:** Outreach, public surveys, and public meetings open to all community members and neighbors.

The subsequent pages describe the involvement of the Core Team, Stakeholders, and the public in the MVP-HMP planning process in more detail.

2.2.1. | Core Team

The Town of Dunstable convened a Core Team to act as a steering committee for the development of the HMP-MVP. The Core Team played an important role in identifying community assets, identifying and involving key stakeholders, supporting and attending the CRB workshops, capturing the Town's capacity to mitigate hazard alongside ongoing operations, and confirming mitigation actions to be completed in the future. Members of the Core Team are listed in Table 2-2.

Table 2.2: Core Team Members

Name	Title/Affiliation
Leah Basbanes	Vice Chair, Select Board & Conservation Commission Member
Jason Silva	Town Administrator
Erik Hoar	Chief, Dunstable Police Department
Bridget Baley	Health Agent
William Farrell	Chief, Dunstable Fire Department
Dave Tully	Highway Department
Mike Martin	Roadway Commissioner
John O'Brien	Commissioner, Water Commission
Mari Amodei	Chair, Board of Health
Jon Crandall	Emergency Management Director

The Core Team met regulatory during the HMP-MVP planning process. The Core Team also provided regular input through email and survey. More information on these meetings is included in Appendix A. Table 2-2 lists the meetings and topics of discussion.

Table 2.3: Core Team Meetings

Meeting	Date	Meeting Topics
Kick-Off Meeting	July 10, 2023	• Overview of project and process • Roles and responsibilities • Data source request • Discussion of hazards in Dunstable • Project schedule • Preview of next steps • Review logistics
Core Team Meeting #1	August 14, 2023	• Review and finalize list of HMP goals • Discuss assets and asset categories • Review and confirm list of Dunstable assets • Finalize logistics for Community Resilience Building Workshop • Discuss promotion of public survey
Core Team Meeting #2	March 31, 2024	• Review draft HMP-MVP: questions and comments from Core Team • Confirm mitigation actions including prioritization • Plan for public review process

2.2.2. | Stakeholders

A variety of stakeholders were invited to participate in plan development and review. Appendix B lists workshop invitees and attendees.

- **Municipal staff beyond those involved in the Core Team** (e.g., Planning Board members, Highway, additional Conservation Commission members, Board of Selectmen, Council on Aging, Historical Commission, Master Planning Committee, Zoning Board of Appeals, Capital Planning Committee, Building Inspector, Parks Commission, Animal Control, School Committee, Senior Center, Veteran Services, Library, etc.)
- **Local survey respondents.** (See Section 2.2.3)
- **State and Regional entities** (e.g., State Senators and Representatives, NMCOG, MassDEP, DCR, MEMA, Merrimack River Watershed Council, Nashua River Watershed Council, MassDOT, Lowell General Hospital, National Grid, Verizon, Charter, etc.).
- **Adjacent communities** (representatives from Tyngsborough, Pepperell, and Groton, MA and Nashua and Hollis, NH).

- **Underserved communities and socially vulnerable populations**. Additionally, the town invited the following representatives related to underserved communities and socially vulnerable populations to participate in the HMP-MVP development. The involvement of these entities during the planning process would have provided a liaison between the planning committee and vulnerable population. The town is not aware of any other community groups or entities that should have been included. Unfortunately, none elected to participate.
    - Council on Aging Chair
    - School Committee Members
    - Senior Center Director
    - Affordable Housing Committee Chair
    - Veterans Agent
    - VP of Patient Care Services – Lowell General

Stakeholders and local survey respondents were engaged by being provided an invitation to the local workshops and an invitation to review the draft HMP-MVP. These entities were also invited to the public meetings.

The **Community Resilience Building (CRB) Workshops** were held at the Dunstable Town Hall on Friday, October 20 and Thursday, October 26, 2023, as two half-day, four-hour workshops. The workshops were organized around topic areas that included People, Structures, Systems, Historical/Cultural/Natural Resources, Economy, and Activities that have Value to the Community. Stakeholders with subject matter expertise and local knowledge and experience, including public officials, regional organizations, neighboring communities, environmental organizations, and local institutions, were invited to attend. During these workshops, Weston & Sampson provided information about natural hazards and climate change, including the top hazards impacting Dunstable. Participants were invited to suggest People, Structures, Systems, Historical/ Cultural/ Natural Resources, Economy, and Activity features in town that are vulnerable to, or provide strength against, these challenges.

Participants also identified and prioritized key actions that would improve the Town's resilience to natural and climate-related hazards. A full list of community representatives who were invited and those who participated in the process are presented in Appendix B, along with the materials from each workshop. There were 19 participants at Workshop #1 and 20 participants at Workshop #2. Key participants at the workshops included:

- Municipal staff members involved in emergency management and response;
- Members of boards and committees, including the Master Planning Committee and Conservation Commission;
- Representatives from State agencies and regional organizations, including Northern Middlesex Council of Governments and Merrimack River Watershed Council; and
- Several Dunstable Residents.

2.2.3. | General Public

In order to gather information from the community and educate community members on hazard mitigation and climate change, the Town pursued the following approach:

Getting the word out (Survey): This first step involved posting an online survey to capture initial input. The online survey allowed residents to engage with the project on their own time, and as their schedule allowed. Materials were posted for four weeks in September on the Dunstable Town website and advertised through email blasts, a social media post on the Town Facebook page, and flyers were handed out at the summer concert, and distributed at the fire station, library, and town hall. The online survey received 80 responses. A copy of the survey questions and responses is included in Appendix C. Survey responses are incorporated into this HMP-MVP.

Public Meeting: Tuesday, November 7, 2023
The Town presented at the Board of Selectmen Public Meeting at the Dunstable Town Hall. The key topics presented were:

- Plan workshops and overall progress
- Plan schedule
- Hazard and vulnerabilities
- Asset categories
- Mitigation actions
- Next steps

No questions were asked at the Board of Selectmen Public Meeting. Appendix D includes a copy of the presentation.

Virtual Listening Session: Thursday April 11, 2024, 6 to 7 PM
This second step involved hosting a virtual Public Listening Session.

The webinar presented information related to the MVP program, climate change in Dunstable, local strengths and vulnerabilities, existing mitigation measures, and priority action items for future climate adaptation. Attendees were invited to submit comments on the draft plan during the listening session and in the following three weeks through an online comment form. More information about the virtual Public Listening Session and Comment Period is in Appendix D.

Survey to solicit input on Draft HMP-MVP: The Town posted an online survey to capture input on the draft HMP-MVP, in particular, the comprehensive list of mitigation actions. This approach allowed stakeholders and residents to provide input. Materials were posted for three weeks in April on the Dunstable Town website and advertised through email blasts, a social media post on the Town Facebook page. The online survey received two responses. A copy of the survey questions and responses is included in Appendix C.

2.3. Review of Existing Plans/ Studies/ Reports/ Technical Information

The following plans, studies, reports, and technical information were reviewed and incorporated into the update of this HMP. Specifically, the information is used in developing portions of the risk assessment found in Chapters 3 and 4.

There are also a variety of bylaws and regulations, as well as committees, that further the Town's efforts to proactively address natural hazards and climate change, which are discussed in Chapter 5 in the Capabilities Assessment.

2.3.1. | Statewide Climate Adaptation Planning Efforts and the Latest Climate Data

The Commonwealth of Massachusetts released the 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan (2023 ResilientMass Plan) in October 2023. This update includes the incorporation of new population growth and development data, findings from the 2022 Massachusetts Climate Assessment, additional and modifications to the hazards described in Chapter 4, new data and mapping regarding environmental justice and other priority populations, and inclusion of all of the latest available climate data. In developing its updated plan, Dunstable has included all of the updated data and findings from the ResilientMass Plan in order to provide the community with the best available data to prepare for climate mitigation and adaptation in the community.

In addition, FEMA released a preliminary Flood Insurance Study (FIS) Report for Middlesex County on June 8, 2023. This latest FIS revises and updates information from the currently effective 2016 FIS Report on the existence and severity of flood hazards for the county, which includes the Town of Dunstable. The studies described in this report provide flood hazard data that will, once formally adopted as final/effective, be used to establish actuarial flood insurance rates and to assist communities in efforts to implement sound floodplain management. The FIS and accompanying Flood Insurance Rate Maps (FIRMs) include relevant data and information on flood hazards for Hudson, including but not limited to descriptions of principal flood problems, flooding sources, FEMA flood zone designations, base flood elevations, and discharge rates of flooding sources. This data and information were reviewed and incorporated into the plan update process by informing the risk assessment, especially as it relates to the hazard profile and GIS-based vulnerability assessment that was prepared for the flood hazard.

2.3.2. | Local Plans Related to Hazard Mitigation and Climate Change

The Core Team suggested or made available reports, maps, and other pertinent information related to natural hazards and climate change impacts in Dunstable. These included:

- Dunstable Master Plan (Committee, 2018)
- Open Space and Recreation Plan 2018-2025 (Commission, 2018)

- Hazard Mitigation Plan for the Northern Middlesex Region (Northern Middlesex Council of Governments, 2015)
- Decennial Census (Bureau, Decennial Census, 2020)

Information from the Master Plan and Open Space and Recreation Plan was used to describe the changes in development that have occurred in hazard-prone areas that have increased or decreased Dunstable's vulnerability since the 2015 HMP, as well as potential future development, as described in Section 3.2.2. Information from the 2015 HMP was used to support narrative of past occurrences of natural hazards throughout Section 4.2 and the Mitigation Actions described in Chapter 6. The Census Data were used to describe people assets, as documented in Section 3.2.1.

2.3.3. | FEMA Guidance

All aspects of the planning process were created and implemented in accordance with the updated FEMA Local Mitigation Planning Policy Guide (FEMA, 2022) and FEMA Local Mitigation Planning Handbook (FEMA, May 2023).

3



3. Risk Assessment: Community Assets

Assets are defined broadly as anything that is important to the character and function of a community (FEMA, 2023). Assets can be built, natural, or non-physical elements. They range from emergency facilities and critical infrastructure to community events that help shape collective identity and social cohesion. Below are asset categories, community lifelines, and the list of assets in Dunstable. This analysis is the first step in the risk assessment to identify local vulnerabilities to natural hazards (Chapter 4) and develop a plan for future resilience (Chapter 6).

3.1. Asset Categories

The following sections discuss categories of community assets and how community assets are categorized into community lifelines.

3.1.1. | Overarching Categories

Assets are organized into the following five categories (FEMA, 2022). These categories represent the wide variety of perspectives, purposes, and goals that assets can include.

While assets may fall into multiple categories, they will be listed under just one. The categories are used for organizational purposes only and will not impact the mitigation actions or vulnerability assessments of any assets.

- **People (including underserved communities and socially vulnerable populations):** "Assets that serve populations that are more vulnerable to disaster (e.g., elderly, children, visiting populations) and/or serve densely populated areas."

- **Structures (including facilities, lifelines, and critical infrastructure):** "Built facilities that provide community lifeline services. A community lifeline enables the

continuation of critical government and business functions and is essential to human health and safety or economic security."

- **Systems (including networks and capabilities):** "A collection of components that perform a critical service for the community. Systems are linear type assets. Systems may include horizontal assets associated with linear type assets."

- **Natural resources:** "Natural Resources are
  - areas that provide protective function to reduce magnitude of hazard impact and increase resiliency.
  - areas of sensitive habitat that are vulnerable to hazard events,
  - protection of areas that are important to community objectives, such as the protection of sensitive habitat, provide socio-economic benefits, etc."

- **Historical and Cultural Resources:** "Assets that possess historical, cultural, archaeological or paleontological significance, including sites, contextual information, structures, districts, and objects significantly associated with or representative of earlier people, cultures, maritime heritage, and human activities and events."

- **Economic Assets:** Economic assets are defined as entities that produce a financial benefit for the owner or community.

- **Community Assets:** "Activities that benefit the community by increasing community morale and well-being. Activities may include education and knowledge transfer."

3.1.2. | Community Lifelines

"Community Lifelines" is FEMA's term for assets of a community that the community cannot survive without. "A lifeline enables the continuous operation of critical government and business functions and is essential to human health and safety or economic security" (FEMA, 2020).

For the purposes of hazard mitigation planning and the asset inventory, community lifelines are used to categorize all assets in terms of these critical functions. Not all assets are community lifelines.

A subset of the Town of Dunstable's assets falls into one of eight lifelines that have been classified and described as follows (FEMA, 2019).

Table 3.1: Community Lifelines

	Law enforcement and government services, as well as the associated assets that maintain communal security, provide search and rescue, evacuations, and firefighting capabilities, and promote responder safety.
	Support systems that enable the sustainment of life, such as water treatment, transmission, and distribution systems; food retail and distribution networks; and wastewater collection and treatment systems.
	Infrastructure and service providers for medical care, public health, patient movement, fatality management, behavioral health, veterinary support, and health or medical supply chains.
	Service providers for electric power infrastructure, composed of generation, transmission, and distribution systems, as well as gas and liquid fuel processing, transportation, and delivery systems. Disruptions can have a limiting effect on the functionality of other community lifelines.
	Infrastructure owners and operators of broadband internet, cellular networks, landlines, cable services, satellite communications services, and broadcast networks (radio and television). Communications systems encompass a large set of diverse modes of delivery and technologies, often intertwined but largely operating independently. Services include elements such as alerts, warnings, and messages, as well as 911 and dispatch. Also includes accessibility of financial services.
	Multiple modes of transportation that often serve complementary functions and create redundancy, adding to the inherent resilience in overall transportation networks. Transportation infrastructure generally includes highways/roadways, mass transit, railway, aviation, maritime, pipeline, and intermodal systems.



Systems that mitigate threats to public health/welfare and the environment. This includes assessment of facilities that use, generate, and store hazardous substances, as well as specialized conveyance assets and efforts to identify, contain, and remove incident debris, pollution, contaminants, oil or other hazardous substances.



Systems for Potable Water and Wastewater Management. This includes potable water intake, treatment, storage, and distribution. It also includes Wastewater collection, storage, treatment, and discharge.

3.2. Town of Dunstable Assets

Assets in the Town of Dunstable have been identified utilizing the newest MassGIS data, the most up to date MassGIS L3 Parcel data, the asset inventory presented in the 2015 Hazard Mitigation Plan, and input collected at the Community Resilience Building Workshops. This section describes community assets and provides summary tables of assets by category including more detail on the general types of assets within that category, how many assets there are, and which assets are considered community lifelines. Maps of community assets are included in Appendix E.

Table 3.2: Summary of Community Assets

People 22	**Natural Resources** 32	**Systems** 22	**Economic + Community Assets** 10
Structures 28		**Cultural + Historic Resources** 16	**% of Assets that are Community Lifelines** 58

3.2.1. | People Assets

Populations

According to the latest U.S. Decennial Census, the Town of Dunstable has a:

- Population of approximately 3,400 people
- Median age of 42
- Race and ethnicity mix of 90% white, 5% Hispanic, 3% Asian, and 1% black

- Median household income of over $190,000
- 1% of persons living below the poverty line
- Primarily owner occupied, single unit housing
- Foreign-born population (just over 6%)
- Educated population (60% holds a bachelor's degree or higher)

There are not mapped Environmental Justice populations in the Town of Dunstable. These populations are defined by specific geographic areas that meet one or more criteria based on race, income, or languages spoken.

However, there are priority populations in Dunstable. According to EEA, "Priority populations are people or communities who are disproportionately impacted by climate change due to life circumstances that systematically increase their exposure to climate hazards or make it harder to respond. In addition to factors that contribute to Environmental Justice status (i.e., income, race, and language), other factors like physical ability, access to transportation, health, and age can indicate whether someone or their community will be disproportionately affected by climate change. This is driven by underlying contributors such as racial discrimination, economic disparities, or accessibility barriers that create vulnerability. The term priority populations acknowledges that the needs of people with these experiences and expertise must take precedence when developing resilience solutions to reduce vulnerability to climate change. All communities have priority populations even if they do not have a mapped Environmental Justice neighborhood." **According to input at the CRB workshops, priority populations in Dunstable include seniors, veterans, and those with special needs.**

Facilities that Serve these Populations

People Assets are defined as "assets that serve populations that are more vulnerable to disaster (e.g., elderly, children, visiting populations) and/or serve densely populated areas." (FEMA, 2022).

Table 3.3: People Assets

Asset Type	Name	Location	Community Lifeline
Schools/ Daycare	Swallow Union Elementary School	518 Main Street	Food, Hydration, Shelter
	Maple Village Preschool	518 Main Street	Food, Hydration, Shelter
	Little Red School House	64 Main Steet	Food, Hydration, Shelter
	Groton-Dunstable Regional High School	703 Chicopee Row, Groton MA	Food, Hydration, Shelter
	YMCA Camp	234 Hall St	Food, Hydration, Shelter

Asset Type	Name	Location	Community Lifeline
	Home Daycares	Multiple	Food, Hydration, Shelter
	Patricia Crandall	147 Hardy Street	Food, Hydration, Shelter
Religious Centers	Dunstable Congregational Church	516 Main Street	Food, Hydration, Shelter
Recreation	Larter Field + Tennis Courts	Groton Street	
	Unofficial Swimming Area (Private)	Massapoag Pond	
	Tully Wildlife Refuge (Dunstable Rural Land Trust)	Approx. West of Main Street, North of Fletcher Street, East of Hollis Street	
Priority Populations	Senior Center / Council on Aging at Dunstable Free Public Library	511 Main Street	Food, Hydration, Shelter
	Veteran Services	Townwide	Safety & Security
	Senior Population Office	Townwide	Food, Hydration, Shelter
	Special Needs Seniors	Townwide	Safety & Security
Library	Dunstable Free Public Library	588 Main Street	Food, Hydration, Shelter
Food / Agriculture	Dunstable Grange	Townwide	Food, Hydration, Shelter
	PACH Food Bank	Pepperell	Food, Hydration, Shelter
	Meals on Wheels	Townwide	Food, Hydration, Shelter
Public Safety	Townwide	Townwide	Safety & Security
Volunteer Force	Townwide	Townwide	Safety & Security

3.2.2. | Structures Assets

"Structure" assets are built facilities including residential, commercial, and industrial facilities that may be in harm's way during a hazard event. Many of these structures provide community lifeline services. Dunstable is a mix or suburban and rural where much of the land is open space and residential neighborhoods with a core commercial corridor. There is an extensive amount of conservation land and undevelopable wetlands.

Development Since Previous Hazard Mitigation Plan

The majority of Dunstable's land use by parcels is comprised of residential development (nearly 40% of the Town's land cover), agriculture (approximately 15% of the Town's land cover), and conservation land (just over 20% of the Town's land cover) (2018 Master Plan). The majority of residential areas in Dunstable consist of single-family homes. Residential parcels are dispersed throughout the Town, with the highest concentrations near the center of Town and along primary roads. Agricultural development is also dispersed throughout the Town, although the largest parcels are concentrated in the northwest corner of Town. Conservation land is dispersed throughout town and provides residents with easy access to natural space from any part of town.

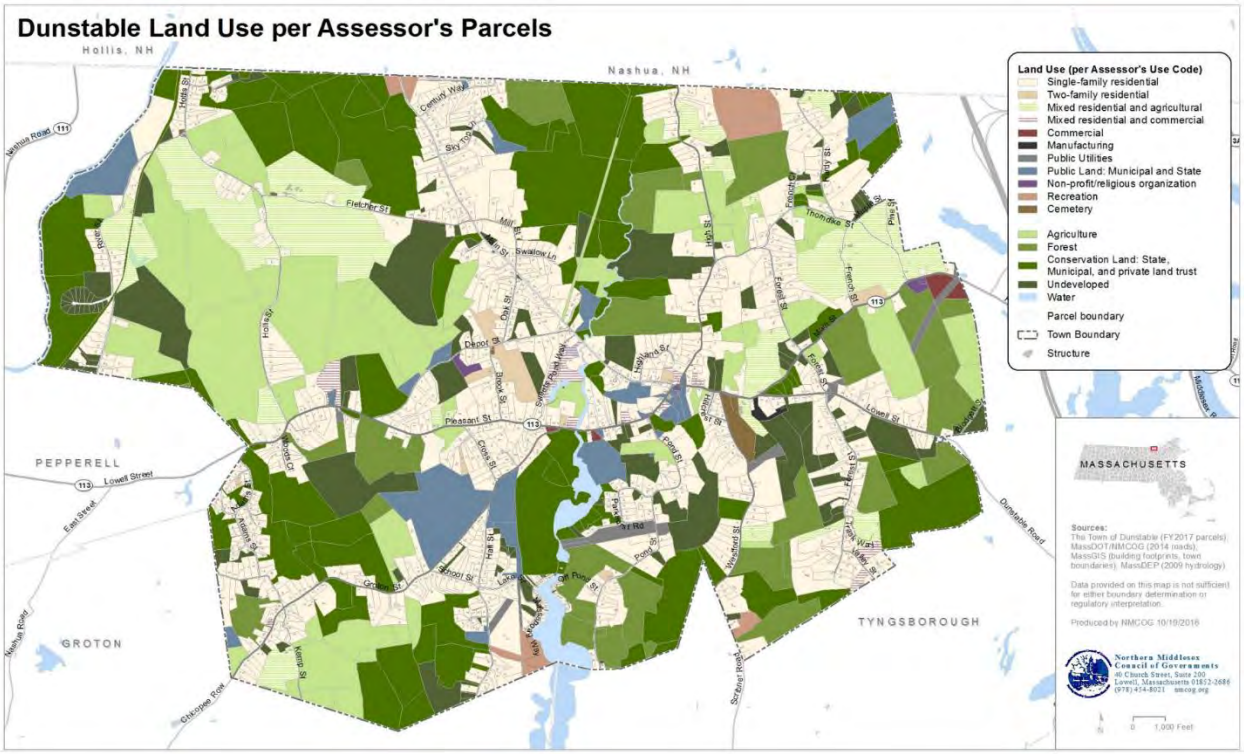


Figure 3.1: Dunstable Land Use (2018 Master Plan)

Dunstable's land use goals include:

- maintaining the Town's rural character and landscape by preserving trees, stone walls, agricultural fields and pastures, and historic architecture;

- Strengthening and maintaining the Town Center as the civic and cultural heart of the community; and
- Examining zoning options to allow for small business enterprises that are compatible with the character and needs of the community (since these goals were set, the Town has passed the Town Center District Overlay which facilitated this goal).

Dunstable regulates land use and development through zoning, which has the capacity to guide the development of vacant land. There are six conventional use districts in Dunstable and three overlay districts:

- Single-family residence (R-1)
- General Residence (R-2)
- Commercial Recreational (R1-a)
- Retail business District (B-1)
- Service Business District (B-2)
- Expanded Commercial District (B-3)
- Mixed Use Overlay District (MUD)
- Floodplain Overlay District
- Tower Overlay District

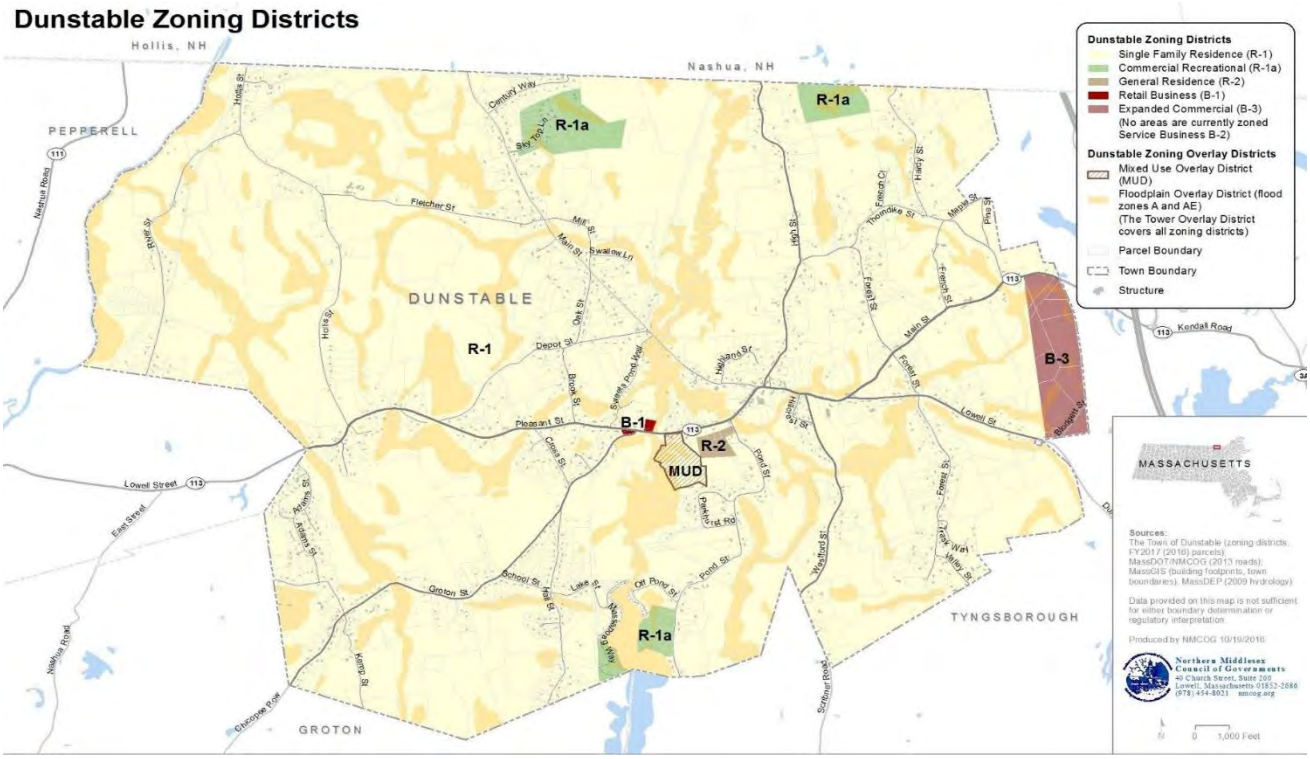


Figure 3.2: Dunstable Zoning Districts

There are also a variety of development standards incorporated in site plan review related to landscaping, parking and loading, signage, and outdoor lighting, all of which guide land use and development.

Since preparation of the last HMP in 2015, a number of new or redevelopment projects have occurred in the Town of Dunstable.

Table 3.4 shows the number of annual building permits in Dunstable. Generally, these have been for single family houses. They have been only three larger developments including Bear Hill, Chapman Street, and Alexander Way, all of which are less than 12 lots and are open space developments (i.e., an area of the development has to be open space protected in perpetuity.)

This level of development coupled with existing land use controls through zoning and wetlands result in an overall decrease to the community's vulnerability to natural hazards.

Table 3.4: Annual Building Permits in Dunstable since 2015 (Last HMP)

Year	Number of Building Permits
2015	12
2016	18
2017	11
2018	19
2019	6
2020	1
2021	2
2022	5

Existing Structure Assets

Table 3.5 shows current structural assets in Dunstable by type and number. In addition, the relevant community lifeline, previously described in Section 3.1.2, is noted. Appendix E includes maps showing town assets.

Table 3.5: Structure Assets

Asset Type	Name	Location	Community Lifeline
Emergency Response	Police Station	23 Pleasant Street	Safety & Security
	Fire Station	28 Pleasant Street	Safety & Security

Asset Type	Name	Location	Community Lifeline
Emergency Shelters	Swallow Union School	518 Main Street	Food, Hydration, Shelter
	Dunstable Congregational Church	516 Main Street	Food, Hydration, Shelter
	Shelters in other Communities	Tyngsborough, Groton	Food, Hydration, Shelter
	Town Hall	511 Main Street	Safety & Security
Town Facilities	Town Hall	511 Main Street	Safety & Security
	Dunstable Free Public Library	588 Main Street	
	DPW Garage	107 Pleasant Street	Transportation
	DPW Garage	589 Pleasant Street	Transportation
	Storage Barn for Highway and Police	91 River Street	Transportation
Post Office	Dunstable Post Office	170 Pleasant Street	Communications
Animal Clinics	Dunstable Animal Clinic	386 Main Street	
Food & Pharmacy	Dunstable General Store & Dunkin' / Gas Station	238 Pleasant Street	Food, Hydration, Shelter
	Tully Farms Dairy Store	446 Pleasant Street	Food, Hydration, Shelter
	The Farmhouse Café	17 Pleasant Street	Food, Hydration, Shelter
Dams	Massapoag Pond Dam (Private) Significant Hazard	Off Lower Dam Way	Water Systems
	Cow Pond Brook Dam (Salmon Brook) (Private) Significant Hazard	Tyngsborough, Groton	Water Systems
	Woodwards Mill Dam	Approximate Intersection of Pond	Water Systems

Asset Type	Name	Location	Community Lifeline
	(Town-owned) Low Hazard	Street and Pleasant Street	
	Joint Grass Brook Dam (Town- owned) Low Hazard	Mills Street just north of Swallow Lane	Water Systems

Critical infrastructure like dams and levees provide recreation, water supply, floodplain management, energy, and other essential functions. Dam owners and operators can be private, non-profit, or public. These structures and their owners are a vital component of local hazard mitigation.

The Hazard Potential Classification System for Dams provides an indication of the consequences of failure of a dam in the United States. This system contains three classes I – Low, II – Significant, and III – High, each representing the degree of potential damage to downstream life and property (FEMA, 2004).

The Town of Dunstable owns and operates three dams, as shown in Table 3.5, above. There is also one private dam in Town. None of these dams are assigned the assigned the high hazard potential classification (which means failure or mis-operation will cause loss of human life).

Potential Future Development

The Town's 2018 Master Plan projects a 14% growth in population from 2010 to 2040, which amounts to approximately 500 residents. The Master Plan also predicts housing will grow by just under 14% from 2020 to 2030 (adding approximately 175 housing units), and then another 10% from 2030 to 2040 (adding approximately 100 housing units.)

The Core Team described two potential affordable housing developments planned in Dunstable under Chapter 40B. One potential affordable housing development may be located "behind" 396 Main Street, or south of this parcel and to the west of Canyons Lake. A second potential affordable housing development may be located at 164 Pleasant Street. A portion of both of these parcels is within the mapped FEMA 100-year flood zone, which must be considered as part of development.

3.2.3. | Systems Assets

Systems are defined as "a collection of components that perform a critical service for the community. Systems are linear type assets. Systems may include horizontal assets associated with linear type assets." (FEMA, 2022).

Table 3.6: Systems Assets

Asset Type	Name	Location	Community Lifeline
Primary Evacuation Routes	Pleasant Street (Route 113) Groton Street High Street Lowell Street Westford Street Main Street	Targeted corridors in Town	Transportation
Culvert & Bridges	All across town	Town-wide	Transportation
Roads	Private roads / direct roads	Townwide	Transportation
Pump Stations	Drinking Water	One at each well	Water Systems
Water Tower	Water Tower	108 Pleasant Street (Simmons Way)	Water Systems
Drinking Water Supply Wells	Salmon Brook Well #1	711 Main Street (and associated Zone I and Zone II)	Water Systems
	Salmon Brook Well #2	711 Main Street (and associated Zone I and Zone II)	Water Systems
Natural Gas	National Grid	Townwide	Energy
Electricity	National Grid	Townwide	Energy
Cable	Charter	Townwide	Communications
	Verizon	Townwide	Communications
Communications	Cell Tower	583 Pleasant Street	Communications
	Reverse 911	Townwide	Communications
	Internet	Townwide	Communications

Asset Type	Name	Location	Community Lifeline
	Cell Tower at Dunstable Congregational Church	516 Main Street	Communications
	Repeater on Water Tower for Fire Department	108 Pleasant Street (Simmons Way)	Communications
Gas Stations	Irving Oil	238 Pleasant Street	Energy
Closed Landfill	Dunstable Transfer Station & Landfill	Depot Street	Hazardous Materials
Hazardous Materials Site	Charles George Landfill Superfund Site	Cummings Road	Hazardous Materials
Solar	Solar installation (private)	Back of 11 Cummings Road, Tyngsborough (0 Blodgett Street, 0 Lowell Street)	Energy
	Solar installation (private)	Back of 377 Groton Street	Energy
	Solar installation (private)	11 Blodgett Street	Energy

3.2.4. | Natural Resources Assets

Natural Resources are defined as "areas that provide protective function to reduce magnitude of hazard impact and increase resiliency, areas of sensitive habitat that are vulnerable to hazard events, and protection of areas that are important to community objectives, such as the protection of sensitive habitat, provide socio-economic benefits, etc." (FEMA, 2022).

Table 3.7: Natural Resources Assets

Asset Type	Name	Location	Community Lifeline
	Petapawag Area of Critical Environmental Concern (ACEC)	Western half of Dunstable	

Asset Type	Name	Location	Community Lifeline
Natural Resources	Black Brook	Southeastern portion of Dunstable, parallel to Westford Street	
	Hauk Brook	Central Dunstable, crosses into Brook Street, Sweets Pond Way, Parallel to Pleasant Street.	
	Lower Massapoag Pond	South-central Dunstable, crosses Pleasant Street, parallel to Gorton Street and Parkhurst Road	
	Upper Massapoag Pond	South-central Dunstable, crosses into Groton and Tyngsborough	
	Nashua River	Northwest Dunstable, parallel to River Street	
	Bass Pond	Northwest Dunstable, between Fletcher and Main Streets	
	Joint Grass Brook	Northwest Dunstable, parallel to Hollis Street	
	Morgan's Pond	Mill Street	
	Unkety Brook + Meadow (Cold Water Fishery)	Northwest Dunstable, crosses into River street and Gorton Street, east and parallel to Adam Street	
	Nissitissit River (Scenic & Protected River)	Parallel and to the north of Brookline Street	
	Kennedy Conservation Area	Main Street, Northeast Dunstable, next to Nashua Acton & Boston Railroad and west of Salmon Brook	

Asset Type	Name	Location	Community Lifeline
	Proctor Conservation Area	Swallow Ln, Dunstable, Northeast of Dunstable, east of Nashua Acton & Boston Railroad	
	Dunstable Brook Wildlife Management Area	Southeast Dunstable, intersection of Lowell Steet and Dunstable Road, east of Forest Street	
	English Wildlife Refuge	Southeast Dunstable, Westford Street	
	Spaulding-Proctor Reservation	Groton Street, west of Lower Massapoag Pond, and to the east of Hall Street	
	Larter Field	80 Groton Street	
	Pierce Town Forest	Groton Street	
	Hauk Swamp Wildlife Management Area	South-central Dunstable, at intersection of Pleasant Depot Streets	
	Horse Hill Quarry	Hall Street Dunstable	
	Dunstable Rural Land Trust Wildlife Preserve	1076 Main Street	
	Flat Rock Hill	High Street abutting Stone Arch Bridge	
	Priority Habitat of Rare Species	Townwide	
	Estimated Habitats of Rare Wildlife	Townwide	
	Certified Vernal Pools	Townwide	
	Potential Vernal Pools	Townwide	
Trees	Trees	Townwide	
Farms + Barns	Farms	Townwide	Food, Hydration, Shelter

Asset Type	Name	Location	Community Lifeline
	McLoon Barn (Dunstable Rural Land Trust)	370 Thorndike	Food, Hydration, Shelter
Open Space + Parks	Article 97 Land	Townwide	
	Town Common	510 Main Street	

3.2.5. | Cultural and Historic Resources Assets

Cultural and Historic Resources are defined as “assets that possess historical, cultural, archaeological or paleontological significance, including sites, contextual information, structures, districts, and objects significantly associated with or representative of earlier people, cultures, maritime heritage, and human activities and events." (FEMA, 2022).

Table 3.8: Cultural and Historic Resources Assets

Asset Type	Name	Location	Community Lifeline
Cultural Resources	Little Red Schoolhouse	64 Main Street	Food, Hydration, Shelter
	Stone Arch Bridge	Salmon Brook, north end of Town	
Historic Resources	West Dunstable - River Road Area	Northwest Dunstable, north of intersection of Hollis and Fletcher Streets	
	Meetinghouse Hill	Main Street	
	East Main Street Area	Main Street	Transportation
	YMCA Camp Massapoag Family Outdoor Center	234 Hall Street	Food, Hydration, Shelter
	Dunstable Center Historic District	Pleasant Street	
	Pond and Pleasant Street Area	Near intersection of Pond and Pleasant Streets	Transportation
	Historical Society	Townwide	

Asset Type	Name	Location	Community Lifeline
	Massachusetts Historic Commission Inventory Properties	Townwide	
	National Register of Historic Places	Townwide	
Cemeteries	Blood Cemetery	580 Hollis Street	
	1754 Meetinghouse Hill Cemetery	200 - 296 Main Street	
	Rideout Cemetery	Fletcher Street	
	Swallow Cemetery	Brook Street	
	Central Cemetery	Westford Street & Route 113	

3.2.6. | Economic and Community Assets

Economic assets are defined as entities that produce a financial benefit for the owner or community, while community assets are defined as "Activities that benefit the community by increasing community morale and well-being. Activities may include education and knowledge transfer." (FEMA, 2022).

Table 3.9: Economic and Community Assets

Asset Type	Name	Location	Community Lifeline
Rail Trail	Nashua River Rail Trail	Northwest Dunstable, crosses Unkety Brook, parallel to River Street	Transportation
Cultural Events	Summer Concert Series	Dunstable Town Common 510 Main Street	
	Fall Fest	McLoon Barn	
	Winter Fest	Fletcher Conservation Land, Main Street	

	Memorial Day Parade	Dunstable Town Center	
	Jingle Fest	Dunstable Town Common	
	Tully Farm Open House	446 Pleasant Street	
	Strawberry Fest	188-198 Kendall Road	
Top Employers	Town of Dunstable	511 Main Street	
	School Department		

4



4. Risk Assessment: Natural Hazards, Asset Vulnerabilities, and Community Impacts

Natural hazards have the potential to induce damage or loss to physical assets, including the structures, infrastructure, and natural, historic, and cultural resources within the Town. Natural hazards also have the potential to affect people, including priority populations, municipal processes and operations, and activities that have value to the community.

As explained by FEMA, "in hazard mitigation planning, risk is the potential for damage or loss when natural hazards interact with people or assets. These assets may be buildings, infrastructure or natural and cultural resources. The way natural hazards interact with a community's people, property and assets can result in a disaster. A risk assessment is a robust, data-driven analysis. It explains what might happen. It also finds where the local jurisdiction is vulnerable to hazards."

4.1. Key Terms & Methods

As previously stated in Section 1.1, **Natural Hazards** are a source of harm or difficulty created by a meteorological, environmental, or geological event (such as extreme wind events, tornadoes, winter weather as well as earthquakes, flooding, and fires) (FEMA). The natural hazards presented herein are those from the 2023 ResilientMass Plan that apply to Dunstable. Because Dunstable is not a coastal community, no information is provided related to Coastal Erosion, Coastal Flooding, or Tsunami.

Table 4.1: Natural Hazards that Apply to Dunstable

	**Average / Extreme Temperatures**
	**Changes in Groundwater**
	**Drought**
	**Earthquakes**
	**Flooding from Precipitation**
	**Hurricanes / Tropical Cyclones**
	**Invasive Species**
	**Landslides/Mudflows**
	**Other Severe Weather**
	**Severe Winter Storms**
	**Tornadoes**
	**Wildfire**

For each natural hazard, the following is discussed in accordance with FEMA guidance:

- How is the hazard described (description)?
- Where might it happen in Dunstable (location)?
- How severe or intense may it be (extent)?
- Where has it happened in the past (previous occurrences) and how likely it is to occur (frequency)?
- How may it change in the future (probability)?
- Which assets are at risk from it (vulnerability)?
- What effects will it have on the community assets including populations (impacts)?

Throughout Section 4.2, information provided in "quotes" is directly from the ResilientMass Plan unless otherwise noted. Sources cited within the quotes are from the ResilientMass Plan and are cited within that plan. Any other source specific to this report for Dunstable is cited. Hazards are presented alphabetically, not in a prioritized order.

The following methods were used to complete each section of the risk assessment:

- **Description:** A description for each natural hazard from the Massachusetts 2023 State Hazard Mitigation and Climate Adaptation Plan (ResilientMass Plan) is provided.

- **Location:** Location is the geographic boundary in which a hazard occurs or the type of environment that is conducive to the hazard. This may include areas larger or smaller than the Town of Dunstable's jurisdiction. It may also include a specific land cover or topographic environment. This information is from the ResilientMass Plan and local knowledge provided at the CRB workshops discussed in Chapter 2.

- **Previous Occurrence(s) and Frequency:** A list or summary of historical occurrences of the natural hazard event within or near Dunstable. Frequency refers to how often the hazard has occurred in the past within the geographical area, based on historic records publicly available.

- **Severity/Intensity:** The likely magnitude of the hazard, using industry standard scales where applicable. For example, the National Hurricane Center's categorizations of tropical storms and hurricanes was used to define the range of hurricanes that may affect areas of Massachusetts. When no standard scale is available, a qualitative description is provided.

- **Probability of Future Hazard Events, including due to Climate Change:** Probability is the likelihood of a hazard occurring or reoccurring. This includes the effects of future conditions, including long term weather patterns, temperatures, and sea levels, on the type, location, and range of anticipated intensities of the hazard. Climate projections indicate a change in long-term weather patterns. Each section identifies how climate change may affect the probability of the natural hazard occurring, and to what degree it may change. In 2018, MA EOEEA created ResilientMass, an online clearinghouse for local governments and the public to explore climate change science and data, information on

community resilience, and decision support tools. The climate change planning efforts that ResilientMass has undertaken have focused on the 2030, 2050, 2070, and 2090 planning horizons, which are defined by the bounding years 2020-2039, 2040-2059, 2060-2079, and 2080-2090, respectively. Future climate data in each section was obtained from the ResilientMass clearinghouse and the ResilientMass Plan.

- **Vulnerability:** A description of which assets within locations identified to be hazard prone are at risk from the effects of the identified hazard(s) (FEMA, 2022). To determine which assets identified in Chapter 3 are located within an area identified to be hazard prone, presently or in the future, the natural hazard profiles presented in this chapter were utilized. For inland flooding, GIS mapping of assets and areas of flooding were utilized to describe vulnerability, as further described in Section 4.7. For all other hazards, the identified hazard is not mapped or cannot be mapped and therefore a qualitative analysis that relies on local knowledge and rational decision making was used to identify vulnerability. Vulnerability discussions focus on specific assets that are most important and most susceptible to damage or loss from hazards.

- **Impacts:** Consequences or effects of each hazard on the town's assets identified in the vulnerability assessment (FEMA, 2022). This section also covers impacts from each hazard on population and land use changes. There are three ways to analyze impacts:

    - Historical Analysis: Historical analysis uses data on the impacts and losses of previous hazard events, which can be used to predict the anticipated impacts and losses for a similar future event. **For Dunstable, a formal historical analysis was not utilized; however, information from those in attendance at the CRB workshops was included in the narrative in this Chapter.**

    - Exposure Analysis: An exposure analysis identifies the existing and future assets in known hazard areas. GIS is often used for this analysis and to make maps to visualize the risk. An exposure analysis can quantify the number, type and value of structures, community lifelines and other assets in areas of identified hazards. It can identify any assets exposed to multiple hazards. Exposure analysis can also help a community understand areas that may be vulnerable if and when buildings, infrastructure and community lifelines are built in hazard-prone areas.

    - Scenario analysis: A scenario analysis asks "what if" a certain event occurs. This kind of analysis uses a hypothetical situation to think through potential impacts and losses. A scenario analysis can be completed narratively by walking through a scenario with the planning team and documenting what could happen. It can also be completed using modeling. FEMA's Hazus program is one of the most common scenario analysis tools for hazard mitigation. **For Dunstable, FEMA's Hazus-MH Version 2.2 SP1 was used to estimate potential losses from earthquakes, flooding, and hurricanes.**

The categories below discuss general impacts that can be the result of natural hazards affecting Dunstable's assets. The impacts are discussed throughout this chapter.

Table 4.2: Types of Impacts due to Occurrence of Natural Hazards

Impact	Examples
Loss of Life	Death
Physical Injuries	Cuts, bruises, broken bones, or amputations.
Public Health	Spread of disease, bacterial infections, and vector-borne illnesses Elevated rates of emergency room visits Respiratory problems arising from air pollution, allergens, and mold
Displacement	Forced abandonment of the home due to unsafe living conditions, either permanently or temporarily
Psychological Impacts	Trauma Anxiety Stress PTSD
Impacts to Daily Life	Cancellation or postponement of sporting or other events that are important to the community Damage to parks, community centers, or public pools inhibits recreation Destruction of historic or cultural landmarks
Property Damage	Damage to physical structures Damage to contents within homes and buildings Damage to vehicles
Building Damage	Structural damage to roofs, walls, or foundations Collapse or destruction
Utility Infrastructure Damage	Damage to power lines, communications towers, and water, wastewater, and gas mains resulting in power outages, loss of water, wastewater, or gas services, and loss of communication, radio signal, or internet
Transportation Infrastructure Damage	Damage to or debris build-up on roads, bridges, railways, or airports that render them impassable or unsafe to use
Disruption to Lifelines	Medical facilities, emergency services, or transportation networks are unable to provide essential services due to damage or debris
Water Resources	Disruption to agriculture practices Yield reduction or damage to drinking water wells

Impact	Examples
Business Impacts	Lost wages Closure of or interruption to businesses Increased insurance premiums Increased costs for repairs/rebuilding Decreased property values Disruption of industry and the transport of goods and services Decreased tourism revenues
Utilities	Increased cost of utilities Disruption of utilities creating travel delays or lack or services
Building Damage	Structural damage to roofs, walls, or foundations Collapse or destruction
Economic	Lost wages Closure of or interruption to businesses Increased insurance premiums Increased costs for repairs/rebuilding Decreased property values Disruption of industry and the transport of goods and services Decreased tourism revenues
Government Services	Increased demand for state and municipal government services Cost to repair services
Municipal Resources	Increased need for municipal resources Disruption of resources
Contamination	Air pollution from dust and debris Transport of toxic chemicals by floodwaters Release of hazardous materials into soil and water Decreased water quality Sewage release into waterways
Ecological	Loss of wildlife Loss or destruction of habitat Disruption to migratory patterns Loss of biodiversity Loss of or damage to natural resources Changes in groundwater temperature
Geological	Landslides Erosion Removal of topsoil Debris deposit Altered nutrient balance

4.2. Previous Federal/State Disaster Declarations

To understand the importance of hazard mitigation, it is useful to know the types and frequencies of disasters that occur in Massachusetts. Federal Disaster Declarations are official acknowledgments that a disaster has overwhelmed local resources and warrants federal assistance to supplement state and local recovery efforts. Massachusetts State of Emergency Declarations are declarations made by the Governor to mobilize state resources and implement emergency measures in response to significant threats or disasters within the state's jurisdiction. Since 1991, there have been 16 storms in Massachusetts that resulted in Federal or State Disaster Declarations in Middlesex County, which includes the Town of Dunstable. These disasters, related assistance from FEMA, and whether there was a corresponding Massachusetts State of Emergency Declaration are described in Table 4.3.

Table 4.3: Federal/State Disaster Declarations for Middlesex County since 1985

Disaster Name (Date of Event)	Disaster Number	Type of Assistance	MA Emergency Declaration	Areas Under Declaration
Hurricane Gloria Sep 27, 1985	DR-751-MA	FEMA Public Assistance		Counties of Barnstable, Berkshire, Bristol, Dukes, Essex, Franklin, Hampden, Hampshire, Middlesex, Norfolk, Plymouth, Suffolk, Worcester
Severe Storms, Flooding Mar 30, 1987 - Apr 13, 1987	DR-790-MA	FEMA Public Assistance; FEMA Individual & Households Program		Counties of Berkshire, Essex, Franklin, Hampshire, Middlesex, Norfolk, Worcester
Hurricane Bob August 19, 1991	DR-914-MA	FEMA Hazard Mitigation Grant Program		Counties of Barnstable, Bristol, Dukes, Essex, Hampden, Middlesex, Plymouth, Nantucket, Norfolk, Suffolk

Disaster Name (Date of Event)	Disaster Number	Type of Assistance	MA Emergency Declaration	Areas Under Declaration
Winter Coastal Storm Dec 11, 1992 - Dec 13, 1992	DR-975-MA	FEMA Public Assistance		Counties of Barnstable, Dukes, Essex, Middlesex, Nantucket, Norfolk, Plymouth, Suffolk, Worcester
Blizzards, High Winds and Record Snowfall Mar 13, 1993 - Mar 17, 1993	EM-3103-MA	FEMA Public Assistance		All 14 Massachusetts Counties
Blizzard January 7-13, 1996	DR-1090-MA	No funding reported		All 14 Massachusetts Counties
Blizzards, High Winds and Record Snowfall Oct 20, 1996 - Oct 25, 1996	EM-3119-MA	FEMA Public Assistance; FEMA Individual & Households Program		Counties of Essex, Middlesex, Norfolk, Suffolk, Plymouth
Severe Storms/Flooding October 20-25, 1996	DR-1142-MA	FEMA Hazard Mitigation Grant Program		Counties of Essex, Middlesex, Norfolk, Plymouth, Suffolk
Heavy Rain and Flooding June 13-July 6, 1998	DR-1224-MA	FEMA Hazard Mitigation Grant Program		Counties of Bristol, Essex, Middlesex, Norfolk, Suffolk, Plymouth, Worcester
Snowstorm Mar 5, 2001 - Mar 7, 2001	EM-3165-MA	FEMA Public Assistance		Counties of Bristol, Essex, Franklin, Hampshire, Middlesex, Norfolk, Worcester

Disaster Name (Date of Event)	Disaster Number	Type of Assistance	MA Emergency Declaration	Areas Under Declaration
Severe Storms & Flooding March 5-April 16, 2001	DR-1364-MA	FEMA Hazard Mitigation Grant Program		Counties of Bristol, Essex, Middlesex, Norfolk, Suffolk, Plymouth, Worcester
Snowstorm Feb 17, 2003 - Feb 18, 2003	EM-3175-MA	FEMA Public Assistance		All 14 Massachusetts Counties
Snow Dec 6, 2003 - Dec 7, 2003	EM-3191-MA	FEMA Public Assistance		Counties of Barnstable, Berkshire, Bristol, Essex, Franklin, Hampden, Hampshire, Middlesex, Norfolk, Plymouth, Suffolk, Worcester
Flooding April 1-30, 2004	DR-1512-MA	FEMA Individual & Households Program; FEMA Hazard Mitigation Grant Program		Essex, Middlesex, Norfolk, Suffolk, Worcester
Snow Jan 22, 2005 - Jan 23, 2005	EM-3201-MA	FEMA Public Assistance		All 14 Massachusetts Counties
Hurricane Katrina Evacuation Aug 29, 2005 - Oct 1, 2005	EM-3252-MA	FEMA Public Assistance		All 14 Massachusetts Counties
Severe Storms and Flooding October 7-16, 2005	DR-1614-MA	FEMA Public Assistance; FEMA Individual & Households Program; FEMA Hazard Mitigation Grant Program		All 14 Massachusetts Counties

Disaster Name (Date of Event)	Disaster Number	Type of Assistance	MA Emergency Declaration	Areas Under Declaration
Severe Storms and Flooding May 12-23, 2006	DR-1642-MA	FEMA Public Assistance; FEMA Individual & Households Program; FEMA Hazard Mitigation Grant Program		Middlesex, Essex, Suffolk
Severe Winter Storm Dec 11, 2008 - Dec 18, 2008	EM-3296-MA	FEMA Public Assistance		Counties of Berkshire, Bristol, Essex, Franklin, Hampden, Hampshire, Middlesex, Suffolk, Worcester
Severe Winter Storm and Flooding December 11-18, 2008	DR-1813-MA	FEMA Public Assistance; FEMA Hazard Mitigation Grant Program		All 14 Massachusetts Counties
Severe Storm and Flooding March 12-April 26, 2010	DR-1895-MA	FEMA Public Assistance; FEMA Individual & Households Program; FEMA Hazard Mitigation Grant Program		Bristol, Essex, Middlesex, Suffolk, Norfolk, Plymouth, Worcester
Water Main Break May 1, 2010 - May 5, 2010	EM-3312-MA	FEMA Public Assistance		Essex, Middlesex, Suffolk, Norfolk
Hurricane Earl Sep 1, 2010 - Sep 4, 2010	EM-3315-MA	FEMA Public Assistance		Counties of Barnstable, Bristol, Dukes, Essex, Middlesex, Nantucket, Norfolk, Plymouth, Suffolk, Worcester

Disaster Name (Date of Event)	Disaster Number	Type of Assistance	MA Emergency Declaration	Areas Under Declaration
Severe Winter Storm and Snowstorm January 11-12, 2011	DR-1959-MA	FEMA Public Assistance; FEMA Hazard Mitigation Grant Program	X	Berkshire, Essex, Hampden, Hampshire, Middlesex, Norfolk, Suffolk
Hurricane Irene Aug 26, 2011 - Sep 5, 2011	EM-3330-MA	FEMA Public Assistance	X	All 14 Massachusetts Counties
Severe Storm Oct 29, 2011 - Oct 30, 2011	EM-3343-MA	FEMA Public Assistance	X	Counties of Berkshire, Essex, Franklin, Hampden, Hampshire, Middlesex, Norfolk, Worcester
Severe Storm and Snowstorm October 29-30, 2011	DR-4051-MA	FEMA Public Assistance; FEMA Public Assistance Snow Removal; FEMA Hazard Mitigation Grant Program	X	Berkshire, Franklin, Hampden, Hampshire, Middlesex, Worcester
Hurricane Sandy Oct 27, 2012 - Nov 8, 2012	EM-3350-MA	FEMA Public Assistance	X	All 14 Massachusetts Counties
Explosions Apr 15, 2013 - Apr 22, 2013	EM-3362-MA	FEMA Public Assistance		Bristol, Middlesex, Norfolk, Suffolk
Severe Winter Storm, Snowstorm, and Flooding February 8-9, 2013	DR-4110-MA	FEMA Public Assistance; FEMA Hazard Mitigation Grant Program	X	All 14 Massachusetts Counties
Severe Winter Storm, Snowstorm, and Flooding	DR-4214-MA	FEMA Public Assistance; FEMA Hazard Mitigation Grant Program	X	Barnstable, Bristol, Dukes, Essex, Middlesex,

Disaster Name (Date of Event)	Disaster Number	Type of Assistance	MA Emergency Declaration	Areas Under Declaration
January 26-28, 2015				Nantucket, Norfolk, Plymouth, Suffolk, Worcester
Severe Winter Storm and Snowstorm March 13-14, 2018	DR-4379-MA	FEMA Public Assistance; FEMA Hazard Mitigation Grant Program		Essex, Middlesex, Norfolk, Suffolk, Worcester
Covid-19 Jan 20, 2020 - May 11, 2023	EM-3438-MA	FEMA Public Assistance	X	All 14 Massachusetts Counties
Covid-19 Pandemic Jan 20, 2020 - May 11, 2023	DR-4496-MA	FEMA Public Assistance: Emergency protective measures - direct federal assistance FEMA Individual Assistance: Crisis Counseling Program	X	All 14 Massachusetts counties
Hurricane Lee September 15-17, 2023	EM-3599-MA	FEMA Public Assistance; FEMA Individual Assistance	X	All 14 Massachusetts counties

Source: Information in the table above is available online at: https://www.fema.gov/data-visualization/disaster-declarations-states-and-counties and https://www.mass.gov/info-details/state-of-emergency-information

4.3. Average/Extreme Temperatures

4.3.1. | Description

"Average/Extreme Temperatures includes extreme cold, extreme heat, and the change over time of average temperatures experienced throughout the year in Massachusetts" (ResilientMass, 2023). Although there is no universal definition, temperatures are considered extreme when they extend outside of the typical range of average conditions for acute or prolonged periods of time. Extremes

can vary seasonally and occur in the form of either extreme cold or extreme heat. The 2023 ResilientMass Plan defines extreme temperatures as "those that are far outside the normal seasonal ranges for Massachusetts" (ResilientMass, 2023). In addition, the ResilientMass Plan states:

- "Extreme heat can be defined as a period of excessively hot weather—usually defined as a daily high temperature above 90 degrees Fahrenheit (°F) in Massachusetts—which may be accompanied by high humidity." (ResilientMass, 2023)
- "Extreme cold is defined as a period of excessively low temperatures, especially with additional wind chill. In Boston, the National Weather Service (NWS) issues a wind chill advisory when the Wind Chill Temperature index drops below −15°F." (ResilientMass, 2023)

4.3.2. | Location

Extreme Heat

Extreme heat is often more extreme in concentrated parts of Dunstable that have less tree canopy, more pavement, and dark surfaces such a roofs and parking areas that absorb more heat.

Extreme Cold

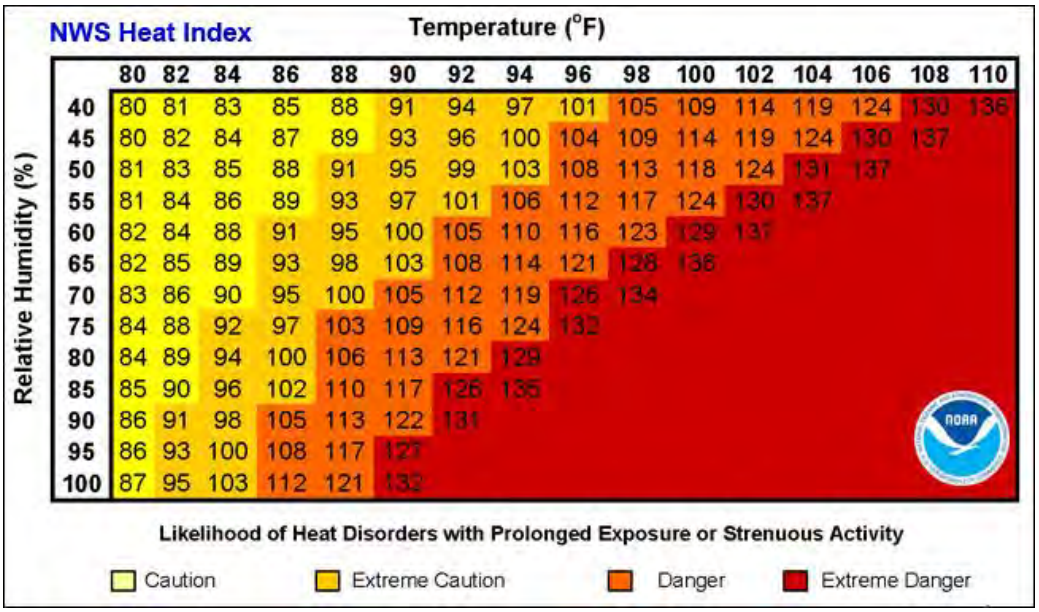
Extreme cold can occur throughout Dunstable. Extreme cold can disproportionately affect priority community members through the town, especially for people without shelter, those who are stranded, and those who live in home that are poorly insulated or without heat.

4.3.3. | Severity/Intensity

Extreme Heat

Heat wave is an extreme heat phenomenon that affects the town. Heat waves are identifiable as 3 or more consecutive days when maximum temperatures greater than 90°F occur. This implies that there is an extended period of unusually high temperatures, causing stress on everyday operations and physical health (EEA & EOPSS, 2018).

Relative humidity can worsen human health effects as temperatures increase. The extent of extreme heat temperatures is generally measured through the NWS Heat Index, which is based both on temperature and relative humidity, and describes a temperature equivalent to what a person would feel at a baseline humidity level. Figure 4.1 presents the heat index chart as published by the National Weather Service and NOAA.



Classification	Heat Index	Effect on the body
Caution	80°F - 90°F	Fatigue possible with prolonged exposure and/or physical activity
Extreme Caution	90°F - 103°F	Heat stroke, heat cramps, or heat exhaustion possible with prolonged exposure and/or physical activity
Danger	103°F - 124°F	Heat cramps or heat exhaustion likely, and heat stroke possible with prolonged exposure and/or physical activity
Extreme Danger	125°F or higher	Heat stroke highly likely

Figure 4.1: National Weather Service Heat Index (NWS NOAA)

Extreme Cold

Extreme cold temperatures can be exacerbated by factors such as wind and relative humidity. The extent of extreme cold temperatures is generally measured through the Wind Chill Temperature Index, and Figure 4.2 shows the Wind Chill Temperature Index. As evident from the figure, temperatures can feel colder and cause more damage to human health as wind speeds increase. The NWS issues a Wind Chill Advisory if the Wind Chill Index is forecast to dip to –15°F to – 24°F for at least 3 hours, based on sustained winds (not gusts). For example, frostbite can occur in 30 minutes at warmer than usual temperatures if wind speeds are greater.

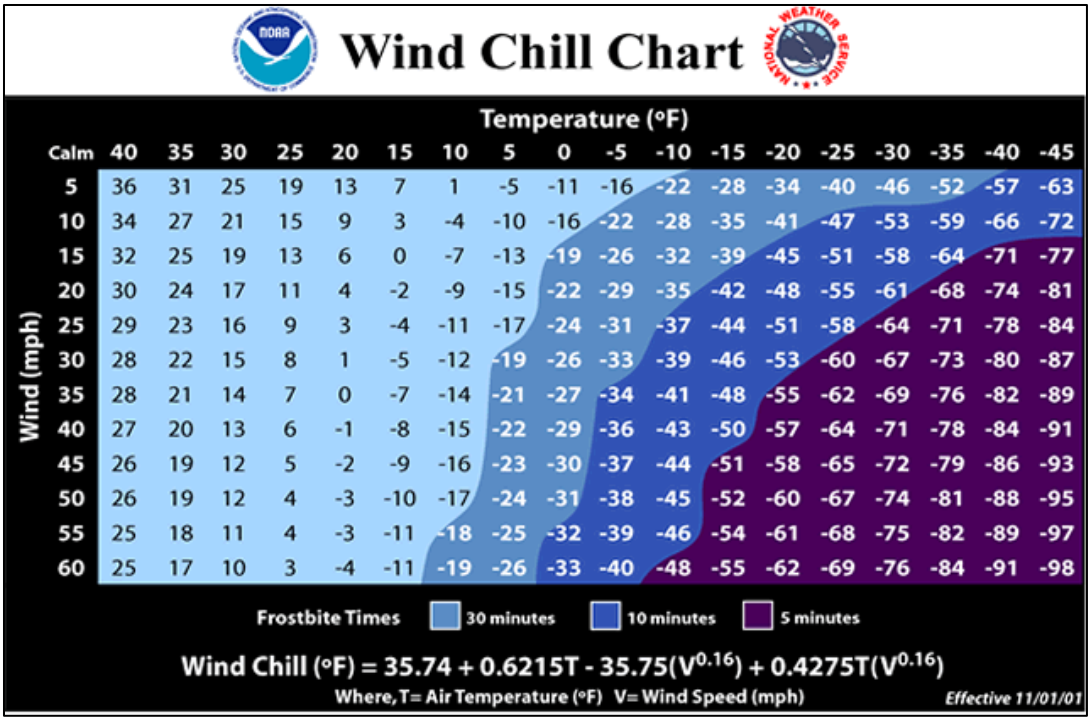


Figure 4.2: National Weather Service Wind Chill Chart (NWS NOAA, 2001)

4.3.4. | Previous Occurrences and Frequency

Extreme Heat

"Between 2018 and 2022, the National Oceanographic and Atmospheric Administration listed 10 heat warning events in Massachusetts (ResilientMass, 2023)."

The 2023 MA State Hazard Mitigation and Climate Adaptation Plan listed notable high temperature events between 1994 and March 2023 (ResilientMass, 2023). Dunstable, like all communities in the commonwealth, experienced these notable heat events.

Table 4.4: High Temperatures

High Temperatures	
01/13/1995	Record Warmth
07/13/1995	Record Heat
02/22/1997	Record Warmth
01/03/1998	Record Warmth
03/27/1998	Record Warmth
03/28/1998	Record Warmth

High Temperatures	
03/31/1998	Record Warmth
09/27/1998	Record Heat
12/02/1998	Record Warmth
12/07/1998	Record Warmth
01/24/1999	Record Warmth
02/12/1999	Record Warmth
03/18/1999	Record Warmth
06/07/1999	Excessive Heat
06/07/1999	Record Heat
07/04/1999	Excessive Heat
07/05/1999	Record Heat
07/16/1999	Record Warmth
07/17/1999	Record Warmth
07/18/1999	Record Warmth
09/07/1999	Record Warmth
03/08/2000	Record Warmth
05/08/2000	Record Heat
05/09/2000	Record Heat
10/14/2000	Record Warmth
12/17/2000	Record Warmth
04/24/2001	Record Heat
05/02/2001	Record Heat
05/03/2001	Record Heat
05/04/2001	Record Heat
05/12/2001	Record Heat
07/06/2010	Excessive Heat
07/21/2011	Excessive Heat

High Temperatures	
07/05- 02/06/2013	Heat
07/19/2013	Heat
07/01/2018	Excessive Heat
07/03/2018	Excessive Heat
08/28/2018	Excessive Heat
08/29/2018	Heat
09/03/2018	Heat
07/19/2020	Heat
07/27/2020	Heat
06/28/2021	Heat
08/11/2021	Heat
08/26/2021	Heat
08/04/2022	Heat
08/08/2022	Heat

Extreme Cold

The 2023 MA State Hazard Mitigation and Climate Adaptation Plan listed notable low temperature events between 1994 and March 2023 (ResilientMass, 2023). Dunstable, like all communities in the Commonwealth during these times, experienced these extreme cold events.

"Between 2018 and 2022, the National Oceanographic and Atmospheric Administration listed 17 cold warning events in Massachusetts. In February 2023, an arctic front moved through the region with a dangerously cold airmass that stayed in place on February 3–4. The cold temperatures broke the records for the lowest recorded minimum temperature and resulted in several deaths (ResilientMass, 2023)."

Table 4.5: Low Temperatures

Low Temperatures	
01/15/1994	Cold
01/18/1994	Cold
01/19/1994	Cold
01/27/1994	Cold
01/17/2000	Extreme Cold

Low Temperatures	
05/20/2002	Freeze
05/22/2002	Freeze
10/15/2002	Freeze
01/15/2004	Extreme Cold/Wind Chill
01/25/2007	Cold/Wind Chill
02/03/2007	Extreme Cold/Wind Chill
01/01/2009	Cold/Wind Chill
01/16/2009	Cold/Wind Chill
04/29/2009	Frost/Freeze
05/19/2009	Frost/Freeze
06/01/2009	Frost/Freeze
05/09/2010	Frost/Freeze
05/13/2010	Frost/Freeze
01/23/2011	Extreme Cold/Wind Chill
01/22-01/24/2013	Cold/Wind Chill
01/02/2014	Cold/Wind Chill
01/07/20144	Cold/Wind Chill
01/21/2014	Cold/Wind Chill
01/26-01/28/2014	Cold/Wind Chill
01/07/2015	Extreme Cold/Wind Chill
01/30-02/02/2015	Cold/Wind Chill
02/05/2015	Cold/Wind Chill
02/13/2015	Cold/Wind Chill
02/15-02/16/2015	Extreme Cold/Wind Chill
02/19-02/20/2015	Extreme Cold/Wind Chill
02/23/2015	Cold/Wind Chill
02/13-02/14/2016	Extreme Cold/Wind Chill

Low Temperatures	
12/15/2016	Cold/Wind Chill
03/11/2017	Cold/Wind Chill
01/01/2018	Extreme Cold/Wind Chill
01/05-01/06/2018	Extreme Cold/Wind Chill
01/06/2018	Cold/Wind Chill
01/13/2018	Cold/Wind Chill
11/22/2018	Cold/Wind Chill
01/20-01/21/2019	Extreme Cold/Wind Chill
01/30/2019	Extreme Cold/Wind Chill
02/021/2019	Cold/Wind Chill
12/18/2019	Cold/Wind Chill
01/28-01/29/2021	Extreme Cold/Wind Chill
03/02/2021	Cold/Wind Chill
01/11/2022	Cold/Wind Chill
01/14/2022	Extreme Cold/Wind Chill
01/20/2022	Cold/Wind Chill
01/29/2022	Cold/Wind Chill
12/23/2022	Cold/Wind Chill
02/03-02/04/2023	Extreme Cold/Wind Chill

4.3.5. | Probability of Future Hazard Events, including Due to Climate Change

"Climate change has already changed average and extreme temperatures in Massachusetts. Climate change is projected to reduce the number of extreme cold events, increase the number of extreme heat events, and shift the average temperature in the Commonwealth higher and shift the seasons the warm seasons forward and lengthen their duration. The effects of these changes will include changes in growing seasons and crops, shifts in habitat and vegetation, warming surface waters, degradation of air quality, impacts on public health, and increased demand for energy and water resources." (ResilientMass, 2023)

Attendees of the CRB workshop shared that the farming community notices the "kill frost." It used to occur by mid-September and now it is late October or early November.

Extreme Heat

Based on all the recently published reports (IPCC, MA Climate Assessment, GBRAG) temperatures will continue to increase through the 21st century. Summers are expected to get hotter with a greater number of days with maximum temperature above 90°F and above 100°F.

The average summer across the Commonwealth during the years between 1971 and 2000 included 4 days over 90 degrees. "The MA Climate Assessment (Commonwealth of Massachusetts, 2022) predicts that by 2050 the average summer temperature will feel like that of Maryland (average high of 94°F with about 90% humidity), and by 2090 average summer temperatures will feel like that of Georgia (average high of 95°F with 90% humidity)." (ResilientMass, 2023)

The ResilientMass Climate Change Projections Dashboard shows hot days for the years 2030, 2050, 2070, and 2090 on an annual basis for the Town of Dunstable. Figures 4.3 and 4.4 show the contrast between 2030 and 2090 for Hot Days.

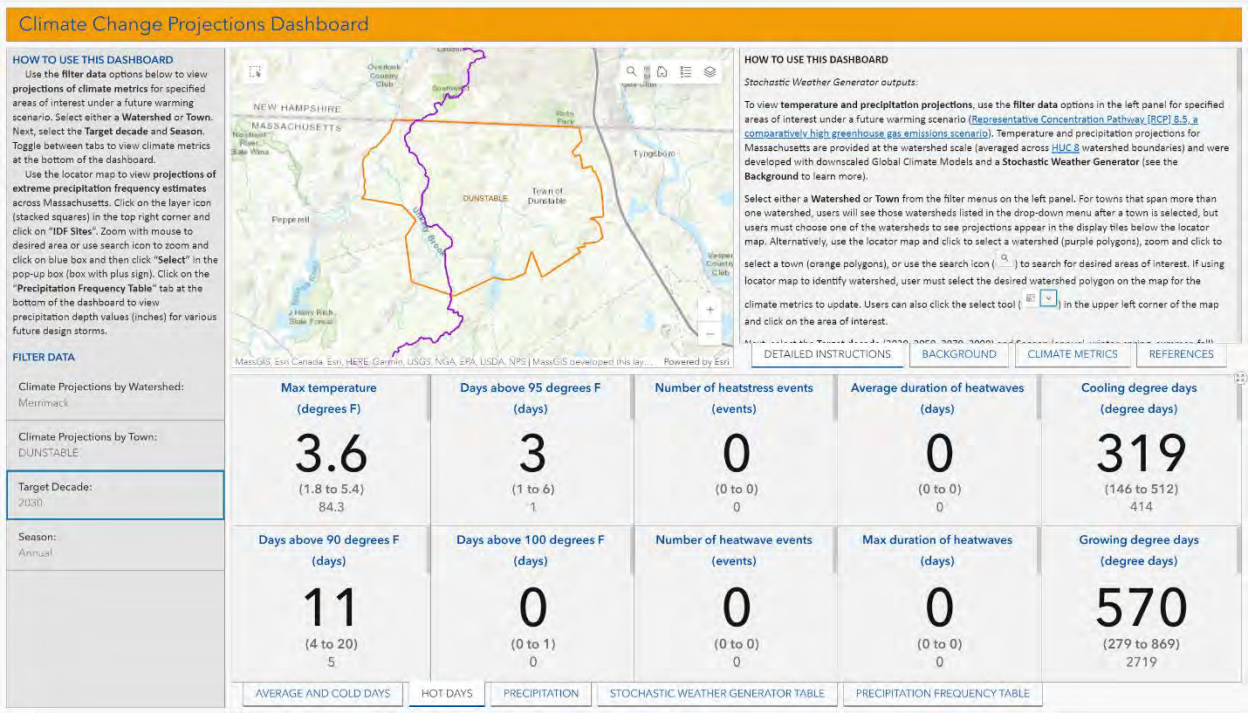


Figure 4.3: Annual Hot Days Projections for 2030

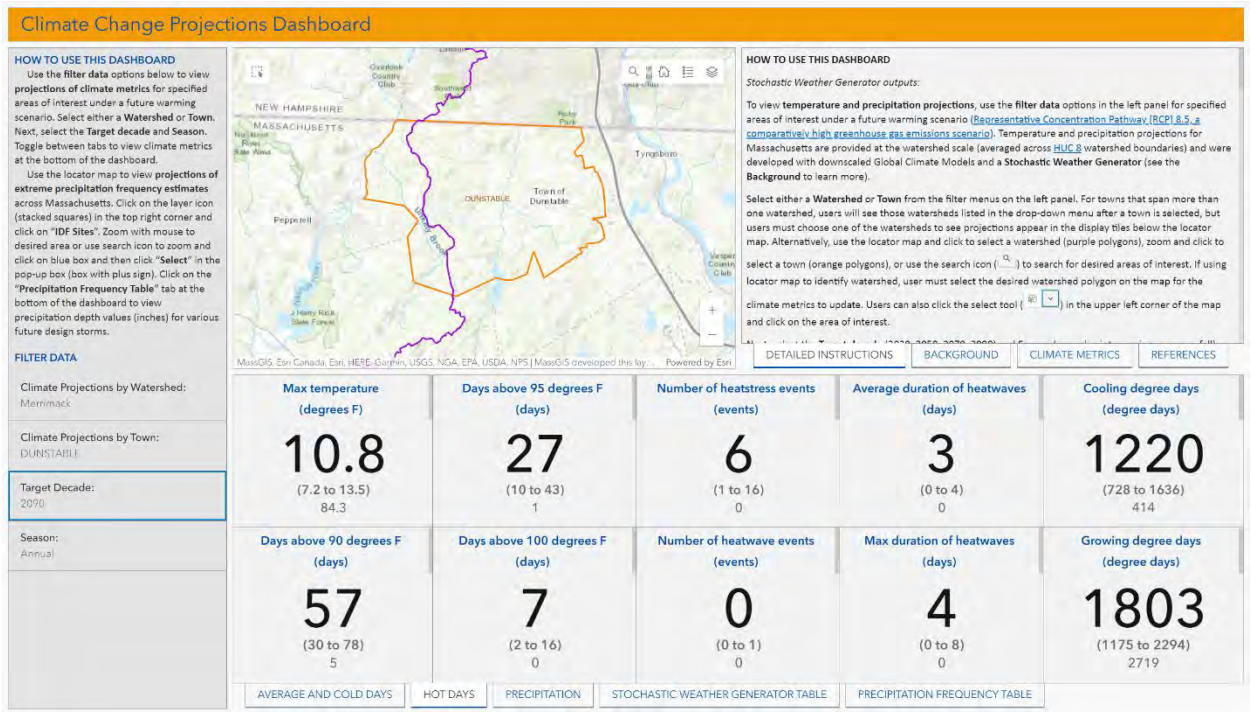


Figure 4.4: Annual Hot Days Projections for 2090

Extreme Cold

The number of days in Massachusetts that experience extreme cold are expected to decrease due to climate change. "Winter temperatures have been rising at a faster rate of 1.3°F (0.7°C) per decade on average. Even what seems like a very small rise in temperatures can cause major changes in climate patterns such as rain or snowfall. In Massachusetts, temperatures are projected to increase significantly over the next century. Winter average temperatures are likely to increase more than those in summer, with major impacts (ResilientMass, 2023)."

The ResilientMass Climate Change Projections Dashboard shows average and cold days for the years 2030, 2050, 2070, and 2090 on an annual basis for the Town of Dunstable. Figures 4.5 and 4.6 show the contrast between 2030 and 2090 for Average and Cold Days.

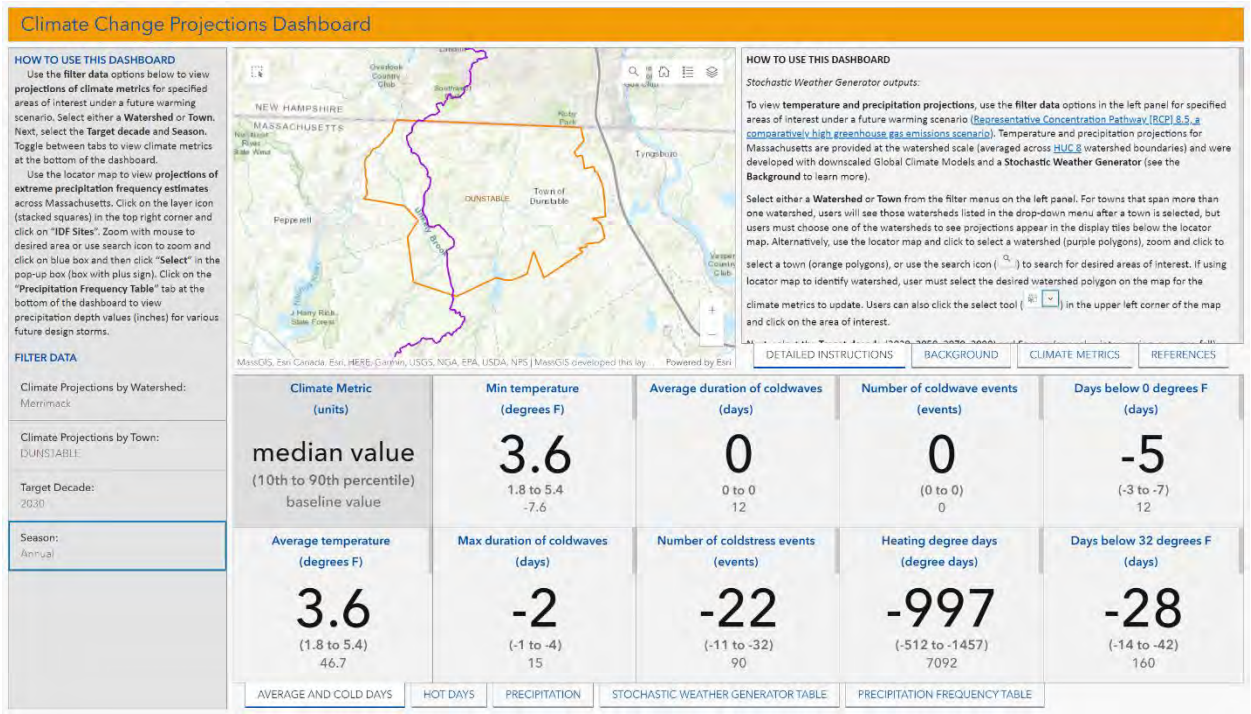


Figure 4.5: Annual Average and Cold Days Projections for 2030

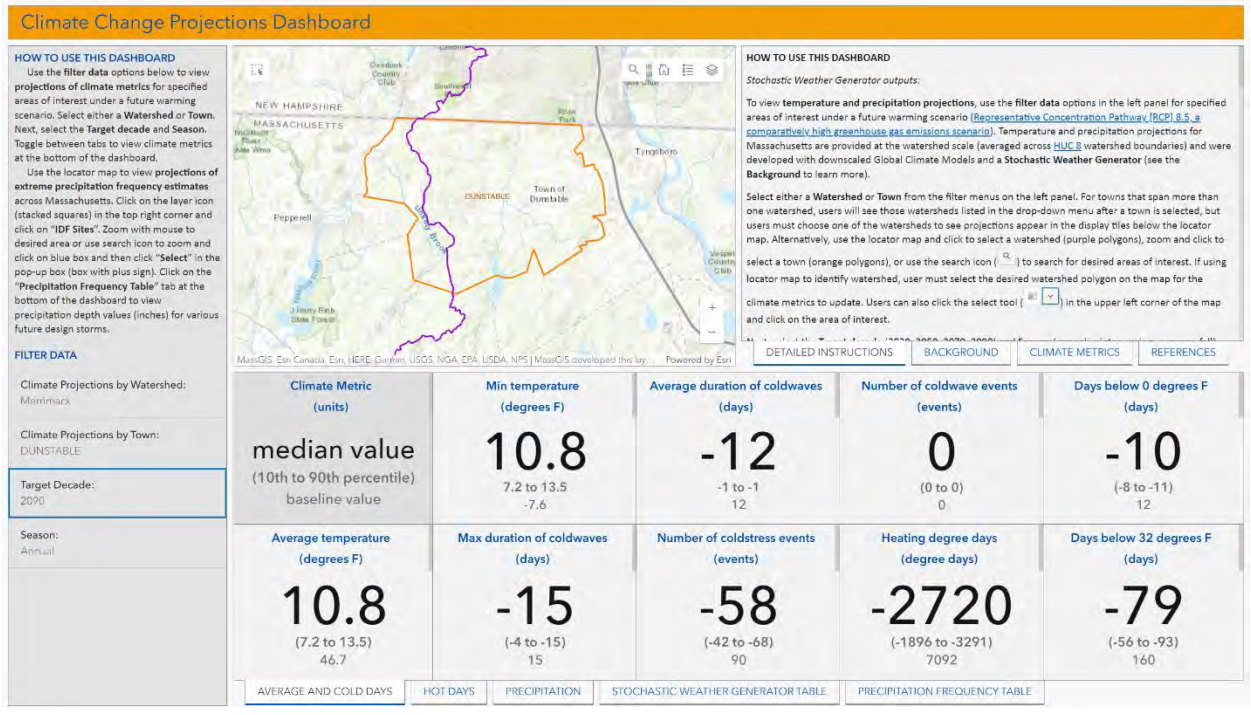


Figure 4.6: Annual Average and Cold Days Projections for 2090

4.3.6. | Vulnerability and Impacts

Extreme temperatures can have severe impacts on the Town of Dunstable. During instances of extreme heat, the frequency of heat stroke, heat stress, or heat related illness is higher. High temperatures can cause people to lose fluids more quickly than usual, leading to dehydration. Dehydration can cause headaches, dizziness, and fatigue. This is especially true for individuals who work physically demanding jobs outside, such as landscapers or construction workers. These individuals should be considered vulnerable during episodes of extreme heat. Extreme heat can cause materials such as concrete, asphalt, and steel to expand and contract, leading to cracking, warping, and other forms of structural damage. High temperatures also increase the demand on the water supply, which can potentially lead to shortages. High temperatures also increase the risk of wildfires, which can cause significant damage to structures and infrastructure. **At the CRB workshop, Dunstable residents expressed concerns regarding a lack of air conditioning in the schools. Residents were highly concerned about power outages during days of extreme heat that could become dangerous to students in the schools. A respondent to the public survey noted that Extreme heat affects everyone at this point and AC is becoming as much a necessity as heat.**

Extreme cold scenarios are equally impactful and more common in the state of Massachusetts. Extremely cold temperatures can impact public health, transportation, agriculture, energy, water resources, and infrastructure. The homeless, the elderly, and people with disabilities are especially vulnerable during instances of extreme cold. Cold weather can cause frostbite or hypothermia. Power outages during cold weather events may cause pipes to freeze and burst. Even underground pipes are subject to freezing and bursting, potentially leading to water main breaks. Power outages may also result in the inappropriate use of space heaters or generators in poorly ventilated areas, potentially leading to carbon monoxide poisoning. If extreme cold is accompanied by snow or ice, travel conditions can become extremely dangerous, and public transportation may shut down. **Dunstable residents noted the increase in the elderly population that would be particularly vulnerable to both extreme cold and extreme heat. However, residents also noted that the community is quick to assist the elderly and infirmed with snow removal during instances of severe cold or winter weather.**

Table 4.6: Impacts of Average/Extreme Temperatures on Dunstable

Asset Category	Likely Impacts
People	Impacts to people's health, welfare, and safety, including underserved communities and socially vulnerable populations: • Increased risk of cold-related or heat-related death or illness (hypothermia, frostbite, heat stroke, heat exhaustion, etc.)

Asset Category	Likely Impacts
	• Most at-risk populations include children, the elderly, the homeless, and those that work outside
Structures	Impacts to buildings, facilities, lifelines, and critical infrastructure: • Extreme heat can lead to structural damage such as cracking or warping • Extreme cold can freeze and damage pipes leading to water leaks and flooding when temperatures rise
Systems	Impacts to transportation systems, and electricity and water systems: • Power grid strain from increased heating or air conditioning use, potentially resulting in power outages • Extreme heat can cause pavement to soften and buckle leading to road closures and transportation disruptions • Extreme cold can result in icy road conditions and reduced visibility, making travel hazardous
Natural/Cultural/Historic Resources	Impacts to ecosystems, natural habitats, community areas, historical facilities and locations, and cultural resources: • Potential increase of wildfires during extreme heat • Extreme temperatures may alter migrations, allow for invasive species, decrease crop yields, and adversely affect livestock
Economic and Community Assets	Impacts to people's ability to work and make a living, and impacts to activities that benefit the community by increasing community morale and well-being: • Cancellation of community or sports events due to extreme temperatures

Extreme Temperature and Population and Land Use Changes

Elderly residents are at the highest risk of impact from extreme temperatures. Over the next 15 years, the potential growth of the elderly population in Dunstable is projected to be fairly significant. According to the Dunstable Master Plan, the percentage of residents 60 and older in 2020 was 16.7%. By 2040, this demographic group is projected to increase to 21.1% of the Town's population. It is possible that extreme temperatures could impact the desire for the elderly population to stay in Dunstable or move to Dunstable, and may pick climates that are more temperate.

Dunstable's population is projected to increase by 7.5% through the 2030s. Development trends have shown an increase in developed land, in particular industrial and residential land use types. The growth in population and development will result in an increase in impervious areas, including new buildings, parking lots, and roadways. This new development may increase urban heat island effect on the Town, particularly if the new development involves removing green space and trees. If

the Town enacted new local code to address long-term impacts of extreme temperatures, it is possible that new development could be less dense and contain more methods to reduce heat.

4.4. Changes in Groundwater

4.4.1. | Description

According to the ResilientMass Plan, "groundwater is a renewable, long-term resource that depends on an adequate quantity and quality of water to replenish it. The quantity and quality of groundwater reflects the cumulative effects of extraction, recharge, and contamination.

Groundwater challenges are caused or amplified by other hazards such as sea level rise, extreme temperatures and rising temperatures, drought, extreme precipitation, and other meteorological events.

There are three primary categories of risk associated with groundwater in Massachusetts:

- Rise in groundwater levels
- Groundwater depletion
- Changes in groundwater quality and characteristics

When variation of groundwater surpasses an elevation threshold or duration, changes in groundwater can affect human and natural systems. The disruption can generate long- term risk to human life and property. Changes in groundwater can result in interruption, loss, and risk due to human demands and impacts on the resource. Infrastructure is built using historical water conditions and parameters. When groundwater levels change outside historical ranges, this can affect critical infrastructure including drainage systems, septic systems, and building foundations" (ResilientMass, 2023).

4.4.2. | Location

Dunstable is located atop a New York and New England group of crystalline-rock aquifers. The town also lies across the Coastal Plain physiographic province. This physiographic region is composed of plains, hills, and coastline with unconsolidated sediments. The water table in Massachusetts is relatively close to the ground surface. Figure 4.7 shows the aquifers in Dunstable.

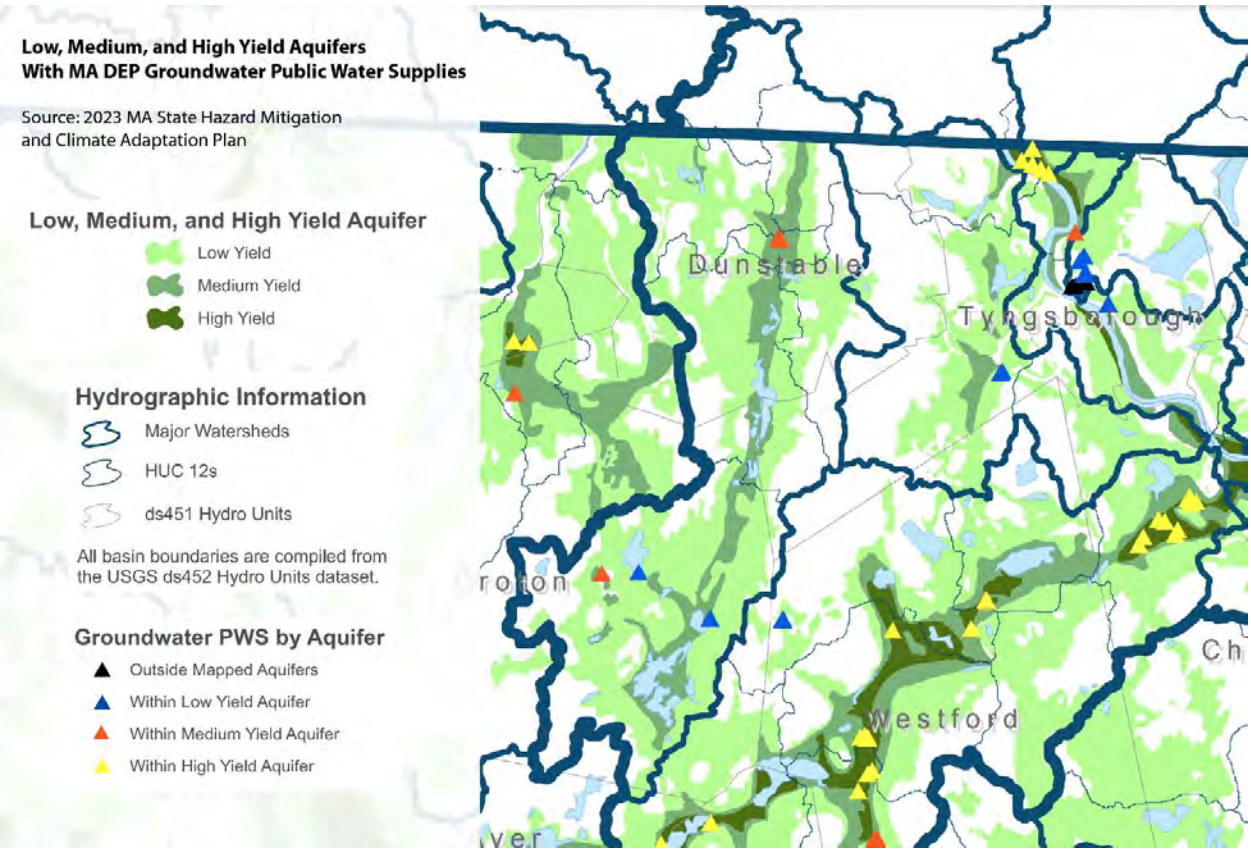


Figure 4.7: MassDEP Groundwater Public Water Supply Aquifers

4.4.3. | Severity/Intensity

"The severity of groundwater rise, depletion, and contamination depends heavily on the ability of the groundwater system to recharge (i.e., the balance between extraction and recharge), the timing of the recharge, and the quality of the water. Extraction can take place through human activity and natural discharge, which can increase when surface water levels drop—particularly during droughts. Water levels can increase during periods of high precipitation, snowmelt, and coastal and inland flood events. In coastal areas, groundwater levels will be affected by coastal conditions including meteorological events, coastal storms, tides, and sea level rise. Local characteristics including topography, hydrology, vegetation, soil conditions, and human activity also have significant impacts on the severity and intensity of groundwater changes. The following environmental factors can affect the severity and intensity of changes in groundwater and have been associated with hazardous conditions and disruption to human and environmental systems.

Groundwater rise is driven by precipitation intensity, coastal and inland storms, sea level rise, and snow melt. Groundwater rise can result in flooding, salinity intrusion, contamination and pollution of groundwater and aquifers, and increased inundation of ecosystems, below ground and at grade assets and infrastructure.

Groundwater depletion, which results in lower a water table and strained water resources, will be more intense when conditions for groundwater recharge are low. These conditions include increasing frequency of drought, a reduced snowpack, higher rates of evapotranspiration, reduced precipitation, diversion of precipitation away from groundwater recharge areas, and pressure from human consumption and natural discharge into surface water. Development patterns and river and stream flood management infrastructure also reduce opportunities for groundwater recharge. Recharge rates can vary significantly between regions: for example, the recharge rate near the South Coastal watershed is 57 percent of total precipitation while annual recharge rates range from 37 to 44 percent of annual precipitation around the Concord watershed (Knott et al., 2022)." (ResilientMass, 2023)

4.4.4. | Previous Occurrences and Frequency

"Changes in groundwater levels can be influenced by several factors associated with human actions, climate change, and natural variations. Groundwater levels fluctuate daily, weekly, and seasonally. Recent analysis has detected long-term variation in groundwater levels over the last 50 years, but the direction of change depends on complex interactions. While there are several studies that evaluate the changes in groundwater levels in specific locations and at the regional level, there is need for a statewide understanding of factors affecting groundwater. One study estimated that annual groundwater recharge could decrease by 3 to 28 percent statewide by the year 2100 (Knott et al., 2022)."

4.4.5. | Probability of Future Hazard Events, including Due to Climate Change

"Climate change can affect the severity of groundwater rise, depletion, and contamination due to the following factors: changes in precipitation, groundwater recharge, impacts from sea level rise, and changing temperatures. These factors' net impact on groundwater can be inferred and is being studied but has not been quantified." (ResilientMass, 2023). The following descriptions from the ResilientMass Plan explain how these factors can impact groundwater.

- **Precipitation:** Increased quantities of precipitation can elevate groundwater levels and increase recharge. However, slow steady snowmelt and rain are more likely to lead to recharge than extreme precipitation events. The timing of precipitation affects groundwater recharge depending on antecedent soil moisture. Rising temperatures are likely to lead to fewer days where the ground is frozen and increase the number of days when recharge is possible. However, recharge from snowmelt will be shifted to the winter rather than the usual springtime.

- **Temperature:** Rising temperatures will also increase the number of days when evapotranspiration is higher. Evapotranspiration is associated with lower rates of groundwater recharge. Increased temperatures are also likely to extend the growing season, placing more demands on aquifer reserves via additional water use and evapotranspiration. Shallow, unconfined aquifers are also likely to experience higher temperatures.

- **Intensity of precipitation:** Climate change is expected to change the intensity of precipitation events. High levels of precipitation over short periods affect the ability of the soil and groundwater system to absorb the water, which can lead to reduced recharge and increased runoff resulting in flooding.

- **Drought:** Climate change is projected to affect the severity and duration of drought. Aquifers experience reduced recharge and increased demand for water reserves during drought periods. Research on the relationship between suburban drought and residential development found that increased developments raised sensitivity to suburban droughts and long-term planning between land use and water management was critical in reducing drought vulnerability and risks to groundwater systems that are needed for multiple ecosystem services (Hill & Polsky, 2007).

- **Contamination:** Higher precipitation over shorter periods can mobilize surface contaminants that can seep into the groundwater (Amanambu, 2015). This is particularly a concern in shallow aquifers like those in Massachusetts. The Plymouth 2021 Hazard Mitigation plan mentioned above addresses the groundwater protection concerns identified in reports conducted by the State Source Water Assessment Protection program[1] by reducing contaminants through zoning enforcement and restrictions on certain development (Horsley Witten Group, 2021). Contamination may also occur from road salting (Heath & Morse, 2013). More frequent road salting necessitated by more rain on snow "mixed precipitation" events can exacerbate salt contamination. (ResilientMass, 2023).

4.4.6. | Vulnerability and Impacts

Groundwater rise can lead to the flooding of below-grade and at-grade utilities, infrastructure, natural environments, living spaces, and workspaces. Rising groundwater levels can also mobilize contaminants in soil and destabilize ground and soil. Groundwater rise can lead to saltwater intrusion to salt-sensitive habitats, vegetation, land uses, and infrastructure. Saltwater intrusion corrodes infrastructure and alters natural habitats.

Decreases in the water table can also have an impact on ecosystems and human health by reducing the availability of freshwater sources. Long-term changes in groundwater levels can also affect structure stability, especially for buildings built on wood pilings.

Groundwater changes in salinity and height driven by sea level rise can affect drinking water supplies and have significant impacts on the natural environment. Groundwater rise can interact with precipitation, drainage, and sea level rise in complex ways that can contribute to flooding.

Attendees of the CRB workshop noted that availability of drinking water is a big concern in Town, as many residents have private wells. Access to drinking water is critical for the health and safety of residents.

Table 4.7: Impacts of Changes in Groundwater on Dunstable

Asset Category	Likely Impacts
People	Impacts to people's health, welfare, and safety, including underserved communities and socially vulnerable populations: • Flooding and damage to basements or below grade living areas creating risk of mold and contamination • Septic system failure leading to water quality degradation in nearby waterways and increased bacterial exposure
Structures	Impacts to buildings, facilities, lifelines, and critical infrastructure: • Damage or loss to below-grade buildings and foundations of buildings due to flooding or unstable soils • Damage to building foundations from salinity intrusion
Systems	Impacts to transportation systems, and electricity and water systems: • Damage or loss to below-grade or at-grade utilities, infrastructure, roads, and transit including power, heat, water, sewer, and stormwater services due to flooding or unstable soils
Natural/Cultural/Historic Resources	Impacts to ecosystems, natural habitats, community areas, historical facilities and locations, and cultural resources: • Damage to habitats, natural areas, and wetlands due to reduced freshwater supplies • Saltwater intrusion and inundation of aquifers, wetlands, and ecosystems that cannot adapt to new conditions due to sea level rise • Changes to groundwater temperature in urban environments which can amplify heat island effects and stress vegetation and urban trees
Economic and Community Assets	Impacts to people's ability to work and make a living, and impacts to activities that benefit the community by increasing community morale and well-being: • Increased costs for alternative sources of water such as desalination • Cost of damage from flooding, especially in areas of repetitive loss • Disruption of utility and infrastructure creating travel delays or lack of water, power, or sewer service

Changes in Groundwater and Population and Land Use Changes

Dunstable's population is projected to increase by 7.5% by 2040. As the population in Dunstable increases, drinking water needs will increase. Additional wells and increased water usage can impact groundwater levels and add an additional strain to the water supply. It is possible that limitations on drinking water quantity and/or quality could affect the desire to live in Dunstable, thereby affecting future population trends.

Developed land, particularly residential and industrial, has been increasing in recent years and is projected to continue. Land use changes and new development may alter recharge rates of groundwater. Additionally, altering wetland areas or riparian zones can change the interaction between surface water and groundwater, affecting recharge and groundwater flow patterns. It is possible that limitations on drinking water quantity and/or quality could affect the desire to develop in Dunstable, thereby affecting changes in land use.

4.5. Drought

4.5.1. | Description

Drought is an extended duration of time characterized by below normal levels of precipitation. The duration of drought can vary widely and can occur in virtually all climatic zones, with different conditions based on the region-specific precipitation normals. Drought differs from aridity, in which a region experiences low precipitation as a typical or permanent characteristic of the climate (i.e., a desert).

The ResilientMass Plan states that "drought is a natural phenomenon that serves a purpose in ecological processes. However, when drought limits the capacity of natural and human systems to sustain themselves, particularly in heavily urbanized or otherwise altered lands, drought can result in hazardous impacts and negative economic outcomes when drought limits the capacity of systems to sustain themselves, particularly in heavily urbanized or otherwise altered lands. The National Drought Mitigation Center (n.d.-b) references five common, conceptual definitions of drought as categorized in the seminal work of Wilhite and Glantz (1985):

- Meteorological drought is when the amount and duration of rainfall in a region is less than normal. It is defined solely by the degree of dryness. Due to climatic differences, what might be considered a drought in one part of the country may not be a drought in another location.
- Hydrological drought results when the lack of precipitation affects streamflow, surface water bodies and groundwater such that they are below normal levels. The frequency and severity of hydrological drought is often defined on a watershed or river basin scale.
- Agricultural drought occurs when there is not enough water available for a particular crop to grow at a particular time. Agricultural drought is defined in terms of soil moisture deficiencies relative to the water demands of plant life, primarily crops. This type of drought can occur when there are precipitation shortages, soil water deficits, and reduced ground water reservoir levels.
- Socioeconomic drought occurs when the demand for an economic good such as water exceeds the supply because of precipitation-related shortfall. This differs from the other types of droughts because its occurrence depends on the processes of supply and demand.

- Ecological drought is a deficit in water availability that drives ecosystems beyond thresholds of vulnerability, impacts ecosystem services, and triggers feedback in natural and/or human systems (Crausbay et al., 2017)" (ResilientMass, 2023).

4.5.2. | Location

"Regions of Massachusetts can experience significantly different weather patterns due to topography; distance from the coast; and a combination of regional, national, and global weather patterns. As a result, the Massachusetts Drought Management Plan (DMP, 2019) organized Massachusetts into seven drought regions" (ResilientMass, 2023). Dunstable is part of the Northeast drought region. This regional approach allows customization of drought actions and conservation measures to address the drought conditions specific to the region. "Dependent on the drought conditions, the Massachusetts Executive Office of Energy and Environmental Affairs (EEA) may adjust the geographic scale of analysis to county or watershed scale to facilitate location-specific response actions and communications" (ResilientMass, 2023).

4.5.3. | Severity/Intensity

"In Massachusetts, drought is defined by a combination of several indices, as detailed in the Massachusetts DMP (Massachusetts Executive Office of Energy and Environmental Affairs & Massachusetts Emergency Management Agency, 2019). The indices are:

1. Precipitation. The Standardized Precipitation Index is based on monthly precipitation totals compiled from DCR's Precipitation Program and the National Weather Service network. The Standardized Precipitation Index is widely used and can be calculated for a range of lookback periods.
2. Streamflow. This index provides an early indication of impacts to rivers, streams, wetlands, and other riparian habitats due to precipitation deficits.
3. Groundwater. Due to the length of time required for groundwater recharge, this index provides information on drought impacts over a longer period.
4. Lakes and impoundments. This index captures the effect of droughts on surface- water storage, including lakes, ponds, and water supply and flood control reservoirs.
5. Fire danger. The Keetch-Byram Drought Index indicates the fire potential and flammability of organic material in the ground by assessing the amount of precipitation required for the top eight inches of soil to be saturated.
6. Evapotranspiration. This index is based on the Crop Moisture Index, which assesses the short-term or current conditions of dryness or wetness relative to the water needs of specific crops and can be used to understand potential impacts to agricultural crops.

These indices are monitored on a weekly basis and used to generate a monthly hydrological conditions report. multiple state and federal agencies monitor these indices, including DAR, DCR, NWS, and USGS. However, the DCR Office of Water Resources is responsible for delivering monthly reports on the six drought indices for MA (Massachusetts Executive Office of Energy and Environmental Affairs & Massachusetts Emergency Management Agency, 2019). The state uses the indices described above to determine the onset, end, and severity of droughts. Refer to Section 3.4.1 of the DMP for more details on the methodology and use of the indices. The DMP defines five levels of increasing drought severity:

- Normal, Level 0
- Mild Drought (formerly Advisory), Level 1
- Significant Drought (formerly Watch), Level 2
- Critical Drought (formerly Warning), Level 3
- Emergency Drought (formerly Emergency), Level 4

The drought levels are associated with state actions outlined in the DMP. In Massachusetts, the DMTF recommends drought levels for each region to the Secretary of EEA, who declares the drought level for each region of the state. Refer to Table 3 of the DMP for a comparison of these indices." (ResilientMass, 2023)

4.5.4. | Previous Occurrences and Frequency

Middlesex County, which includes the Town of Dunstable, most recently experienced a period of Severe Drought (D2) from July 2016 through April 2017 (NOAA Storm Events Database, 2023). According to NOAA, during this period precipitation levels and soil moisture were abnormally low and groundwater conditions were found to be below normal. River and streamflow conditions were also well below normal.

4.5.5. | Probability of Future Hazard Events, including Due to Climate Change

"Rising temperatures and changes in precipitation patterns are expected to increase the length, frequency, and intensity of droughts. Reduced snowpack will affect the ability of groundwater supplies to recharge and the availability of water for the growing period.

The likely range of consecutive dry days per year is projected to increase by up to 33 days per year in 2090, compared to the annual, statewide-average baseline of 31 days from 1986 to 2005. Table 4.8 indicates the projected number of consecutive dry days based on the Stochastic Weather Generator data developed for the 2022 Massachusetts Climate Change Assessment (MA Climate Assessment). Projections from the MA Climate Assessment suggest that the average days of zero precipitation per year is likely to increase across most of the Commonwealth. Individual drought events are likely to increase in frequency and severity. In addition, drought may persist with extremely low precipitation days; therefore, consecutive dry days and average dry days per year likely underestimate the potential increase in dry or drought conditions. (ResilientMass, 2023)."

The likely range of consecutive dry days per year is projected to increase by up to 33 days per year in 2090, compared to the annual, statewide-average baseline of 31 days from 1986 to 2005. Table 4.8 indicates the projected number of consecutive dry days based on the Stochastic Weather Generator data developed for the 2022 Massachusetts Climate Change Assessment (MA Climate Assessment). Projections from the MA Climate Assessment suggest that the average days of zero precipitation per year is likely to increase across most of the Commonwealth. Individual drought events are likely to increase in frequency and severity. In addition, drought may persist

with extremely low precipitation days; therefore, consecutive dry days and average dry days per year likely underestimate the potential increase in dry or drought conditions. (ResilientMass, 2023)."

Table 4.8: Indicators of Drought—Consecutive Dry Day Events and Total Annual Days Without Rain

Number of Consecutive Dry Day Events per Year					
Region	Baseline	2030	2050	2070	2090
Eastern Inland (including Dunstable)	32	32	32	33	33

Source: Steinschneider & Najibi (2022).

Number of Days without Rain per Year [a]					
Region	Baseline	2030	2050	2070	2090
Eastern Inland (including Dunstable)	186	181	185	188	193

Source: MA Climate Assessment (Commonwealth of Massachusetts, 2022).

[a] Future projections presented for four time periods are identified in the table by their central year: 2030 (near-term, 2020–2039); 2050 (mid-century, 2040–2059); 2070 (mid-late century, 2060–2079); and 2090 (end of century, 2080–2099). Values may not sum due to rounding.

4.5.6. | Vulnerability and Impacts

Droughts can lead to water scarcity, which can affect drinking water supplies, sanitation, and hygiene. Lack of access to safe drinking water can lead to dehydration, malnutrition, and waterborne illnesses, which can be especially harmful to children and vulnerable populations. Droughts can cause the soil to dry out, shrink, and crack, which can lead to settlement and subsidence of buildings. This can result in damage to foundations, walls, and other structural elements. Droughts can impact water infrastructure, including reservoirs, wells, and pipelines. Lower water levels can impact water quality and availability, leading to water rationing and potentially causing damage to infrastructure due to exposure. Finally, droughts can impact soil quality by reducing moisture levels, leading to soil erosion, degradation, and reduced fertility. This can impact agriculture, food production, and ecosystem health.

Attendees of the CRB workshop shared that drought is a concern for drinking water both at the public water supply and private wells.

Table 4.9: Impacts of Drought on Dunstable

Asset Category	Likely Impacts
People	Impacts to people's health, welfare, and safety, including underserved communities and socially vulnerable populations: • Increased risk of dehydration, death, heat-related illness, and heat stroke (if the drought coincides with warmer months) • Dry soils and wildfires can increase the number of airborne particles such as pollen and smoke with can worsen chronic respiratory illness. For example, in Dunstable, drought may impact the unofficial Massapoag Pond Swimming Area (Private) or the swimming area at Tully Wildlife Refuge (Dunstable Rural Land Trust), which will reduce access to areas used for cooling and other co-benefits.
Structures	Impacts to buildings, facilities, lifelines, and critical infrastructure: • Can cause power outages, especially in areas powered by hydroelectric power plants • Drying or cracking of sediments can cause foundation damage to structures or the settlement/ subsidence of buildings
Systems	Impacts to transportation systems, and electricity and water systems: • Reduced water availability can complicate firefighting efforts • Decrease in groundwater supplies may cause shortages or rationing of water • Waterways can recede which can limit the size of ship that can navigate shallower waters, potentially impacting the delivery of goods and services
Natural/Cultural/Historic Resources	Impacts to ecosystems, natural habitats, community areas, historical facilities and locations, and cultural resources: • Damage to wildlife habitat, degradation of air and water quality, wildfires, degradation of landscape quality, loss of biodiversity, soil erosion • Loss of wetlands, lakes, and vegetation • Impact on crop production and supplies of animal feed • Increased potential for fires
Economic and Community Assets	Impacts to people's ability to work and make a living, and impacts to activities that benefit the community by increasing community morale and well-being:

Asset Category	Likely Impacts
	• Waterways can recede which can limit the size of ship that can navigate shallower waters, potentially impacting the delivery of goods and services • Potential to drain state and local resources, which can have a significant fiscal impact on local government

Drought and Population and Land Use Changes

Increased populations will put a further strain on the drinking water supply during drought conditions. The Town's elderly population is project to increase by 4.4% by 2040 according to the Dunstable Master Plan.

Increased development will create additional strain on drinking water supply, which will be exacerbated during times of drought.

Drought can affect farming, as well, which is a core business in Dunstable. Presence of drought may result in farmers moving to areas with greater water availability and that land becoming desired for other changes, thereby affecting the population trends and changes in land use.

4.6. Earthquakes

4.6.1. | Description

"An earthquake is experienced as the vibration of the Earth's surface that follows the release of seismic energy in the Earth's crust. Seismic energy is released when cracks in the crust (called faults) suddenly slip. Earthquakes happen at the edges of the world's tectonic plates, which rub against each other as they move across the surface of the Earth. The stresses of tectonic plate motions also build up within the interiors of the tectonic plates, causing some faults to slip there and cause intraplate earthquakes—though these are much rarer than the plate boundary earthquakes that are common in places such as California (Richardson, n.d.). Scientists are still exploring the cause of intraplate earthquakes; many believe they occur along geologic features that were created millions of years ago and are now weaker than the surrounding areas (Kafka, 2020). New England experiences intraplate earthquakes when stress is released within the interior of the North American plate. Ground shaking and the liquefaction resulting from it are the primary causes of earthquake damage. This damage can vary locally due to soil types that can amplify shaking or are susceptible to liquefaction. A contributor to this amplification is the velocity at which rock or soil transmits shear waves (S waves). Accordingly, the National Earthquake Hazards Reduction Program classifies soil according to S-wave velocity in the top 30 meters (100 feet) below the Earth's surface. The soil classification system ranges from A to E, where A represents hard rock that reduces ground motions from an earthquake and E represents soft soils that amplify and magnify ground shaking and increase building, infrastructure, and utility damage and losses. A seismic site classification map for Massachusetts using these soil types is shown Figure 4.8

Areas along the shoreline that have previously been filled are particularly at risk from liquefaction and increased damage from earthquakes" (ResilientMass, 2023).

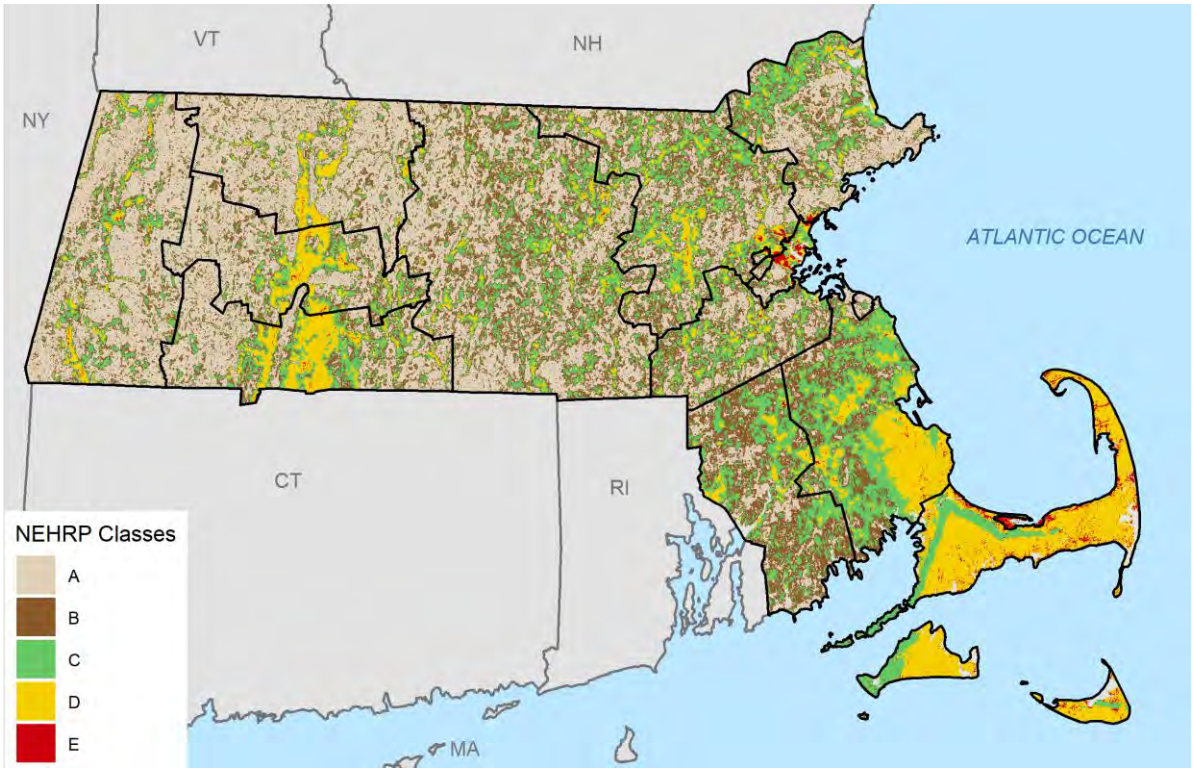


Figure 4.8: Massachusetts Soil Types

4.6.2. | Location

"New England earthquake epicenters may not follow the major mapped geologic faults of the region, nor are they confined to any geologic structures or terrains. Because earthquakes have been detected all over New England, seismologists suspect that a strong earthquake could be centered anywhere in the region, although it is possible that earthquakes tend to re-occur along pre-existing planes of weakness (Kafka, 2020). Generally, USGS seismic hazard maps show that Massachusetts has a low to moderate level of seismic hazard compared to other areas of the country (USGS, 2018a). Peak ground accelerations (PGA) with a 2 percent probability of being exceeded in 50 years are predicted to be higher in Dunstable and the northeast part of the Commonwealth, around 20– 30 percent the force of gravity (Figure 4.9). Shaking at this level is known to cause some property damage, such as broken chimneys. However, as discussed above and shown in Figure 4.4, softer soil types can amplify local ground shaking and thus the impacts from an earthquake.

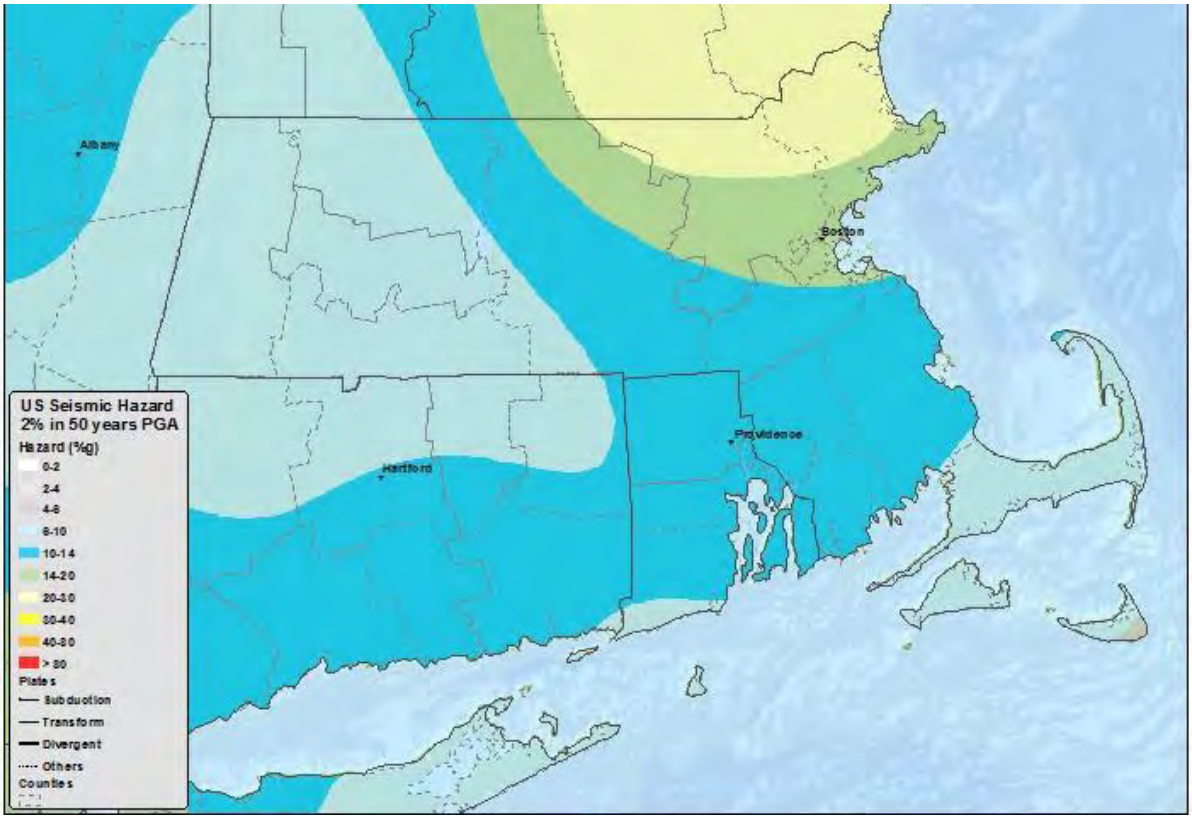


Figure 4.9: Seismic Hazard

4.6.3. | Severity/Intensity

"The location of an earthquake is commonly described by its focal depth and the geographic position of its epicenter. The focal depth of an earthquake is the depth from the surface to the region where the earthquake's energy originates (the focus). Globally, earthquakes with focal depths up to about 43.5 miles are classified as shallow.

Earthquakes with focal depths of 43.5 to 186 miles are classified as intermediate. The focus of deep earthquakes may reach depths of more than 435 miles. Most earthquakes have focal depths of 20 miles or less. The depth to the Earth's core is about 3,960 miles, so even the deepest earthquakes originate in relatively shallow parts of the Earth's interior. The epicenter of an earthquake is the point on the Earth's surface directly above the focus.

Seismic waves are the vibrations from earthquakes that travel through the Earth and are recorded on instruments called seismographs. The magnitude of an earthquake is a seismograph-measured value of the amplitude of the seismic waves. The most widely known scale for earthquake magnitude is the Richter scale, developed in 1935 as a mathematical device to compare earthquakes. The Richter scale has no upper limit.

Importantly, it does not express damage: an earthquake in a densely populated area, which results in many deaths and considerable damage, can have the same magnitude as an earthquake in a

remote area that causes no damage. It is the presence of vulnerable assets and populations near an earthquake epicenter, combined with the earthquake magnitude, that determines the amount of damage and where that damage takes place.

The severity of an earthquake is based on the observed effects of ground shaking on people, buildings, and natural features. Intensity is expressed by the Modified Mercalli Intensity (MMI) scale, which describes how strongly an earthquake was felt at a particular location using values ranging from I to XII. Seismic hazards are also expressed in terms of PGA, which USGS defines as the greatest acceleration that "is experienced by a particle on the ground." More precisely, seismic hazards are described in terms of spectral acceleration, defined by USGS as "approximately what is experienced by a building, as modeled by a particle on a massless vertical rod having the same natural period of vibration as the building" in terms of percent of acceleration force of gravity (percent g).

Table 4.10 summarizes the MMI scale, associated damage, and corresponding PGAs and Richter scale magnitudes. Note that the typical comparisons between Mercalli intensity and Richter magnitudes are biased toward the type of earthquakes that happen in California. Smaller magnitude earthquakes can be felt over larger regions in New England, so the Mercalli descriptions for "equivalent"-magnitude earthquakes are not always accurate in this region. For example, a 4.2 magnitude is typically considered to be equivalent to MMI II ("felt only by a few persons"); this may be true on the West Coast, but an earthquake of that magnitude in New England can be felt my many more people over a wide area, sometimes so strongly that people get scared and run out of their buildings (as is typically described for an MMI IV or V earthquake)." (ResilientMass, 2023)

Table 4.10: MMI and Equivalent PGA and Richter Scale Magnitude

\Mercalli Intensity	Equivalent Richter Scale Magnitude	Description	Abbreviated MMI Scale Descriptions	Acceleration (Percent g) (PGA)
I		Detected only on seismographs.	Not felt except by a very few under especially favorable conditions.	< .17
II		Some people feel it.	Felt only by a few people at rest, especially on upper floors of buildings.	.17–1.4
III		Felt by people resting; like a truck rumbling by.	Felt quite noticeably by people indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations similar to the passing of a truck. Duration	.17–1.4

\Mercalli Intensity	Equivalent Richter Scale Magnitude	Description	Abbreviated MMI Scale Descriptions	Acceleration (Percent g) (PGA)
			estimated.	
IV		Felt by people walking.	Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.	1.4–3.9
V	< 4.8	Sleeping people awake; church bells ring.	Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.	3.9–9.2
VI	< 5.4	Trees sway; suspended objects swing; objects fall off shelves.	Felt by all; many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.	9.2–18
VII	< 6.1	Mild alarm; walls crack; plaster falls.	Damage negligible in buildings of good design and construction, slight to moderate in well-built ordinary structures, considerable in poorly built or badly designed structures; some chimneys broken.	18–34
VIII		Moving cars are uncontrollable; masonry fractures; poorly constructed buildings damaged.	Slight damage in specially designed structures; considerable damage in ordinary substantial buildings, with partial collapse. Great damage in poorly built structures. Chimneys, factory stacks, columns, monuments, and walls fall. Heavy furniture overturned.	34–65

\Mercalli Intensity	Equivalent Richter Scale Magnitude	Description	Abbreviated MMI Scale Descriptions	Acceleration (Percent g) (PGA)
IX	< 6.9	Some houses collapse; ground cracks; pipes break open.	Considerable damage in specially designed structures; well-designed frame structures thrown out of plumb. Great damage in substantial buildings, with partial collapse. Buildings shifted off foundations.	65–124
X	< 7.3	Ground cracks profusely; many buildings destroyed; liquefaction and landslides are widespread.	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.	>124
XI	< 8.1	Most buildings and bridges collapse; roads, railways, pipes, and cables are destroyed; general triggering of other hazards occurs.	Few, if any (masonry structures remain standing. Bridges destroyed. Rails bent greatly.	>124
XII	> 8.1	Total destruction; trees fall; ground rises and falls in waves.	Total damage. Lines of sight and level are distorted. Objects thrown into the air.	>124

Source: Swiss Seismological Service (n.d.).

Dunstable can be expected to have a low to moderate risk of earthquake damage compared to other areas of the country. However, the damage incurred by even a moderate earthquake would still be relatively high. Therefore, Dunstable can be characterized as a "high impact, low probability" earthquake region (Ebel, 2019).

Impacts in Dunstable can vary based on types of construction, building density, and soil type, among other factors. This is demonstrated in the Hazus analysis summarized in Section 4.4.6.

4.6.4. | Previous Occurrences and Frequency

Earthquakes cannot be predicted and may occur at any time. USGS seismic hazard maps are used to determine the likelihood that a given earthquake severity will be exceeded over a defined

period (as shown in Figure 4.5) which maps the PGA with a 2 percent chance of being exceeded in 50 years). However, these maps are not useful for predicting the timing of individual events.

A 1994 report by USGS, based on a meeting of experts at the Massachusetts Institute of Technology, provides an estimated probability of occurrence for earthquakes above magnitude 5.0 (earthquakes of this size can cause damage near their epicenters, and in general larger-magnitude earthquakes can cause damage over larger areas). This report found that the probability of a magnitude 5.0 or greater earthquake centered somewhere in New England in a 10-year period is about 10 to 15 percent, which the Intergovernmental Panel on Climate Change classifies as "unlikely." This probability rises to about 41 to 56 percent for a 50-year period. Larger earthquakes have lower probabilities of occurrence.

Meanwhile, small earthquakes (magnitude 1 to 1.5) like those experienced in Peabody in 2021, typically occur once or twice a month throughout New England (McCarthy, 2021). The rate of earthquake occurrence in New England appears to be fairly constant over time (Northeast States Emergency Consortium, n.d.). There is no research indicating any effects of climate change on the frequency or severity of the earthquakes in the Commonwealth.

Since 1963, there have been 151 earthquake events in Massachusetts (USGS 2023), the highest having a magnitude of 3.7 on the Richter scale. There have been no epicenters located in Dunstable.

4.6.5. | Probability of Future Hazard Events, including Due to Climate Change

"There is no consensus on the effects of climate change on the frequency and severity of earthquakes across the United States or within Massachusetts. Some scientists and researchers have speculated that the effects that sea level rise will have on groundwater levels near the coast may increase the areas exposed to liquefaction risk. Other and research have considered the impacts of extreme precipitation events on increased frequency and intensity of earthquakes. While these questions have been raised and some studies are pursuing further information, there is no current consensus on any links between earthquakes and climate change in the Commonwealth or the United States." (ResilientMass, 2023).

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4.6.6. | Vulnerability and Impacts

In addition to building collapse, earthquakes can cause structural damage to roadways, breakage of water and gas lines, and flooding and fires. Furthermore, landslides can be triggered by earthquakes.

"The area's vulnerability to a devastating earthquake is based primarily on the following elements: the density of the population in the region, and the age of the region's buildings and lack of earthquake proof design. Dunstable is a rural community with a low population density, however, there are a significant number of older buildings that can be found throughout the town (2015 Hazard Mitigation Plan for the Northern Middlesex Region)."

A particularly strong earthquake could be potentially devastating for the town, causing disruptions to daily life and severe structural damage. Using FEMA's Hazus software, potential losses for various earthquake scenarios were estimated. Both a magnitude 5 and a magnitude 7 earthquake would be disastrous for the town. Both scenarios result in severe property damage, large amounts of debris generation, displaced households, people seeking public shelter, and losses due to business interruption. Obviously, a magnitude 7 earthquake would be more detrimental to the Town and have greater, more severe impacts.

Table 4.11: Hazus Earthquake Impacts

Type of Damage or Displacement	Magnitude 5.0	Magnitude 7.0
Building Damages		
Number of buildings sustaining slight damage	375	135
Number of buildings sustaining moderate damage	196	428
Number of buildings sustaining extensive damage	50	341
Number of buildings completely damaged	12	337
Number of households displaced	5	222
Number of people seeking public shelter	2	98
Building debris generated (millions of tons)	0.01	0.08
Number of truckloads to clear building debris	360	3,040
Total property damage (millions of dollars)	86.48	531.53
Total losses due to business interruption (millions of dollars)	8.76	51.35

Table 4.12: Impacts of Earthquakes on Dunstable

Asset Category	Likely Impacts
People	Impacts to people's health, welfare, and safety, including underserved communities and socially vulnerable populations: • Loss of life or severe injury • Vehicle accidents • Injury from debris or falling objects • First responders are particularly at-risk
Structures	Impacts to buildings, facilities, lifelines, and critical infrastructure: • Significant structural damage, especially if buildings are not constructed to withstand seismic forces or if there are insufficient evacuation plans • Critical facilities can be impacted or damaged from ground shaking and falling debris • Collapse of buildings or bridges
Systems	Impacts to transportation systems, and electricity and water systems: • Disruption of government operations • Seismic activity can damage communication infrastructure such as phone lines, cell networks, and data networks • Power outages from damaged electrical infrastructure • Disruption of gas lines, electric lines, or phone service
Natural/Cultural/Historic Resources	Impacts to ecosystems, natural habitats, community areas, historical facilities and locations, and cultural resources: • Potential to trigger secondary hazards such as fires, flash flooding, hazardous materials release, slope failure, dam failure, and tsunamis • Contamination of the environment from hazardous materials • Significant injury to animals or livestock • Historic buildings may not be able to withstand ground shaking due to outdated construction standards
Economic and Community Assets	Impacts to people's ability to work and make a living, and impacts to activities that benefit the community by increasing community morale and well-being: • Expensive response and recovery efforts can drain local resources • Closure of businesses due to damage • Disruption of delivery services due to dangerous transportation conditions

Earthquakes and Population and Land Use Changes

The Town's elderly population is project to increase by 4.4%. Elderly residents and other vulnerable populations are at a higher risk during hazard events, including earthquakes, due to impacts including falls and the inability to respond quickly to the hazard. It is unlikely that earthquakes will change population trends in Dunstable.

There is no known correlation between earthquakes and land use changes.

4.7. Flooding from Precipitation

4.7.1. | Description

Extreme precipitation events can result in flooding, often characterized and "inland flooding" to distinguish it from coastal flooding. This section addresses the risks associated with flooding from high precipitation events, which include convective storms (thunderstorms or other typically sudden and extreme precipitation events), nor'easters, and hurricanes. Also included are inland flood events caused by extreme rainfall events, riverine overtopping, overwhelmed stormwater systems, ice jams blocking drainage, and dam failure or overtopping, described in greater detail below.

"**Riverine Flooding**: Riverine flooding occurs when excessive rainfall over an extended period collects across a watershed and causes a river to exceed its natural drainage capacity.

Stormwater Drainage Flooding: Stormwater drainage flooding is caused by high-intensity rainfall in combination with high amounts of impervious surface area that prevents infiltration. This causes stormwater drainage systems to reach a state of over-capacity, rather than rain causing a river system to exceed its capacity. Drainage systems are designed to remove surface water from developed areas as quickly as possible to prevent localized flooding on streets and other urban areas. They make use of conveyance systems that channel water away from developed areas to surrounding streams, bypassing natural processes of water infiltration into the ground, groundwater storage, and evapotranspiration (plant water uptake and respiration). Since drainage systems reduce the amount of time that rainfall takes to reach surrounding streams, riverine flooding in developed areas can be exacerbated and may occur more quickly and reach greater depths than less densely developed areas. In addition, undersized, poorly maintained, or clogged drainage system increase the frequency and/or severity of this type of flooding.

Ice Jams: An ice jam is an accumulation of ice that acts as a natural dam and restricts the flow of a body of water. There are two types of ice jams: a freeze-up jam and a breakup jam. A freeze-up jam usually occurs in early to mid-winter during extremely cold weather when super-cooled water and ice formations extend to nearly the entire depth of the river channel. This type of jam can act as a dam and begin to back up the flowing water behind it. The second type, a breakup jam, forms because of the breakup of the ice cover at ice- out: large pieces of ice move downstream, potentially piling up at culverts, around bridge abutments, and at curves in river channels. Breakup

ice jams occur when warm temperatures and heavy rains cause rapid snowmelt. The melting snow, combined with the heavy rain, causes frozen rivers to swell. The rising water breaks the ice layers into large chunks, which float downstream and pile up near narrow passages and obstructions (bridges and dams). Ice jams may build up to a thickness great enough to raise the water level and cause flooding upstream of the obstruction.

Dam Failure: As dams are used to impound water by controlling water flow, changes in precipitation intensity and duration can affect dam performance and safety. When reservoir inflows exceed the capacity of a dam's spillway, rising reservoir water levels can result in increased rates of seepage outflow, destabilization of embankment slopes, and/or dam failure due to overtopping." (ResilientMass, 2023).

4.7.2. | Location

Floods can impact a small portion of the Town or the entire Town of Dunstable. Areas of lower elevation are more likely to experience impacts from flooding.

The Federal Emergency Management Agency (FEMA) characterizes the current hazard using floodplain boundaries. These data include the locations of FEMA flood zones:

- The 1 percent annual chance event (also sometimes referred to as 100-year flood) zones, including both A Zones and V Zones
- The 0.2 percent change event (or 500-year flood) zones

While A and V Zones are more likely to experience flooding than X zones, it is still possible to experience flooding in X zones.

Figure 4.10 shows FEMA Flood Zones in Dunstable.

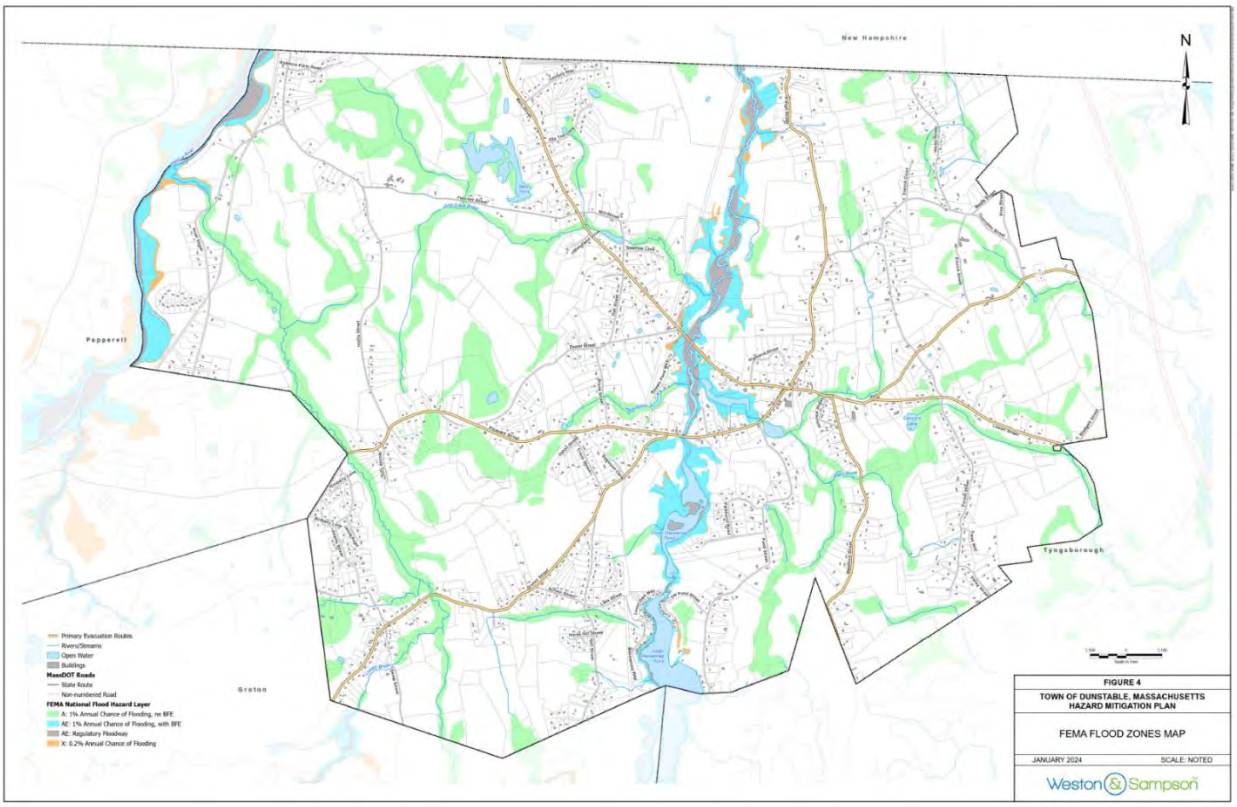


Figure 4.10: FEMA Flood Zones in Dunstable

4.7.3. | Severity/Intensity

As discussed in the previous section, return periods are used to represent the average interval between occurrences of particular rainfall events. Rainfall events with greater return periods will have much more rain than a smaller return period, and thus will cause more flooding and greater damage. Table 4.13 outlines the amount of precipitation that would fall during various return periods in Dunstable.

Table 4.13: 2030, 24-hour rainfall depth

Return Interval:	1 year	2 years	5 years	10 years	25 years	50 years	100 years	200 years	500 years	1000 years
Depth (inches)	2.9	3.6	4.6	5.5	6.7	7.6	8.5	9.7	11.5	13.1

Flooding from precipitation can vary in severity and intensity depending on several factors, including the amount and duration of rainfall, topography, soil conditions, land use patterns, and the capacity of drainage infrastructure. Increases in intensity and duration of precipitation on rainy days can lead to flooding, stress on built infrastructure and ecosystems, and consequent impacts on human health.

4.7.4. | Previous Occurrences and Frequency

Since the previous hazard mitigation plan update in 2015, there have been 38 days of flooding in Middlesex County (NOAA Storm Events Database). There were 13 days where this flooding resulted in property damage (NOAA Storm Events Database). Property damage in Middlesex County since 2015 totaled 1.639 million dollars.

Return periods, also known as recurrence intervals, are statistical measures used to estimate the likelihood of a specific event, such as a rain event of a certain magnitude, occurring within a given timeframe. In the context of rainfall events and flooding, return periods help assess the probability of different levels of rainfall intensity over a specified duration.

For example, a 100-year return period for a rainfall event means that, on average, such an event is expected to occur once every 100 years. It does not mean that the event will occur exactly once every 100 years, but rather that there is a 1% chance of it occurring in any given year. Similarly, a 10-year return period indicates that there is a 10% chance of that rainfall event occurring in any given year. The 2030, 24-hour 100-year rainfall event sees 8.5 inches of rain.

Return periods are typically calculated using historical rainfall data and statistical methods. By analyzing rainfall data from past years, statisticians can estimate the probability of rainfall events of different magnitudes occurring in the future. However, as rainfall has increased over the year years, the historically-calculated 100-year storm event has been occurring more frequently. This is expected to continue into the future, and is covered in Section 4.7.5.

A respondent to the public survey shared the torrential rains during summer 2023 caused significant erosion across town and locations of periodic flooding on side streets.

4.7.5. | Probability of Future Hazard Events, including Due to Climate Change

“Forecasting precipitation under climate change is complex, but scientists expect that there will be more precipitation overall in Massachusetts, on an annual basis and in most years: higher temperatures will mean the moisture-holding capacity of the atmosphere increases, but also that evaporation rates are higher. Patterns to date suggest that annual precipitation is likely to be more variable, and fall over few days, but that precipitation will be more intense on days when it does rain or snow. According to climate projections for Massachusetts, annual precipitation will increase and will fall more intensely at the daily to weekly scale. Climate change is also projected to bring longer and deeper periods of drought and/or reduced precipitation.” (ResilientMass, 2023).

Figure 4.11 below shows projected precipitation intensity and frequency over time in the central region of Massachusetts, where Dunstable is located. The graph shows changes in the expected size of a 10-year return period rainstorm (i.e., a storm, defined in terms of equal or greater precipitation within 24 hours, that has 10 percent chance of occurring in a given year) and the

expected frequency of rainstorms that would meet the current 10-year return period size (ResilientMass, 2023).

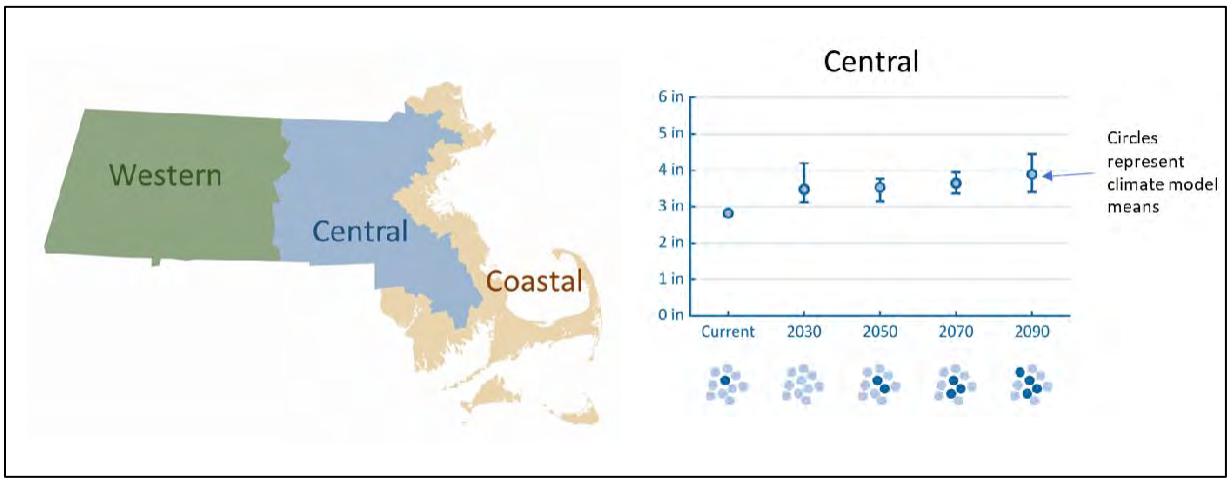


Figure 4.11: Changes in Intensity and Frequency of 10-year return period precipitation events

Source: MA Climate Assessment (Commonwealth of Massachusetts, 2022).

Figure 4.11 Note: A 10-year size indicates a 10 percent chance of equal or greater precipitation within 24 hours in a given year. Bar charts show the projected size of 10-year return period events, and filled dots show the anticipated frequency of storms that would exceed current 10-year return period events.

Under the current climate, the 10-year return period event is roughly 3 inches. By the end of the century, the intensity of the 10-year return period event is expected to increase by one third, to 4 inches in a day. The frequency of the current 10-year return period event is expected to increase by the end of the century by a factor of four in the Central region.

The ResilientMA Climate Change Projections Dashboard shows precipitation for the years 2030, 2050, 2070, and 2090 on an annual basis for the Town of Dunstable. Figures 4.12 and 4.13 show the contrast between 2030 and 2090 for precipitation.

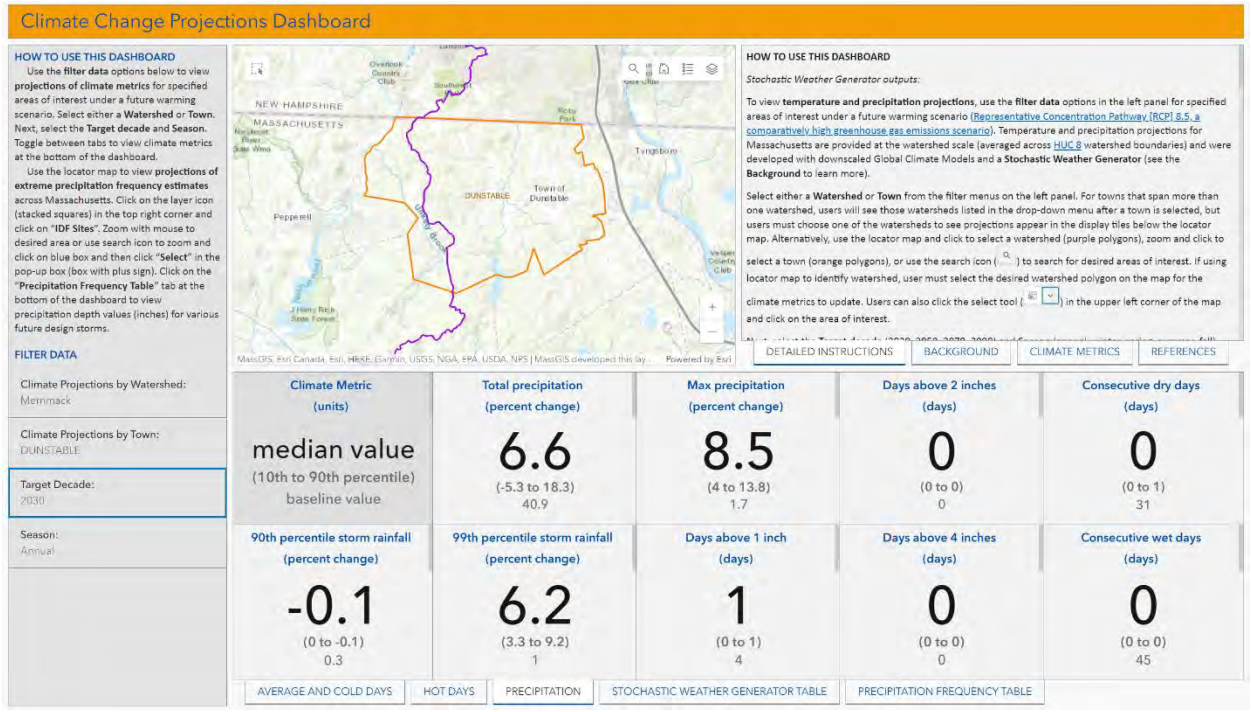


Figure 4.12: Annual Precipitation Projections for 2030

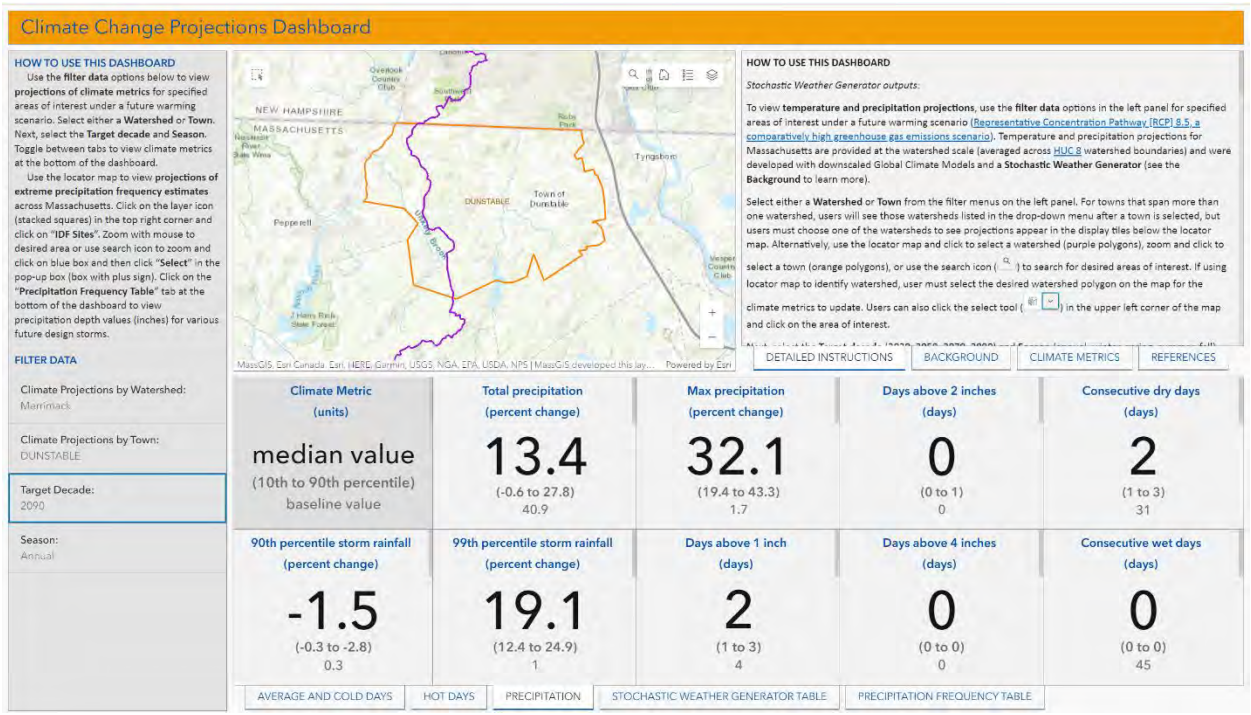


Figure 4.13: Annual Precipitation Projections for 2090

4.7.6. | Vulnerability and Impacts

Precipitation flooding includes stormwater flooding, riverine flooding, and flooding from dam overtopping. Riverine flooding is most likely to impact areas closest to bodies of water, while stormwater flooding can occur anywhere in the Town. Stormwater flooding is often concentrated to smaller areas including parking lots and roadways. Dam overtopping can impact areas adjacent to and downstream of the dam. Dams are categorized by DCR as "high hazard", "significant hazard" and "low hazard". Higher hazard dams post a greater risk to downstream populations. Dunstable has four low hazard and two significant hazard dams.

Much of the infrastructure in Dunstable, including bridges, stormwater systems, and roadways were designed based on historical rain events. With increased frequency and severity of storm events, inland flooding could become an increased vulnerability for the Town to manage. Recently, more frequent occurrences of flood events larger than the historic have occurred and put vital infrastructure at risk. Much of the population of Dunstable lives on dirt roads in isolated areas, and damage to the road network could impact a large percentage of the population and result in inability for them to get to work, appointments, and other essential locations.

Attendees of the CRB workshop expressed concerns regarding precipitation flooding. Dunstable residents noted the commonality of basement flooding, and their concerns regarding flooding from snow melt and rain. In addition, heavy rains have caused "gullies" alongside roadways, due to country drainage. This has created concerning infrastructure conditions and heavy maintenance and repair needs. Additionally, residents have noticed the impact that beaver dams have on increasing water levels and flooding in town and expressed interest in better monitoring of this impact. The Fire Department faces basement flooding due to water levels in nearby Salmon Brook.

A resident who took the public survey shared that the increase and rapid rainfall quickly causes flash flooding on our town streets and can result in flooded basements.

Using FEMA's Hazus software, potential losses during the 100-year and 500-year flood events were estimated. As seen in Table 4.14, both the 100- and 500-year flood event have the potential to displace many people from their homes, generate a few tons of debris, and cause losses due to business interruption.

Table 4.14: Hazus Flooding Impacts

Type of Damage or Displacement	100-Year	500-Year
Building Damages		
Number of buildings sustaining slight damage	3	10

Type of Damage or Displacement	100-Year	500-Year
Number of buildings sustaining moderate damage	0	0
Number of buildings sustaining extensive damage	0	0
Number of buildings completely damaged	0	0
Number of households displaced	52	84
Number of people seeking public shelter	8	8
Building debris generated (tons)	5	8
Number of truckloads to clear building debris	1	1
Total property damage (millions of dollars)	0.62	1.32
Total losses due to business interruption (millions of dollars)	6.07	8.80

The following community assets are at risk of flooding due to their proximity to mapped flood zones:

- The Dunstable Post Office
- The Dunstable Police Station
- The Dunstable Fire Station
- The Public Library
- The Massapoag Pond Dam
- The Woodwards Mill Dam
- The YMCA
- Salmon Brook Well #1 and #2

There are some community assets of historical significance in Dunstable that are vulnerable to flooding due to their proximity to flood zones, as well:

- Camp Massapoag Cabins
- Ebenezer Kendall House
- 466 Main Street
- 458 Main Street

- Lowell Street Property
- East Main Street Gates
- Captain Josiah Cummings House
- W. Gillson House
- Locust Avenue Bridge over Route 3
- Dea. Zebedee Kendall House
- 726 Main Street
- R. Robbins House
- Blood Cemetery
- Eber Blood House

Table 4.15: Impacts due to Flooding from Precipitation

Asset Category	Likely Impacts
People	Impacts to people's health, welfare, and safety, including underserved communities and socially vulnerable populations: • Physical injury or death • Increase in physiological stressors • Displacement due to building damage • Isolation due to road closures • Mold and allergens from water damage creates an increased risk to people with existing respiratory damage • Increase in vector-borne diseases and bacterial infections • Increased rate of emergency room visits
Structures	Impacts to buildings, facilities, lifelines, and critical infrastructure: • Water damage to internal and external of buildings, including houses, governmental buildings, community lifelines, and critical infrastructure • Damage to facilities
Systems	Impacts to transportation systems, and electricity and water systems: • Disruption to roadways because of water and debris blocking routes and road washouts, making transportation networks impassible or unsafe • Damage to utility infrastructure • Bridge support scour • Dams are at higher risk of overtopping or experiencing damage from flooding
Natural/Cultural/Historic Resources	Impacts to ecosystems, natural habitats, community areas, historical facilities and locations, and cultural resources: • Damage or destruction of the natural environment

Asset Category	Likely Impacts
	• Ecosystem degradation and reduced water quality due to increased sedimentation, nutrients, and contaminants from agriculture practices, stormwater runoff, and septic overflow. • Loss of habitat • Erosion • Changes in river and stream ecology • Forest health degradation • Damage to cultural resources and sites • Damage to historic buildings and sites • Parks and public spaces could experience damage or disruptions
Economic and Community Assets	Impacts to people's ability to work and make a living, and impacts to activities that benefit the community by increasing community morale and well-being: • Business interruption • Limited patrons resulting in reduced revenue • Increased costs of maintenance • Increase in demand for municipal services • Increased cost for response and repairs • Temporary loss of community activities

Precipitation Flooding and Population and Land Use Changes

As the general population increases and additional land in Dunstable is developed, the increase in impervious surfaces will cause additional runoff and flooding during heavy precipitation. The floodplain overlay district and wetland bylaw protects new development from encroaching too close to water bodies, to help lower flood impacts. Flooding from precipitation will mostly affect changes in land uses, as areas that flood due to riverine and/or stormwater flooding will be less desirable to develop/redevelop and those living in those areas may move away from the location. These flooded areas, over time, may move from developed to restored natural areas. In addition, areas that flood that are natural now may be undesirable to develop in.

4.8. Hurricanes / Tropical Cyclones

4.8.1. | Description

Hurricanes originate from tropical storms, which form rotating cloud systems, developing over tropical or subtropical waters. There are four classifications of these types of storms (tropical cyclones):

- "Tropical Depression: A tropical cyclone with maximum sustained winds of 38 mph (33 knots) or less.
- Tropical Storm: A tropical cyclone with maximum sustained winds of 39 to 73 mph (34 to 63 knots).

- Hurricane: A tropical cyclone with maximum sustained winds of 74 mph (64 knots) or higher. In the western North Pacific, hurricanes are called typhoons; similar storms in the Indian Ocean and South Pacific Ocean are called cyclones.
- Major Hurricane: A tropical cyclone with maximum sustained winds of 111 mph (96 knots) or higher, corresponding to a Category 3, 4 or 5 on the Saffir-Simpson Hurricane Wind Scale." (NOAA, n.d.)

"The term "tropical" refers both to the origin of these systems, which usually form in tropical regions of the globe, and their formation in maritime tropical air masses. The term "cyclone" refers to such storms' cyclonic nature, with counterclockwise wind flow in the Northern Hemisphere and clockwise wind flow in the Southern Hemisphere.

A tropical storm system is characterized by a low-pressure center and numerous thunderstorms that produce strong winds and heavy rain. Tropical storms strengthen when water evaporates from the ocean and is released as the saturated air rises, resulting in condensation of the water vapor contained in the moist air. These storms are fueled by a different heat mechanism than other cyclonic windstorms, such as nor'easters and polar lows. The characteristic that separates tropical cyclones from other cyclonic systems is that at any height in the atmosphere, the center of a tropical cyclone will be warmer than its surroundings—a phenomenon called "warm core" storm systems" (ResilientMass, 2023).

4.8.2. | Location

Despite being located inland, Dunstable is still vulnerable to the impacts of hurricanes and tropical cyclones. While coastal areas are typically more directly affected by hurricanes, Dunstable's vulnerability lies in the potential for severe weather conditions and flooding that can accompany tropical storms as they move inland. Heavy rainfall associated with hurricanes can lead to flash flooding, especially in low-lying areas or regions with poor drainage systems. Strong winds from hurricane remnants can also cause town-wide damage to structures, uproot trees, and disrupt power lines, impacting the local community.

4.8.3. | Severity/Intensity

"Hurricanes are measured according to the Saffir-Simpson scale, described in Table 4.16 below, which categorizes hurricanes from 1 (minimal) to 5 (catastrophic) based on their intensity. This is used to estimate the property damage and flooding expected from a hurricane landfall. Wind speed is the determining factor in the scale, as storm surge values are highly dependent on the slope of the continental shelf and the shape of the coastline in the landfall region. All winds are assessed using the U.S. one-minute average, meaning the highest wind that is sustained for one minute (ResilientMass, 2023)."

Table 4.16: Hurricane Categories

Scale No. (Category)	Winds (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

Scale No. (Category)	Winds (mph)	Potential Damage
		structures.
2	96–110	Moderate: Some trees topple, some roof coverings are damaged, and major damage is done to mobile homes.
3	111–129	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	130–156	Extreme: Extensive damage is done to roofs, windows, and doors; roof systems on small buildings completely fail; and some curtain walls fail.
5	>157	Catastrophic: Roof damage is considerable and widespread, window and door damage is severe, there are extensive glass failures, and entire buildings could fail.

Source: NOAA (n.d.-d).

"Tropical storms (39–73 mph) and tropical depressions (38 mph or less), while generally less dangerous than hurricanes, often cause widespread damage, disruption, and injury and loss of life. Tropical storms can produce extremely powerful wind gusts and torrential rain, high waves, damaging storm surge, and tornadoes. These storms develop over large bodies of warm water but can lose their strength as they move over land due to increased surface friction and loss of the warm ocean as an energy source. The heavy rains that are often associated with a tropical storm can produce significant inland flooding, and storm surges can produce extensive coastal and inland flooding up to 25 miles from the coastline. Widespread and lengthy power outages are often a result of these events. For example, after Hurricane Irene passed through the region as a tropical storm in late August 2011, many areas of the Commonwealth were without power for more than five days (ResilientMass, 2023)."

4.8.4. | Previous Occurrences and Frequency

Dunstable has been impacted by two tropical storms since the previous hazard mitigation plan update. Tropical storms occurred on September 20, 2017, and August 4, 2020. Together these storms caused $20,500 worth of damage in Middlesex County (NOAA Storm Events Database, 2023). Tropical storms and hurricanes have occurred in the proximity of the Commonwealth about once every two years on average. NOAA's National Hurricane Center estimates that a Category 3 hurricane could occur once every 50–60 years (NOAA, n.d.-e).

A respondent to the public survey shared that a hurricane back in late 80's/east 90's did quite a bit of damage in Dunstable.

4.8.5. | Probability of Future Hazard Events, including Due to Climate Change

"Both historic events and models of future conditions suggest that climate change will cause the intensity of tropical storms and hurricanes to increase, though uncertainty remains over the relationship between the frequency of tropical cyclones and climate change. The IPCC reports low confidence in observations of long-term changes to tropical cyclone frequency, partly due to inadequate historical data (IPCC, 2021). There is some evidence of a relative increase in the frequency of tropical cyclones in the Atlantic, resulting from a poleward shift in hurricane activity due to warmer temperatures (Shelton, 2022). Together with the increasing intensity and duration of tropical cyclones, these changes are likely to lead to significant changes in this hazard for the Atlantic coast (Dinan, 2017; Marsooli et al., 2019). A recent study of Atlantic tropical cyclones downscaled from climate reanalysis indicates increasing activity over the past 150 years, with a significant uptick since 1990 (Emanuel, 2021). The MA Climate Assessment identifies a possible increase in tropical cyclone frequency of nearly 50 percent by the end of the century (Commonwealth of Massachusetts, 2022)." (ResilientMass, 2023)

4.8.6. | Vulnerability and Impacts

Hurricane force winds can destroy buildings and mobile homes. Items that are not secured can quickly become airborne debris that can cause severe injury. Hurricanes can also spawn tornadoes. Heavy rain associated with hurricanes can cause extreme flooding. Historically, flooding has occurred on River Street, Main Street (near Sweets Pond), Lowell Street, and Forest Street (2015 Hazard Mitigation Plan for the Northern Middlesex Region). Hurricane rain and winds can result in downed trees and tree limbs, blocked roads, and downed telephone and power lines. This can severely disrupt transportation routes and communication channels. The elderly and those with mobility issues are of particular concern during hurricane or tropical storm events.

Using FEMA's Hazus software, potential losses for a Category 2 and Category 4 storm were estimated. Both storms have the potential to greatly impact the Town of Dunstable by causing property damage, debris generation, and business interruptions, as seen in Table 4.17.

Table 4.17: Hazus Earthquake Impacts

Type of Damage or Displacement	Category 2	Category 4
Building Damages		
Number of buildings sustaining minor damage	29.06	147.98
Number of buildings sustaining moderate damage	1.02	13.78
Number of buildings sustaining severe damage	.02	0.39
Household Displacement and Needs		
Number of households displaced	0	0

Type of Damage or Displacement	Category 2	Category 4
Number of people seeking public shelter	0	0
Debris		
Building debris generated (tons)	621	1,444
Tree debris generated	516	982
Number of 25-ton truckloads to clear building debris	4	18
Value of Damages		
Total property damages	$6,812.77	$17,297.44
Total losses due to business interruption	$95.37	$438.85

Dunstable residents at the CRB workshop discussed how the Hurricane of 1938 caused significant rain, wet conditions, and took down many trees, and how Hurricane Carol in the 1950s had an impact on Dunstable: it also took down a lot of trees, significantly changing the landscape of the town.

Table 4.18: Impacts of Hurricanes and Tropical Cyclones on Dunstable

Asset Category	Likely Impacts
People	Impacts to people's health, welfare, and safety, including underserved communities and socially vulnerable populations: • Death and Injury • Mental health impacts such as anxiety or PTSD • Displacement • Loss of property
Structures	Impacts to buildings, facilities, lifelines, and critical infrastructure: • Damage to buildings from high winds, flying debris, or flooding • Power outages • Damage to critical facilities is possible
Systems	Impacts to transportation systems, and electricity and water systems: • Damage to transportation infrastructure such as roads or bridges can impact emergency responses and daily travel • Damage to telecommunications infrastructure can disrupt communications

Asset Category	Likely Impacts
	• Widespread power outages can disrupt critical facilities, emergency response centers, water treatment plants, and hospitals • Water supply interruptions from flooding or damage to water treatment plants and pipelines • Flooding can overwhelm wastewater systems causing contamination and health risks • Utility services such as gas may be disrupted
Natural/Cultural/Historic Resources	Impacts to ecosystems, natural habitats, community areas, historical facilities and locations, and cultural resources: • Historic buildings may not be able to withstand high winds • Increased coastal erosion • Potential for flash flooding and storm surge
Economic and Community Assets	Impacts to people's ability to work and make a living, and impacts to activities that benefit the community by increasing community morale and well-being: • Decreased economic activity • Expensive response and recovery costs • Damage to businesses or business closures • School closures

Hurricanes/Tropical Cyclones and Population and Land Use Changes

The Town's elderly population is projected to increase 4.4% by 2040, thus creating a larger demographic of residents vulnerable to hurricane/tropical cyclone impacts. Because Dunstable is so far inland, it is unlikely that hurricanes and tropical cyclones will have a significant impact on population trends.

No correlation is established between hurricanes/tropical cyclones and land use changes.

4.9. Invasive Species

4.9.1. | Description

The term invasive species can apply to both flora and fauna. This section will focus on plants and insects (referred to as pests) specifically. The Massachusetts Invasive Plant Advisory Group (MIPAG) was founded in 1995 by the Executive Office of Energy and Environmental Affairs to inform the Commonwealth about the presence and management of invasive species. MIPAG defines invasive species as meeting the following four base criteria (MIPAG, 2022):

- non-indigenous to Massachusetts,
- demonstrates the potential for rapid and widespread dispersion and establishment,
- has the potential to disperse over spatial gaps,

- exists in high numbers in natural habitats.

"Invasive species have biological traits that give them competitive advantages over native species, particularly because they are not restricted by the biological controls of their native habitat. As a result, invasive species can outcompete natural communities, displacing many natives and causing widespread economic and environmental damage" (ResilientMass, 2023).

Pests exacerbate the problems that invasive plant species pose. Pests often prey on native plant species, causing pre-mature death and creating gaps in the eco-system for invasive species to fill. Certain pests, while not necessarily detrimental to the environment, can pose a threat to public health.

4.9.2. | Location

Invasive species are a widespread problem that have that potential to impact the entirety of Dunstable, although the impacts of these species vary by location, elevation, ecosystem, and habitat type, as well as land and water uses. Locations with the greatest susceptibility include natural areas, waterways and wetlands, roadsides and disturbed areas, agriculture areas, and areas that are landscaped with non-native species.

The ability of invasive species to travel far distances (via either natural mechanisms once established or accidental human transport) allows them to propagate rapidly over a large area. Similarly, in open freshwater and marine ecosystems, invasive species can spread quickly, as there are generally no physical barriers (other than physiological tolerances) to prevent establishment, and commercial and recreational water activities provide ample opportunities for transport to new locations.

A respondent to the public survey noted that Garlic Mustard, Bittersweet, Japanese Knotweed, Milfoil and Curly Leaf Pondweed in the Lake Massapoag area are problematic. Another resident to the public survey clarified that bittersweet is pervasive in the town's conservation areas, which has a significant negative impact on native species. It was noted at the CRB Workshop that the invasive species Wintercreeper (Euonymus fortunei) evergreen vine and Japanese Knotweed are becoming quite prevalent along roadsides.

4.9.3. | Severity/Intensity

"The geographic extent, severity, and intensity of invasive species varies greatly depending on the species in question and other factors, including the availability of hospitable natural or artificial habitats, as well as availability of disturbed habitats and ecosystems, and the range that the invasive species can inhabit. Invasive species are measured through monitoring and recording observations into existing databases. However, monitoring and reporting activities are time-consuming and costly and must be factored into the costs of this hazard.

Quantifying the extent of, and resultant damage from, invasive species can be challenging due to several factors. For one, accurately mapping their distribution and abundance is difficult due to their uneven distribution, dispersal mechanisms and speed, and impact from human activities. Invasive species may establish and spread in areas where they have not been previous documented and are not noticed until they reach high population densities. "Additionally, there is no way to directly evaluate or quantify impacts from invasive species on aesthetics or the perceived value of natural areas (Marsh et al., 2021)."

4.9.4. | Previous Occurrences and Frequency

Because the presence of invasive species is ongoing rather than a series of discrete events, it is difficult to quantify the frequency of these occurrences. However, increased rates of global trade and travel have created many new pathways for the dispersion of species outside their natural ranges. As a result, the frequency with which these threats have been introduced has increased significantly with globalization. Increased international trade in ornamental plants is particularly concerning because many of the invasive plant species in the U.S. were originally imported as ornamentals or for medicinal purposes. **Dunstable residents at the CRB workshop expressed concern about both Japanese knotweed and bittersweet. They also noted that the new jumping worm is having severe impacts on soil quality. Residents stated that recently they were seeing an impact to wooded areas in Dunstable due to non-native species.**

4.9.5. | Probability of Future Hazard Events, including Due to Climate Change

There are a multitude of factors that can determine the ability of invasive species to survive and propagate. These factors include "temperature, concentration of carbon dioxide in the atmosphere and oceans, frequency and intensity of coastal storm events, habitat disturbances (from storms, flooding, and other weather-related events), changes in seasons due to climate change (e.g., shorter winters, drier summers) and available nutrients. Climate change is already altering these variables, increasing the temperature of the oceans, the frequency and intensity of storms, and the concentration of carbon dioxide in the atmosphere and the oceans." (ResilientMass, 2023).

"Additionally, increased risks to ecosystems from flooding, fire, drought, and heat, are already creating stress to native flora and fauna, making it easier for invasive species to outcompete them. Some research suggests that extreme weather events, which are increasing due to climate change, may lead to increased establishment of invasive species. Extreme events, such as hurricanes, high wind events, and others, can cause damage or mortality for native species and allow invasive species to take over as they are often able to establish more rapidly following a disturbance (North American Invasive Species Management Association, 2022). Other climate change impacts that could increase the severity of the invasive species hazard include the following (Casey, 2021; Finch et al., 2021; North American Invasive Species Management Association, 2022; Sorte, 2014):

- Elevated atmospheric carbon dioxide levels could increase some organisms' photosynthetic rates, improving the competitive advantage of those species.
- Changes in atmospheric conditions, such as changes in temperature and humidity, could decrease the transpiration rates of some plants, increasing the amount of moisture in the underlying soil. Species that could most effectively capitalize on this increase in available water would become more competitive.
- Fossil fuel combustion can result in widespread nitrogen deposition, which tends to favor fast-growing plant species. In some regions, these species are primarily invasive, so continued use of fossil fuels could make conditions more favorable for these species.
- As the growing season shifts to earlier in the year, several invasive species (including garlic mustard, Japanese barberry, glossy and common buckthorn, and Asian bush honeysuckle) have proven more able to capitalize on this by beginning to flower earlier, which allows them to outcompete later-blooming plants for available resources. Species whose flowering times do not respond to elevated temperatures have decreased in abundance.
- Some research has found that forest pests (which tend to be ectotherms, drawing their body heat from environmental sources) will flourish under warming temperatures. As a result, the populations of defoliating insects and bark beetles are likely to increase.
- Warmer winter temperatures also mean that fewer pests will be killed over the winter season, not only allowing populations to grow beyond previous limits, but also allowing southern pests previously limited by winter temperatures to spread north into Massachusetts." (ResilientMass, 2023)

4.9.6. | Vulnerability and Impacts

Invasive species can have far reaching impacts on the town of Dunstable and its surrounding areas. Invasive species can sometimes outcompete native species, resulting in the extinction of local flora or fauna. Invasive species can be direct predators for local flora and fauna. This can disrupt or upset ecosystems. Additionally, invasive species have the potential to spread disease.

Table 4.19: Impacts of Invasive Species on Dunstable

Asset Category	Likely Impacts
People	Impacts to people's health, welfare, and safety, including underserved communities and socially vulnerable populations: • Increased potential for vector-borne diseases • Invasive species can bring new diseases or aggravate existing health problems
Structures	Impacts to buildings, facilities, lifelines, and critical infrastructure: • Japanese knotweed is known to decrease streambank stability and contribute to topsoil erosion which can contribute to flood damage

Asset Category	Likely Impacts
Systems	Impacts to transportation systems, and electricity and water systems: • Facilities that rely on biodiversity or the health of the surrounding ecosystems such as outdoor recreation areas or agricultural/forestry operations could be vulnerable • Japanese knotweed is known to decrease streambank stability and contribute to topsoil erosion which can contribute to flood damage
Natural/Cultural/Historic Resources	Impacts to ecosystems, natural habitats, community areas, historical facilities and locations, and cultural resources: • Die-off of native species that are unable to complete with invasive species • Loss of biodiversity • Loss of ecosystem function • Potential loss of species that were culturally important • Japanese knotweed can contribute to streambank destabilization and erosion
Economic and Community Assets	Impacts to people's ability to work and make a living, and impacts to activities that benefit the community by increasing community morale and well-being: • Increased cost of ongoing control efforts • Economic impact from loss of crops, aquaculture, and public goods such as water quality

Invasive Species and Population and Land Use Changes

There is no known correlation between population changes and invasive species.

As more of the Town is developed, as predicted, new and different landscaping could impact invasive species. Smart development has the potential to reduce and stop the spread of invasives. Overall, the presence of invasive species are unlikely to significantly impact land use changes.

4.10. Landslides / Mudflows

4.10.1. | Description

"A landslide or mudflow is the movement of rocks, earth, or debris down a slope (USGS, n.d.-b). The most common types of landslides in Massachusetts include translational debris slides, rotational slides, and debris flows (Mabee & Duncan, 2013). Most of these events are caused by a combination of unfavorable geologic conditions (silty clay or clay layers contained in glaciomarine, glaciolacustrine, or thick till deposits), steep slopes, and/or excessive water or saturated soils leading to excess pore pressures in the subsurface. In 2013, the Massachusetts Geological Survey

and the University of Massachusetts Amherst published a Slope Stability Map of Massachusetts. This project, which was funded by the Federal Emergency Management Agency's Hazard Mitigation Grant Program, was designed to provide statewide mapping and identification of landslide hazards that can provide the public, local governments, and emergency management agencies with the locations of areas where slope movements have occurred or may possibly occur in the future under conditions of prolonged moisture and high-intensity rainfall. Historical landslide data for the Commonwealth suggest that most landslides are preceded by two or more months of higher-than-normal precipitation, followed by a single, high-intensity rainfall of several inches or more that can cause slopes to become saturated and fail (Mabee & Duncan, 2013).

Landslides associated with slope saturation occur in areas with steep slopes underlain by glacial till or bedrock. Bedrock is impermeable relative to the unconsolidated material that overlies it. Similarly, glacial till is less permeable than the soil that forms above it. Thus, there is a permeability contrast between the overlying soil and the underlying, less permeable, un-weathered till and/or bedrock. Water accumulates on this less permeable layer and cannot filter through it, resulting in pore pressure at the interface of the hard and impermeable layer and the soils and unconsolidated material that forms the surface. This interface becomes a plane of weakness and materials above it are at high risk for landslides.

Geologic conditions also contribute to landslide risk. Adverse geologic conditions exist wherever there are lacustrine or marine clays, as clays have relatively low strength. These clays often formed in the deepest parts of the glacial lakes that existed in Massachusetts following the last glaciation. These lakes include Bascom, Hitchcock, Nashua, Sudbury, Concord, and Merrimack, among many other smaller glacial lakes in more remote areas of the Commonwealth. The greater Boston area is underlain by the Boston Blue Clay, a glaciomarine clay. The northeastern coast of Massachusetts is underlain by marine clays. When over steepened or exposed in excavations, these vulnerable areas often produce classic rotational landslides.

External forces such as undercutting due to flooding or wave action can initiate landslides. Undercutting of slopes during flooding or coastal storm events is a major cause of property damage. Streams and waves erode the base of the slopes, causing them to over- steepen and eventually collapse. This is particularly problematic in unconsolidated glacial deposits, which cover most of the Commonwealth. This type of failure occurs often along the coasts and rivers in the Commonwealth, for example in Cape Cod, Nantucket, Martha's Vineyard, Scituate, Newbury, the Connecticut River Valley, the Cold River in Savoy, and the Deerfield River.

Another external force can be construction. Construction-related failures occur predominantly in road cuts through glacial till where topsoil has been placed on top of the till. Examples of these failures can be found along the Massachusetts Turnpike. Other construction-related failures occur in utility trenches constructed in areas with very low cohesive strength and an associated a high water table (usually within a few feet of the surface). This situation occurs in sandy deposits with very few fine sediments and can occur in any part of the Commonwealth.

In Massachusetts, landslides tend to be more isolated in size and pose threats to linear systems and networks such as highways, roadways, rail, and utilities. Additionally, due to their location in more remote and less populated areas, structures that support fisheries, tourism, outdoor

recreation, rural communities, and interstate transportation infrastructure are often exposed to landslides." (ResilientMass, 2023).

4.10.2. | Location

Landslides and mudflows are most likely to occur in areas of elevation changes or higher slopes. The 2013 slope stability map (see Figure 4.14) categorizes areas of Massachusetts into stability zones, and the categorization is correlated to the probability of instability in each zone. The probability of instability metric indicates how likely each area is to be unstable, based on the parameters used in the analysis (e.g., slope angle, angle of internal friction and cohesion, flow direction, transmissivity/recharge) (Mabee & Duncan, 2013).

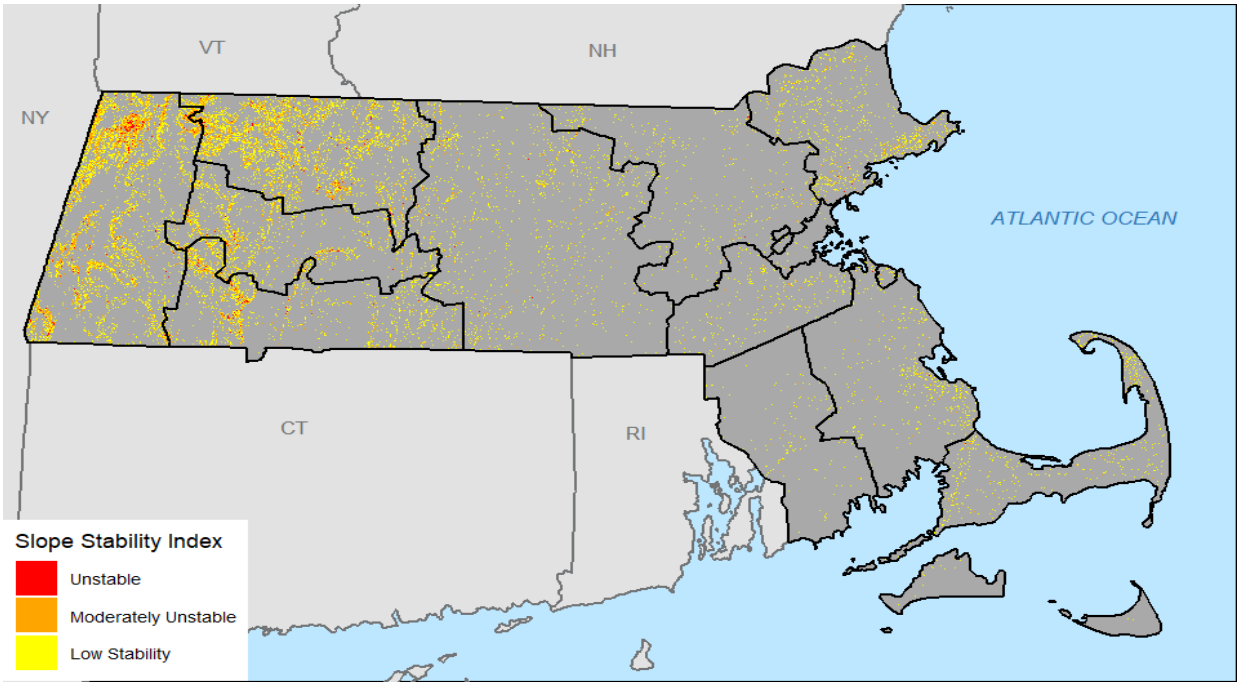


Figure 4.14: Slope Stability Map of Massachusetts

While Dunstable is located in an area not typically associated with high landslide or mudflow risk compared to regions with steeper terrain or more frequent heavy rainfall, there are still factors that could contribute to localized risks. These include areas of town with slopes that are prone to instability, especially those that have been altered by human activities such as construction or landscaping. Soil characteristics such as loose or poorly compacted soils, particularly if they are situated on slopes, can increase vulnerability. Saturated soils have lower stability, and limited vegetation cover can cause erosion and reduce water absorption from the soil.

Specific areas of Dunstable with a higher susceptibility to landslide include:

- Depot street between Pleasant Street and Brook Street
- South of Larter Field
- Lower Dam Way
- East side of Bass Pond

- River Street near Unkety Brook Wildlife Management Area

4.10.3. | Severity/Intensity

"Variables that contribute to the extent of potential landslide activity include soil properties, topographic position and slope, and historical incidence. Predicting a landslide is difficult and data are limited and hard to collect due to limited monitoring instruments and lack of eyewitness accounts. As a result, estimations of the severity of landslides are informed by previous occurrences as well as an examination of landslide susceptibility. Information about previous landslides can provide insight on where landslides may occur and what types of damage may result. It is important to note, however, that susceptibility only identifies areas potentially affected and does not imply a timeframe when a landslide might occur. Nor does this process account for how climate change is altering the intensity and frequency of the hazards that increase the risks of landslides. Therefore, it is important not to rely solely on past events, but to also consider the variables and conditions that increase landslide risk and evaluate areas for those factors (ResilientMass, 2023)."

4.10.4. | Previous Occurrences and Frequency

Landslides commonly occur shortly after other major natural disasters, such as extreme precipitation events, wildfire, earthquakes, and floods, which can slow response and recovery efforts, including emergency response, evacuations, debris removal, restoration of services, and stabilization efforts. Many landslide events occur in remote areas and are unobserved or reported, making it difficult to account for the frequency of landslides, the scale of such events, and the geographic range. In general, landslides are most likely during periods of higher-than-average rainfall, with the intensity of the rainfall being an important factor, as well as the health of the soil. Areas that have experienced disturbance due to wildfire, drought, invasive species, recent development, or vegetation or tree removal are more likely to experience landslides.

There are no records of significant landslides or mudflows in Dunstable.

4.10.5. | Probability of Future Hazard Events, including Due to Climate Change

"It is difficult to determine the probability of future occurrences due to a lack of recent data on landslides in the Commonwealth (The 2013 data for landslides in Massachusetts—the most data recent available—are a decade old). Impacts of climate change on the duration and intensity of rainfall events, wildfire, drought, and invasive species will result in an increase in the frequency of landslides and may result in an increase in the areas at risk from landslides. Another factor is the changes in the intensity and type of land uses in areas with high risk for landslides (ResilientMass, 2023)."

4.10.6. | Vulnerability and Impacts

Landslides or mudflows can cause significant damage to trees, structures, roadways, cars, and other built infrastructure. This damage can result in blocked transportation routes, road closures, general disruption to daily life, and costly repairs.

Table 4.20: Impacts of Landslides/Mudflows on Dunstable

Asset Category	Likely Impacts
People	Impacts to people's health, welfare, and safety, including underserved communities and socially vulnerable populations: • Death or Injury • Loss of property
Structures	Impacts to buildings, facilities, lifelines, and critical infrastructure: • Collapse of buildings or other damage • Damage to critical infrastructure
Systems	Impacts to transportation systems, and electricity and water systems: • Blocked or damaged roadways or bridges • Potential to impact utility services such as power, water, or gas lines • Road closures
Natural/Cultural/Historic Resources	Impacts to ecosystems, natural habitats, community areas, historical facilities and locations, and cultural resources: • Increased erosion
Economic and Community Assets	Impacts to people's ability to work and make a living, and impacts to activities that benefit the community by increasing community morale and well-being: • Cancellation of community events • Possible business or school closures

Landslides/Mudflows and Population and Land Use Changes

The growing population of elderly residents in Dunstable will create an increased risk to landslides and mudflows.

As the Town becomes more developed in the future, land clearing for new development may increase the risk of landslides as slopes are unprotected. It is unlikely that landslides will significantly affect changes in land use or population trends.

4.11. Other Severe Weather

4.11.1. | Description

Other severe weather refers to conditions such as high winds, thunderstorms, lightning, thunder, hail, tropical storms, and extreme precipitation events. The ResilientMass Plan defines these conditions below:

High Winds

"Wind advisory events are defined by the National Weather Service (NWS) as sustained winds of 31 to 39 miles per hour for at least one hour or any gusts of 46 to 57 miles per hour over land. Wind advisories pose a moderate threat to life and property and the NWS recommends securing objects that are outdoors and taking caution when driving in wind advisories. High winds are sustained winds of over 40 miles per hour or any gusts of over 58 miles per hour and pose a high threat to life and property. The NWS recommends reducing driving speeds and seeking shelter during high winds. Over water, the NWS issues a small craft advisory for sustained winds of 25 to 33 knots, a gale warning for sustained winds of 34 to 47 knots, a storm warning for sustained winds of 48 to 63 knots, or a hurricane-force wind warning for sustained winds of 64 knots or more.

For tropical systems, the NWS issues a tropical storm warning for any inland or coastal areas expecting sustained winds of 39 to 73 miles per hour. NWS issues a hurricane warning for any coastal or inland areas expecting sustained winds of 74 miles per hour. High winds can cause downed trees and/or power lines; damage to communication infrastructure; and damage or loss to buildings, particularly roofs, windows, outbuildings, and structures and utilities on roofs or outside of buildings. High winds can also damage unanchored structures such as mobile homes, carports, awnings, trampolines, and debris that is not properly stored, including hazardous waste and toxic materials. High wind events can disrupt transportation services, resulting in air travel delays, cancellation of ferry service, closed roadways due to debris and downed power lines, and transit service delays. High winds also pose unique risks to outdoor workers and often result in power outages, transportation delays, and communication disruptions due to downed trees and power lines. High winds are also a hazard for the maritime, shipping, and aviation industry sectors." (ResilientMass, 2023)

Thunderstorms

"Thunderstorms include heavy rains, strong winds, lightning, thunder, and sometimes hail and tornadoes. A thunderstorm is classified as "severe" when it produces damaging wind gusts in excess of 58 miles per hour (50 knots), hail that is 1 inch in diameter or larger (quarter size), or a tornado (NWS, n.d.). Three basic components are required for a thunderstorm to form: moisture, rising unstable air, and a lifting mechanism. As warm surface air rises, it transfers heat from the surface of the Earth to the upper levels of the atmosphere (i.e., the process of convection). The water vapor it contains begins to cool, releasing the heat, and the vapor condenses into a cloud. The cloud eventually grows upward into areas where the temperature is below freezing. Some of the water vapor turns to ice and some of it turns into water droplets; both have electrical charges. When a sufficient charge builds up, the energy is discharged in a bolt of lightning, which causes

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

Every thunderstorm has an updraft (rising air) and a downdraft (sinking air). Sometimes strong downdrafts known as downbursts can cause tremendous wind damage similar to that of a tornado. A small (less than 2.5-mile path) downburst is known as a "microburst" and a larger downburst is called a "macroburst." An organized, fast-moving line of microbursts traveling across large areas is known as a "derecho;" these occasionally occur in Massachusetts. Winds exceeding 100 miles per hour have been measured from downbursts in Massachusetts." (ResilientMass, 2023)

Extreme Precipitation

"Extreme precipitation generally refers to events of rainfall or snowfall that substantially exceeds what is normal in an area. In Massachusetts, extreme precipitation is often defined or measured as an accumulation of rain or snow of 2 or more inches within 24 hours (Commonwealth of Massachusetts, 2018; Runkle et al., 2022). Heavy precipitation events occur when an air mass holding significant amounts of moisture moves over land or converges into a storm system. Extreme precipitation events do not mean that total precipitation in an area has increased—it only refers to more intense events occurring over a shorter duration. Climate change is expected to increase the intensity and frequency of extreme precipitation. The impacts of these events include crop damage, soil erosion, and increased flood risk." (ResilientMass, 2023)

4.11.2. | Location

Severe weather can impact all of Dunstable, but there are factors that create increased vulnerability. Areas of Dunstable that are more exposed or have fewer natural windbreaks, such as hills, ridges, or open fields, may experience stronger winds. Additionally, areas with sparse vegetation or where trees have been removed posed an increased risk of impacts from high winds. Locations near large bodies of water, such as rivers or lakes, can experience increased wind speeds due to unobstructed airflow across the water surface. Bodies of water can also increase the risk of thunderstorms, as the water bodies contribute moisture to the atmosphere, enhancing instability and providing a source of energy for thunderstorms to develop.

Extreme precipitation events can occur in the entirety of Dunstable, but there are various conditions that can increase the likeliness of their occurrence. These include topography, where areas with steeper slopes or valleys may experience more localized heavy rainfall. Low lying areas and locations with inadequate drainage are at a higher risk of flooding from extreme precipitation.

The types of severe weather outlined in this section oftentimes occur simultaneously, with one bringing on the other. Certain weather conditions, such as thunderstorms, nor'easters, or tropical cyclones, can bring strong winds and precipitation to the region.

4.11.3. | Severity/Intensity

High Winds

"Massachusetts is susceptible to high winds from several types of weather events: straight- line winds, before and after frontal systems, hurricanes and tropical storms, severe thunderstorms and tornadoes, and nor'easters. Straight-line winds are often the result of a thunderstorm downdraft but can be caused by several other meteorological processes. Straight-line winds are defined as winds exceeding 50 to 60 miles per hour and can reach up to 100 miles per hour and cover hundreds of miles (FEMA, 2021). Sometimes, wind gusts of only 40 to 45 miles per hour can cause scattered power outages from downed trees and wires. This is especially true after periods of prolonged drought or excessive rainfall since both can weaken root systems and make trees more susceptible to the wind's effects. Winds measuring less than 30 miles per hour are not considered to be hazardous under most circumstances (ResilientMass, 2023)."

Figure 4.15 presents a map of wind speeds in the United States. Dunstable is in tornado Zone II, which corresponds with a moderate risk of high winds but low risk of tornadoes. It is also located in a hurricane-prone region, which represents high risk for hurricanes and other high wind events. High wind events not associated with hurricanes or nor'easters often have localized impacts.

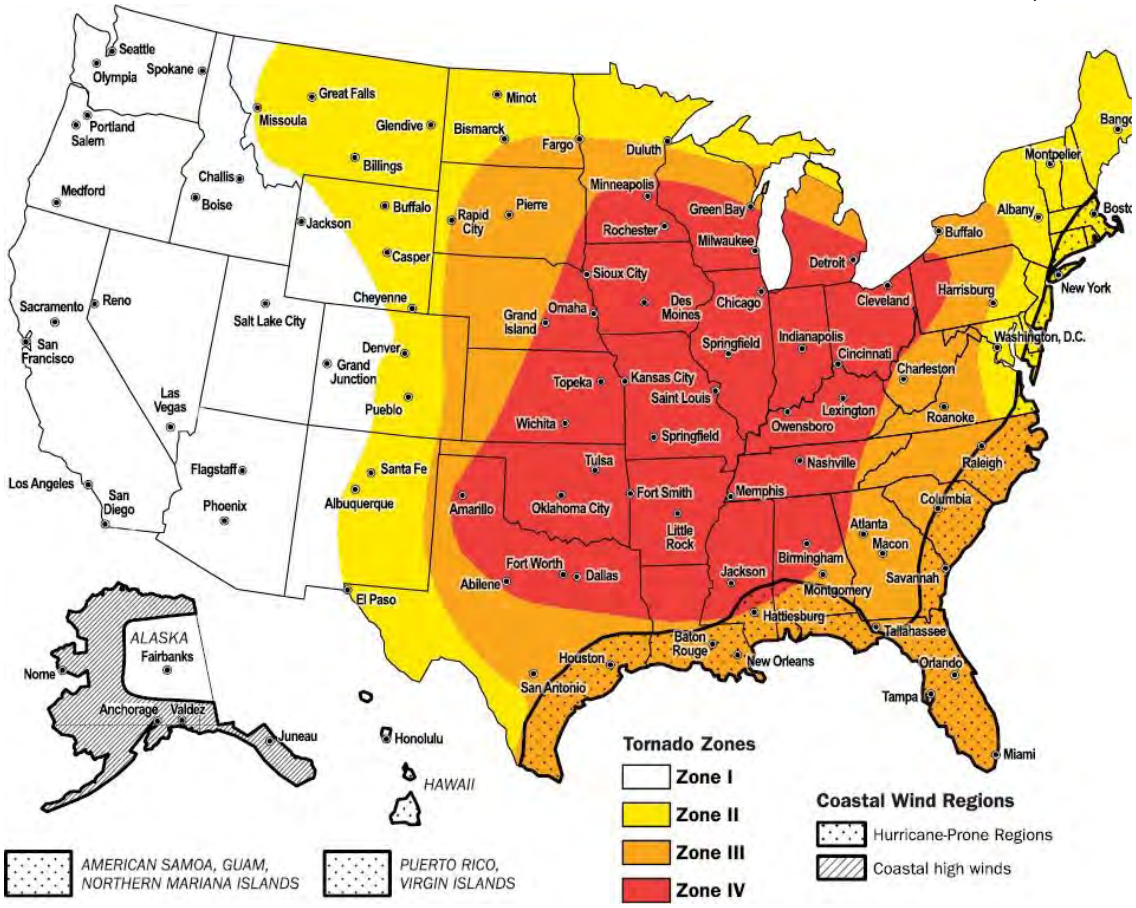


Figure 4.15: Wind Hazards in the United States

Thunderstorms

"The severity of thunderstorms can vary widely, from short-term, localized events to large- scale storms that result in major consequences, including flooding and direct damage to people, buildings, and ecosystems throughout a region. Widespread flooding is the most common characteristic that leads to a storm being declared a disaster in Massachusetts. The severity of flooding varies widely based on characteristics of the storm and the region in which it occurs. Lightning can also present a high magnitude of consequence to humans (ResilientMass, 2023)."

Extreme Precipitation

Extreme precipitation events in Dunstable, Massachusetts, can occur under various weather conditions and can have significant impacts on the town and its residents. These events are characterized by unusually high rainfall amounts over short durations, leading to localized flooding, property damage, and disruption of infrastructure.

Extreme precipitation events in Dunstable typically occur during periods of intense weather systems, such as severe thunderstorms, tropical storms, or nor'easters. These events can happen throughout the year but are more common during the warmer months, particularly in the spring and summer when atmospheric instability is higher. These events can produce heavy rainfall rates, often exceeding the capacity of natural drainage systems and stormwater infrastructure to handle runoff. Rainfall amounts during these events can vary widely but may reach several includes within a short period, leading to flash flooding and rapid rises in water levels.

4.11.4. | Previous Occurrences and Frequency

Since the previous Hazard Mitigation Plan in 2015, there have been 149 days where Middlesex County has experienced either strong wind, high wind, or thunderstorm wind (NOAA StormEvents Database, 2024). In total, these 149 events caused 3.071 million dollars in damage in Middlesex County (NOAA StormEvents Database, 2024). In 2021, there was one fatality in the Northwest part of the County due to a falling tree during one of these storm events (NOAA StormEvents Database, 2024). Since 2015, there have been 11 injuries caused by severe weather in Middlesex County (NOAA StormEvents Database, 2024). Severe weather occurs fairly frequently in Dunstable.

4.11.5. | Probability of Future Hazard Events, including Due to Climate Change

High Winds

"Climate models and projections do not always model changes in winds, and some climate scientists have found uncertainties in long-term wind trends (Schauffler, 2021). However, global wind speeds on average have increased since 2010 and buoy data off the Gulf of Maine has tracked an increase in monthly average wind speeds (Zeng et al., 2019).

Massachusetts is highly likely to continue experiencing high wind events based on previous occurrences. Though the effect of climate change on high winds is not certain, based on recent data, it appears likely that high wind events will increase because of more frequent severe weather events in the future." (ResilientMass, 2023)

Thunderstorms

"Massachusetts experiences between nine and 27 thunderstorm days each year. Based on previous occurrences, Massachusetts is highly likely to continue experiencing thunderstorms. Data for Massachusetts from the Localized Constructed Analogs' downscaled global climate models supports the trend of slightly increased frequency. Based on these projections the probability of future thunderstorm events is anticipated to increase. Two key factors lead to the formation of thunderstorms: convective available potential energy (CAPE) and strong wind shear. Climate change is expected to increase CAPE while decreasing wind shear in mid-latitudes. Modeling suggests that CAPE will increase enough to overwhelm the small decrease in wind shear, leading to more favorable conditions for thunderstorms in the eastern United States (NASA Earth Observatory, 2013).

CAPE and thunderstorm precipitation rates can be used to predict lightning strikes. Climate change is very likely to increase lightning strikes over the contiguous United states by about 50 percent over the next century. Modeling using a 1990–2020 baseline predicts lightning strikes to increase in every Massachusetts county by at least 40 percent by 2030 and by over 100 percent in 2070 (Romps et al., 2014)." (ResilientMass, 2023)

Extreme Precipitation

"Scientists expect that there will be more rain overall in Massachusetts. The amount of annual precipitation and intensity of precipitation is likely to increase, and this increase is expected to occur in most years. The patterns emerge as higher temperatures are anticipated to increase the moisture-holding capacity of the atmosphere. The days of rainfall, however, are likely to be more variable and reduce overall, implying that on days when it does rain, there will be more moisture. The Massachusetts Climate and Hydrologic Risk Project supports the trend of a slightly increased frequency of high-intensity rainfall events, defined here as a day with more than 2 inches of precipitation. Table 4.21 shows modeling results for the planning horizons identified in this plan (2030, 2050, 2070, and 2090) for the increase in days with more than 1 inch of rain and more than 2 inches of rain. Extreme precipitation projections by U.S. Geological Survey subbasins indicate that the coast will experience the greatest number of high-intensity rainfall days, but increased precipitation will occur in every region of the Commonwealth." (ResilientMass, 2023)

Table 4.21: Projected Frequency of Future Annual Extreme Precipitation Events in Massachusetts

	2030	2050	2070	2090
Number of days >1" precipitation	2.7–7.3	3.1–8.0	3.7–8.7	4.0–9.2
Number of days >2" precipitation	0.2–1.0	0.2–1.2	0.3–1.4	0.4–1.5

Note: This table was developed with information in the Massachusetts Climate and Hydrologic Risk Project (Phase 1) Stochastic Weather Generator Climate Projections

Source: Massachusetts Executive Office of Energy and Environmental Affairs (2023).

4.11.6. | Vulnerability and Impacts

Severe storms, high winds, and heavy precipitation can have a wide range of effects on people, structures, systems, and resources. First and foremost, in the absence of proper shelter, people are subject to serious injury or even death from hail, lightning, and high winds. Thunderstorms can cause power outages, which can disrupt daily life and impact essential services. They can also cause damage to electrical infrastructure, such as power lines, transformers, and substations. Severe thunderstorms can also strain public safety resources, including emergency services, law enforcement, and medical facilities. They can also cause wildfires from lightning strikes. High winds have the capability of blowing down tree limbs and creating flying debris that can injure people or block roads.

CRB attendees clarified that a big concern locally is trees coming down and power lines being destroyed.

A resident who provided input via the public survey reminded that no power often means no water.

Table 4.22: Impacts of Severe Weather on Dunstable

Asset Category	Likely Impacts
People	Impacts to people's health, welfare, and safety, including underserved communities and socially vulnerable populations: • Death and injury • Mental health impacts such as anxiety and PTSD • Displacement
Structures	Impacts to buildings, facilities, lifelines, and critical infrastructure: • Falling objects, trees, or debris can damage buildings or critical infrastructure • Fallen power lines • High winds and hail can damage buildings or infrastructure
Systems	Impacts to transportation systems, and electricity and water systems: • Airport closures • Electrical infrastructure damage • Communications disruptions from damage to telecommunications infrastructure • Power outages

Asset Category	Likely Impacts
	• Transportation disruptions from heavy rain, strong winds, or flooding • Severe storms can overwhelm water treatment plants and wastewater facilities leading to contamination and water supply disruptions
Natural/Cultural/Historic Resources	Impacts to ecosystems, natural habitats, community areas, historical facilities and locations, and cultural resources: • Flash floods or riverine flooding • Potential for wildfire due to lightning strikes • Potential for tornadoes to form
Economic and Community Assets	Impacts to people's ability to work and make a living, and impacts to activities that benefit the community by increasing community morale and well-being: • Severe storms may cause business closures • Cancellations of community or sporting events

Other Severe Weather and Population and Land Use Changes

The Town's elderly population has been increasing in recent years and is projected to increase by 4.4% by 2040. The Town's youth population has remained the same and is not predicted to change between 2020 and 2040. These are the two populations in Dunstable that face the greatest risk from severe weather. It is possible that severe weather occurrences may affect population trends in that those who are most vulnerable may seek to live elsewhere.

There is no known correlation between land use changes and severe weather.

4.12. Severe Winter Storms

4.12.1. | Description

"Severe winter storms include ice storms, nor'easters, heavy snow, blowing snow, and other extreme forms of winter precipitation. Severe winter storms are a type of extratropical cyclone, which are formed when a cold mass of air meets with a warm mass of air and creates a front. Extratropical cyclones have cold air at their core and can be accompanied by either weak or strong winds.

Blizzards: A blizzard is a winter snowstorm with sustained or frequent wind gusts of up to 35 miles per hour or more, accompanied by falling or blowing snow that reduces visibility to or below a quarter of a mile (NWS, n.d.-a). These conditions must be the predominant characteristics over a three-hour period to classify as a blizzard. Extremely cold temperatures are often associated with

blizzard conditions but are not a formal part of the definition. Although extremely cold temperatures are not necessary, the likelihood of a blizzard occurring increases significantly with temperatures below 20°F. A severe blizzard is categorized as having temperatures near or below 10°F, winds exceeding 45 miles per hour, and visibility reduced by snow to near zero.

Storm systems powerful enough to cause blizzards usually form when the jet stream dips far to the south, allowing cold air from the north to clash with warm air from the south. Blizzard conditions often develop on the northwest side of an intense storm system. The difference between the lower pressure and the higher pressure to the west creates a tight pressure gradient, resulting in strong winds and extreme conditions due to the blowing snow. Blowing snow is wind-driven snow that reduces visibility to 6 miles or less, causing significant drifting. Blowing snow may be snow that is falling and/or loose snow on the ground picked up by the wind.

Ice Storms: Freezing rain is defined by liquid rain falling and freezing on contact with cold objects, creating ice buildups. While even a trace of ice can cause significant impacts, an ice storm, by the National Weather Service's definition, is a half inch of ice accretion across any location. Lesser icing events can be incorporated into either Winter Storm Warnings or Winter Weather Advisories, whenever icy conditions may lead to dangerous walking or driving conditions or can result in damage to power lines and trees.

Ice pellets are another form of freezing precipitation, formed when snowflakes fall through a shallow warmer layer of air above the surface. As they fall through the warm layer, they melt. Sleet is the result of those raindrops refreezing back into snow before they reach the surface. As a result, the observed precipitation mimics a pellet of ice. The difference between sleet and hail is that sleet is a wintertime phenomenon, whereas hail falls from convective clouds (usually thunderstorms), and often occurs during the warmer spring and summer months.

Nor'easters: A nor'easter is a storm that occurs along the East Coast of North America with winds from the northeast (NWS, n.d.-b). A nor'easter is characterized by a large counterclockwise wind circulation around a low-pressure center that often results in heavy snow or rain and high winds. A nor'easter gets its name from its continuously strong northeasterly winds blowing in from the ocean ahead of the storm and over the coastal areas.

Nor'easters can occur at any time of year, though they most often occur between September and April (NWS, n.d.-b). These weather events produce heavy snow, rain, and oversized waves that crash onto Atlantic beaches, often causing beach erosion and damage to coastal infrastructure, buildings, and habitats. More detail on the risks associated with Coastal Erosion (Section 5.4) and Coastal Flooding (Section 5.5) is available. These storms occur most often in late fall and early winter. The storm radius of a nor'easter is often as much as 100 miles across, and nor'easters can last between 12 hours and 3 days, affecting multiple tide cycles and causing extended heavy precipitation in an area. Sustained wind speeds of 20 to 40 miles per hour are common during a nor'easter, with short-term wind speeds gusting up to 50 to 60 miles per hour. Nor'easters are commonly accompanied by a storm surge equal to or greater than 2 feet.

Nor'easters begin as strong areas of low pressure either in the Gulf of Mexico or off the East Coast in the Atlantic Ocean. The low-pressure system will move either up the East Coast, into New England and the Atlantic provinces of Canada, or out to sea. A strong hurricane often causes more severe damage than a nor'easter, but historically Massachusetts has suffered more damage from nor'easters because of the greater frequency of these coastal storms (one to two per year, on average). Nor'easters can directly affect Massachusetts for a longer period than tropical storms and hurricanes—the duration of high storm surge and winds in a hurricane range from six to 12 hours, while a nor'easter can last much longer." (ResilientMass, 2023).

4.12.2. | Location

The entire town of Dunstable is at risk from the hazard of severe winter storms. "Nor'easters can bring heavy snow, which can paralyze inland cities or regions, limiting or eliminating access to some areas and disrupting power and communications. Inland areas, especially those in floodplains, low-lying areas, or development areas on historic wetlands, are at risk for flooding. Wind damage can occur throughout the Commonwealth." (ResilientMass, 2023) Factors such as elevation, vegetation cover, and proximity to infrastructure and transportation networks can influence the severity of impacts in Dunstable.

4.12.3. | Severity/Intensity

"Snowfall is a component of multiple hazards, including nor'easters and other severe winter storms. Since 2005, the Regional Snowfall Index (RSI) has become the descriptor of choice for measuring winter events that affect the eastern two-thirds of the U.S. The RSI ranks snowstorm impacts on a scale from 1 to 5, as shown in Table 4.23. It is like the Fujita scale for tornadoes or the Saffir-Simpson scale for hurricanes, except that it includes an additional variable: population. The RSI is based on the spatial extent of the storm, the amount of snowfall, and the population affected (NOAA NCEI, n.d.).

The RSI is a regional index. Each of the six climate regions in the eastern two-thirds of the nation (as identified by the NOAA National Centers for Environmental Information) has a separate index, calculated according to region-specific parameters and thresholds. The RSI is important because, with it, a storm event and its societal impacts can be assessed in the context of a region's historical events. Snowfall thresholds in Massachusetts (in the Northeast region) are 4, 10, 20, and 30 inches of snowfall, while thresholds in the Southeast U.S. are 2, 5, 10, and 15 inches. Based on the RSI, the number of high-impact snowstorms (categorized as "notable" or higher) occurred at a rate of almost three per year over the last 50 years, although there is significant interannual variability in the frequency and severity of winter storms (ResilientMass, 2023)."

Table 4.23: Regional Snowfall Index Categories, Corresponding RSI Values, and Description

Category	RSI Value	Northeast Threshold	Description	Number of Events in New England (1973–2022)
1	1–3	Less than 4 inches	Notable	75
2	3–6	4–10 inches	Significant	23
3	6–10	10–20 inches	Major	7
4	10–18	20–30 inches	Crippling	4
5	18.0+	30+ inches	Extreme	3

Source: National Centers for Environmental Information (n.d.).

4.12.4. | Previous Occurrences and Frequency

Middlesex County, which includes Dunstable, experienced 35 days of severe winter weather since the previous hazard mitigation plan update. A complete list of winter weather events is presented in Table 4.24 below. The combined property damage from these winter events totaled $464,900.

Attendees of the CRB workshop noted that the largest two storms in memory were the Storm in 2008 and the Halloween Storm in 2009. The power was out for almost a week for many residents in town.

A respondent to the public survey noted another severe winter storm in early 2013, where 3 feet of snow fell.

A respondent to the public survey shared that there were big ice storms around 2010 / 2011 and that was when the electricity was out the longest this resident had ever experienced.

Table 4.24: Winter Weather Events in Dunstable

Date of Occurrence	Type of Hazard
1/18/2015	Winter Weather
2/5/2015	Winter Weather
2/21/2015	Winter Weather
3/1/2015	Winter Weather
12/29/2015	Winter Weather
1/23/2016	Winter Weather

Date of Occurrence	Type of Hazard
2/8/2016	Winter Weather
3/21/2016	Winter Weather
4/3/2016	Winter Weather
4/4/2016	Winter Weather
12/17/2016	Winter Storm
1/7/2017	Winter Storm
2/8/2017	Winter Weather
2/9/2017	Winter Storm
2/12/2017	Winter Storm
12/9/2017	Winter Storm
12/22/2017	Winter Weather
12/23/2017	Winter Weather
12/25/2017	Winter Weather
1/4/2018	Winter Storm
1/23/2018	Winter Weather
2/7/2018	Winter Weather
2/17/2018	Winter Storm
3/7/2018	Winter Storm
3/13/2018	Winter Storm
12/28/2018	Winter Weather
1/19/2019	Winter Storm
2/13/2019	Winter Weather
3/3/2019	Winter Storm
12/30/2019	Winter Weather
4/18/2020	Winter Weather
10/30/2020	Winter Weather
2/1/2021	Winter Storm

Date of Occurrence	Type of Hazard
1/28/2022	Winter Storm
12/16/2022	Winter Weather

4.12.5. | Probability of Future Hazard Events, including Due to Climate Change

"Massachusetts already experiences notable winter weather events and nor'easters every year. Therefore, it is virtually certain Massachusetts will continue to experience severe winter storms at least annually. However, it is unclear how much the frequency of these storms will change in Massachusetts over the next few decades due to climate change. Extreme weather events—including extreme precipitation events—are anticipated to occur more often as climate change occurs. Rising temperatures mean that more of this precipitation is likely to fall as rain rather than snow, However, there has been little information on the climate trends of extratropical cyclones such as nor'easters. The Greater Boston Research Advisory Group found little evidence to indicate that nor'easters and other extratropical storms will change in frequency in the region (Douglas & Kirshen, 2022).

However, historical data show that the frequency of extreme snowstorms in the U.S. doubled between the first half of the 20th century and the second. As temperatures throughout the year increase, it is possible that nor'easter events may become more concentrated in the coldest winter months when atmospheric temperatures are still low enough to result in snowfall rather than rain. Whether events are classified as nor'easters or not, storm surge impacts from all winter storms are likely to increase significantly because of sea level rise and coastal erosion.

While evidence for the frequency is not clear, climate change is likely to increase the intensity of winter storms. Increased sea surface temperature in the Atlantic Ocean due to climate change will cause air moving north over the ocean to hold more moisture. As a result, when these fronts meet cold air systems moving from the north, an even greater amount of precipitation than normal can be anticipated to fall on Massachusetts. Although no one storm can be linked directly to climate change, the severity of rain and snow events has increased dramatically in recent years. As shown in Figure 4.16, the amount of precipitation released by the heaviest storms in the Northeast has increased by 55 percent since 1958 (U.S. Global Change Research Program, 2018). Other research has found that increasing water temperatures and reduced sea ice extent in the Arctic are changing atmospheric circulation patterns that favor the development of winter storms in the eastern U.S. by sending more cold air to the Eastern Seaboard (Rawlins, 2022) (ResilientMass, 2023)."

Attendees of the CRB workshop noted ice storms are becoming a bigger concern – there are more freezing rains than there used to be.

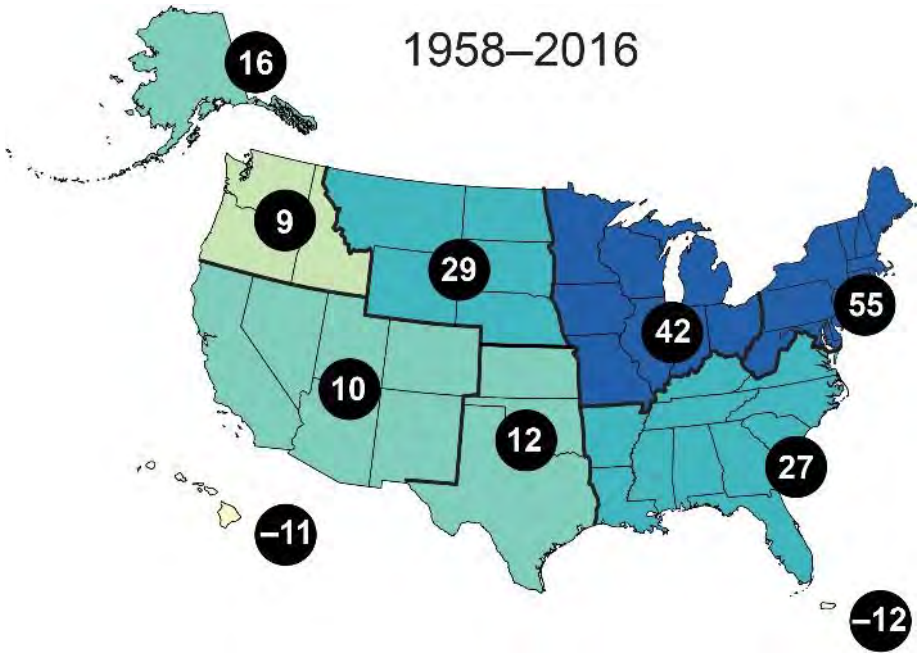


Figure 4.16: Map of observed changes in heavy precipitation.

4.12.6. | Vulnerability and Impacts

Severe winter weather has the potential to paralyze the entire town. Heavy snow and ice can yield dangerous travel conditions and result in public transportation closures. Prolonged closures of roads and public transportation systems can inhibit the delivery of critical services or the ability to obtain vital resources. Heavy snow has the capacity to cause power outages or frozen pipes. Extended power outages, the cost of snow removal, and repairing damages can have severe economic impacts on smaller communities. The elderly and the sick are populations of particular concern during these events. While there are no senior housing or medical facilities within Dunstable, most residents are on private wells and have no access to drinking water during a power outage (2015 Hazard Mitigation Plan for the Northern Middlesex Region).

Winter storms were one of the highest priority hazards according to the public survey. **Residents in Dunstable expressed concern at the CRB workshop about the increased frequency of freezing rains. While many residents have generators, attendees recalled there have been recent storms that caused power outages of over a week in length across Dunstable. The community relies on National Grid to restore power, but due to its low density and lack of regional critical facilities, Dunstable is often delayed in getting power restored. As a result, many residents stated that they had their own generators. Residents also noted how quickly the community comes together to assist with snow removal for the elderly and infirmed.**

A resident who took the public survey reminded that no power often means no water.

Table 4.25: Impacts of Severe Winter Storms on Dunstable

Asset Category	Likely Impacts
People	Impacts to people's health, welfare, and safety, including underserved communities and socially vulnerable populations: • Death and injury • Increased instances of frostbite and hypothermia • Stranded or isolated communities
Structures	Impacts to buildings, facilities, lifelines, and critical infrastructure: • Heavy snow loads may cause roof collapse • Increased heating demands • Frozen pipes
Systems	Impacts to transportation systems, and electricity and water systems: • Power outages • Transportation disruptions due to low visibility, icy road conditions, or heavy snow • Communications disruptions from damaged infrastructure due to ice and freezing rain • Water supply interruptions caused by frozen pipes that burst
Natural/Cultural/Historic Resources	Impacts to ecosystems, natural habitats, community areas, historical facilities and locations, and cultural resources: • Historic buildings may not be capable of handling snow loads and may be more susceptible to roof collapse • Flooding may occur after rapid melting of snow • Chemicals used to treat roadways may contaminate natural environments and water bodies if used in large quantities
Economic and Community Assets	Impacts to people's ability to work and make a living, and impacts to activities that benefit the community by increasing community morale and well-being: • Increased heating costs • Disruption of essential services • Reduced economic activity • Expensive response and recovery costs • School closures

Severe Winter Storms and Population and Land Use Changes

The Town's elderly population has been increasing in recent years and is projected to increase by 4.4% by 2040. The Town's youth population has remained the same and is not predicted to change between 2020 and 2040. These are the two populations in Dunstable that face the greatest risk from severe winter storms. It is possible that the presence of severe winter storms may affect population trends in that people may desire to live in other areas that have less likelihood of severe winter storms.

There is no known correlation between land use changes and severe winter storms.

4.13. Tornadoes

4.13.1. | Description

"A tornado is a narrow, violently rotating column of air that extends from the base of a cumulonimbus cloud to the ground. The observable aspect of a tornado is the rotating column of water droplets, which captures dust and debris in the column. Tornadoes are the most violent of all atmospheric storms. Tornadoes are measured on the Enhanced Fujita (EF) scale, which ranges from EF0 (light damage) with three-second gust wind speeds of 65–84 miles per hour, to EF5 (incredible damage) with three-second guest wind speeds of over 200 miles per hour. Tornadoes tend to form when cold, dry air clashes with warm, humid air.

The following are common factors in tornado formation:

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

Tornadoes can form along severe thunderstorm squall lines, from individual supercell thunderstorms, or from tropical cyclones. Most tornadoes occur in the late afternoon and evening hours when the temperatures are the highest. The most common months for tornadoes to occur in Massachusetts are June, July, and August, although the 1995 Great Barrington, Massachusetts, tornado occurred in May, and the 1979 Windsor Locks, Connecticut, tornado occurred in October.

A tornadic waterspout is a rapidly rotating column of air extending from the cloud base (typically a cumulonimbus thunderstorm) to a water surface, such as a bay or the ocean. They can be formed in the same way as regular tornadoes. Tornadic waterspouts can have wind speeds of 60 to 100 miles per hour, but since they do not move very far, vessels can often navigate around them. They can become a threat to land if they move onshore." (ResilientMass, 2023)

4.13.2. | Location

Dunstable, like much of the Commonwealth, is not located in a region known for frequent tornado activity. However, there is still the possibility of a tornado occurring in Dunstable. In general, tornadoes can develop anywhere, but they are most likely to occur in areas with certain characteristics. Areas with flat terrain are more conducive to tornadoes. Tornadoes often form along or near weather fronts. Dunstable experiences a variety of weather conditions; thus it is possible that the town many be affected by weather systems that produce tornadoes, particularly during the spring and summer months. Additionally, low-lying areas have a higher risk of tornado formation than areas with higher elevations or steep slopes.

4.13.3. | Severity/Intensity

"Tornadoes are among the most dangerous of local storms. If a major tornado were to strike in a populated area of the Commonwealth, damage would be significant. Fatalities could be high, many people would be displaced for an extended period of time, buildings would be damaged or destroyed, and businesses would suffer damage and loss.

Additionally, utilities and infrastructure, particularly communications, energy, and rail infrastructure, could experience significant damage, disruption, and a long period of recovery of physical assets and functions, leaving people without critical services. Massachusetts ranks 35th among the states for frequency of tornadoes, 14th for frequency of tornadoes per square mile, 21st for injuries, and 12th for cost of damage.

The National Weather Service rates tornadoes using the Enhanced Fujita scale (EF scale), which does not directly measure wind speed but rather the amount of damage created. This scale derives three-second gusts estimated at the point of damage based on the assignment of one out of eight degrees of damage to a range of different structure types. These estimates vary with the height of a damaged structure (damage above the ground) and exposure of the event. This method is considerably more sophisticated than the original Fujita scale, and it allows surveyors to create more precise assessments of tornado severity after an event (ResilientMass, 2023)."

Table 4.26: Fujita Scale

EF-Scale	Class	Wind Speed (Mph)	Description
EF-0	Weak	65-85	Gale
EF-1	Weak	86-110	Moderate
EF-2	Strong	111-135	Significant
EF-3	Strong	136-165	Severe
EF-4	Violent	166-200	Devastating
EF-5	Violent	>200	Incredible

4.13.4. | Previous Occurrences and Frequency

The United States experiences an average of about 1,000 tornadoes per year; in 2021, there were 1,376 tornadoes across the country (Insurance Information Institute, 2022). Because Massachusetts experiences far fewer tornadoes than other parts of the country, residents may be less prepared to react to a tornado. There have been no tornadoes reported in Dunstable since the last Hazard Mitigation Plan update.

While the number of tornadoes is small in Massachusetts compared to other areas of the country, the Commonwealth experiences between two to five tornadoes per year and past tornadoes have caused significant damage. Given these factors, the likelihood that a tornado event will occur within the Commonwealth is high. However, given the challenge of identifying specific parts of Massachusetts that are more at risk from tornadoes, mitigation measures to reduce the risk of high winds that tornadoes and other extreme weather events generate should focus on the assets and populations most at risk, such as mobile homes and other manufactured buildings; people with characteristics that make them most at risk from tornadoes; and lifeline infrastructure, including utilities, infrastructure, and critical assets such as hospitals and schools. Removing debris, storing hazardous waste and materials, and removing or enclosing critical equipment and assets located on roofs or outside of structures can make a significant difference in reducing the damage from tornadoes and other high-wind events.

Attendees of the CRB workshop did not recall a tornado occurring in Dunstable, but did recall a microburst that skirted through Dunstable in 2021 or 2022.

A respondent to the public survey noted that the tornado warning in late 2023 was concerning.

While there have been no tornadoes recorded in Dunstable, there have been two tornados that passed through Middlesex County since the previous hazard mitigation plan update. The first tornado was an EF-1 that occurred on August 22, 2016 in Concord. The second tornado was an EF-0 that occurred on August 23, 2021 In Marlborough and Stow. The combined damage from these two tornadoes totaled 1.01 million dollars. (NOAA Storm Events Database, 2023)

4.13.5. | Probability of Future Hazard Events, including Due to Climate Change

“Current climate models predict an increase in severe thunderstorms, which have the potential to produce tornadoes. However, it is unclear if tornado frequency will increase with climate change. Some studies suggest there will be a decrease in the number of tornado days, but an increase in the number of tornadoes per day. Given that less than 10 percent of severe thunderstorms produce tornadoes, it is difficult to draw firm conclusions about the processes leading up to a tornado and how these processes might be influenced by climate change (Treisman, 2021). Additionally, given that the tornado record only dates to 1950 in the United States and varies significantly from year to year, it is difficult to identify long-term trends.” (ResilientMass, 2023)

4.13.6. | Vulnerability and Impacts

Tornadoes can cause severe injury or even death. Tornadoes can destroy homes, businesses, and other structures, leaving people without shelter and their possessions destroyed or lost. Tornadoes can also cause economic impacts, such as lost wages, business interruption, and increased insurance premiums. Infrastructure such as power lines, communication towers, water mains, and gas mains are vulnerable to tornadoes. Damage to such infrastructure can cause power outages, disruptions to communication, and water contamination. Tornadoes can also disrupt transportation systems, including roads, railways, and airports, by blocking them with debris, making them impassable or unsafe to use.

Table 4.27: Impacts of Tornadoes on Dunstable

Asset Category	Likely Impacts
People	Impacts to people's health, welfare, and safety, including underserved communities and socially vulnerable populations: • Death or injury • Flying debris can cause death or injury • Mental health impacts such as anxiety or PTSD • Displacement
Structures	Impacts to buildings, facilities, lifelines, and critical infrastructure: • Damage to buildings and infrastructure from high winds and flying debris • Critical facility damage • Power outages
Systems	Impacts to transportation systems, and electricity and water systems: • Damage to roadways, bridges, and other transportation infrastructure can disrupt daily travel • Damage to telecommunications infrastructure can disrupt communications • Downed power lines can cause power outages • Damage to water treatment plants, pump stations, or water distribution systems can lead to a loss of clean drinking water and sanitation services
Natural/Cultural/Historic Resources	Impacts to ecosystems, natural habitats, community areas, historical facilities and locations, and cultural resources: • Uprooting or damaging trees • Destroyed vegetation or altered landscapes • Downed utility lines can cause wildfires

Asset Category	Likely Impacts
Economic and Community Assets	Impacts to people's ability to work and make a living, and impacts to activities that benefit the community by increasing community morale and well-being: • Decreased economic activity • Business closures • School closures

Tornadoes and Population and Land Use Changes

The Town's elderly population has been increasing in recent years and is projected to increase by 4.4% by 2040. The Town's youth population has remained the same and is not predicted to change between 2020 and 2040. These are the two populations in Dunstable that face the greatest risk from tornadoes. It is unlikely that tornadoes will affect population trends in Dunstable.

There is no known correlation between land use changes and tornadoes.

4.14. Wildfires

4.14.1. | Description

"A wildfire is an uncontrolled, unplanned fire that spreads through natural or unnatural vegetation. Severe wildfires have the potential to threaten lives and property and can cause smoke-related accidents and illnesses. Fire is a natural process that occurs in the landscape and has helped shape the landscape and maintain the ecological integrity of many natural communities in Massachusetts. However, increased development within the wildland-urban interface (WUI), the legacy of historical fire suppression practices, climate change, and invasive insects, pests, and plants have increased the risks associated with wildfire. Wildfires in Massachusetts are caused by natural events (such as lightning) and human activity. Wildfires often begin unnoticed but spread quickly, igniting brush, trees, and potentially homes. Fast-moving fires typically occur from March to June. Deep-burning duff fires can occur in the drier months of June through November. April is historically the month in which wildfire danger is the highest. However, drought, snowpack level, and local weather conditions can impact the timing and length of the fire season." (ResilientMass, 2023)

4.14.2. | Location

In Dunstable, the risk of wildfires is moderate compared to the Commonwealth of Massachusetts, as seen in Figure 4.17 below. The figure shows wildfire hazard potential on a scale from 1 (low) to 8 (high), with Dunstable in the scale of hazard potential 3-4.

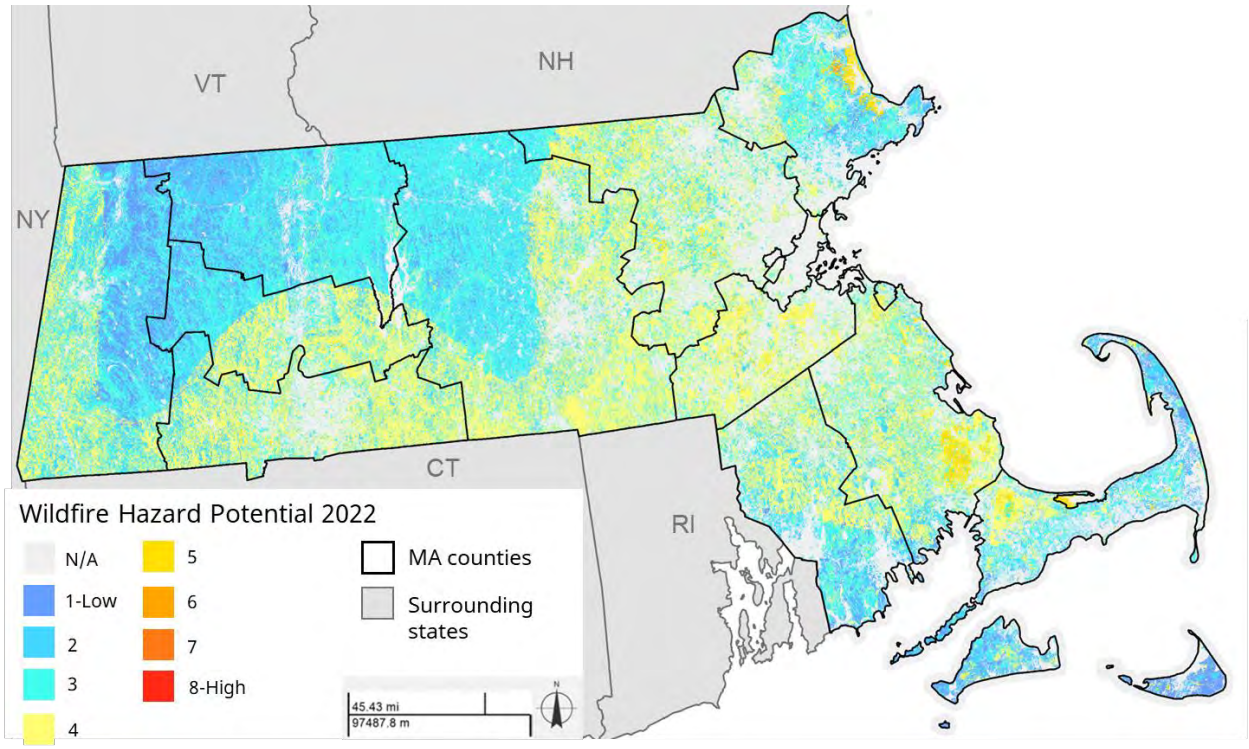


Figure 4.17: Wildfire hazard potential for the Commonwealth of Massachusetts.

Source: Map created by ERG using data from Northeast-Midwest Wildfire Risk Explorer (2022).

There are certain factors that can contribute to the likelihood of wildfires and areas of vulnerability. Portions of Dunstable with dense forests, particularly those with a high concentration of flammable vegetation such as pine or scrub oak, may be more susceptible to wildfires. These areas provide fuel for fires to ignite and spread and also make it difficult for emergency response to access the fire. Open spaces and fields can be vulnerable to fires, especially during periods of drought when the vegetation becomes dry and prone to ignition. Other weather conditions such as dry and windy weather allow wildfires to spread rapidly. Wildfire risk increases near roadways, as they can be started by human activities such as discarded cigarettes and sparks from vehicles.

4.14.3. | Severity/Intensity

"The National Wildfire Coordinating Group defines seven classes of wildfires:

- Class A: 0.25 acre or less
- Class B: more than 0.25 acre, but less than 10 acres
- Class C: 10 acres or more, but less than 100 acres
- Class D: 100 acres or more, but less than 300 acres
- Class E: 300 acres or more, but less than 1,000 acres
- Class F: 1,000 acres or more, but less than 5,000
- Class G: 5,000 acres or more

Unfragmented and heavily forested areas of the Commonwealth are vulnerable to wildfires, particularly during droughts. However, wildfires are part of the history of these forests and are not, by themselves, a risk. Risk is determined by the conditions and context within which the wildfire occurs. Conditions are being influenced by climate change, with droughts, invasive species, and extreme heat all increasing and affecting wildfire risk. The context of surrounding land use also increases the risk. The greatest potential for significant damage to life and property from fire exists in areas designated as WUI areas. A WUI area defines the conditions where development has been placed in or adjacent to wildlands and forestlands. These development areas have been sighted in lands that have burned throughout history. The presence of development within and adjacent to wildlands and forestlands makes managing these lands challenging and significantly increases the risk associated with wildland fires, even those that are historically beneficial and necessary in fire-dependent ecosystems.

Fire intensity is measured by the energy released from the fire as well as characteristics such as flame length. A commonly used measure of fire intensity is fireline intensity, which refers to the rate of heat transfer per unit length of fire (measured in kW m^{-1} or kilowatt meters) and measures the energy released from the flame (Keeley, 2008). Fireline intensity tends to correlate with flame length.

Fire severity is a quantitative measure of the effects of fire on an ecosystem that measures the loss of or change in aboveground and belowground organic matter. Fire severity is described on a spectrum ranging from unburned/low severity to moderate severity and to high severity (Berger et al., 2018). Fire severity measurements can vary depending on the ecosystem in which the fire burns. In forests, fire severity is measured based on canopy loss or tree mortality. In shrublands, where all aboveground biomass is usually burned, the same fire severity measures used in forests are generally not relevant. In these cases, ecosystem indicators of fire severity may include resprouting success and seed bank survivorship (Keeley, 2008) (ResilientMass, 2023)."

4.14.4. | Previous Occurrences and Frequency

Attendees of the CRB workshop noted there was a brush fire in 2022 and shared that there do not appear to be as many brushfires now as there may have been in the 1930s, due to change in landscape in town.

Several notable wildfires have occurred in Massachusetts history, although none has ever resulted in a disaster declaration by the U.S. Federal Emergency Management Agency. Wildfires in the Commonwealth tend to be around five acres. Due to the relatively small size of the incidents compared to larger fires in California and other parts of the West, it can be difficult to consistently track and record these fires since they are not federally declared events. As such, it is difficult to compile a consistent historical record of wildfires for the Commonwealth. In 2017, DCR began working to improve fire reporting data.

Therefore, the most accurate wildfire data for the Commonwealth is available starting for 2017. As of November 28, 2022, 1,027 fires had burned 2,716 acres in 2022. Large fires in Essex County (164 fires burned 603.9 acres total) and Worcester County (153 fires burned at least 446.7 acres total) contributed to 2022 being the largest fire year of the past six years in terms of acres burned (Massachusetts Department of Conservation and Recreation, 2022).

4.14.5. | Probability of Future Hazard Events, including Due to Climate Change

"Precipitation changes, prolonged drought, rising temperatures, and increased frequency of lightning are expected to contribute to increased frequency and severity of wildfire. As droughts become more frequent and severe, forest types that do not usually burn and are not fire adapted will be more likely to burn. Wildfires are projected to increase worldwide by 14% by 2030, 30% by 2050, and 50% by 2100 (ResilientMass, 2023)."

4.14.6. | Vulnerability and Impacts

Wildfires can have extensive and far-reaching impacts. First and foremost, wildfire smoke can contain harmful pollutants that can cause respiratory problems, especially for people with pre-existing conditions like asthma or COPD. Exposure to smoke can also lead to eye irritation, headaches, and other health effects. Wildfires can also cause physical injuries such as burns and can even potentially be fatal. During wildfire events, people may be displaced from their homes due to the need to evacuate. Wildfires can cause severe structural damage to homes and businesses alike, as well as other property. The loss of personal possessions and cherished belongings can have emotional and financial impacts on individuals and families. Wildfires can destroy or damage critical lifelines such as power lines, water treatment facilities, and transportation infrastructure. This can lead to disruptions in basic services such as electricity, clean water, and transportation. Wildfires can cause soil erosion and other changes to the landscape that impact water quality. This can lead to contamination of drinking water supplies. Wildfires can also impact air quality, which can have implications for the health of individuals and for the operation of critical infrastructure such as airports. Lastly, wildfires can decimate natural landscapes as well as local populations of flora and fauna.

Attendees of the CRB workshop shared that access roads are limited into wooded areas, limiting ability to put out brushfires and therefore increasing risk to the community.

Table 4.28: Impacts of Wildfire on Dunstable

Asset Category	Likely Impacts
People	Impacts to people's health, welfare, and safety, including underserved communities and socially vulnerable populations: • Death or injury • Displacement or evacuation

Asset Category	Likely Impacts
	• Loss of property • Mental health impacts such as anxiety or PTSD • Worsening of chronic respiratory illnesses due to smoke and increased particles in the air
Structures	Impacts to buildings, facilities, lifelines, and critical infrastructure: • Burning structures • Charring of exterior surfaces • Damage to roofs, walls, or windows • Heat generated by wildfires can weaken or melt building materials
Systems	Impacts to transportation systems, and electricity and water systems: • Wildfire can damage utility infrastructure, including power lines, gas pipelines, and water lines, leading to disruptions in services • Damage to infrastructure such as roads or bridges can disrupt travel and emergency responses
Natural/Cultural/Historic Resources	Impacts to ecosystems, natural habitats, community areas, historical facilities and locations, and cultural resources: • Wildfires can decimate habitats and harm or displace wildlife • Displacement of wildlife can lead to conflicts with human populations • Post-fire landscapes are vulnerable to colonization by invasive plant species which can outcompete native vegetation and disrupt ecosystem function
Economic and Community Assets	Impacts to people's ability to work and make a living, and impacts to activities that benefit the community by increasing community morale and well-being: • Increased insurance claims • Reduced economic activity in areas affected by wildfire • Need for emergency shelters • Expensive response and recovery costs

Wildfire and Population and Land Use Changes

The Town's elderly population has been increasing in recent years and is projected to increase by 4.4% by 2040. Elderly residents living in forested areas face a greater risk from wildfires. It is unlikely that wildfires will affect population trends unless they become more common in the area. Residents may want to move to areas that are less likely to be impacted by smoke inhalation.

Land use changes may impact the way that fire travels through the Town. As development increases, building may be constructed closer together, making fires harder to contain if they

begin in a developed area. It is possible that wildfires will affect land use changes on the long term, especially if wildfires become more common in the developed area of Dunstable.

4.15. Summary

Table 4.29 provides definitions of hazard location, extent, frequency, and probability. The definitions support the basis of determination in Table 4.30.

Table 4.29: Description of Natural Hazard Risks for the Town of Dunstable

Points	Description
Hazard Extent (Severity/Intensity)	
Minor	Limited damages to property, no damage to public infrastructure (roads, bridges, trains, airports, public parks, etc.); contained geographic area (i.e., one or two neighborhoods); essential services (utilities, hospitals, schools, etc.) not interrupted; no injuries or fatalities.
Serious	Scattered major property damage (more than 10% destroyed); some minor infrastructure damage; wider geographic area (several communities); essential services briefly interrupted up to 1 day; some minor injuries.
Extensive	Consistent major property damage (more than 25%); major damage public infrastructure damage (up to several days for repairs); essential services are interrupted from several hours to several days; many injuries and possible fatalities.
Catastrophic	Property and public infrastructure destroyed (more than 50%); essential services stopped for 30 days or more, multiple injuries and fatalities.
Present Frequency of Hazard	
Very Low	Events that occur less frequently than once in 100 years (less than 1% chance per year).
Low	Events that occur from once in 50 years to once in 100 years (1% to 2% chance per year).
Medium	Events that occur from once in 5 years to once in 50 years (2% to 20% chance per year).
High	Events that occur more frequently than once in 5 years (greater than 20% chance per year).
Future Probability of Hazard	

Points	Description
Very Low	Events that are projected to occur less frequently than once in 100 years (less than 1% chance per year).
Low	Events that are projected to occur from once in 50 years to once in 100 years (1% to 2% chance per year).
Medium	Events that are projected to occur from once in 5 years to once in 50 years (2% to 20% chance per year).
High	Events that are projected occur more frequently than once in 5 years (greater than 20% chance per year).
Location of Hazard	
N/A	Hazard has not yet affected town area
Small	Less than 10% of the town is or could be affected by the hazard
Medium	Between 10-50% of the town is or could be affected by the hazard
Large	More than 50% of the town is or could be affected by the hazard

Table 4.30, below, provides a summary of the natural hazards affecting Dunstable. This evaluation takes into account historical records, the extent, frequency, location, and anticipated future probability. Information regarding future projections for specific scenarios is not available for every natural hazard, each hazard section contains best available science, and discusses projections in the context of specific future scenarios when available and appropriate.

Table 4.30: Summary of Natural Hazard Risks for the Town of Dunstable

Natural Hazard	Previous Occurrence of Hazard Event in Dunstable	PRESENT			FUTURE
		Extent	Frequency	Location	Probability of Occurrence
Average / Extreme Temperatures	Yes	Serious	High	Large	High
Changes in Groundwater	Yes	Minor	Low	Medium	Medium
Drought	Yes	Minor	High	Large	High
Earthquakes	No	Catastrophic	Low	N/A	Low

Natural Hazard	Previous Occurrence of Hazard Event in Dunstable	PRESENT			FUTURE
		Extent	Frequency	Location	Probability of Occurrence
Flooding from Precipitation	Yes	Minor	High	Medium	High
Hurricanes / Tropical Cyclones	Yes	Extensive	Medium	Large	High
Invasive Species	Yes	Minor	High	Large	High
Landslides / Mudflows	No	Minor	Very Low	N/A	Very Low
Other Severe Weather	Yes	Serious	High	Large	High
Severe Winter Storms	Yes	Serious	High	Large	High
Tornadoes	No	Catastrophic	Low	N/A	Low
Wildfires	No	Serious	Low	N/A	Medium

Based on discussion at CRB Workshop #1, the attendees each prioritized natural hazards affecting Dunstable. Each attendee voted for three natural hazards. Results are as follows:

- **Severe Winter Weather/Nor'easters (10)**
- **Invasive Species (8)**
- **Flooding from Precipitation & Extreme Temperatures (6)**
- **Changes in Groundwater (4)**
- **Drought (3)**
- **Hurricanes/Tropical Storms & Wildfire / Brush Fire (1)**

No votes were received for Earthquakes, Tornadoes, or Landslides due to low risk to Dunstable.

The public had a similar response, as shown in Figure 4.18.

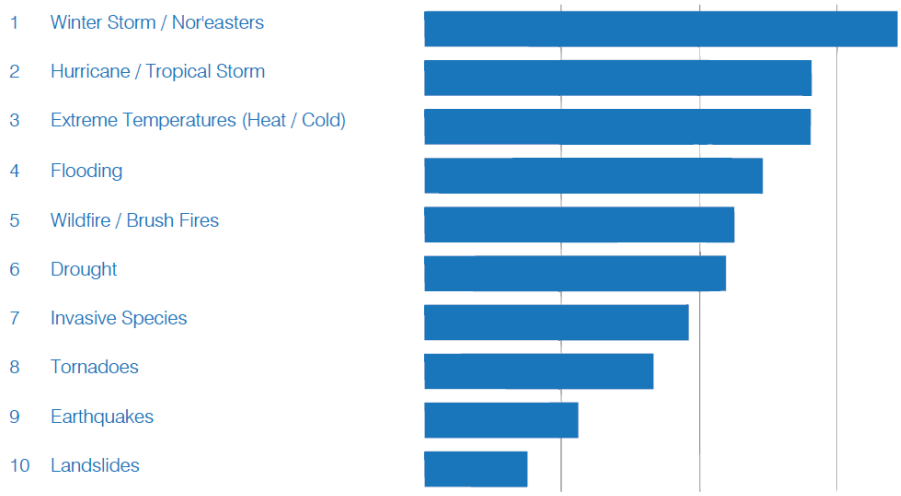


Figure 4.18: Natural Hazards Considered a Priority in Dunstable by the Public.

Figure 4.19 shows which natural hazards the public has experienced in Dunstable. The most common are winter storms/ Nor'easters, then extreme temperatures (hot and cold), and then hurricanes and tropical storms.

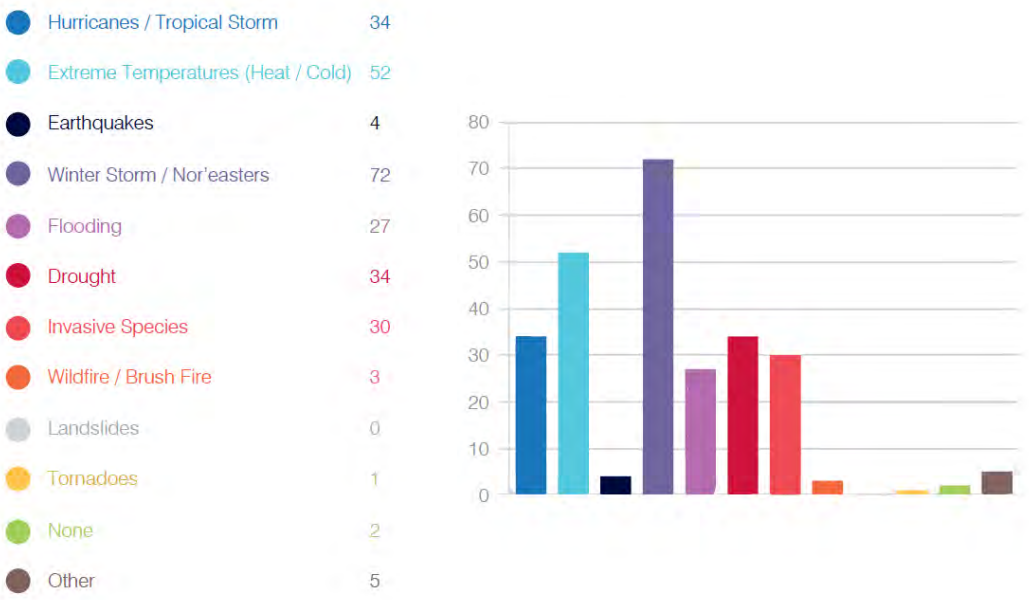


Figure 4.19: Natural Hazards Experienced in Dunstable.

The public shared how natural hazards has affected their lives (Figure 4.20) and what problems due to natural hazards concern them the most (Figure 4.21). Power outages are a clear concern.

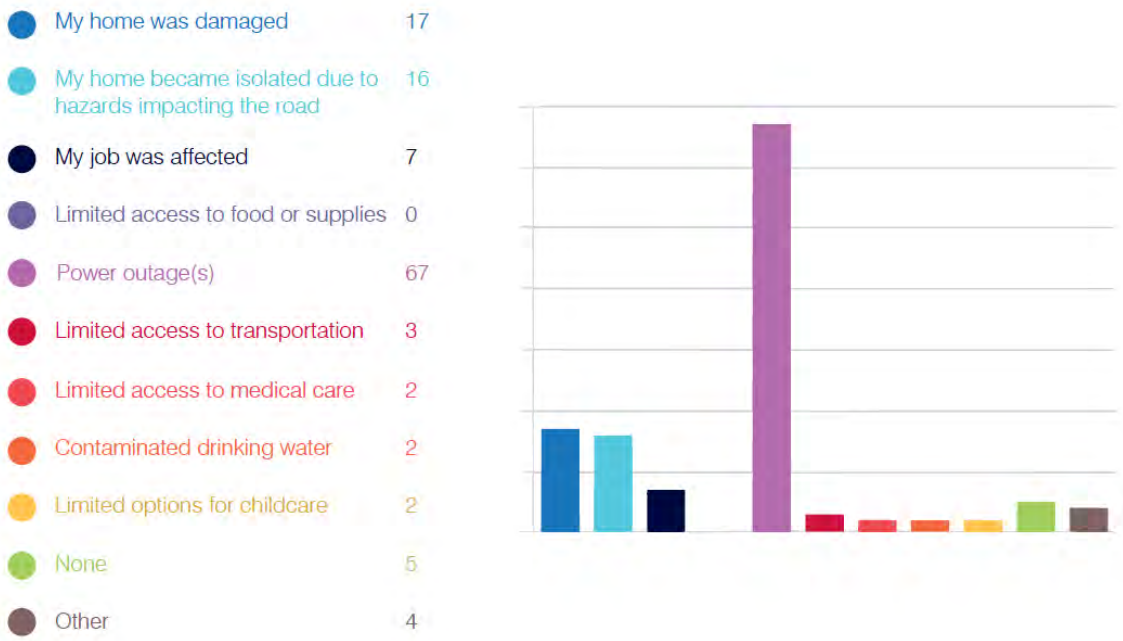


Figure 4.20: Public Input on how Natural Hazards have Affected the Community

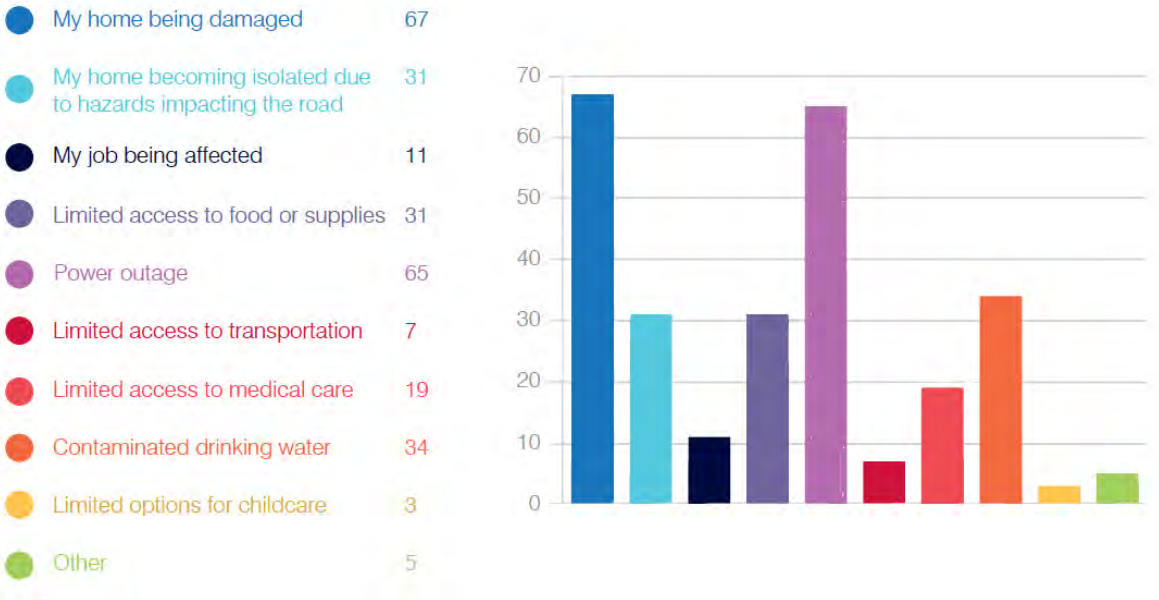


Figure 4.21: Public Input on what Natural Hazard Impacts are most Concerning.

5



5. Community Capabilities

The Town of Dunstable has a unique set of capabilities, in the form of laws, polices, programs, staff, funding, and other resources to carry out the HMP and to increase local climate resilience. This chapter reviews the Town's capabilities and describes the resources Dunstable has available to accomplish hazard mitigation and reduce disaster losses now and in the future. There are five types of mitigation capabilities in accordance with FEMA's Local Mitigation Planning Handbook:

1. **Compliance with the National Flood Insurance Program**.
2. **Planning and regulatory capabilities** are the codes, ordinances, policies, laws, plans, and programs that guide growth and development.
3. **Administrative and technical capabilities** are the town's staff, skills, and tools.
4. **Financial capabilities** are the resources to fund mitigation actions.
5. **Education and outreach capabilities** are programs and methods that can communicate about and encourage risk reduction.

In each section, the Town's existing capabilities and gaps in capabilities are discussed.

5.1. National Flood Insurance Program Compliance

Communities across the country build their floodplain management capabilities by participating in the National Flood Insurance Program (NFIP). The NFIP supports flood risk reduction before and after disasters. It helps reduce the socioeconomic impact of floods. The NFIP allows property owners and renters in participating communities to purchase federal flood insurance policies to

recover financial losses after a flood. To participate in the NFIP, communities adopt and enforce floodplain management policies to reduce the effects of flooding.

5.1.1. | Existing Capabilities

Staff Resources

There is not dedicated staff for NFIP compliance in Dunstable. The Conservation Commission oversees local regulations applicable to flood hazard areas.

Road commission, Fire, and Police generally are involved in review of damage following a natural hazard event.

Regulation

The Town of Dunstable entered the National Flood Insurance Program on November 29, 1974 (https://www.fema.gov/cis/MA.pdf). The initial Flood Insurance Rate Map became effective on July 5, 1982 (https://www.fema.gov/cis/MA.pdf). There is a Flood Insurance Study (FIS) effective July 6, 2016 and a preliminary FIS dated June 8, 2023. This town is aware of this study but has not yet updated local bylaws as they continue to await the final FIRMs being issued by FEMA. (The current effective FIRM date is June 4, 2010 (https://www.fema.gov/cis/MA.pdf). Preliminary maps for the town of Dunstable are dated June 8, 2023 (FEMA Map Service Center). These maps are not yet effective.) FEMA will notify the town when the newest FIRMs become effective. At that time, the town will need to update their local bylaws to adopt the most recent effective FIRMs. All construction after adoption of the new maps will be held to that standard.

Building in the floodplain is regulated by the Town's Conservation Commission through the Wetlands Protection Act local bylaw. The Board of Health reviews any septic system construction in the flood plain. Monitoring and compliance throughout the construction process may be overseen by Conservation Commission, the Town's engineer, or the building inspector.

The Town implements the SI/SD 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 will also coordinate with State Flood Hazard Management Program staff to assure that proper practices are followed and that a post-disaster plan will be in place to implement all SI/SD provisions.

Community Rating System

The Town of Dunstable does not currently participate in FEMA's Community Rating System Program (https://www.fema.gov/cis/MA.pdf).

Insurance Summary

According to MEMA, as of January 19, 2024, there are no repetitive loss properties located in the Town of Dunstable.

NFIP Compliance History

The Town is not aware of any outstanding NFIP compliance issues.

5.1.2. | Capability Gaps

Based on evaluation with the NFIP Compliance, the following gaps in capabilities are identified and can be incorporated into the mitigation strategy:

- Dunstable could benefit by identifying a dedicated local Floodplain Manager. This would likely need to be added to the job roles and responsibilities for an existing employee, not by adding a new dedicated employee.

- Dunstable may be interested in participating in FEMA's Community Rating System Program (https://www.fema.gov/cis/MA.pdf). The CRS program is an incentive program that promotes floodplain management regulations that go beyond the minimum requirements set by the NFIP. The CRS program has 19 creditable activities. When communities implement these activities, they receive points. The more points a community scores, the greater the discount on flood insurance premiums will be for citizens of that community. In order to join the CRS program, Dunstable must remain in good standing with the NFIP and have enough credit points (500) to achieve a Class 9 rating. The first step to joining the program is completing an application and providing a letter of interest to FEMA.

5.2. Planning and Regulatory Capabilities

Planning and regulatory capabilities encompass a wide range of tools such as codes, bylaws, policies, laws, plans, and programs that guide growth and development. These capabilities play a crucial role in either supporting risk reduction or creating areas that are more vulnerable to disasters. These strategies are aimed at breaking the cycle of disaster damage and reconstruction. Additionally, effective law and regulation for disaster risk reduction are critical in shaping choices for sustainable development and building resilience to disasters.

5.2.1. | Existing Capabilities

The following discusses Dunstable's current planning and regulatory capabilities to address natural hazards.

Building Code

A challenge for the capabilities of a community can be the use of an updated building code which reflects industry best practices and standard of care. Currently, the Town of Dunstable utilizes the latest Commonwealth of Massachusetts Building Code (Ninth Edition), which is Code of Massachusetts Regulations 780. According to the mass.gov website, "the Massachusetts State Building Code includes international model codes and state specific amendments adopted by the Board of Regulations and Standards (BBRS). The BBRS regularly updates the state building codes as new information and technology becomes available and change is warranted."

The Massachusetts building code addresses natural hazards through elevation requirements aligning with guidance from FEMA, hazard-resistant standards from ASCE 24 and ASCE 7, recognition of floodplain overlay districts, and enforcement.

Land Use / Development Bylaws and Regulations

The following discusses various municipal codes related to natural hazard mitigation and climate change resilience.

General Wetlands Bylaw

The General Wetlands Bylaw (Dunstable, General Bylaws, Adopted 5/13/19) was instituted to protect developed or undeveloped wetland resources including public water supply, private water supply, groundwater supply, flood control, erosion control, storm damage prevention, water pollution, fisheries, shellfish, wildlife, recreation, and aesthetics. This bylaw prohibits new permanent structure or impervious surface (greater than 100 square feet in the aggregate) be within 60 feet of any freshwater wetland.

Stormwater Management and Erosion Control Bylaw

The Stormwater Management and Erosion Control Bylaw (Dunstable, General Bylaws, Adopted 5/9/16) aims to protect water quality in Dunstable and limit stormwater runoff. It also ensures that Dunstable complies with federal regulations set by the Environmental Protection Agency regarding water quality and pollutant discharge. It establishes stormwater management and erosion control standards to minimize adverse impacts from development in downstream or offsite areas. The bylaw protects water resources, prevents pollutants from entering municipal storm drains, controls the volume and rate of runoff resulting from development, requires practices to treat stormwater runoff, protects groundwater and surface water from degradation or depletion, promotes infiltration and the recharge of groundwater, and requires practices that minimize soil erosion and sedimentation. It also ensures that stormwater management is incorporated into the site plan review process.

Water Supply Protection Bylaw

The Water Supply Protection Bylaw (Dunstable, General Bylaws, Adopted 5/12/08) ensures an adequate quality and quantity of drinking water for the residents of the Town of Dunstable. It preserves and protects existing and potential sources of drinking water supplies, conserves the natural resources of the Town of Dunstable, and prevents temporary and permanent contamination of the environment.

Zoning Code

Through the Zoning Bylaws, the Town of Dunstable enforces a Floodplain Overlay District, the boundaries of which are determined by the 100-year floodplain designated in the Flood Insurance Rate Map dated June 4, 2010. All development must be in compliance with the Wetlands Protection Act and the Massachusetts State Building Code, which addresses floodplain and coastal high hazard areas. Furthermore, a base flood elevation is required for all subdivision proposals or other development greater than 5 acres. The Zoning Code requires that the Board of

Health review all water and sewer facilities proposed to be located in the Floodplain Overlay District. (Dunstable, Zoning Bylaws, 2021).

Local Plans

There are a variety of local plans that inform and relate to the Hazard Mitigation Plan. These plans include:

- Stormwater Management Plan (2021)
- Open Space and Recreation Plan (2018-2025)
- Comprehensive Master Plan (2018)
- Capital Improvement Plan (FY 2022)

These plans present an opportunity for synthesized planning efforts. Action items found in these plans can and should be aligned with action items identified in the hazard mitigation plan, and vice versa.

5.2.2. | Capability Gaps

Based on evaluation with the planning and regulatory capabilities, the following gaps in capabilities are identified and can be incorporated into the mitigation strategy:

- A review of local bylaws & regulations for climate resilience provisions could be completed to enhance the ability to regulate approaches to mitigation the impact of natural hazards on community assets.
- When local plans are updated or developed, HMP Mitigation Actions discussed in Section 6.2.2 should be integrated and incorporated, for more effective implementation of Mitigation Actions.

5.3. Administrative and Technical Capabilities

Administrative and technical capabilities are the Town's staff, skills and tools, as well as capacity. They also include the ability to access, coordinate and implement natural hazard mitigation resources effectively. Administrative and technical capabilities are "people-powered" capabilities. This category includes other public and private sector resources, such as county, regional, quasigovernmental or nongovernmental agencies, community-based organizations, and grassroots groups.

5.3.1. | Existing Capabilities

The following discusses Dunstable's current administrative and technical capabilities to address natural hazards.

Staff Capacity and Training

The Core Team feels the town is generally understaffed when it comes to preparing for and responding to hazard events, especially in regard to the Highway and Fire departments.

Dunstable relies on a volunteer Emergency Management Director.

Internal and External Communications

Communication during a disaster is critical for ensuring the safety and well-being of the affected community.

The Core Team report there is generally effective communication infrastructure among town departments. The Town has regular department head and staff meetings to discuss a variety of topics. During issues of emergencies, as needed, the response teams constantly communicate through phone, cell, text, and email, and meet, as needed. Additionally, there is an annual capital planning process through the Town Administrator's Office and ultimately managed, reviewed, and approved by the Capital Planning Committee where infrastructure needs are addressed that affect our resiliency and preparedness.

- The Dunstable website is used for external communication.
- The Town is active on both Facebook and Instagram, and is able to alert residents via these avenues to hazards in the area such as flooding or road closures.
- The Town also pays for a form of “Reverse 911” to be able to phone residents quickly.
- The Core Team also identified its schools and libraries as effective ways to communicate information to the community.
- There is also a board at Town Hall where residents can obtain information, which was emphasized as being effective at the MVP CRB Workshops. The Town also disseminates information via cable television alerts and emails.

Regional Coordination and Collaboration

Natural hazards do not adhere to jurisdictional boundaries and therefore regional coordination and collaboration during a disaster event is crucial for an effective response.

- The Town of Dunstable partners with the Town of Pepperell for water system management. The Water Division from the Department of Public Works in Pepperell provides operational and maintenance services to the Dunstable Water Department. They provide routine checks of the wells and reading meters, and conduct distribution system maintenance activities.

- Dunstable has previously partnered with the Town of Groton for emergency dispatch, but recently approved a partnership with Patriot Regional Emergency Communications Center. The Patriot RECC provides an emergency notification system, CodeRED, by which town officials can notify Dunstable residents by telephone, cell phone, text message, or electronic mail about time-sensitive emergency situations or community alerts. The system is capable of sending messages only to localized areas or to the entire town.

- The Core Team indicated effective collaboration among the Emergency Management Department, the Fire and Police departments, the Highway department, National Grid, and the Board of Selectmen during emergency responses.

- Additionally, the Town of Dunstable coordinates with the towns of Tyngsborough and Groton for use of their emergency shelters as needed.

- The Town of Dunstable has a mutual aid agreement with The Northeastern Massachusetts Law Enforcement Council (NEMLEC). NEMLEC is a consortium of police departments in Middlesex and Essex Counties and two County Sheriff's departments (nemlec.com). Member agencies can share resources and personnel, especially in times of emergency.

Local Committees and Task Forces

The Capital Planning Committee was established in 2014 and is responsible for reviewing capital projects in order to analyze and determine the essentials, costs, and benefits of proposed projects.

The Conservation Commission prepares, adopts, and enforces all wetland regulations. They protect the wetlands of Dunstable from activities that could have an adverse impact. They also provide stewardship, education, and advocacy of the Town's natural and recreational assets.

The Board of Health reviews all water and sewer facilities that are proposed to be located within the floodplain.

The PACH Food Bank in Pepperell has food available food in times of need. Meals on Wheels supports those with need on a regular basis, including before, during, and after natural hazard events.

The Dunstable Grange is a fraternal organization of men, women and children of all ages who serve the community in many ways, including the annual grant of a scholarship to a graduating high school senior from Dunstable, providing refreshments for the Memorial Day Parade, memorial benches and gifts, as well as reaching out with donations to a number of charities and community organizations. The Annual Grange Fair from every August is a very popular event that is open to all members of the community.

Assistance from Non-Governmental Organizations

The Dunstable Rural Land Trust was established in 1974 to protect and maintain the character and landscapes of Dunstable. The Trust's mission is to preserve and protect the rural character of the Town of Dunstable. The Trust holds in excess of 800 acres and holds and additional 200 acres of easements (drlt.org). The Trust contributes to floodplain management by creating and maintaining open space in the Town of Dunstable.

The Nashua River Watershed Association was founded in 1969 to lead the clean-up of one of the nation's most polluted rivers. The NRWA acts as a regional leader in natural resource protection, water quality improvement, and environmental education. There are 32 watershed communities within the NRWA. They aim to restore and protect water quality and quantity, conserve open spaces, and encourage careful land use with well-planned development.

The Northern Middlesex Council of Governments works with the communities of the Greater Lowell region to support and enhance a wide range of land use planning objectives. These objectives include environmental protection, economic development, transportation and transit planning, and the building and maintenance of community character. They provide technical assistance to member communities in designing, facilitating, and implementing community planning projects.

5.3.2. | Capability Gaps

Based on evaluation with the administrative and technical capabilities, the following gaps in capabilities are identified and can be incorporated into the mitigation strategy:

- The Core Team noted the town would benefit from increased funding for additional staff positions.
- The Town may want to consider training on hazard response and hazard mitigation for staff members.
- Formalizing an in-person emergency communications plan would be beneficial as most outreach capabilities rely on electronic communication.
- Enacting a program to encourage signups for outreach systems would help more community members get information prior to, during, and following a natural hazard event. In particular, priority populations should be targeted.
- The Town could develop a list of Emergency Shelters in other communities (including Pepperell) to improve regional coordination and collaboration.
- Developing policies for use for Library/Council on Aging will support equitable use of these important facilities for priority populations.

5.4. Financial Capabilities

Financial capabilities are the resources to fund mitigation actions. Talking about funding and financial capabilities is important because mitigation actions have different costs. Mitigation actions like outreach programs are lower cost and often use staff time and existing budgets. Other

actions, like earthquake retrofits, could require substantial funding from local, state and federal partners.

5.4.1. | Existing Capabilities

The Core Team identified the following financial methods as being used in the recent past to fund mitigation activities:

- Capital improvement project funding
- Authority to levy taxes for specific purposes
- Fees for water, gas, or electric
- State funding programs
- Impact fees for new development
- Incurring debt through general obligation bonds and/or special tax bonds
- Other federal funding programs

5.4.2. | Capability Gaps

The Core Team indicated the desire and need to apply for state and federal grant funding for additional monies for hazard mitigation activity. The Town of Dunstable should target FEMA funding sources such as the Hazard Mitigation Grant Program, Flood Mitigation Assistance grants, or Building Resilient Infrastructure and Communities grants. There are also state-level grant programs available such as the Municipal Vulnerability Preparedness Action Grant. Historically, a barrier to applying for these grants has been staff capacity.

5.5. Education and Outreach

Education and outreach to the community are vital components of both preparedness and response. These capabilities are programs and methods that can communicate about and encourage risk reduction and may be run by the Town or a community-based partner.

5.5.1. | Existing Capabilities

- The Dunstable website is used for education and outreach. The website contains links to information such as extreme cold safety tips and Coronavirus updates from the Massachusetts Emergency Management Agency. The website also contains links to Ready.Gov, FEMA, and the Executive Office of Public Safety and Security. The website also provides a link where residents can subscribe to E-Alerts from the Town.

- The Town is active on both Facebook and Instagram and is able to share educational information with the community via these methods.

5.5.2. | Capability Gaps

Based on evaluation with the education and outreach capabilities, the following gaps in capabilities are identified and can be incorporated into the mitigation strategy:

- The Core Team indicated a need to increase education and outreach to the community regarding preparedness and hazard mitigation. Preparing a formal Communication Plan for priority populations will improve equity in outreach.
- The Town may consider developing Education & Outreach related to Invasives, Wells, Trees, and Flooding, among other topics.
- The public noted that email updates from the Town related to hazard mitigation would be the preferred method of communication in the future.

5.6. Community Input on Capabilities

According to public input received during development of this plan, the town treats winter roads (salting and sanding) well and completes snow removal well, to prepare for natural hazard events.

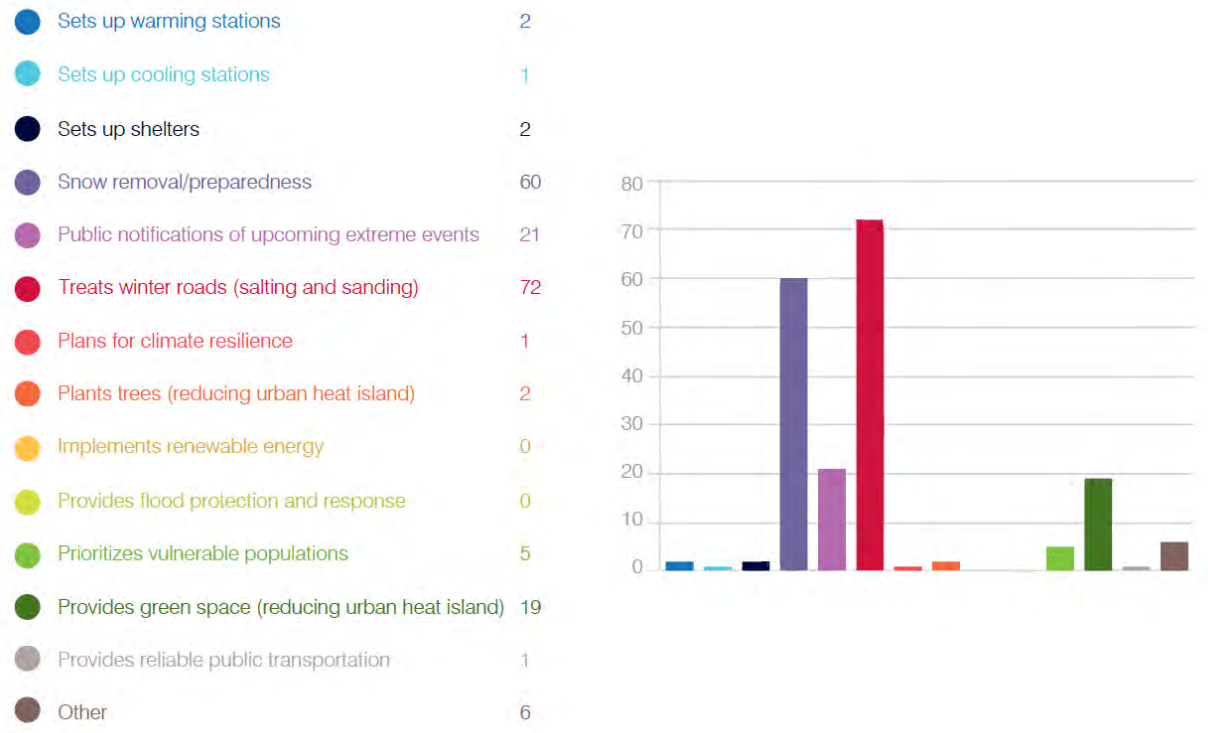


Figure 5.1: Community Input on Dunstable's Capabilities for Natural Hazard Preparedness.

According to public input received during development of this plan, Dunstable could improve preparedness for natural hazards by implementing renewable energy, planning for climate resilience, and providing public notification of upcoming extreme events.

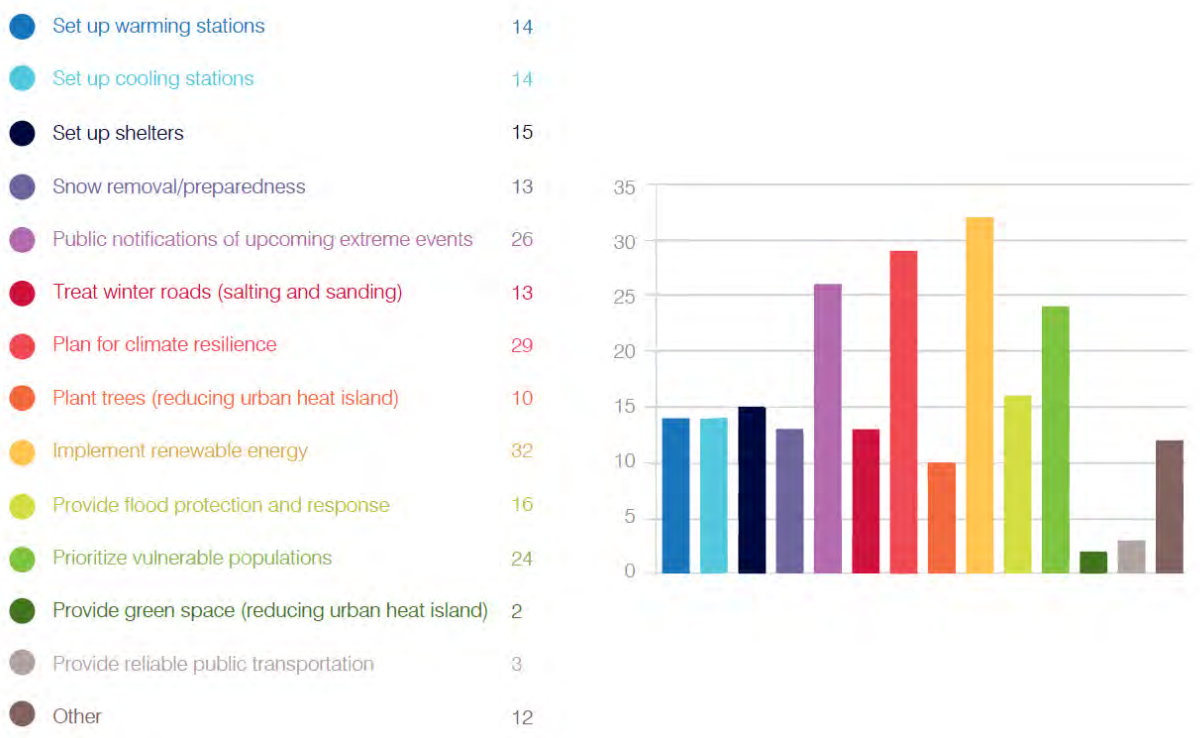


Figure 5.2: Community Input on Potential Natural Hazard Preparedness Improvements

6



6. Mitigation Actions

The mitigation actions are one of the most important components of the Hazard Mitigation Plan. They serve as the blueprint for reducing the potential losses identified in the risk and vulnerability assessment. They can be a measure, project, plan, or activity proposed to achieve the Town's mission and goals and reduce current and future vulnerabilities described in the risk assessment (Chapter 4).

There are many different types of hazard mitigation actions that generally fall into the following four categories (FEMA, Local Mitigation Planning Handbook, 2023):

Local Plans and Regulations: These actions include government authorities, policies or codes that influence the way land and buildings are developed and built.

Structure and Infrastructure Projects: These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area. This could apply to public or private structures as well as critical facilities and infrastructure.

Natural Systems Protection and Nature-based Solutions: This type of action can include green infrastructure and low impact development, nature-based solutions, Engineering with Nature and bioengineering to incorporate natural features or processes into the built environment.



Education and Awareness Programs: These types of actions keep residents informed about potential natural disasters. Many of these types of actions are eligible for funding through the FEMA HMA program.

Through the stakeholder and community engagement process discussed in Chapter 2, mitigation actions and an action plan for implementation were developed to help achieve the mitigation goals (See Chapter 1 Section 1.5 for mitigation goals). This provides a framework to prioritize and implement actions to reduce risks from hazards. Chapter 6 reviews the mitigation actions created in 2015 and outlines mitigation actions for Dunstable for the next five years.

6.1. Status of 2015 HMP Mitigation Actions

The 2015 HMP has been used as a tool to assist the Town in prioritizing planning, operational, and capital projects and improvements. The Town's Capital Improvement Plan and operational budgets were informed, in part, by the Town's 2015 HMP allowing the Town to complete many of the action items contained in that plan.

The Town has updated its bylaws to place controls over development within the 100-year floodplain and, in 2016 and 2021, the Town adopted bylaws to manage stormwater and control erosion before, during, and post construction supporting local resilience. Additionally, regional planning initiatives underway incorporate resiliency and mitigation efforts. These initiatives include the regional housing planning effort, At Home in Greater Lowell, and the Greater Lowell Vision Zero: Safe Streets and Roads for All incorporate resiliency and mitigation efforts.

Town staff reviewed the mitigation measures identified in the 2015 HMP and determined whether measures identified in that plan had been implemented or deferred. For implemented projects, they were categorized as either complete or in progress, with the latter referring to projects were still under development or had begun but not yet completed. If measures had been deferred, the Core Team evaluated whether the measure should be deleted or carried forward into this 2023 HMP Update. The decision on whether to delete or retain a particular measure was based on the STC's assessment of the continued relevance or effectiveness of the measure and whether the deferral of action on the measure was due to the inability of the town to take action on the measure. Table 6.1 lists all mitigation actions from the 2015 HMP and their current status.

Table 6.1: Status of 2015 HMP Mitigation Actions

Description of Action	Implementation Responsibility/ Status	Status	Notes
Prepare study of flooding problems along Main Street near Sweets Pond.	Town Board of Selectmen and Conservation Commission	Deleted	New culvert has been installed in area and flooding has been minimized. Study no longer needed.
Study the Community Rating System to determine appropriateness for Dunstable	Town Emergency Manager and building inspector, MEMA and FEMA	Deferred	Included in 2024 HMP Update
Increase public awareness of the dangers of extreme temperatures and outline locations where vulnerable populations (elderly and those with health issues) can have access to air conditioning or shelter from the cold	Town Emergency Manager	In Progress	Included in 2024 HMP Update
Work with DCR Office of Dam Safety to ensure that the inspections of all dams are current.	Town Administrator, DCR Office of Dam Safety, dam owners	In Progress	Included in 2024 HMP Update
Incorporate Hazard Mitigation into subdivision regulations, Master Plan and Open Space Plan Updates.	Town Planning Board and Conservation Commission. The town's Open Space Plan currently addresses hazard mitigation.	Deferred	Included in 2024 HMP Update

Description of Action	Implementation Responsibility/ Status	Status	Notes
Participate in DCR's Fire Wise Program for the forested sections of town.	DCR and Town Fire Department	Deferred	Included in 2024 HMP Update
Upgrade and expand the Route 113 water line, which will improve fire suppression capabilities.	Town Water Department	Completed	Note: Dunstable does not have fire suppression capabilities.
Purchase communication equipment with interoperability capabilities.	Town police and fire departments	Completed	
Replace Main Street/Salmon Brook Bridge.	Highway department and MassDOT. The bridge replacement project is currently under design	Completed	
Study regional consolidation of 911 dispatch services by establishing an RECC	Town public safety officials, NMCOG and the State 911 Department	Completed	
Repair the next phase of the Route 113 retaining wall in order to keep the roadway open and replace culvert.	MassDOT and the Town Highway Department. This project is currently under design	Completed	
Ensure that administrators of schools, businesses, and municipal buildings have a shelter plan in the event of a tornado warning	Emergency Manager and public safety	Deferred	Included in 2024 HMP Update

Description of Action	Implementation Responsibility/ Status	Status	Notes
Study the establishment of a mutual aid agreement with neighboring communities to administer NFIP following a major storm event.	Town Emergency manager, Board of Selectmen, and building inspector	Deferred	Included in 2024 HMP Update
Revise subdivision regulations, erosion control regulations, and Board of Health regulations to improve floodplain management as needed	Town Planning Board, Conservation Commission and Board of Health	Deleted	Local and state regulations are sufficient to cover this previous action.
Distribute educational information to residents and businesses on protecting life and property from severe winter storm events	Emergency Manager	In Progress	
Inspect public buildings to evaluate the capacity to withstand snow loads and prevent roof collapse. Develop plans to clear roofs of excessive snow accumulations to prevent collapse.	Building inspector and Emergency Manager	In Progress	
Identify locations for snow storage farms for utilization in severe winters with heavy snowfall	Highway Department	Deleted	There are no major parking lots or impervious areas that need extensive snow removal. There is sufficient space at schools and other town facilities for site-specific snow removal.

Description of Action	Implementation Responsibility/ Status	Status	Notes
Evaluate public buildings and critical facilities for the potential to withstand high winds	Building inspector and emergency manager	Deleted	Captured in updated hazards list.
Assess bridges and roadways to ascertain their capability to support fire apparatus and develop alternative routing plans where deficiencies are noted	Fire Department and Highway Department	Deleted	Has not been a concern.
Develop an inventory of public buildings that do not currently meet seismic standards	Building inspector and emergency manager	Deleted	
Provide information to homeowners on how to protect their property from brush fire or wildfire during times of drought	Fire Department	Deleted	Combine with firewise/updated Mitigations

6.2. MVP Actions Identified at Community Resilience Building Workshop

At the Community Resilience Building workshops held in October 2023, attendees in groups (Groups 1, 2, and 3) brainstormed a number of potential mitigation strategies to address severe weather/ nor'easters, invasive species, flooding from precipitation, and extreme temperatures (top hazards identified as previous discussed in Section 4.15) for assets (See Section 3.2) identified.

Each group ranked their list and reported out to the larger workshop about their top three mitigation strategies. Strategies were organized by asset category (People, Structures, Systems, Historic/Natural/Cultural Resources), and Economy & Activities with Value to the Community.

Attendees prioritized the list of mitigation strategies to undertake in Dunstable. Each attendee voted for three mitigation strategies.

Based on the results of votes at the CRB & HMP Stakeholder Workshop Day 2, the following priority actions were identified:

- Fire Department Station/ Lot Resilience
- Road infrastructure evaluation and management plan
- Woodwards Mill Pond Dam Repairs
- Communication plan for priority populations
- Create cooling areas (e.g., natural approaches & structures) at Larter Field, Town Common, school parking lot
- Culverts & Dams: inventory & evaluation and flood study regarding prevention
- Education & Outreach for:
    - Invasives
    - Wells
    - Trees
- Install mixer at water tower
- Complete a review of bylaws & regulations for climate resilience
- Add AC to school for shelter use/ designation

Other Actions were also identified but not ranked as high priority:

- Implement Building Envelope Actions at Union School
- Improve access roads to open / wooded spaces for fire management and emergency response
- Mitigate potential impacts of flooding and other natural hazards at new development projects
- Flood study for DPW
- Develop policies for use for Library/Council on Aging
- Provide access to drinking water from town on public properties (e.g., water fountains, fill stations)
- Improve and create affordable senior housing options
- Adapt community activities to seasons/weather (time to avoid natural hazards)
- Develop procedure and obtain equipment for fire department to pump basements
- Gas / power / energy resilience study
- Regional Coordination re Cow Pond Dam
- Police Department resilience study
- Hydrant inventory & code identification
- In-person emergency communications plan
- Encourage signups for outreach systems, priority populations in particular
- Downtown flooding study

- Generators for heating/cooling at critical buildings
- Beaver management planning
- Ongoing maintenance of trees surrounding critical facilities, pre storm event
- Resilient Bandstand at Town Common

These actions have been incorporated into the overall mitigation and adaption strategy for Dunstable.

6.3. Mitigation Action and Adaptation Strategy for 2024-2028

The Core Team developed an updated mitigation action and adaptation strategy for this HMP Update. The actions were developed from a multi-faceted approach, including the following:

- The goals and objectives endorsed by the Core Team; more detail about this is available in Chapter 1.
- Input from stakeholders through the CRB Workshops and the community through public meetings and survey input; more detail about this is available in Chapter 2.
- Identified community assets, described in Chapter 3.
- A hazard and climate change risk and vulnerability assessment; more detail about this is available in Chapter 4.
- The Town's capacity to mitigate and respond to hazard events as described in Chapter 5.
- The progress of actions from the 2015 HMP; more detail about this is available in Chapter 6 Section 6.1
- Actions included in related town plans and reports; more detail about this is available in Chapter 2.3.

The actions include both specific projects and recognize broader results to be achieved by implementing a project. The level of specificity differs based on the input received and the currently available data associated with the mitigation action. In some cases, actions are broader because the specific steps to accomplish the result may not be determined at this point in time. These actions will all be tracked an updated during the annual plan maintenance and review, discussed in greater detail in Chapter 7.

6.3.1. | Initial Prioritization of Potential Actions

Actions were prioritized using FEMA's Guidance. If the action satisfied the criteria, it received points. If it did not, it received no points. Points were added to yield a total score. Scores were then categorized into low (8-16 points), medium (16-22 points) or high (23+ points) priority.

All actions were identified to have a beneficial impact on businesses, residents, and properties in the Town and to proactively reduce the risk of a natural hazard. The questions used to evaluate priorities are shown in Table 6.2.

Table 6.2: Prioritization of Potential HMP Mitigation Actions

Question	Potential Answers	Point System
Is there sufficient staff to implement the project?	Yes No	2 0
Is training required for the staff to implement the project?	Yes No	2 0
Is there political support for the project?	Yes No Maybe	2 0 1
Does the community have the legal authority to do the project?	Yes Maybe No	2 1 0
What is the cost of the project? *	$ = <$50,000 $$ = $50,000 to <$250,000 $$$ = $250,000 or more	2 1 0
Does the community have the funds for the project on the whole or the local match?	Yes Maybe No	2 1 0
Des the action advance other local objectives or plans?	Yes No	2 0
What is the scale of the overall benefit?	High (town-wide or regional) Medium (neighborhood/area/portion of town) Low (site specific/limited population)	2 1 0

Question	Potential Answers	Point System
Will the action adversely affect priority populations?	Yes Maybe No	2 1 0
Does the action build resilience for priority populations?	Yes Maybe No	2 1 0
What priority was this action assigned at the MVP Community Resilience Building Workshops? **	High Medium Low N/A (from 2015 HMP)	2 1 0 0

* Costs listed in the prioritization are estimated and are based on the cost of similar projects and professional estimates. Actual costs may vary based on the specific site, project, and scope of work. Cost estimates should be verified during the financial planning stage of a project.

** During Workshop #2, each group (Groups 1, 2, and 3) brainstormed a number of potential mitigation strategies to address Severe Weather/ Nor'easters, invasive species, flooding from precipitation, and extreme temperatures for assets identified in Workshop Day 1. Each group ranked their list and reported on their top three mitigation strategies. Strategies were organized by asset category (People, Structures, Systems, Historic/Natural/Cultural Resources), and Economy & Activities with Value to the Community). Attendees prioritized the list of mitigation strategies to undertake in Dunstable. Each attendee voted for three mitigation strategies.

The mitigation strategy, or action plan, is the heart of the plan and the primary tool to get funding, assign priorities, guide decisions, and track progress in future plan updates.

Table 6.3 presents the initial prioritized list potential mitigation actions.

Table 6.3: Initial Prioritized List of Potential Mitigation Actions

#	Action Description	Is there sufficient staff to implement the project?	Is training required for the staff to implement the project?	Is there political support for the project?	Does the community have the legal authority to do the project?	What is the cost of the project?	Does the community have the funds for the project on the whole or the local match?	Does the action advance other local objectives or plans?	What is the scale of the overall benefit?	Will the action adversely affect priority populations?	Does the action build resilience for priority populations?	What priority was this action assigned at the MVP Community Resilience Building Workshops?	Overall Priority	Selected for Implementation?
		Yes No	Yes No	Yes No Maybe	Yes No Maybe	$ = <$50,000 $$ = $50,000 to <$250,000 $$$ = $250,000 or more	Yes No Maybe	Yes No	High (regional, town-wide) Medium (neighborhood specific) Low (site specific)	Yes No Maybe	Yes No Maybe	High Medium Low N/A (from 2015 HMP)	High Medium Low	Yes No
1	Fire Department Station/ Lot Resilience	Yes	No	Maybe	Yes	$$	No	Yes	Low	No	No	High	Medium	Yes
2	Road infrastructure evaluation and management plan	Yes	Yes	Yes	Yes	$$	Maybe	Yes	High	No	Yes	High	High	Yes
3	Woodwards Mill Pond Dam Repairs	Yes	No	Yes	Yes	$$	Maybe	Yes	Medium	No	No	High	Medium	No
4	Communication plan for priority populations	Yes	No	Yes	Yes	$	Yes	No	Medium	No	Yes	High	High	Yes
5	Create cooling areas (e.g., natural approaches & structures) at Larter Field, Town Common, school parking lot	No	No	No	Yes	$$	Maybe	No	Medium	No	Yes	High	Low	No
6	Culverts & Dams: inventory & evaluation and flood study regarding prevention	Yes	Yes	Yes	Maybe	$$	Maybe	Yes	High	No	No	High	High	Yes
7	Education & Outreach for Invasives, Wells, Trees, Flooding	Yes	No	Yes	Yes	$	Yes	No	High	No	Yes	High	High	Yes
8	Install mixer at water tower	Yes	No	Yes	Yes	$$	Maybe	Yes	Medium	No	No	High	Medium	No
9	Complete a review of bylaws & regulations for climate resilience	Yes	No	Yes	Yes	$	Yes	Yes	High	Maybe	Maybe	High	High	Yes
10	Generators for heating/cooling at critical buildings	Yes	No	Yes	Yes	$$	Maybe	Maybe	Medium	No	Yes	High	High	Yes
11	Develop List of Emergency Shelters in other communities (including Pepperell)	Yes	No	Yes	Yes	$	Yes	Yes	Medium	No	Yes	High	High	Yes
12	Improve and create affordable senior housing options	Yes	No	Yes	Maybe	$$$	Maybe	Yes	High	No	Yes	High	Medium	No
13	Improve access roads to open / wooded spaces for fire management and emergency response	Yes	No	Yes	Yes	$$	Maybe	No	Medium	No	No	High	Medium	Yes
14	Add AC to school for shelter use/ designation	Yes	No	Yes	Yes	$	Maybe	Yes	Medium	No	Yes	High	High	Yes
15	Implement Building Envelop Actions at Union School	Yes	No	Yes	Yes	$$$	Maybe	Yes	Low	No	No	Medium	Medium	Yes
16	Mitigate potential impacts of flooding and other natural hazards at new development projects	Yes	No	Maybe	Maybe	$	Yes	Yes	High	Maybe	Maybe	Medium	High	Yes
17	Flood study for DPW	Yes	Yes	No	Yes	$	Maybe	Yes	Low	No	No	Medium	Medium	No
18	Develop policies for use for Library/Council on Aging	Yes	No	Yes	Yes	$	Yes	Yes	Low	No	Yes	Medium	High	Yes
19	Provide access to drinking water from town on public properties (e.g., water fountains, fill stations)	No	No	Maybe	Yes	$$	Maybe	Yes	Low	No	Yes	Low	Low	No
20	Adapt community activities to seasons/weather (time to avoid natural hazards)	Yes	No	Yes	No	$	Yes	Yes	Medium	No	Yes	Low	Medium	No
21	Develop procedure and obtain equipment for fire department to pump basements	Yes	No	Maybe	Yes	$	Maybe	Maybe	Medium	No	Yes	Low	Medium	No
22	Gas / power / energy resilience study	No	No	No	Maybe	$$	No	Maybe	High	No	Maybe	Low	Low	No
23	Regional Coordination for Cow Pond Dam	Yes	No	Maybe	Maybe	$	Yes	Yes	Medium	No	No	Low	Medium	No
24	Police Department resilience study	No	No	No	Yes	$$	No	No	Low	No	No	Low	Low	No
25	Hydrant inventory & code identification	Yes	No	Yes	Yes	$	Maybe	Yes	Medium	No	Maybe	Low	Medium	No
26	In-person emergency communications plan	Yes	No	Yes	Yes	$	Yes	Maybe	High	No	Yes	Low	Medium	No
27	Encourage sign ups for outreach systems, priority populations in particular	Yes	No	Yes	Yes	$	Yes	Yes	High	No	Yes	Low	High	No
28	Downtown flooding study	No	Yes	Maybe	Yes	$$	No	Yes	Medium	No	Maybe	Low	Medium	No
29	Add cell tower for equal service in case of emergencies	No	No	Maybe	Maybe	$$$	No	Yes	High	No	Yes	Low	Low	No
30	Beaver management planning	Yes	No	Maybe	Yes	$	Yes	Yes	Medium	No	No	Low	Medium	No
31	Ongoing maintenance of trees surrounding critical facilities, pre storm event	Yes	No	Yes	Maybe	$	Yes	Yes	High	No	Maybe	Low	Medium	No
32	Resilient Bandstand at Town Common	Yes	No	Maybe	Yes	$$$	No	Maybe	Low	No	Yes	Low	Low	No
33	Splash pad at Larter Field	Yes	No	Maybe	Yes	$$$	No	Maybe	Low	No	Yes	Low	Low	No
34	Study the Community Rating System to determine appropriateness for Dunstable	Yes	No	Maybe	Yes	$$	No	Maybe	Medium	No	Yes	N/A	Medium	Yes
35	Increase public awareness of the dangers of extreme temperatures and outline locations where vulnerable populations (elderly and those with health issues) can have access to air conditioning or shelter from the cold	No	Yes	Maybe	Yes	$$	Maybe	Yes	Medium	No	Maybe	N/A	Medium	Yes
36	Work with DCR Office of Dam Safety to ensure that the inspections of all dams are current.	Yes	No	Yes	Yes	$	Yes	Yes	High	Maybe	Maybe	N/A	High	Yes
37	Incorporate Hazard Mitigation into subdivision regulations, Master Plan, and Open Space Plan updates	Yes	Yes	Yes	Yes	$	No	Yes	Medium	No	No	N/A	Medium	Yes
38	Participate in DCR's Fire Wise Program for the forested sections of town	Yes	Yes	Maybe	Yes	$	Yes	Maybe	Medium	No	No	N/A	Medium	No
39	Ensure that administrators of schools, businesses, and municipal buildings have a shelter plan in the event of a tornado warning	Yes	Yes	Yes	Yes	$	No	Yes	High	Maybe	Maybe	N/A	High	Yes

Table 6.3: Initial Prioritized List of Potential Mitigation Actions

#	Action Description	Is there sufficient staff to implement the project?	Is training required for the staff to implement the project?	Is there political support for the project?	Does the community have the legal authority to do the project?	What is the cost of the project?	Does the community have the funds for the project on the whole or the local match?	Does the action advance other local objectives or plans?	What is the scale of the overall benefit?	Will the action adversely affect priority populations?	Does the action build resilience for priority populations?	What priority was this action assigned at the MVP Community Resilience Building Workshops?	Overall Priority	Selected for Implementation?
40	Study the establishment of a mutual aid agreement with neighboring communities to administer NFIP following a major storm event	Yes	Yes	Yes	Maybe	$	Yes	Yes	High	No	No	N/A	High	Yes
41	Distribute educational information to residents and businesses on protecting life and property from severe winter storm events	Yes	No	Maybe	Yes	$	Maybe	Yes	High	No	Yes	N/A	Medium	No
42	Inspect public buildings to evaluate the capacity to withstand snow loads and prevent roof collapse. Develop plans to clear roofs of excessive snow accumulations to prevent collapse.	No	No	Maybe	Yes	$$	No	Maybe	Medium	No	Maybe	N/A	Low	No
43	Identify local areas for landslides with a mapping exercise and include in CEMP.	Yes	No	No	Yes	$	Yes	No	High	No	Yes	N/A	Low	Yes

6.3.2. | Core Team Review of Initial Prioritized List of Mitigation Actions

In combining the HMP Mitigation Actions from the previous plan (see Section 6.1) with the Mitigation Actions identified as part of the MVP / HMP process (see Section 6.2), the new list contained 44 Actions. Realizing that this was too many, the Core Team sought to pare down the list.

First, the Core Team reviewed all of the Mitigation Actions and were able to eliminate Action #21 as the Fire Department does not have the capacity to be pumping residential basements during or after flood events. The Core Team also identified other Actions for potential elimination.

Next, the Core Team identified similar and redundant Mitigation Actions and grouped them together. The following Mitigation Actions shown in Table 6-3 were grouped together:

- 2, 3, 6, and 36
- 9, 12, 16, and 37
- 10, 14, and 35
- 7 and 41
- 34 and 40
- 5, 32, and 33

Next, the Core Team reviewed the actions to confirm that at least one Mitigation Action was included for each Hazard, and further consolidated similar Actions. While the town did have several Actions that fell into the "All Hazards" category, the Core Team tried to make sure Mitigation Actions were delineated to address more specific Hazards. Not every Hazard was unique to a Mitigation Action, so the Core Team made sure to retain those grouped Hazards (such as winter weather / hurricanes, or invasive species / drought / wildfires) where practicable. Based on this effort, the Core Team was able to further group the Mitigation Actions together:

- 2, 3, 6, 23, 30, 36
- 9, 12, 16, and 37
- 10, 11, 14, and 35
- 7, 38, and 41
- 4, 18, 26, and 27
- 34 and 40
- 1, 17, 22, 24, 28, and 42
- 5, 32, and 33

Next, the Core Team sorted the Mitigation Actions by their Prioritization score (highest to lowest) and renumbered the Mitigation Actions (lowest to highest) based on the highest Prioritization score of the groupings. For instance, Action #2 had the highest prioritization of 28 between all Actions, and of course the highest prioritization within its grouping of Actions: #2 (ranked 28), #3 (ranked 21), #6 (ranked 24), and #36 (ranked 25). The new group became Action #1.

Last, the Core Team revised the Mitigation Action description to capture each grouping under one new Mitigation Action and refined the other columns in the Actions Table to capture the Action appropriately. By doing this, the Core Team was able to reduce the list of Mitigation Actions from 44 to 18, which is much more reasonable for a 5-year plan considering the Town of Dunstable capabilities.

6.3.3. | Dunstable's 2024 - 2029 Mitigation Actions

For each mitigation action considered to be part of the 5-year plan, the following characteristics were defined such that the Town is able to tie the actions to the risk assessment and mitigation goals, define who is responsible for implementing/ administering the identified mitigation action, understand general cost and benefit of an action, understand available funding source(s), determine the expected timeframe for the action, and confirm consistency with and integration into other local plans.

- **Action #:** Number for quick reference.
- **Action Description:** Brief narrative describing the action.
- **Hazards/Risks Addressed:** Actions may mitigate a single or multiple hazards, which will be indicated for each action. All the hazards discussed in Chapter 4 were addressed when developing the priority list, and there is at least one action associated with each hazard. Some actions address all hazards and are listed as such.
- **Goals Addressed:** This column lists which goals the mitigation action aims to accomplish. Some actions contribute toward more than one goal. The goals are listed in Section 1.5
- **Responsible Party:** Many hazard mitigation actions and climate adaptation measures will require a multi-department strategy where several departments share responsibility. The designation of implementation responsibility is assigned to a primary department based on the responsibility of each department.
- **Partner Agencies:** Some mitigation actions may require cooperation with outside entities, such as Massachusetts state departments, neighboring communities, regional organizations, or private entities. In those cases, the relevant entities are included in additional to the town department.
- **Overall Priority:** This column shows the ranking based on the process described in Section 6.2.1.
- **Cost Estimate:** Costs listed in the mitigation action spreadsheet are estimated and are based on the cost of similar projects and professional estimates. Actual costs may vary based on the specific site, project, and scope of work. Cost estimates should be verified during the financial planning stage of a project.
- **Potential Funding Source:** The Town's general funds are considered a default potential funding source unless the Town pursues additional funding. Annually, the Town

funds various capital needs through its operating funds and aggressively seeks out grants and other funding sources to address Town needs. The identification of potential funding sources is preliminary and may vary depending on numerous factors. These factors include, but are not limited to, changes in grant eligibility criteria, program objectives, and funding availability. The funding sources identified are not a guarantee that a specific project will be eligible for, or receive, funding. Upon adoption of this plan, the local representatives responsible for implementation should begin to explore potential funding sources in more detail. Potential grants were assigned based on eligibility and competitiveness, but the recommendations may not be comprehensive. Please note that grant eligibility and scoring criteria should also be reviewed prior to applying. Grants may also only be a source of funding for a single stage of a project. In many cases, the actions will require a combination of funding sources.

- **Timeframe to Start:** This column indicates whether or not the action is in progress. If the action is not yet in progress, the estimated time remaining until the project starts is listed.
- **Estimated Timeline for Completion:** This column indicates the estimated timeline for completing the mitigation action. Short-term = 1 to 3 years. Medium-term = 4 to 5 years. Long-term = 6 to 10 years.
- **Integration Status:** It is crucial that the Hazard Mitigation Plan be aligned with other long-range planning documents for the Town of Dunstable. This column demonstrates areas where mitigation actions overlap with the intent of other planning documents.
- **Integration Opportunity into Local Plans:** For successful implementation of mitigation actions, they must be incorporate into local plans. This column indicates where mitigation actions may be integration into another local plan or planning mechanism.

The mitigation strategy, or action plan, is the heart of the plan and the primary tool to get funding, assign priorities, guide decisions, and track progress in future plan updates.

Table 6.4 presents the prioritized list of Dunstable's 2024 - 2029 Mitigation Actions.

Table 6.4: Dunstable 2024 – 2029 Mitigation Actions

Action #	Action Description	Hazards / Risks Addressed	Goals Addressed	Responsible Party	Partner Agencies	Overall Priority	Cost Estimate	Potential Funding Source(s)	Timeframe to Start	Estimated Timeline for Completion	Integration Status	Integration Opportunity
					Can any stakeholders help carry out the action, and if so, who?	High Medium Low	$ = <$50,000 $$ = $50,000 to <$250,000 $$$ = $250,000 or more	Capital Budget Operating Budget Municipal Bond Grant Staff Time	In Progress Less than 1 year 1-2 years 2-5 years Annual	Short-term (1 - 3 years) Medium-term (4 - 5 years) Long-term (6 - 10 years)	Action Identified in other Local Plan? Yes No	Action could support other local plan or planning mechanism? Yes No
1	Road infrastructure evaluation and management plan to include: - Culvert inventory, evaluation, and flood study. - Dam review with DCR Office of Dam Safety to ensure inspections are current. - Regional coordination for Cow Pond Dam. - Beaver management plan	Precipitation flooding	1. Protect Health and Safety 4. Protect Priority Populations 5. Consider the Economy 6. Integrate Climate Change	Road Commission	Select Board Conservation Commission Board of Health	High	$$	Capital Budget / Operating Budget / Municipal Vulnerability Preparedness Grant / Asset Management Grant	In Progress	Medium-term	Yes	Yes
2	Complete a review of bylaws & regulations for climate resilience to incorporate Hazard Mitigation into subdivision regulations, Master Plan, and Open Space Plan updates, considering zoning for accommodating priority populations.	All hazards	1. Protect Health and Safety 2. Increase Outreach and Education 4. Protect Priority Populations 5. Consider the Economy 6. Integrate Climate Change 7. Encourage Smart Development 8. Be Sustainable	Planning Board	Zoning Board of Appeals / Conservation Commission / Master Plan Committee / Select Board / NMCOG / Affordable Housing Committee	High	$$	Staff Time (Town Administrator, Planning Board and Conservation Commission Administrator, Town Clerk, Planning and Select Board members) (Town to confirm which staff time applies) / Community Development Block Grant / Municipal Vulnerability Preparedness Grant	Less than 1 year	Short-term	Yes	Yes
3	Assess and identify locations where vulnerable populations (young, elderly, and those with health issues) can have access to air conditioning or shelter from the cold (both in Town and in surrounding communities), and increase public awareness of the dangers of extreme temperatures.	Average/Extreme temperatures	1. Protect Health and Safety 3. Increase Response Capacity 4. Protect Priority Populations 6. Integrate Climate Change	Emergency Management Director	Police, Fire, Select Board, Schools	High	$$	Staff Time (Town Administrator, Assistant to Town Administrator and Select Board, Emergency Management Director, Select Board members) / Community Facilities Grant	1-2 years	Short-term	No	Yes
4	Ensure that administrators of schools, businesses, and municipal buildings have a shelter plan in the event of a tornado warning	Tornados	1. Protect Health and Safety 3. Increase Response Capacity 6. Integrate Climate Change 8. Increase Coordination	Schools	Police / Fire	High	$	Staff Time (Emergency Management Director, Town Administrator, School officials) / Pre-Disaster Mitigation Grant / Emergency Management Performance Grant	Annual	Long-term	No	Yes
5	Distribute educational information to residents and businesses on tree management and on protecting life and property from severe winter storm events, invasives, wild fires, and flooding.	Invasive Species, drought, wildfires, winter weather	1. Protect Health and Safety 2. Increase Outreach and Education 4. Protect Priority Populations 6. Integrate Climate Change	Emergency Management Director	Town Forest Committee / Conservation Commission / Fire Department	High	$	Staff Time (Tree Warden, Highway Director, Police and Fire Chiefs, Emergency Management Director, Town Administrator) / Municipal Vulnerability Preparedness Grant / Landscape Scale Restoration Grant / Environmental Education Grant	In Progress	Short-term	No	No
6	Develop emergency communications plan, with focus on outreach to priority populations.	All hazards	1. Protect Health and Safety 2. Increase Outreach and Education 3. Increase Response Capacity 4. Protect Priority Populations 6. Integrate Climate Change	Police	Select Board / Council on Aging / Senior Center / Emergency Management Director	High	$	Staff Time (Town Administrator, Assistant to Town Administrator and Select Board)	Less than 1 year	Short-term	No	Yes
7	Develop policies for use for Library/Council on Aging	All hazards except changes in groundwater and invasive species	1. Protect Health and Safety 2. Increase Outreach and Education 4. Protect Priority Populations 6. Integrate Climate Change	Library Trustees	Council on Aging	High	$	Staff Time (Library Director and Senior Services Director)	Less than 1 year	Short-term	No	No
8	Study the establishment of a mutual aid agreement with neighboring communities to administer NFIP following a major storm event, including review of the Community Rating System to determine appropriateness for Dunstable.	Precipitation flooding	1. Protect Health and Safety 3. Increase Response Capacity 4. Protect Priority Populations 6. Integrate Climate Change 8. Increase Coordination	Select Board	NMCOG	High	$$	Staff Time (Police and Fire Chief, Emergency Management Director) / Flood Mitigation Assistance Grant	Annual	Long-term	No	Yes
9	Ongoing maintenance of trees surrounding critical facilities, pre storm event	winter weather, hurricanes	1. Protect Health and Safety 4. Protect Priority Populations 6. Integrate Climate Change 8. Increase Coordination	Road Commission	Town Forest Committee	Medium	$	Operating Budget / Urban and Community Forestry Grant / Urban and Community Forest Challenge Grant	Annual	Long-term	No	Yes
10	Install mixer at water tower	Extreme Temperatures	1. Protect Health and Safety 3. Increase Response Capacity 6. Integrate Climate Change	Water Commission	Select Board	Medium	$$	Capital Budget / Municipal Bond	1-2 years	Short-term	Yes	Yes
11	Hydrant inventory & code identification	Wildfires	1. Protect Health and Safety 3. Increase Response Capacity	Fire Dept	Emergency Management Director	Medium	$	Staff Time (Fire Chief, Water Commission)	Less than 1 year	Short-term		No

Table 6.4: Dunstable 2024 – 2029 Mitigation Actions

Action #	Action Description	Hazards / Risks Addressed	Goals Addressed	Responsible Party	Partner Agencies	Overall Priority	Cost Estimate	Potential Funding Source(s)	Timeframe to Start	Estimated Timeline for Completion	Integration Status	Integration Opportunity
					Can any stakeholders help carry out the action, and if so, who?	High Medium Low	$ = <$50,000 $$ = $50,000 to <$250,000 $$$ = $250,000 or more	Capital Budget Operating Budget Municipal Bond Grant Staff Time	In Progress Less than 1 year 1-2 years 2-5 years Annual	Short-term (1 - 3 years) Medium-term (4 - 5 years) Long-term (6 - 10 years)	Action Identified in other Local Plan? Yes No	Action could support other local plan or planning mechanism? Yes No
12	Adapt community activities to seasons/weather (time to avoid natural hazards)	All hazards	1. Protect Health and Safety 2. Increase Outreach and Education 4. Protect Priority Populations 6. Integrate Climate Change 8. Increase Coordination	Emergency Management Director	Cultural Council	Medium	$	Staff Time (Town Administrator)	Less than 1 year	Short-term	No	No
13	Complete a resiliency study to include: 1. Downtown flooding 2. Fire Station / Lot 3. Public buildings for snow loads 4. Gas / power / utilities 5. Police Department 6. Flood study at DPW	All hazards	1. Protect Health and Safety 3. Increase Response Capacity 4. Protect Priority Populations 5. Consider the Economy 6. Integrate Climate Change 7. Encourage Smart Development 10. Be Sustainable	Select Board	Road Commission / Fire Department / Police Department / Emergency Management Director	Medium	$$	Complete Streets Grant / Municipal Vulnerability Preparedness Grant / Municipal Bond	1-2 years	Medium-term	Yes	Yes
14	Improve access roads to open / wooded spaces for fire management and emergency response	Wildfires	1. Protect Health and Safety 3. Increase Response Capacity 6. Integrate Climate Change	Town Forest Committee	Road Commission	Medium	$$	Operating Budget / Forest Service Community Wildfire Defense Grant / Fire Prevention and Safety Grant	In Progress	Short-term	No	Yes
15	Implement Building Envelop Actions at Union School	Average/Extreme temperatures, precipitation flooding, winter storms, hurricanes, tornadoes, earthquakes	1. Protect Health and Safety 3. Increase Response Capacity 4. Protect Priority Populations 6. Integrate Climate Change	Select Board	CPC, Historical Commission	Medium	$$$	Capital Budget / Energy Efficient and Conservation Block Grant / State Energy Program	1-2 years	Short-term	Yes	Yes
16	Create cooling areas (e.g., natural approaches & structures) at Larter Field (splash pad), Town Common (resilient bandstand), school parking lot.	Average/Extreme temperatures	1. Protect Health and Safety 4. Protect Priority Populations 6. Integrate Climate Change 10. Be Sustainable	Select Board	Community Preservation Committee / Cultural Council / Water Commission	Low	$$	Capital Budget / Municipal Bond / Municipal Vulnerability Preparedness Grant	2-5 years	Medium-term	No	Yes
17	Provide access to drinking water from town on public properties (e.g., water fountains, fill stations)	Drought, average/extreme temperatures	1. Protect Health and Safety 2. Increase Outreach and Education 3. Increase Response Capacity 4. Protect Priority Populations 6. Integrate Climate Change	Water Commission	Planning Board, Select Board	Low	$$	Municipal Bond / Drinking Water State Revolving Fund / Healthy Community Design Initiatives Grant	2-5 years	Long-term	No	Yes
18	Add cell tower for equal service in case of emergencies	All hazards	1. Protect Health and Safety 3. Increase Response Capacity 8. Increase Coordination	Police, Fire	Select Board	Low	$$$	Municipal Bond / Connect America Fund / Community Connect Grant	2-5 years	Medium-term	No	Yes
19	Identify local areas for landslides with a mapping exercise and include in CEMP.	Landslides	1. Protect Health and Safety 3. Increase Response Capacity 4. Protect Priority Populations 7. Encourage Smart Development	Emergency Management Director	Planning Board, Select Board	Low	$	Capital Budget	1-2 years	Short-term	No	Yes

7



7. Plan Maintenance

Hazard Mitigation Plans are intended to serve as living documents. In order to be impactful, they must be regularly updated to reflect the current state of hazards, vulnerabilities, goals, strategies, and public sentiment. The three main components of plan maintenance are: *monitoring*, *evaluating*, and *updating* the plan.

Included in this chapter is a multi-pronged strategy to always keep the HMP as effective as possible. Monitoring, evaluating, and updating the plan will be intertwined with public engagement, integration with other local, regional, and state planning mechanisms, and plan implementation. These processes will run on an ongoing basis with the expectation there is coordination and collaboration between monitoring, evaluating, and updating the plan.

The Town Administrator or their designee, with the Select Board's guidance and oversight, will:

- Track the progress of the HMP Mitigation Actions and MVP (see Section 7.1);
- Reconvene the Core Team annually to monitor, evaluate, update, and integrate the plan (see Section 7.1, 7.2, 7.3, and 7.4);
- Share HMP and MVP progress with the public once a year (see Section 7.5);
- Make all monitoring information publicly available (see Section 7.1);
- Notify the public when new information has been posted or updated (see Section 7.5; and
- Provide the public opportunities to give input on this information (see Section 7.5).

7.1. Monitoring the Plan

According to FEMA, monitoring means tracking the implementation of the HMP and MVP Plan over time.

Who: The Town Administrator or their designee will take ownership of monitoring the plan.

How: The Town Administrator or their designee will monitor the status of mitigation actions (Chapter 6) through an internal tracking system using Excel. This should be made publicly available.

When: Monitoring will take place on an ongoing basis with annual meetings to formally update the status of Mitigation Actions and complete the MVP. In advance of this meeting, the Town Administrator or their designee will send out notices to the Core Team that will include a shared document where all Core Team members can collaborate to review status of mitigation actions and identify any new mitigation actions that may be under consideration or in progress as part of ongoing Town efforts.

7.2. Evaluating the Plan

According to FEMA, evaluating means assessing the effectiveness of the plan at achieving its stated purpose and goals.

Who and When: The Core Team will meet annually to evaluate the effectiveness of the plan. The Core Team may also be called to meet after a major event or storm to evaluate the effectiveness of the plan.

How: The Core Team will:

- Review the 2024 HMP Goals; and
- Discuss how mitigation actions are or are not meeting 2024 HMP Goals and where improvements or adjustments may be needed (e.g., re-prioritization of projects, integrating with other planning processes more effectively, adding new data to climate projections, etc.

7.3. Updating the Plan

The following discusses plan updates under three circumstances:

- Maintaining eligibility with FEMA
- Major disasters
- MVP requirements

7.3.1. | Plan Updates to Maintain FEMA Funding Eligibility

According to FEMA, updating means reviewing and revising the HMP at least once every five years.

Hazard Mitigation Plans expire five years from the date approved by FEMA. To maintain eligibility for certain types of non-emergency disaster assistance from FEMA, an entity such as the Town of Dunstable must have an approved active Hazard Mitigation Plan.

Hazard Mitigation Plans should be reviewed and updated at least every five years. The Town Administrator or their designee will initiate the process to complete a comprehensive update to the HMP. As a best practice, the comprehensive update should be initiated approximately 18 months prior to this HMP's expiration. This process generally includes:

- Re-engaging the Core Team;
- Considering expansion of the Core Team;
- Confirming FEMA's and MEMA's most recent requirements and guidance;
- Gathering updated information and relevant documents;
- Defining a list of stakeholders (such as the Stakeholders discussed in Chapter 2);
- Initiating an outreach and engagement process;
- Undertaking the planning steps to prepare required Hazard Mitigation Plan sections; and
- Completing and reviewing the draft Plan and submitting for approval.

The Town may elect to complete this process in-house or with guidance from an outside contractor.

7.3.2. | Plan Updates Due to Major Disaster Events or New Conditions

FEMA recommends that HMPs also be revisited and updated after a major disaster event (a State or Federally declared disaster) or if new conditions significantly change risk (such as new climate projections or local risk and vulnerability assessment efforts). The Town Administrator or their designee will initiate the process to complete any updates needed in these circumstances. The decision to update the plan will be based on the annual monitoring and evaluation process.

7.3.3. | Plan Updates to Address MVP Requirements

The MVP Summary of Findings must be reviewed and updated annually. The Town must use EEA's latest annual report template and submit the annual report to the Regional Coordinator once a year, at the end of the Town's fiscal year.

7.4. Integrating the MVP-HMP

In order to be impactful, the MVP-HMP must be effectively integrated into other Town planning mechanisms. This will increase co-benefits of hazard mitigation projects, streamline planning and implementation activities, and help secure funding for mitigation projects

.

Integrating the ideas, information, and strategy of a mitigation plan into other planning mechanisms can be achieved through plan integration. Plan integration involves a two-way exchange of information and incorporation of ideas and concepts between hazard mitigation plans and other planning mechanisms. Some ways Dunstable can integrate the ideas, information, and strategy of a mitigation plan into other planning mechanisms are:

- **Next Master Plan and Open Space Plan:** Community planning mechanisms can be integrated into hazard mitigation plans to ensure that community needs and concerns are considered when developing hazard mitigation strategies.
- **Building and Zoning Regulations:** The local hazard mitigation plan can integrate with building and zoning regulations, if they are being updated, to ensure that new construction and development are designed to withstand potential hazards.

- **Partnerships:** Developing strong partnerships between planners and emergency managers in neighboring communities can help to fully integrate land use and hazard planning efforts

Integration will be a topic of discussion at each annual update meeting. MVP-HMP goals and mitigation actions will be integrated into other Town planning mechanisms. At each annual Core Team meeting, there will be an update on the progress of integration of mitigation actions into relevant planning mechanisms and a discussion of other planning mechanisms that should be integrated into the next five-year HMP update.

7.5. Public Participation throughout Plan Maintenance

Public engagement is a critical part of the plan maintenance process. Public input, education, and support are crucial to ensuring that the plan is effective, equitable, and impactful.

A coordinated public engagement effort will be led by the Town Administrator or their designee.

The public survey indicated that residents would like to be informed about future plan updates via emails from the Town, fact sheets on the Town website, or social media.

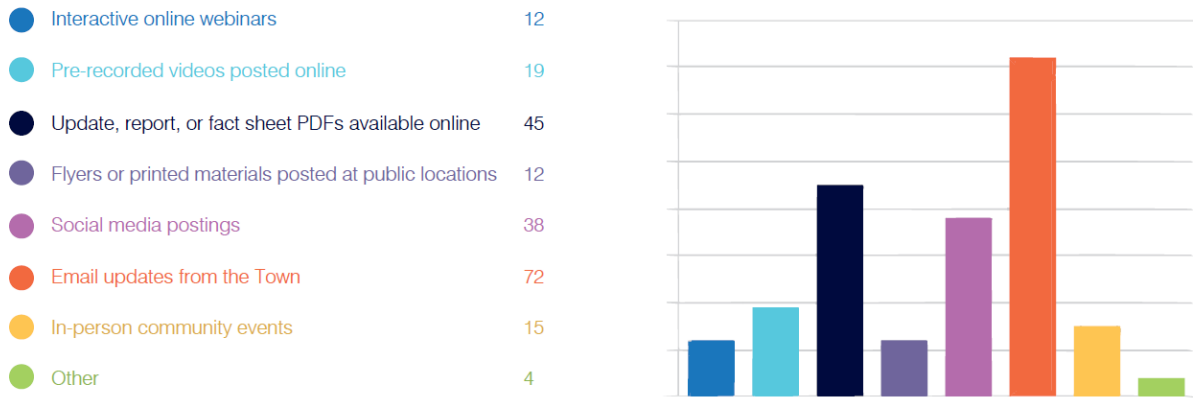


Figure 7.1: Community feedback related to best methods to receive information on hazard mitigation

The Town anticipates undertaking the following public outreach and engagement activities in alignment with the annual evaluation, monitoring, and plan update meetings, as well as with large storms or events at the discretion of the Core Team and Town Administrator or their designee.

- **Public Education:** The Town will annually provide:
  - A website update on the HMP-MVP;

- A brief update to the Select Board and a public meeting; and
- An email blast and social media posts to advertise the website and Select Board update.

- **Public Input:** Each year,
  - Attendees to the Select Board meeting can provide input and ask questions
  - Interested parties will be invited to attend the Core Team annual update meeting to provide input on the HMP-MVP progress.

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8



8. Adoption

Once the draft of the Dunstable Hazard Mitigation Plan is reviewed by the Core Team, Stakeholders, and the general public, the Plan is reviewed by MEMA and FEMA. When the Plan is finally approved by FEMA, it enters into the five year "maintenance" phase. In addition, because this is a combination MVP Summary of Findings Report, EEA will review the plan for consistency with MVP requirements. This Section describes the timeline for plan adoption and includes documentation of the Plan adoption by the Board of Selectmen.

8.1. Timeline for Plan Adoption

The timeline for Plan Adoption is as follows:

The Dunstable Hazard Mitigation Plan 2024 Update was submitted to MEMA and EEA	May 13, 2024
MEMA reviewed the Plan and returned it to the Town with required edits	June 27, 2024
The Dunstable Hazard Mitigation Plan was submitted to FEMA for final review	August 29, 2024
FEMA issued an Approved Pending Adoption status	December 18, 2024
The Select Board officially adopted the Hazard Mitigation Plan 2024 Update during a regularly scheduled meeting.	January 8, 2025
Dunstable received formal approval from FEMA Region 1.	January 22, 2025

8.2. Plan Adoption

The Certificate of Adoption is provided on the following page.

Docusign Envelope ID: 64EBF596-0D05-4BE9-87E0-3367BC64A0BB

OFFICE OF THE
SELECT BOARD
TOWN OF DUNSTABLE
TOWN HALL, 511 MAIN STREET
DUNSTABLE, MA 01827-1313
(978) 649-4514 X224
e-mail select-board@dunstable-ma.gov



TOWN OF DUNSTABLE, MASSACHUSETTS

A RESOLUTION OF THE TOWN OF DUNSTABLE ADOPTING THE 2024 HAZARD MITIGATION PLAN UPDATE

WHEREAS the Select Board recognizes the threat that natural hazards pose to people and property within the Town of Dunstable; and

WHEREAS the Town of Dunstable has prepared a multi-hazard mitigation plan, hereby known as the Town of Dunstable 2024 Hazard Mitigation Plan Update, in accordance with federal laws, including the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended; the National Flood Insurance Act of 1968, as amended; and the National Dam Safety Program Act, as amended; and

WHEREAS the Town of Dunstable 2024 Hazard Mitigation Plan Update identifies mitigation goals and actions to reduce or eliminate long-term risk to people and property in the Town of Dunstable from the impacts of future hazards and disasters; and

WHEREAS the Select Board authorizes Departments to executive their responsibilities demonstrated in the 2024 Hazard Mitigation Plan Update; and

WHEREAS adoption by the Select Board demonstrates its commitment to hazard mitigation and achieving the goals outlined in the Town of Dunstable 2024 Hazard Mitigation Plan Update; now therefore be it

Resolved: That in accordance with M.G.L. 40 §4 or the charter and bylaws of the Town of Dunstable, the Select Board adopts the Town of Dunstable 2024 Hazard Mitigation Plan Update. While content related to the Town of Dunstable may require revisions to meet the plan approval requirements, changes occurring after adoption will not require the Town of Dunstable to re-adopt any further iterations of the plan. Subsequent plan updates following the approval period for this plan will require separate adoption resolutions.

ADOPTED by a vote of 3 in favor and 0 against, and 0 abstaining, on this 8th day of January 2025.

Approved by:

DocuSigned by: Leah D. Basbanes BCB31C785C664C5...
Leah Basbanes
Select Board Chair

Signed by: Kieran Meehan 7FDFF5D398804F2...
Kieran Meehan
Select Board Vice Chair

Signed by: Ronald Mikol 1E76D83897A3419...
Ronald Mikol
Select Board Member

ATTEST By: Signed by: BQ 0168181C4304497...
Brynn Durno, Town Clerk

APPENDIX A: CORE TEAM MEETINGS

Attendance:
Michelle Rowden- EOEEA
Jennie Moonan - Weston & Sampson
Dave Langlais - Hoyle Tanner
Nichole Davis - Hoyle Tanner
Leah Basbanes - Selectboard & ConCom
Jason Silva - Town Admin
Eric Hoar - Dunstable PD
Bridget Baley - Health Agent
William Farrell - Dunstable FD
Dave Tulley - Highway Department
Mike Martin - Roadway Commissioner
John O'Brien - Water Commission
Maria Amodei - Board of Health

Notes:
Jennie conducted introduction to the project. Grants are key to this project/process. $3M maximum for single for climate / nature-based solutions. $5M for regional (multiple communities) submission. Also allows you to apply for FEMA BRIC program funding.

Projects could include GIS gaps, etc.
FEMA/MEMA projects like generators, etc. could potentially been funded through this program

Meetings will be with the core team, 3 public meetings (1 is public input session, CRB input, and 1 public listening session).

This process we need to identify the issues/concerns… we don't need a solution to identify the problem.

MVP is looking for long-term proactive solutions for the future. (i.e. Culvert upgrades) Need to follow in the goals for long term resilience. Projects that could be funded: dam removals, green infrastructure, regulatory updates, zoning updates, social resilience, food security, equity, climate migration (is Dunstable a target for different people migrating away from coastal flooding?)

Deadline is JUNE 30TH 2024 FOR COMPLETING MVP PLANNING GRANT.

Your roles in the process:
1. Need help on the stakeholders list.
2. Community resilience building workshop (1-8 hour OR 2-4 hour workshops).
3. 2 public meetings.
4. Looking at the mitigation actions and providing input.
5. Promoting and staying engaged.
6. Weigh in on Survey (Jennie)
7. Need another core team meeting August - Nichole to send out a Doodle for week of August 14th

Data Sources:
1. Dunstable Master Plan - has a few maps in there (NMCOG may have digital copies of the full-sized maps - Dave to check)
2. Open Space/Recreation Plan - Could apply for Grant to look at through the "Climate Lens" - Need to look at this in the future.
3. HMP - expired and will be updated as part of this process.
4. River & Wild Study - only part of the community is impacted by this.
5. Demographics from Census

6. All Hazards Plan (Eric Hoar has it) needs to be scanned (3-ring binder)
7. GIS - facilities, assets beyond water, sewer, stormwater - no current mapping - need to physically add them to a map. Only a few municipal buildings. Stormwater map from Dave Langlais. John has the last 5 years of water service (maybe Wright Pierce may have something transferrable)
8. Items to add:
    a. Public Safety Building/Housing - mitigation action in the future. Needs to be included in the plan.
    b. Complete Streets Prioritization Plan - Dave has it. Jason is going to look for a narrative.
    c. Green Community - Online Application. Leah provided.
    d. Open Space (EOEEA has funded land acquisition for recreational opportunities and forestry that holds importance from climate/community. Land Acquisition for mitigation (i.e. something that is in a flood plain) to move that infrastructure. Will show a map of all of the parcels that have been protected to date for the workshop.
    a. Trues Brook Landing Bridge - permit through the ConCom with a Boardwalk connecting for two open space parcels.
    b. AARP - Received a walkability grant to study downtown area
    c. Joint Grass Brook Culvert - project planning phase
    d. Woodward's Mill Dam
    e. School building in planning phase

Hazards/Natural Disasters/Flooding/Heat/Wind/Ice/Fire:

1. River Street Floods once in a while - 2-48" twin culverts, beavers plug up screens in front of the culvert
2. Last summer had the heat wave that caused issues with the water tank (coliform) and needed to treat the system. Things could be done to the tank to keep this from happening in the future.
3. Culverts are presenting an issue with 100-year floods
4. Fletcher Street - floods sometimes
5. High Street - winter has road flooding/icing because of the ledge. Conservation property creates an issue due to pipes being removed.
6. Stormwater inventory that is creating problems (may include issues created by individual properties).
7. Forest Street - stormwater runoff and the culvert is undersized and beavers create blockages.
8. Ice Storms - major ice storms - Ice Storm/Storm Christmas 2021.
9. Fires - potential for brush fires in the community.
10. Heavy Rain has been washing out sides of the roads
11. Public Health Perspective - most of community is on well service. Some of the community members have put in 2nd and 3rd well. Main Street one property was down 800' through hydrofracking with water delivery issues. Water supply is an issue.
12. Invasive species - grants to manage invasive?? No we do not fund invasive species management. It has been funded as part of a larger mitigation project.
13. Tick and mosquito populations are exponential.

Schedule:

1. First public meeting: <u>In-person after school starts</u>, Facebook, Summer Concerts, 350th events, Fall (Special Town Meeting) this is supplemental, - This should be NO LATER THAN October 1, 2023.
2. Create a SurveyMonkey with a QR Code - Neighbor to Neighbor, Hand out at summer concerts, 350th events, What's Happening, Facebook
    a. Overview of project
    b. What are natural hazards
    c. Climate Change and how it impacts Dunstable
    d. Personal stories
3. CRB workshop(s): Going to have to happen in October 2023
    . 2-4 hour workshops - industrial sectors, agricultural sectors, vulnerable populations,
        i. Need to keep the group manageable (20-60 people - 30 is the sweet spot)
        ii. Social Resilience - steps were in this https://www.mass.gov/info-details/mvp-20

    b. Sessions should be a week apart. (1 during the day and 1 at night? Is this an option if following the MVP process)
4. Listening session to go over the results - perhaps at November Special Town Meeting

Next Steps:

1. **Core Team Meeting:** Week of August 14th - will be at Dunstable Police Department
2. **Public Meeting:** September
3. **CRB:** October
4. **Listening Session:** November?

Logistics:

1. Michelle Rowden reviewed details of MVP/HMP contract requirements
    a. Contract documents: Received - documents/expectations
    b. Initial Disbursement: Received by Town
    c. Questions: Michelle is our regional coordinator.
        1. Jeff Zukowski, MEMA, can answer questions regarding HMP. Look up the policy guide for the process, and keep up to date on MEMA requirements
    d. Be done the review or need to be substantially done review by end of January 2024. Need to submit by MEMA by June 30th 2024.
    e. Attachment 3 shows the items the municipality is responsible for.
    f. REQUIRE QUARTERLY REPORTS - May 5th was the first one. September 15th is second one. February 16th for third and the June 30th is the deadline for everything else.
    g. If we are changing anything… you need to get Michelle's approval.
    h. Look at the Planning 2.0 document and see what we can integrate.
    i. Please invite Michelle to all events, so include her on the core team.

Municipal Vulnerability Preparedness (MVP) Planning Grant
& Hazard Mitigation Plan (HMP) Planning Grant Update

Core Team Meeting
Location: Dunstable Town Hall, 511 Main Street, Dunstable, MA
Monday, August 14, 2023 @ 3:00 PM

Welcome & Meeting Agenda — 5 Minutes

Mitigation Goals — 10 Minutes

1. Review the final list of HMP goals
2. Endorse that goals can be presented at workshops

Asset Inventory — 20 Minutes

1. Discuss assets and asset categories on provided list and maps
2. Review and provide input/confirmation on the list of assets

Community Resilience Building Workshop — 10 Minutes

1. Select a meeting date for the CRB workshop
2. Finalize logistics (location, food, invitations, attendees, etc.)

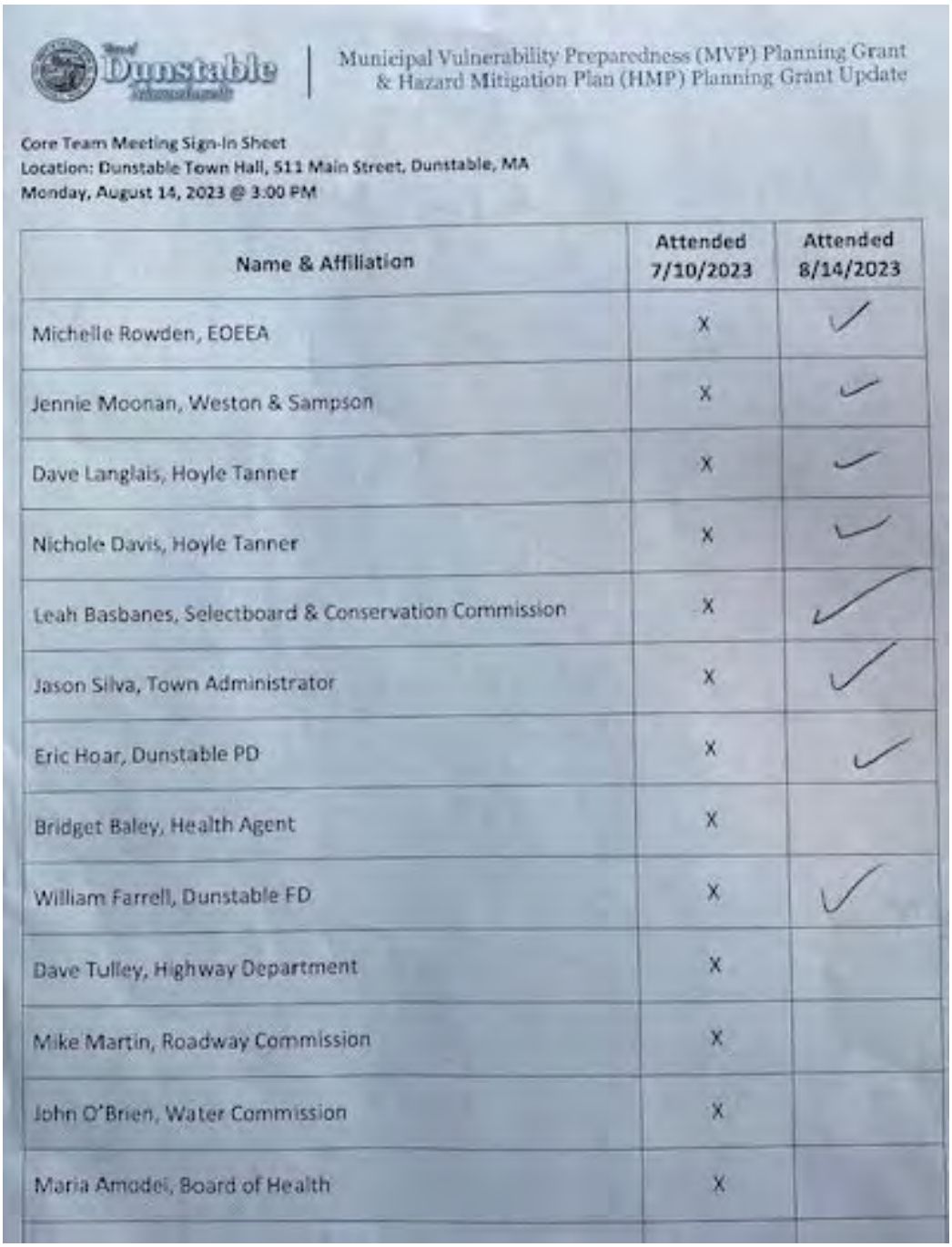
Public Survey Promotion — 10 Minutes

1. Discuss methods of promoting survey
2. Determine survey response timeframe

Wrap Up & Next Steps — 5 Minutes

Core Team Meeting
Location: Dunstable Town Hall, 511 Main Street, Dunstable, MA
Monday, August 14, 2023 @ 3:00 PM

Attendees



Municipal Vulnerability Preparedness (MVP) Planning Grant
& Hazard Mitigation Plan (HMP) Planning Grant Update

Core Team Meeting Sign-In Sheet
Location: Dunstable Town Hall, 511 Main Street, Dunstable, MA
Monday, August 14, 2023 @ 3:00 PM

Name & Affiliation	Attended 7/10/2023	Attended 8/14/2023
Michelle Rowden, EOEEA	X	✓
Jennie Moonan, Weston & Sampson	X	✓
Dave Langlais, Hoyle Tanner	X	✓
Nichole Davis, Hoyle Tanner	X	✓
Leah Basbanes, Selectboard & Conservation Commission	X	✓
Jason Silva, Town Administrator	X	✓
Eric Hoar, Dunstable PD	X	✓
Bridget Baley, Health Agent	X	
William Farrell, Dunstable FD	X	✓
Dave Tulley, Highway Department	X	
Mike Martin, Roadway Commission	X	
John O'Brien, Water Commission	X	
Maria Amodei, Board of Health	X	

Welcome & Meeting Agenda — 5 Minutes

1. Review Mitigation Goals
2. Review Asset Inventory
3. Discuss CRB Workshops
4. Confirm Promotion of Public Survey

Mitigation Goals — 10 Minutes

The following mitigation goals were included in the 2015 Hazard Mitigation Plan for the Northern Middlesex Region. Attendees reviewed the goals and proposed the following updates:

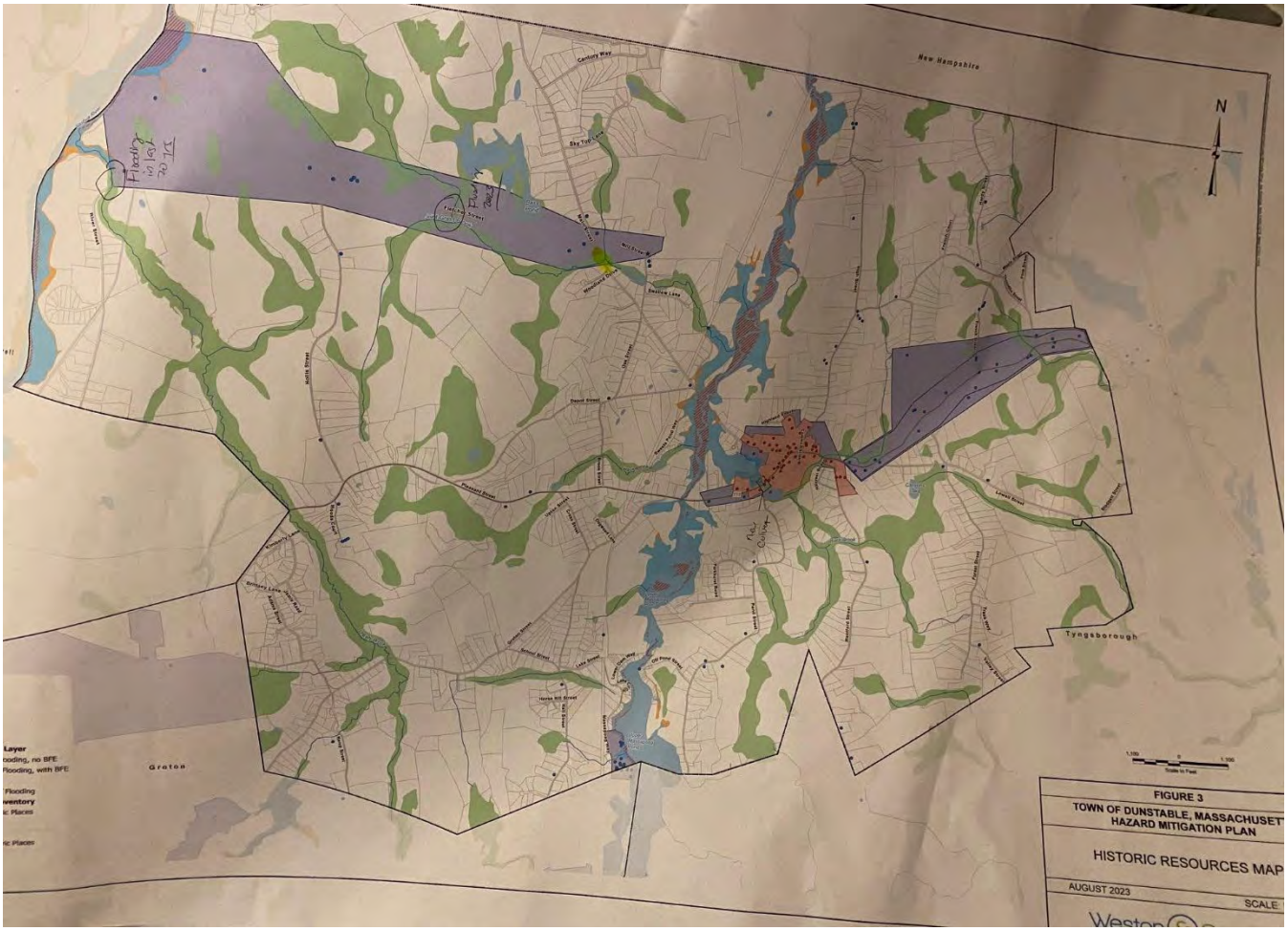
- (8) Increase coordination between the Federal, State, regional and local levels of government;
- (7) Discourage future development in hazard prone areas, such as flood plains;
- ~~(1) Protect and preserve irreplaceable cultural and historic resources located in hazard prone areas;~~
- Ensure that ~~critical infrastructure~~people, structures, systems, natural/cultural/historic resources (health and safety of Dunstable?) ~~is~~are protected from natural hazards;
- ~~(2) Develop programs and measures that protect residences and other structures from natural hazards;~~
- ~~Protect electric power delivery infrastructure from natural hazards;~~
- ~~Provide alternative drinking water supplies for local communities in the event of contamination or disruption from a natural hazard;~~
- Increase awareness and support for natural hazard mitigation among ~~municipalities,~~ private organizations, businesses, and area residents through outreach and education;
- (4) Implement a broad range of mitigation measures that protect the ~~region's~~ Town's ~~vulnerable~~ priority population ~~and infrastructures~~;
- ~~(5) Protect critical public facilities and services from damage due to natural hazards;~~
- Develop a mitigation strategy that considers area businesses and protects the economic vitality of the ~~region~~Town;
- (9) Update and maintain the Plan as resources permit;
- ~~(3) Increase the number of communities participating in the Community Rating System;~~
- ~~Provide communities with information concerning hazard mitigation funding opportunities, and assist the communities in the identification and development of specific mitigation projects;~~
- Increase Dunstable's ~~each~~ community's capacity for responding to a natural hazard event ~~by promoting the adequate provision of emergency service capabilities~~; and
- (6) Implement ~~adaptation~~ mitigation strategies ~~and modify local emergency plans~~ to protect ~~critical infrastructure and property~~ the community from the impacts of climate change.
- (10) Encourage sustainability of the Town?

Asset Inventory **20 Minutes**

The assets and asset categories on provided list and maps were discussed. Attendees reviewed and provided input / confirmation on list.

- YMCA should be Y Camp
- Add 147 Hardy Street to Daycare list
- Library also doubles as senior center
- Water department does not have an office at 511 Main Street
- The library is at 588 Main Street
- 91 River Street is a Barn used by Highway and Police for storage
- 59 Main Street is a Land Trust property
- The Joint Grass Brook Dam will soon become property of the Conservation Commission
- The dams outside of Dunstable, like Tyngsborough, should be considered
- Confirm evacuation routes
- The two drinking water pump stations are at the wells
- There is also a Water Tower on Simmons Way
- The Dunstable transfer station and landfill is closed and is only monitored
- There are two solar farms (see map)
- There is a cell tower at the Church at 518 Main Street (see map)
- Ran out of time to review Natural, Historic, and Cultural Resources – but need to confirm Land Trust properties
- Two 40Bs are planned (see map)
- Make sure to add bridges and culverts to asset inventory
- There is a stone arch bridge at the north end of Salmon Brook in Town that is historic/cultural resource
- Culvert at Route 113 and approx. Hillcrest Street in good condition


N
New Hampshire
Pepperell
Groton
Tyngsborough
FIGURE 4
TOWN OF DUNSTABLE, MASSACHUS
HAZARD MITIGATION PLAN
PHYSICAL RESOURCES M
AUGUST 2023
Weston & Samp



- Note that in the last 20 years, there has been flooding on River Street by Unkety Brook.
- There was flooding in 2023 on Fletcher Street at Joint Grass Brook
- A new culvert was installed on Route 113 at Black Brook
- Intersection of Main Street and Joint Grass Brook – culvert being replaced?
- Bridge at intersection of Route 113 and Salmon Brook also functions as a dam/limits flow

Community Resilience Building Workshop — 10 Minutes

- Send out doodle poll for 4 hours or 8 hours, send out potential dates/times?
- Reviewed list of stakeholders, added some
- Public meeting – BoS Meetings are usually Tuesday at 5 PM every other Tuesday, Planning Board is on Mondays
- September 19th or 26th will be public meeting
- MTW best for Police

Public Survey Promotion — 10 Minutes

- Promote survey at concert on August 16
- Promote survey at September 10 parade and ice cream social
- Can plan be ready for November Town Meeting so folks can provide input? Answer - yes

Wrap Up & Next Steps — 5 Minutes

Municipal Vulnerability Preparedness (MVP) Planning Grant
& Hazard Mitigation Plan (HMP) Planning Grant Update

Core Team Meeting
Location: Dunstable Town Hall, 511 Main Street, Dunstable, MA
Monday, August 14, 2023 @ 3:00 PM

Welcome & Meeting Agenda — 5 Minutes

Mitigation Goals — 10 Minutes

1. Review the final list of HMP goals
2. Endorse that goals can be presented at workshops

Asset Inventory — 20 Minutes

1. Discuss assets and asset categories on provided list and maps
2. Review and provide input/confirmation on the list of assets

Community Resilience Building Workshop — 10 Minutes

1. Select a meeting date for the CRB workshop
2. Finalize logistics (location, food, invitations, attendees, etc.)

Public Survey Promotion — 10 Minutes

1. Discuss methods of promoting survey
2. Determine survey response timeframe

Wrap Up & Next Steps — 5 Minutes

These actions will be coordinated with other regional and community priorities, as well as with mitigation goals of state and federal agencies. Such coordination will improve access to technical assistance; provide broader support for implementation; and reduce duplication of effort. The actions have been further categorized by timeframe into on-going, immediate, short-term projects and long-term measures.

A. Mitigation Goals

In updating the Action Plan, the regional Multiple Hazard Community Planning Team (MHCPT) reviewed the hazard identification and analysis, the regional vulnerability assessment, and the existing protection matrix and measures. The goals in the 2006 Plan were reviewed and affirmed. In addition, a new goal was added to address the impacts of climate change. The following goals were considered in the development of the Action Plan Update:

- Increase coordination between the Federal, State, regional and local levels of government;
- Discourage future development in hazard prone areas, such as flood plains;
- Protect and preserve irreplaceable cultural and historic resources located in hazard prone areas;
- Ensure that critical infrastructure is protected from natural hazards;
- Develop programs and measures that protect residences and other structures from natural hazards;
- Protect electric power delivery infrastructure from natural hazards;
- Provide alternative drinking water supplies for local communities in the event of contamination or disruption from a natural hazard;
- Increase awareness and support for natural hazard mitigation among municipalities, private organizations, businesses, and area residents through outreach and education;
- Implement a broad range of mitigation measures that protect the region's vulnerable population and infrastructure;
- Protect critical public facilities and services from damage due to natural hazards;
- Develop a mitigation strategy that considers area businesses and protects the economic vitality of the region;

- Update and maintain the Plan as resources permit;
- Increase the number of communities participating in the Community Rating System;
- Provide communities with information concerning hazard mitigation funding opportunities, and assist the communities in the identification and development of specific mitigation projects;
- Increase each community's capacity for responding to a natural hazard event by promoting the adequate provision of emergency service capabilities; and
- Implement adaptation strategies and modify local emergency plans to protect critical infrastructure and property from the impacts of climate change.

B. Mitigation Progress Since 2007

Since completion of the last Plan, the region's municipalities have made significant progress in implementing additional measures to mitigate natural hazards. The following table lists the measures that have been implemented within each municipality since 2007. All other actions were pulled into this plan update (see Table 82).

Table 81: Mitigation Actions Implemented Since Completion of the Previous Plan

Billerica	
Action Implemented	**Hazard Addressed**
Maintained compliance with the National Flood Insurance Program	Flooding
Enforced the town's floodplain bylaw	Flooding
Enforced the erosion control and stormwater management standards with the town's subdivision regulations	Flooding
Implemented BMPs within the town's Stormwater Management Plan	Flooding
Enforced the local wetlands bylaw, the Massachusetts Wetlands Protection Act, and the Rivers Protection Act	Flooding
Pursued acquisition of open space parcels along the Concord and Shawsheen Rivers	Flooding

Core Team Meeting Sign-In Sheet
Location: Dunstable Town Hall, 511 Main Street, Dunstable, MA
Monday, August 14, 2023 @ 3:00 PM

Name & Affiliation	Attended 7/10/2023	Attended 8/14/2023
Michelle Rowden, EOEEA	X	
Jennie Moonan, Weston & Sampson	X	
Dave Langlais, Hoyle Tanner	X	
Nichole Davis, Hoyle Tanner	X	
Leah Basbanes, Selectboard & Con Com	X	
Jason Silva, Town Admin	X	
Eric Hoar, Dunstable PD	X	
Bridget Baley, Health Agent	X	
William Farrell, Dunstable FD	X	
Dave Tulley, Highway Department	X	
Mike Martin, Roadway Commission	X	
John O'Brien, Water Commission	X	
Maria Amodei, Board of Health	X	

Draft Asset Inventory for the Town of Dunstable Hazard Mitigation Plan

Assets are defined by the Federal Emergency Management Agency (FEMA) Local Mitigation Planning Policy Guide (Released April 19, 2022, Effective April 19, 2023). Assets are "determined by the community and include, but are not limited to: people; structures; systems; natural, historic, and cultural resources; and/or activities that have value to the community."

There are five categories of assets:

- People (including underserved communities and socially vulnerable populations). "Assets that serve populations that are more vulnerable to disaster (e.g., elderly, children, visiting populations) and/or serve densely populated areas."

- Structures (including facilities, lifelines, and critical infrastructure). "Built facilities that provide community lifeline services. A community lifeline enables the continuation of critical government and business functions and is essential to human health and safety or economic security."

- Systems (including networks and capabilities). "A collection of components that perform a critical service for the community. Systems are linear type assets. Systems may include horizontal assets associated with linear type assets.

- Natural, historic, and cultural resources. "Natural Resources: Areas that provide protective function to reduce magnitude of hazard impact and increase resiliency. Areas of sensitive habitat that are vulnerable to hazard events, protection of areas that are important to community objectives, such as the protection of sensitive habitat, provide socio-economic benefits, etc.

- Historical and Cultural Resources: Assets that posses historical, cultural, archaeological or paleontological significance, including sites, contextual information, structures, districts, and objects significantly associated with or representative of earlier people, cultures, maritime heritage, and human activities and events."

- The economy and other activities that have value to the community. These are defined as "Activities that benefit the community by increasing community morale and well-being. Activities may include education and knowledge transfer."

We also need to consider:

- Development that has occurred from January 1, 2015 through present

- Planned development for the next five years (say 2023 through 2028)

Critical assets in the Town of Dunstable have been identified utilizing the newest MassGIS data, and the most up to date MassGIS L3 Parcel data, and the asset inventory presented in the 2015 Hazard.

Category 1 – People

Asset Type	Name	Address
Schools/Daycare	Swallow Union Elementary School	518 Main Street
	Maple Village Preschool	518 Main Street
	Groton-Dunstable Regional High School	703 Chicopee Row, Groton MA
Religious Centers	Dunstable Congregational Church	516 Main Street
Recreation	YMCA	234 Hall Street
Priority Populations	*Priority populations are people or communities who may be disproportionately impacted by climate change due to life circumstances that systematically increase their exposure to climate hazards or make it harder to respond. In addition to factors that contribute to EJ status (i.e., income, race, and language), other factors like physical ability, access to transportation, health status, and age shape whether someone or their community will be disproportionately affected by climate change. This is because of underlying contributors such as racial inequality, financial insecurity, or accessibility barriers that create vulnerability.*	
Environmental Justice (EJ) Communities	There are no mapped EJ Communities within Dunstable	

Category 2 – Structures

Asset Type	Name	Address
Emergency Response	Police Station	23 Pleasant Street
	Fire Station	28 Pleasant Street
Emergency Shelters	Swallow Union School	518 Main Street
	Dunstable Congregational Church	516 Main Street
	Town Hall	511 Main Street
Town Facilities	Water Department	511 Main Street
	Town Hall	511 Main Street
	Dunstable Free Public Library	511 Main Street
	DPW Garage	107 Pleasant Street
	DPW Garage	589 Pleasant Street
		91 River Street
		59 Main Street

Post Office	Dunstable Post Office	170 Pleasant Street
Animal Clinics	Dunstable Animal Clinic	386 Main Street
Food & Pharmacy	Dunstable General Store & Dunkin'	238 Pleasant Street
	Tully Farms Dairy Store	446 Pleasant Street
	The Farmhouse Café	17 Pleasant Street
Dams	Massapoag Pond Dam (Private) Low Hazard	Off Lower Dam Way
	Woodwards Mill Dam (Town-owned) Low Hazard	Approximate Intersection of Pond Street and Pleasant Street
	Joint Grass Brook Dam (Private) Low Hazard	Mills Street just north of Swallow Lane

Category 3 - Systems

Primary Evacuation Routes	Pleasant Street (Route 113) Groton Street High Street Lowell Street Westford Street	

Pump Stations	Drinking Water (2)	
Drinking Water Supply Wells	Salmon Brook Well #1	711 Main Street (and associated Zone I and Zone II)
	Salmon Brook Well #2	711 Main Street (and associated Zone I and Zone II)
Natural Gas	National Grid	Town-wide
Electricity	National Grid	Town-wide
Cable	Charter	Town-wide
	Verizon	Town-wide
Communications	Cell Tower	583 Pleasant Street
Gas Stations	Irving Oil	238 Pleasant Street
Transfer Station	Dunstable Transfer Station & Landfill	Depot Street

Hazardous Materials Site	Charles George Landfill Superfund Site	Cummings Road

Category 4 – Natural, Historic, & Cultural Resources

Natural Resources	Canyons Lake Black Brook Hauk Brook Lower Massapoag Pond Upper Massapoag Pond Nashua River Bass Pond Joint Grass Brook Unkety Brook (Cold Water Fishery) Nissitisset River (Scenic & Protected River) Kennedy Conservation Area Proctor Conservation Area Dunstable Brook Wildlife Management Area English Wildlife Refuge Spaulding-Proctor Reservation Larter Field Pierce Town Forest Hauk Swamp Wildlife Management Area Unkety Brook Wildlife Management Area	
	Prioirty Habitat of Rare Species	Town-wide
	Estimated Habitats of Rare Wildlife	Town-wide
	Certified Vernal Pools	Town-wide
	Potential Vernal Pools	Town-wide
Open Space	Article 97	Town-wide

Cultural Resources	Little Red Schoolhouse	64 Main Street
Historic Resources	West Dunstable - River Road Area	
	Meetinghouse Hill	
	East Main Street Area	
	YMCA Camp Massapoag Family Outdoor Center	
	Dunstable Center Historic District	
	Pond and Pleasant Street Area	
	Massachusetts Historic Commission Inventory Properties	Town-wide
	National Register of Historic Places	Town-wide
Cemeteries	Hollis Street	

	Meetinghill Cemetery	200 Main Street
		Brook Street
		Brook Street
		Fletcher Street
		Main Street
	Central Cemetery	Westford Street

Category 5 – The Economy and Activities that have Value to the Community

We need your input! This includes major employers and events like parades, fairs, festivals, farmers markets, road races, etc.

Rail Trail	Nashua River Rail Trail	

Development

We need your input! What developments have occurred staring since January 1, 2015?

Planned Development

We need your input! What Developments are planned for 2023 through 2028?

Community Resilience Building (CRB) & HMP Stakeholder Workshop
Location:
DAY, DATE @ TIME

Registration & Refreshments — 30 Minutes

Welcome & Introductions — 10 Minutes

- Town Appointed Official
- MVP Regional Coordinator
- MVP/HMP Core Team/Committee Members
- Consulting Team
- Participant Introductions

MVP/HMP Workshop Purpose & Overview — 20 Minutes

- Hazards
- Existing Climate Change
- Projected Climate Change
- Recent Planning Efforts
- Overview of Data and Maps Being Used During Workshop

Large Group Exercise #1 — 10 Minutes

- Identify Major Hazards
- Prioritize Top Four Hazards

BREAK — 10 Minutes

Presentation: Risk Matrix Overview — 5 Minutes

- Hazards
- Features
    - Infrastructure, Societal, Environmental
    - Vulnerability or Strength
    - Location
    - Ownership
- Actions

Small Group Exercise #1 — 10 Minutes

- Infrastructure and Buildings Features
    - Vulnerability and/or Strength, Location, Ownership

Small Group Exercise #2 — 5 Minutes

- Societal Features
    - Vulnerability and/or Strength, Location, Ownership

Small Group Exercise #3 — 10 Minutes

- Environmental Features
    - Vulnerability and/or Strength, Location, Ownership

LUNCH — 5 Minutes

Presentation: HMP Mitigation Strategies/MVP Community Actions — 10 Minutes

Small Group Exercise #4 — 5 Minutes

- Define HMP Mitigation Strategies/MVP Community Actions

BREAK — 10 Minutes

Large Group Exercise #2 — 5 Minutes

- Identify High Priority HMP Strategies/MVP Priority Actions

Wrap-up and Closing Remarks — 10 Minutes

Community Resilience Building Risk Matrix

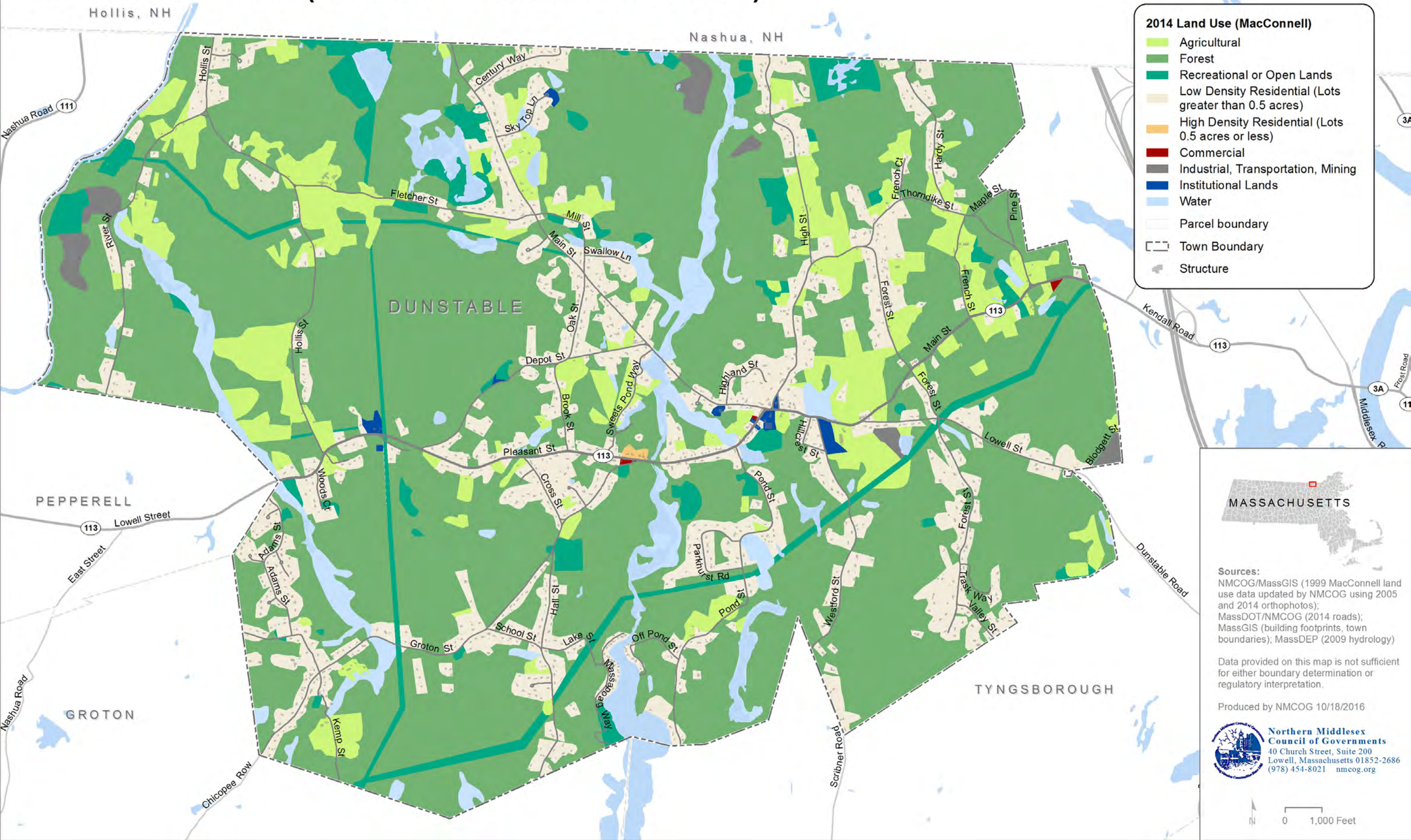
www.CommunityResilienceBuilding.org

H-**M**-**L** priority for action over the **S**hort or **L**ong term (and **O**ngoing)
V = Vulnerability **S** = Strength

Top Priority Hazards (tornado, floods, wildfire, hurricanes, earthquake, drought, sea level rise, heat wave, etc.)

Features	Location	Ownership	V or S					Priority	Time
								H - **M** - **L**	**S**hort **L**ong **O**ngoing
Infrastructural									
Societal									
Environmental									

Dunstable Land Use (2014 MacConnell Classification)



Sources:
NMCOG/MassGIS (1999 MacConnell land use data updated by NMCOG using 2005 and 2014 orthophotos);
MassDOT/NMCOG (2014 roads);
MassGIS (building footprints, town boundaries); MassDEP (2009 hydrology)

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Dunstable Land Use per Assessor's Parcels

Hollis, NH

Nashua, NH

PEPPERELL

GROTON

TYNGSBOROUGH

Nashua Road (111)

Lowell Street (113)

East Street

Chicopee Row

Dunstable Road

Hollis St

Century Way

Sky Top Ln

Fletcher St

River St

Mill St

Main St

Swallow Ln

High St

French Ct

Hardy St

Thorndike St

Maple St

Pine St

Forest St

French St

Oak St

Depot St

Brook St

Sweets Pond Way

Highland St

Hillcrest St

Pond St

Lowell St

Blodgett St

Pleasant St

Woods Ct

Cross St

Adams St

Hall St

Parkhurst Rd

Pond St

Westford St

Trask Way

Valley St

School St

Lake St

Groton St

Massapoag Way

Off Pond St

Kemp St

Scribner Road

Land Use (per Assessor's Use Code)

- Single-family residential
- Two-family residential
- Mixed residential and agricultural
- Mixed residential and commercial
- Commercial
- Manufacturing
- Public Utilities
- Public Land: Municipal and State
- Non-profit/religious organization
- Recreation
- Cemetery
- Agriculture
- Forest
- Conservation Land: State, Municipal, and private land trust
- Undeveloped
- Water
- Parcel boundary
- Town Boundary
- Structure

MASSACHUSETTS

Sources:
The Town of Dunstable (FY2017 parcels); MassDOT/NMCOG (2014 roads); MassGIS (building footprints, town boundaries); MassDEP (2009 hydrology)

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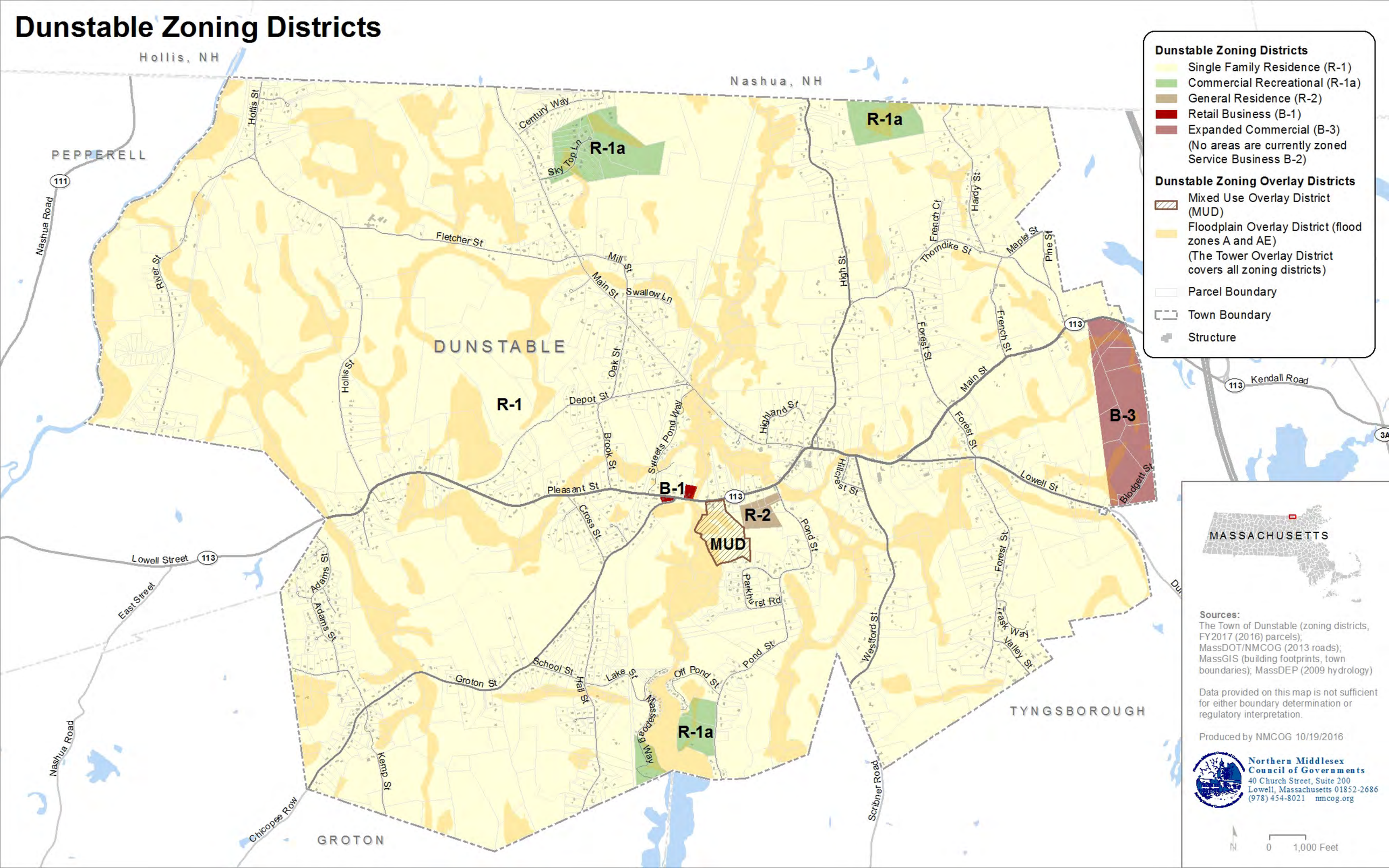
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Dunstable Zoning Districts



Dunstable Zoning Districts

- Single Family Residence (R-1)
- Commercial Recreational (R-1a)
- General Residence (R-2)
- Retail Business (B-1)
- Expanded Commercial (B-3)

(No areas are currently zoned Service Business B-2)

Dunstable Zoning Overlay Districts

- Mixed Use Overlay District (MUD)
- Floodplain Overlay District (flood zones A and AE)

(The Tower Overlay District covers all zoning districts)

- Parcel Boundary
- Town Boundary
- Structure

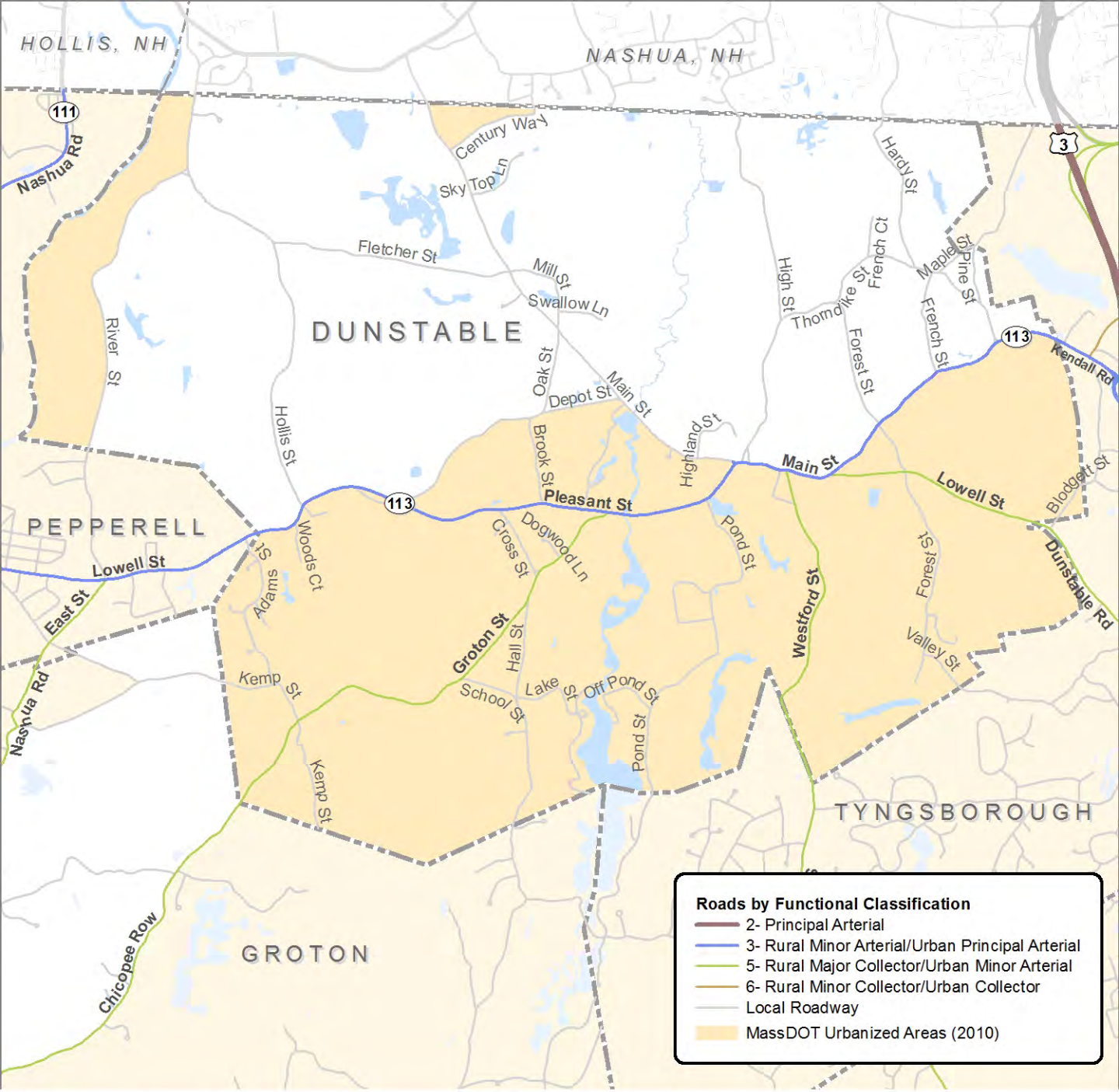
Sources:
The Town of Dunstable (zoning districts, FY2017 (2016) parcels); MassDOT/NMCOG (2013 roads); MassGIS (building footprints, town boundaries); MassDEP (2009 hydrology)

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Sources:
MassDOT/NMCOG (2014 roads); MassGIS (town boundaries); MassDEP/NMCOG (2009 hydrography); NH GRANIT (roads, political boundaries)

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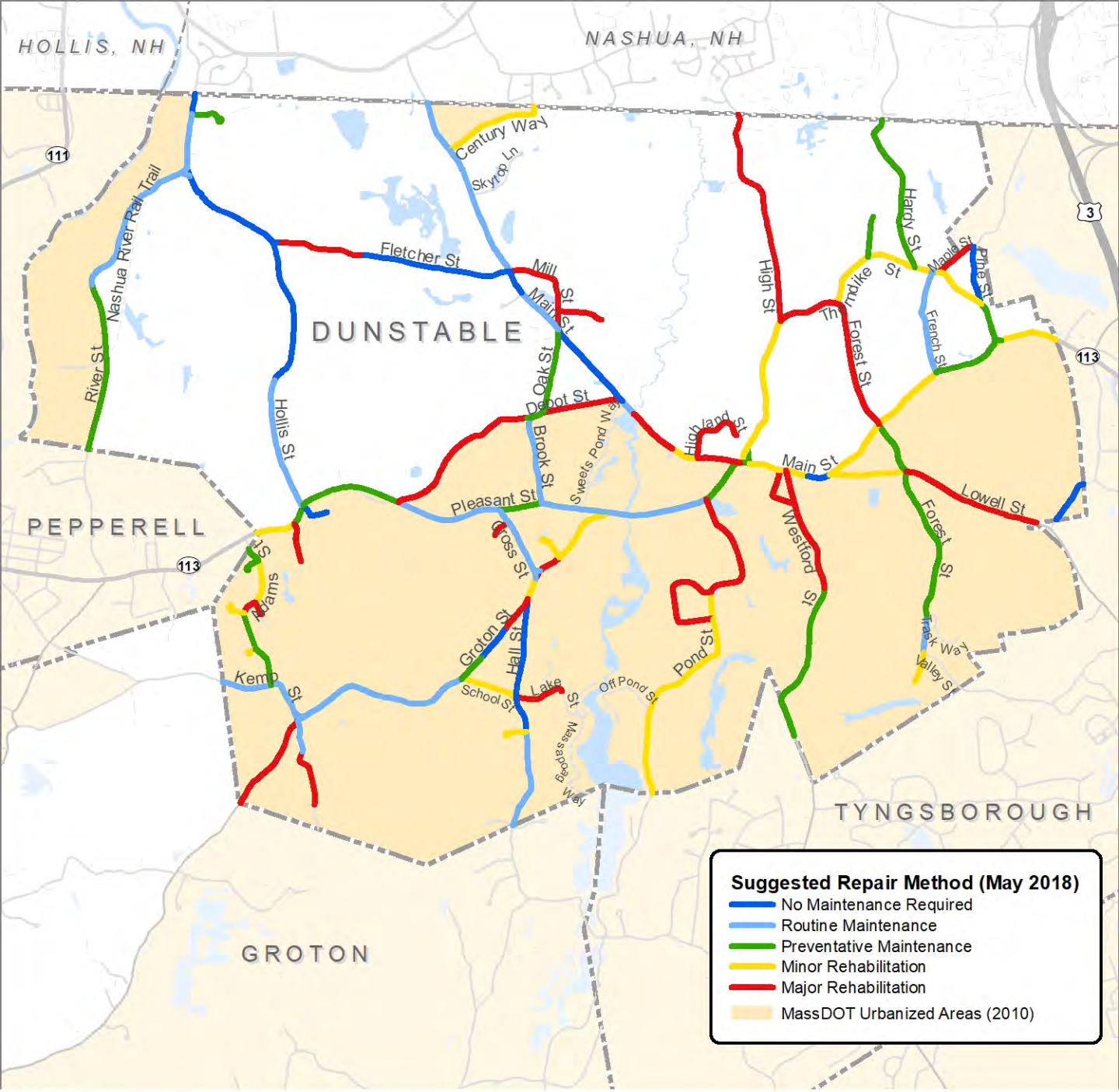
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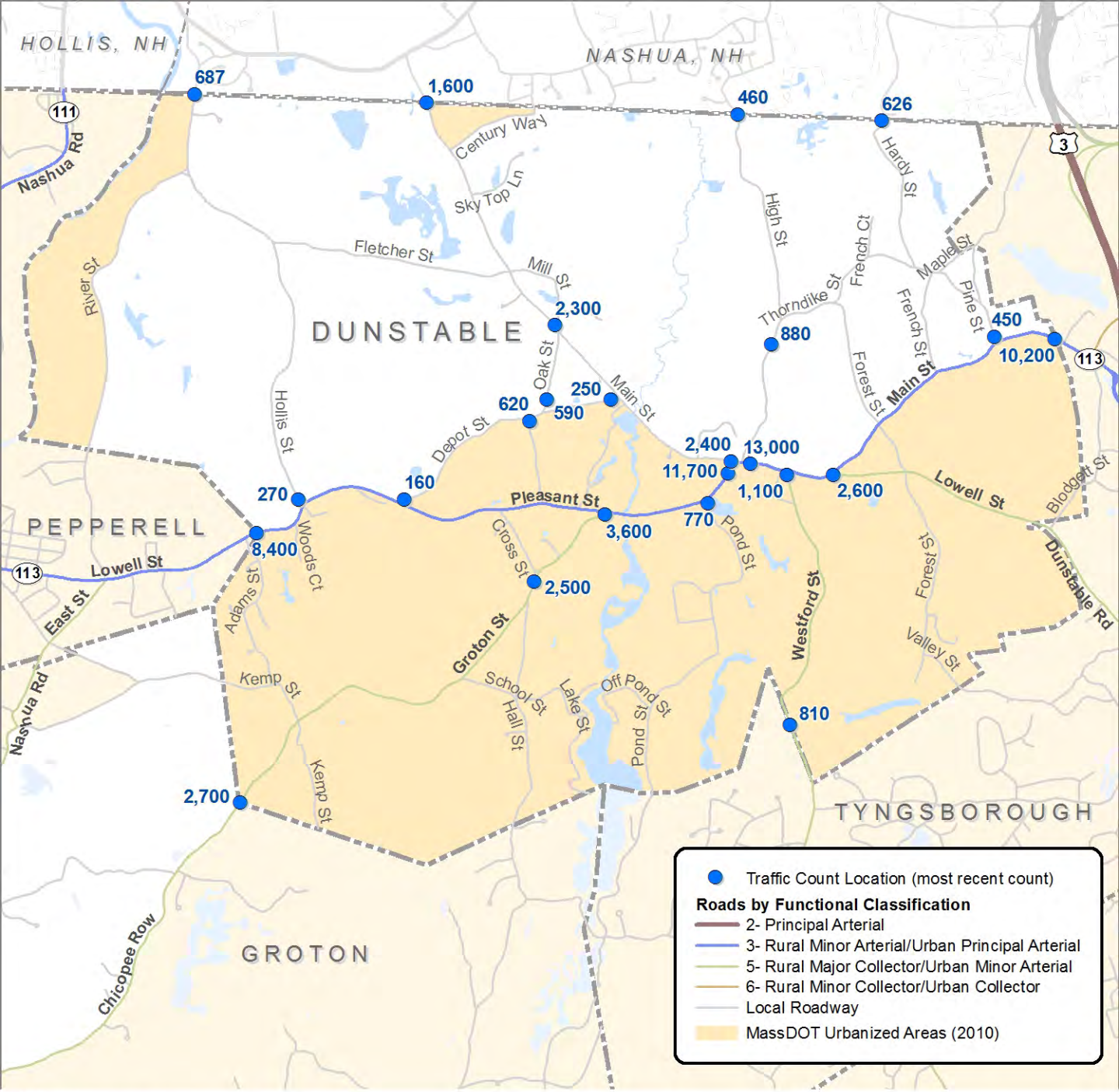
Sources:
Beta Group, Inc. (5/2018 pavement management summary data); MassDOT/NMCOG (2014 roads); MassGIS (town boundaries); MassDEP/NMCOG (2009 hydrography); NH GRANIT (roads, political boundaries)

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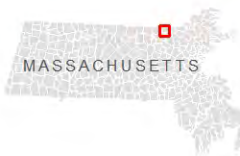
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Sources:
NMCOG (traffic counts); MassDOT/NMCOG (2014 roads); MassGIS (town boundaries); MassDEP/NMCOG (2009 hydrography); NH GRANIT (roads, political boundaries)

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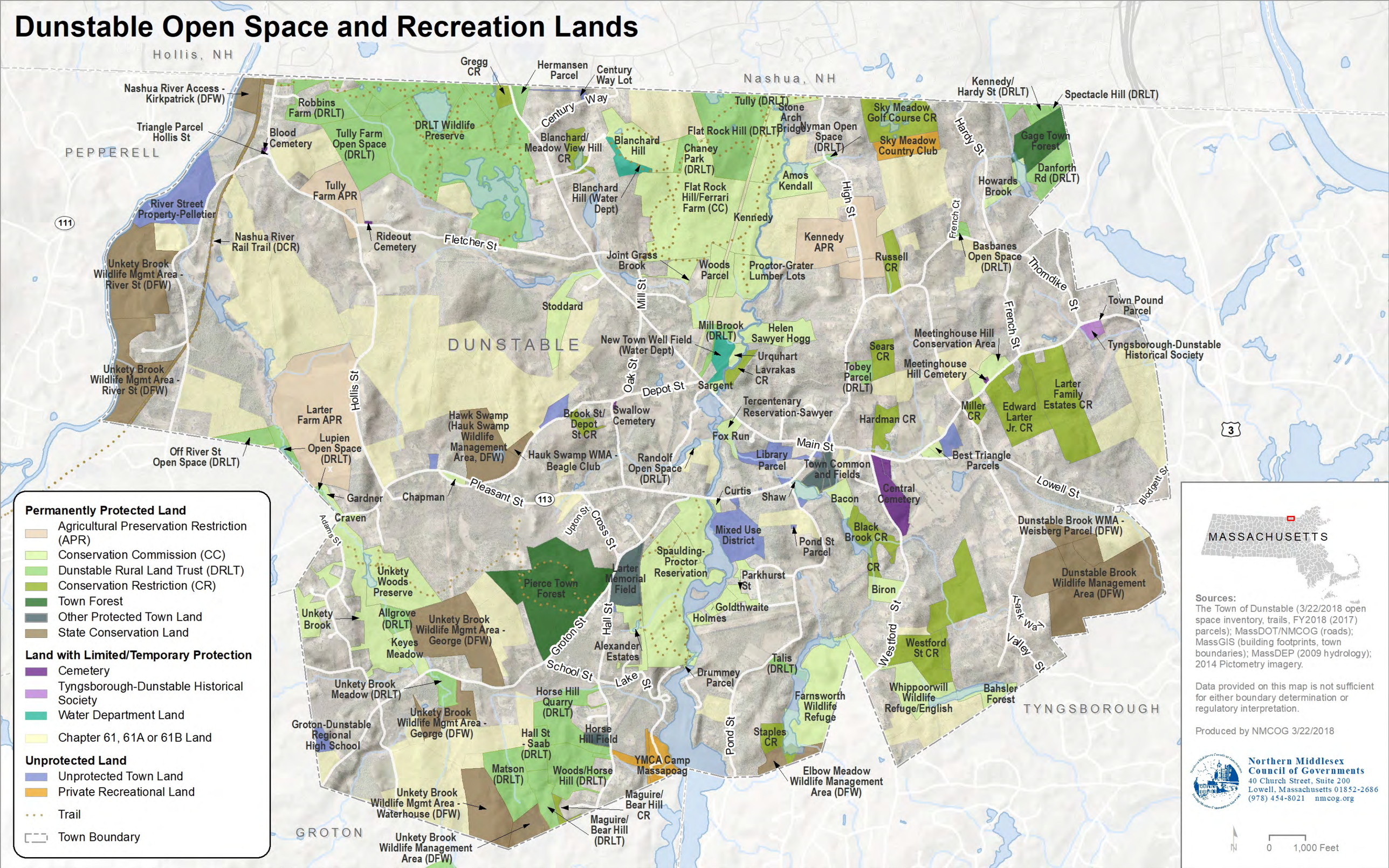


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Dunstable Open Space and Recreation Lands



Permanently Protected Land
- Agricultural Preservation Restriction (APR)
- Conservation Commission (CC)
- Dunstable Rural Land Trust (DRLT)
- Conservation Restriction (CR)
- Town Forest
- Other Protected Town Land
- State Conservation Land

Land with Limited/Temporary Protection
- Cemetery
- Tyngsborough-Dunstable Historical Society
- Water Department Land
- Chapter 61, 61A or 61B Land

Unprotected Land
- Unprotected Town Land
- Private Recreational Land
- Trail
- Town Boundary

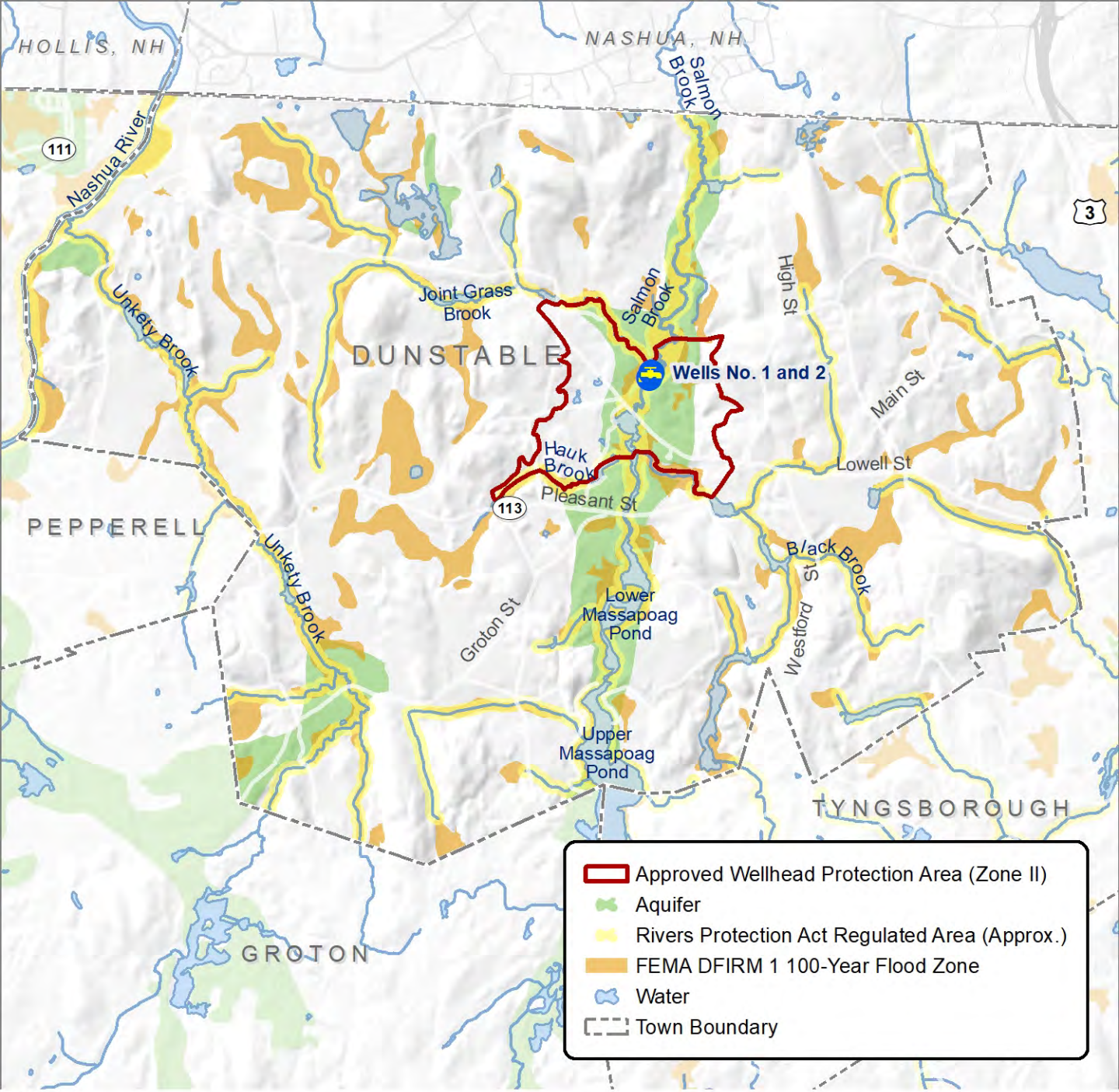
Sources:
The Town of Dunstable (3/22/2018 open space inventory, trails, FY2018 (2017) parcels); MassDOT/NMCOG (roads); MassGIS (building footprints, town boundaries); MassDEP (2009 hydrology); 2014 Pictometry imagery.

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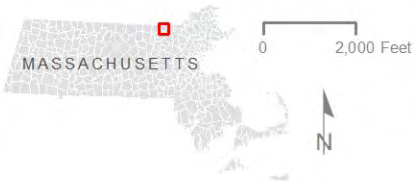
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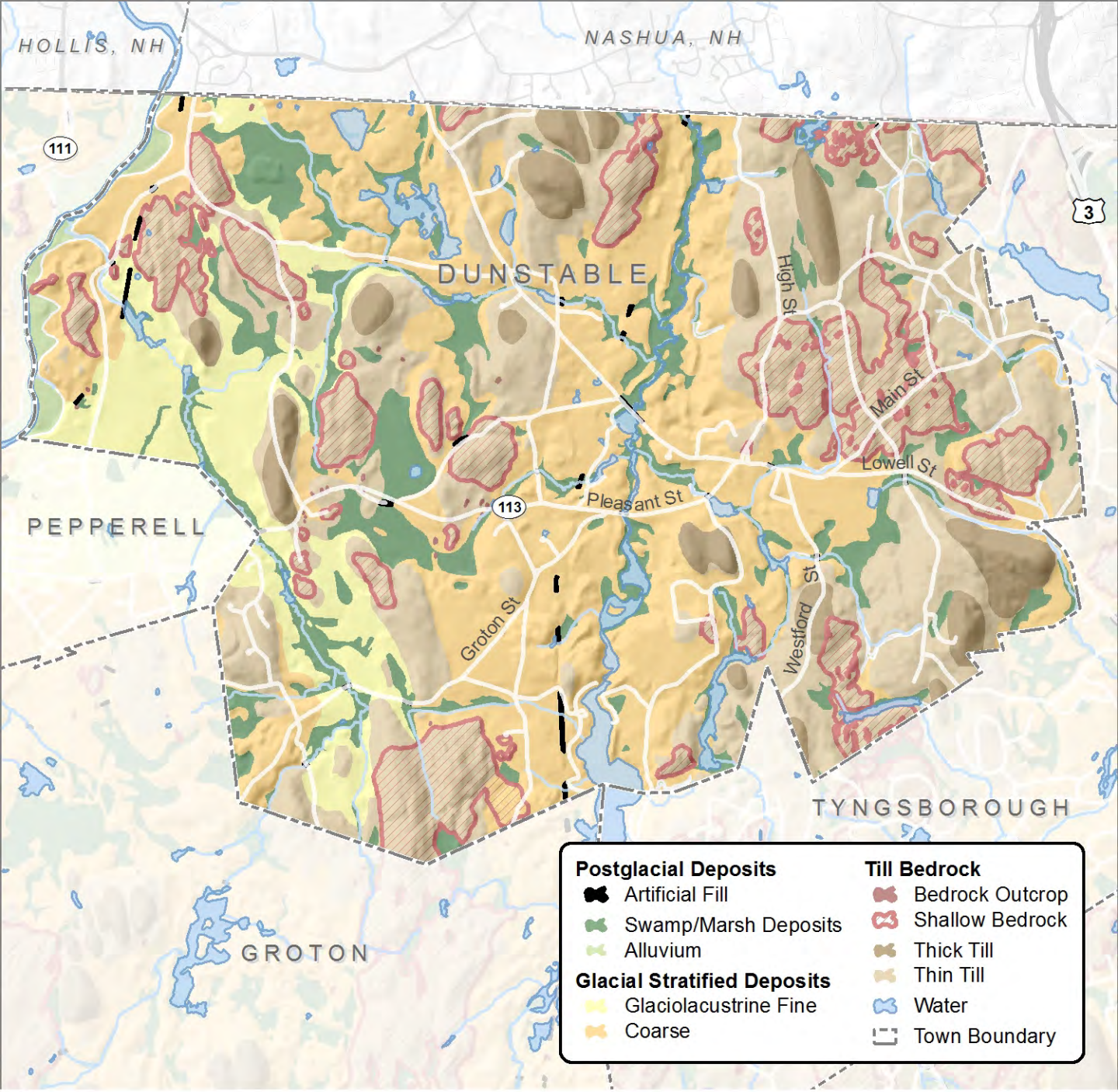
Sources:
MassDEP (2009 hydrography, Zone IIs, Aquifers); FEMA (DFIRM flood zones A, AE); MassGIS (aquifers, shaded relief); NMCOG (Rivers Protection Act areas); MassGIS/NMCOG (2013 roads, town boundaries); NH GRANIT (roads, boundaries)

Data provided on this map is not sufficient for either boundary determination or regulatory interpretation.

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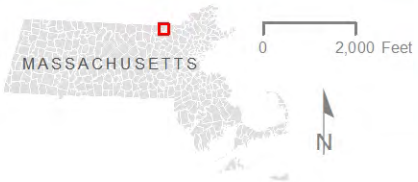
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Sources:
MassGIS (surficial geology 1:24,000, shaded relief); MassGIS/NMCOG (2013 roads, town boundaries); NH GRANIT (roads, boundaries)

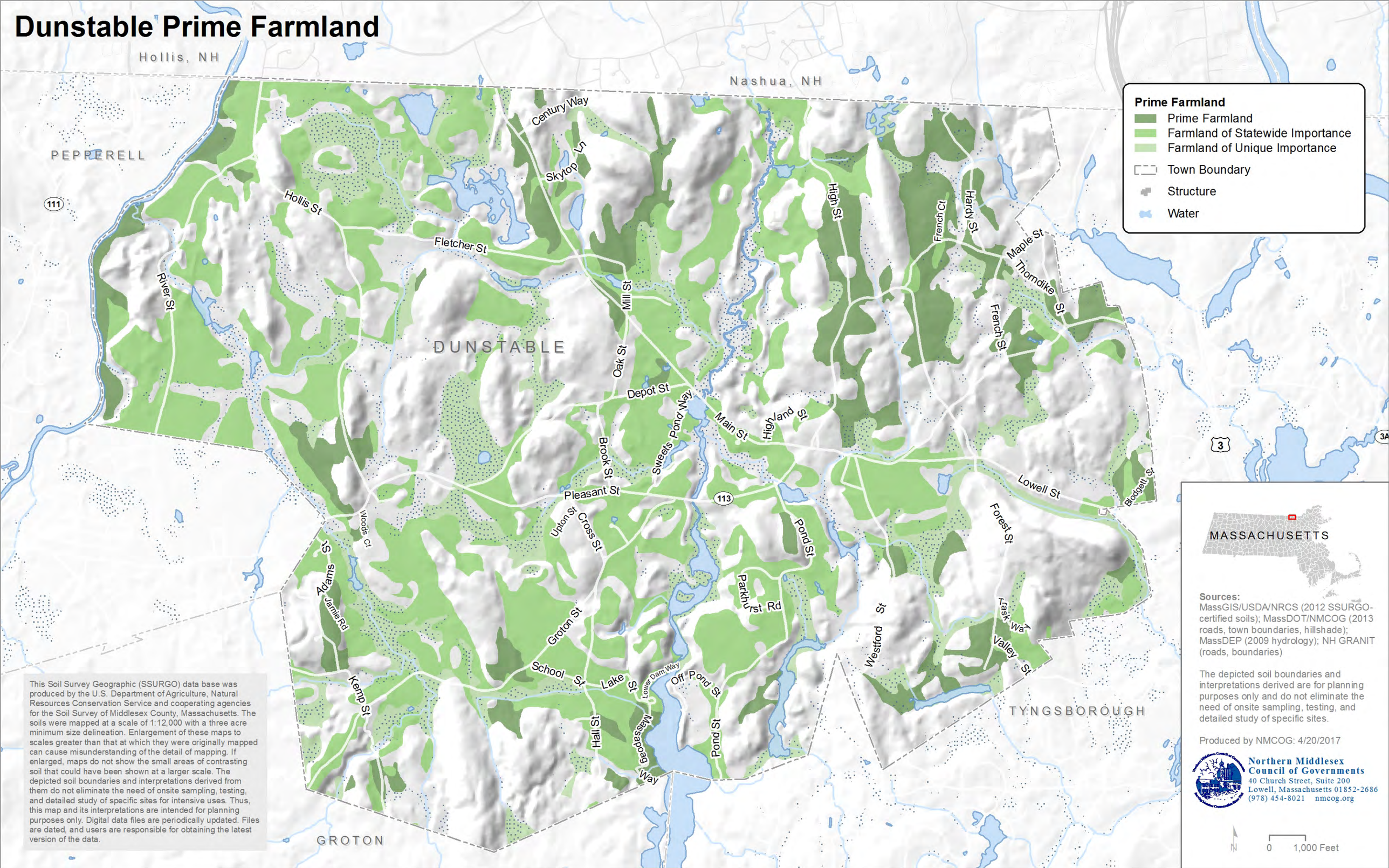
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Dunstable Prime Farmland



This Soil Survey Geographic (SSURGO) data base was produced by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies for the Soil Survey of Middlesex County, Massachusetts. The soils were mapped at a scale of 1:12,000 with a three acre minimum size delineation. Enlargement of these maps to scales greater than that at which they were originally mapped can cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soil that could have been shown at a larger scale. The depicted soil boundaries and interpretations derived from them do not eliminate the need of onsite sampling, testing, and detailed study of specific sites for intensive uses. Thus, this map and its interpretations are intended for planning purposes only. Digital data files are periodically updated. Files are dated, and users are responsible for obtaining the latest version of the data.

Sources:
MassGIS/USDA/NRCS (2012 SSURGO-certified soils); MassDOT/NMCOG (2013 roads, town boundaries, hillshade); MassDEP (2009 hydrology); NH GRANIT (roads, boundaries)

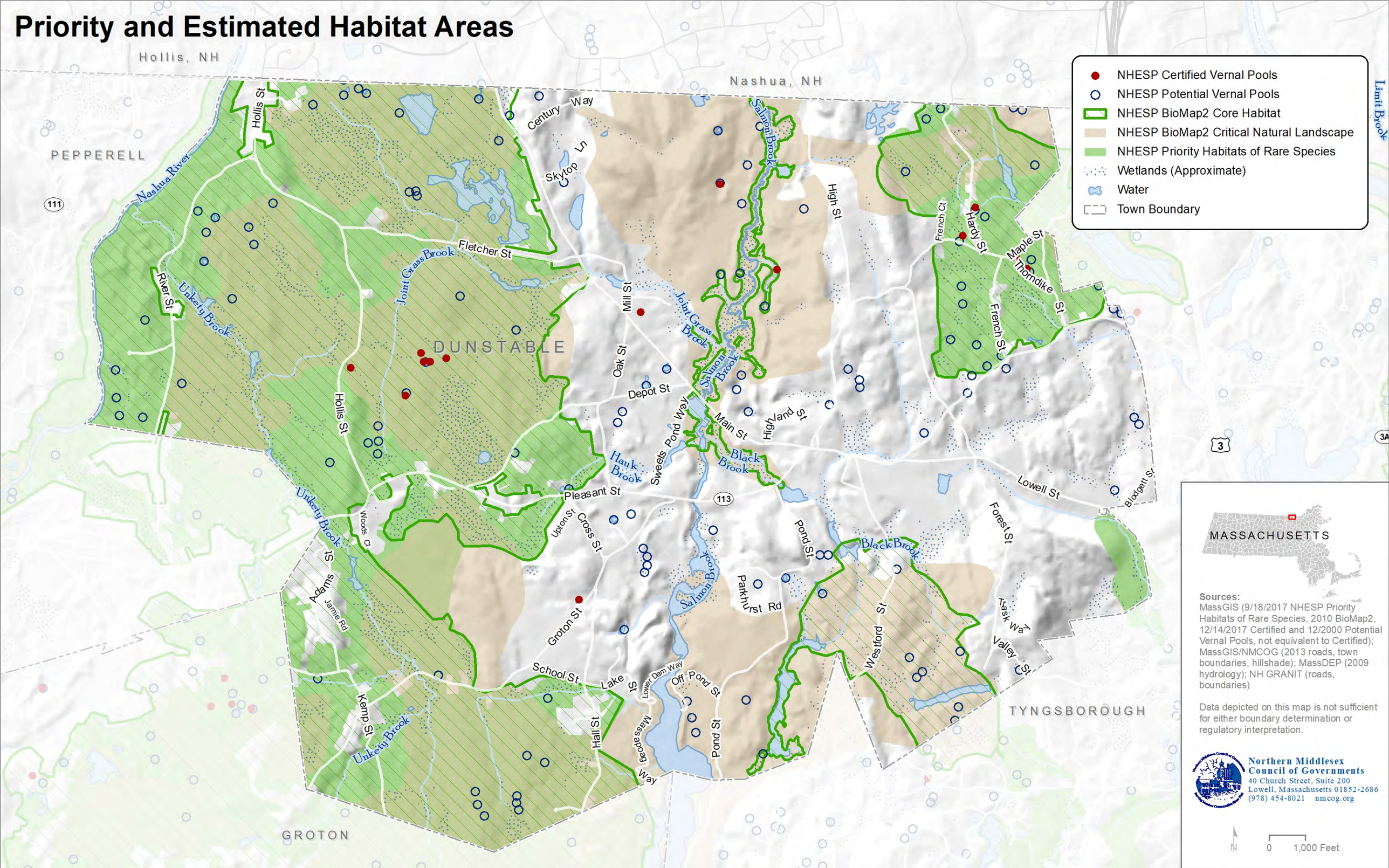
The depicted soil boundaries and interpretations derived are for planning purposes only and do not eliminate the need of onsite sampling, testing, and detailed study of specific sites.

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Priority and Estimated Habitat Areas

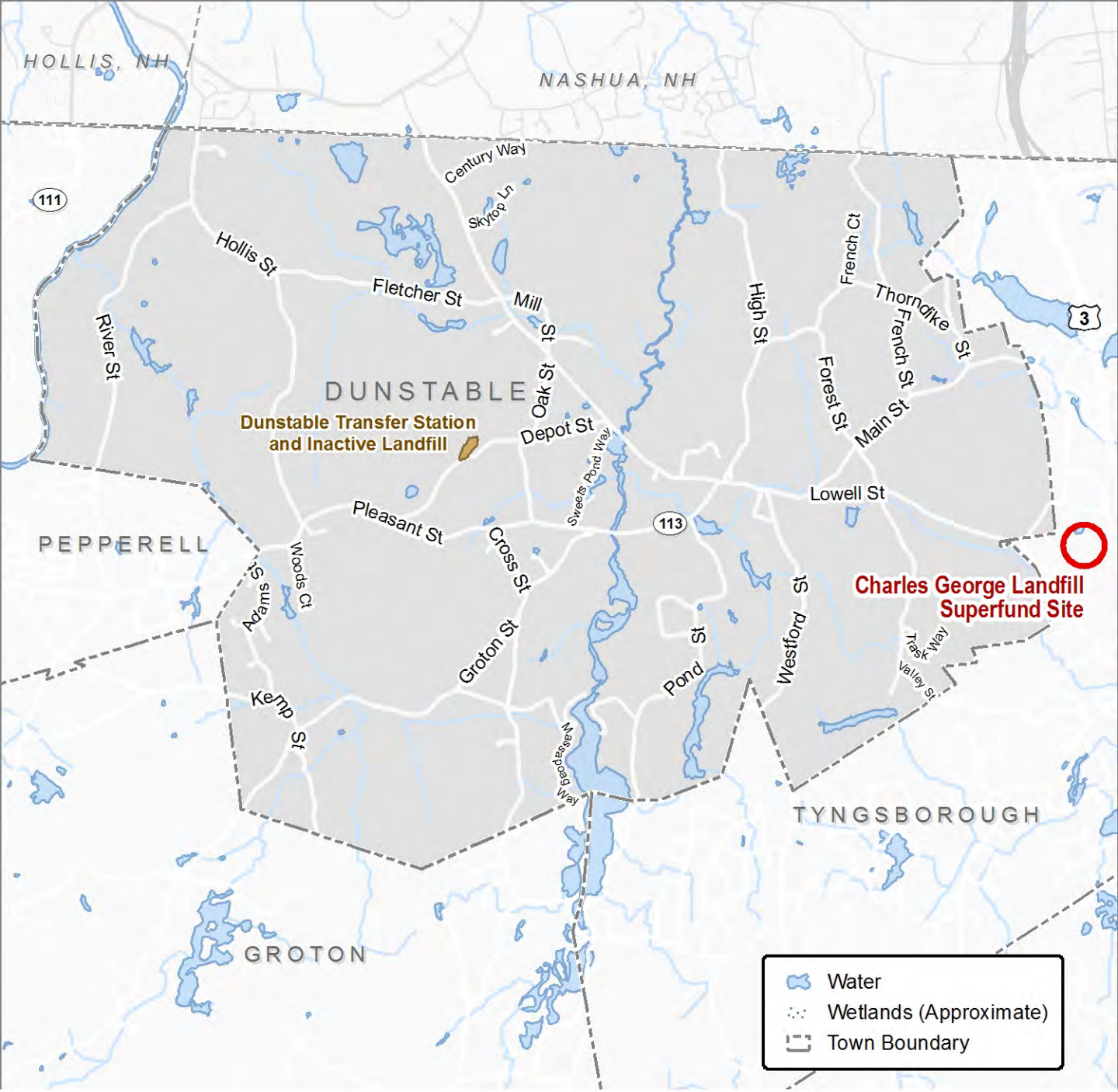


Sources:
MassGIS (9/18/2017 NHESP Priority Habitats of Rare Species, 2010 BioMap2, 12/14/2017 Certified and 12/2000 Potential Vernal Pools, not equivalent to Certified); MassGIS/NMCOG (2013 roads, town boundaries, hillshade); MassDEP (2009 hydrology); NH GRANIT (roads, boundaries)

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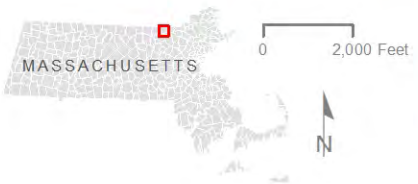
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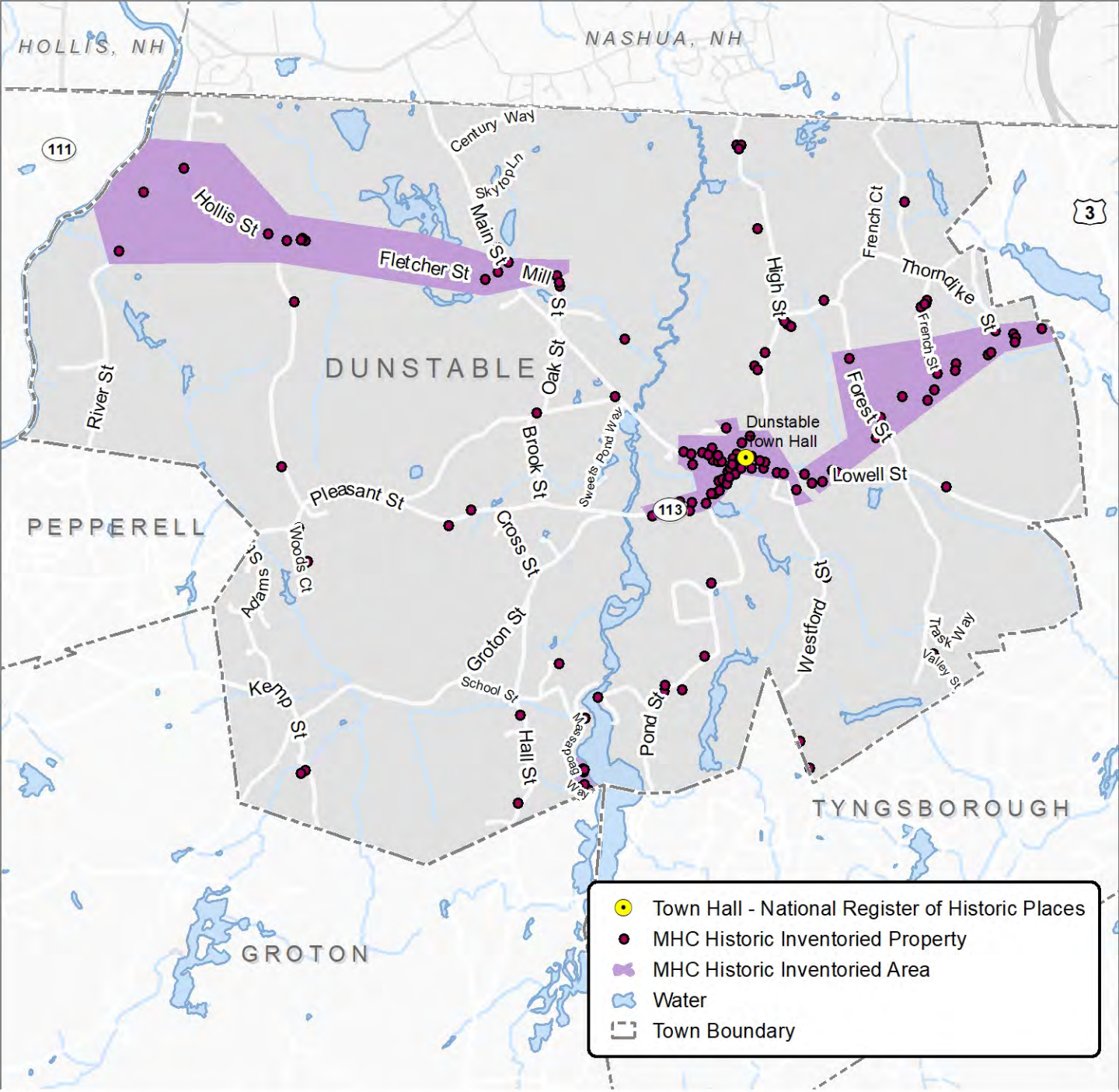
Sources:
MassGIS (BWP solid waste disposal sites); EPA (CERCLA Superfund sites); MassDOT/NMCOG (2013 roads, town boundaries); MassDEP (2009 hydrology); NH GRANIT (roads, boundaries)

Data depicted on this map is not sufficient for either boundary determination or regulatory interpretation.

Produced by NMCOG: 5/9/2017



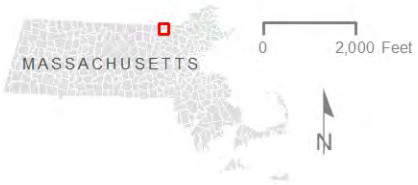
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40 Church Street, Suite 200
Lowell, Massachusetts 01852
(978) 454-8021 nmcog.org



Sources:
MassGIS (Massachusetts Historical Commission MACRIS); MassGIS/NMCOG (2013 roads, town boundaries); MassDEP (2009 hydrology); NH GRANIT (roads, boundaries)

Data depicted on this map is not sufficient for either boundary determination or regulatory interpretation.

Produced by NMCOG: 9/12/2018



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Robbins Farm Road
New Hampshire
Century Way
Sky Top Lane
Nashua River
River Street
Floodzy in last 25 yr
Flushy 2023
Bass Pond
Fletcher Street
Joint Grass Brook
Main Street
Milli Street
Woodland Drive
Swallow Lane
High Street
French Court
Hardy Street
Beech Street
Thorndike Street
Pine Street
Hollis Street
Oak Street
Depot Street
Highland Street
Sweets Pond Way
Highland Brook
Brook Street
Pleasant Street
Hillcrest Street
Canyons Lake
Lowell Street
Blodgett Street
N
Upton Street
Cross Street
Dogwood Lane
New Culvert
Woods Court
Kimberly Lane
Brittany Lane
Janie Road
Adams Street
Unkety Brook
Black Brook
Forest Street
Panhurst Road
Lower Massapoag Pond
Pond Street
Westford Street
Teak Way
Valley Street
Tyngsborough
Groton Street
School Street
Lake Street
Lower Dean Way
Off Pond Street
Horse Hill Street
Hall Street
Massapoag Brook
Upper Massapoag Pond
Kemp Street
Groton
Layer
ooding, no BFE
Flooding, with BFE
Flooding
ventory
ic Places
ric Places
1,100 0 1,100
Scale in Feet

FIGURE 3
TOWN OF DUNSTABLE, MASSACHUSET
HAZARD MITIGATION PLAN
HISTORIC RESOURCES MAP
AUGUST 2023
SCALE:

Stone Arch Bridge Cultural

New Hampshire

147 Hardy St - Private Dog Park

N

Robbins Farm Road

Century Way

Main Street

Sky Top Lane

Nashua River

Bass Pond

Fletcher Street

Joint Grass Brook

River Street

Mill Street

Joint Grass Brook Dam

Woodland Drive

Swallow Lane

Oak Street

Salmon Brook Wall #1 and Wall #2

Hollis Street

Depot Street

Brook Street

Hawk Brook

Highland Street

Town Hall

Evangelical Congregational Church

Dunstable Animal Clinic

The Farmhouse Cafe

Public Library

Dunstable Police Station

Swallow Union School

Dunstable Fire Station

Whitehall Mill Dam

Sweets Pond Way

Irving Dr

Dunstable General Store & Dunkin'

DPW Garage

Dunstable Post Office

Water Tower

Lowell Street

Bridget Street

Solaris

Private Solar Field

Pepperell

DPW Garage

New England Power

113

Pleasant Street

Tully Farms Dairy Store

Upton Street

Cross Street

Dogwood Lane

Woods Court

Kimberly Lane

Brittany Lane

Jarvis Road

Adams Street

Groton Street

School Street

Lake Street

Lower Massapoag Pond

Peasant Road

Pond Street

Massapoag Pond Dam

Off Pond Street

Lower Main Way

Lake Circle

Horse Hill Street

Hall Street

Massapoag Ave

YMCA

Upper Massapoag Pond

Keep Street

Groton

Black Brook

Westford Street

Forest Street

Trask Way

Valley Street

Tyngsborough

French Court

Hardy Street

Rhode Island

Pine Street

Thornton Street

French Street

Little Red Schoolhouse

High Street

40B MAYBE

40B

Private Solar Field

Solar

Dam in Tyngsboro

1,100 0 1,100

Scale in Feet

FIGURE 4

TOWN OF DUNSTABLE, MASSACHUS
HAZARD MITIGATION PLAN

PHYSICAL RESOURCES M

AUGUST 2023 SC

Weston & Samp

s with Significant Hazard
s with Low Hazard
ary Evacuation Routes
rs/Streams
n Water
d Waste Facilities
P Approved Zone I
P Approved Zone II
erim Wellhead Protection Area
ctric Transmission Right-of-Way

OT Roads

te Route
n-numbered Road

Assets

imal Clinic
ll Tower
emetery
urch
rinking Water Supply Well
lectric Transmission ROW
lectricity Regulating Substation
ire Station
ood & Pharmacy
Gas Station
Historic and Cultural Resources
Library
Municipal Building
Municipal or Public Safety
Police Station
Postal Service
Recreation
School

MA National Flood Hazard Layer

od Zone Designations
A: 1% Annual Chance of Flooding, no BFE
AE: 1% Annual Chance of Flooding, with BFE
AE: Regulatory Floodway
X: 0.2% Annual Chance of Flooding
NE States Bordering Mass.

Note: The following layers are not located within the town boundary
AUL Sites, Underground Storage Tanks, BWP Major Facilities,
DEP Groundwater Discharge & Permits, Tier Classified Sites

Municipal Vulnerability Preparedness (MVP) Planning Grant
& Hazard Mitigation Plan (HMP) Planning Grant Update

Core Team Meeting Sign-In Sheet
Location: Dunstable Town Hall, 511 Main Street, Dunstable, MA
Monday, August 14, 2023 @ 3:00 PM

Name & Affiliation	Attended 7/10/2023	Attended 8/14/2023
Michelle Rowden, EOEEA	X	✓
Jennie Moonan, Weston & Sampson	X	✓
Dave Langlais, Hoyle Tanner	X	✓
Nichole Davis, Hoyle Tanner	X	✓
Leah Basbanes, Selectboard & Conservation Commission	X	✓
Jason Silva, Town Administrator	X	✓
Eric Hoar, Dunstable PD	X	✓
Bridget Baley, Health Agent	X	
William Farrell, Dunstable FD	X	✓
Dave Tulley, Highway Department	X	
Mike Martin, Roadway Commission	X	
John O'Brien, Water Commission	X	
Maria Amodei, Board of Health	X	

Municipal Vulnerability Preparedness (MVP) Planning Grant
& Hazard Mitigation Plan (HMP) Planning Grant Update

Core Team Meeting
Location:

- **Virtual on Teams**
- **Dunstable Town Hall, 511 Main Street, Dunstable, MA**

Thursday, March 21, 2024 - 10:00 AM to 11:00 AM

Meeting Goals

1. Review the draft MVP-HMP – confirm input and review any questions
2. Review the MVP-HMP Mitigation Actions and plan for completion
3. Confirm next steps

Draft MVP-HMP — 15 Minutes

1. Confirm questions contained in draft have been answered
2. Review comments from Core Team

MVP- HMP Mitigation Actions — 35 Minutes

1. Review spreadsheet
2. Confirm plan for completion (if needed)

Final Steps to Complete Draft Plan — 10 Minutes

1. Provide draft plan to the public
    a. Public Review Period dates?
    b. Outreach approach?
    c. Survey to collect comments?
    d. Send draft to CRB workshop attendees
    e. Send draft to EEA with clarification on MVP sections
2. 1 hour listening session (Town to lead)
    a. When to hold?
    b. Who will lead presentation?
    c. Survey on mitigation actions?
3. Core team meeting #2 to review and incorporate comments
4. BoS vote to send to MEMA? Not required but may want them to understand this process is in progress
5. Submit to EEA as draft and MEMA as draft by June 30, 2024

MVP Meeting 3/21/24

Kristina Hooper
Michael Martin
David Tully
Erik How
Leah Bashaw
John O'Brien
Bridgette Braley
Jason Silva
David Langlais

Virtual Attendees:
Janet (Jennie) Moonan
Anna Kimelblatt

Core Team Meeting
Location:

- **Virtual on Teams**
- **Dunstable Town Hall, 511 Main Street, Dunstable, MA**

Thursday, March 21, 2024 - 10:00 AM to 11:00 AM

Attendance: attendees signed in in person

Meeting Goals

1. Review the draft MVP-HMP – confirm input and review any questions
2. Review the MVP-HMP Mitigation Actions and plan for completion
3. Confirm next steps

Draft MVP-HMP 15 Minutes

1. Confirm questions contained in draft have been answered
2. Review comments from Core Team

- Jennie: we are going to go to some targeted review spots in the plan.
- Started in Chapter 1: re-defined goals, please confirm. Any last edits or comments on goals? No additional comments on goals. Consider them final. No other comments on chapter 1.
- Chapter 2: Jennie reminded them we will be making final tweaks to this as we finish up the public process. Change Board of Selectmen to Select Board. Change throughout plan.
- Jennie: we will want to send this plan out to stakeholders; including staff beyond the core team, survey respondents, those that came to the CRB workshop. Core team asked if that was to open it to public comment? Jennie confirmed that yes it opens it up to comments. Typically we have a survey that they can fill out by chapter to submit their comments.
- Listening Session is required by MVP program. Need to pick a date for this. It is a public listening session. EEA recommends doing it at a Select Board meeting. If you don't do it in conjunction with another town meeting, people typically don't come. Can also do it virtually. Presentation is to present the plan to the public. Town does not want to add it to a town meeting. Can do it with a Select Board meeting or a separate virtual meeting. Potentially middle of April. Town thinks virtual meeting might get more people to participate. Thursday April 11 from 6 to 7. Weston & Sampson will provide the meeting invite.
- Can do a process to get feedback on the plan and/or a separate survey on the mitigation actions. Extra enhanced step but can be done if you want public to weigh in on mitigation actions. Initial survey was to help us identify critical hazard interest. This would be more commentary on the steps were planning on taking to address those hazards. Think it might be Pandora's box. Could be open ended or close ended. Town thinks close ended. One survey that's open ended can be sent to the people that participated in the meetings/crb workshops. Close ended survey can be sent to the general public. Town wants to keep it as simple as possible.
- Chapter 3: list the other unofficial swimming area as a cool down area (Tully Wildlife Refuge)
- Check if there's a newer open space plan, check for newer open space map
- Has new development increased or decreased the community's vulnerability to natural hazards? Probably not, development regulations are pretty robust. Bear Hill development had 7 lots. Chapman Street 11 lots, Alexander Way 12 lots, but all were open space developments where land had to be set aside and conserved as open space.
- Town will get information on building permits
- Delete major developments column from building permit table.

- Reviewed all assets
- There's an additional repeater on the water tower that the fire department uses
- Add ACEC area of critical environmental concern to natural resources assets
- Reviewed Chapter 4 Hazard Profiles and vulnerabilities
- Jennie explained how we wrote Chapter 4 and made it specific to Dunstable
- Chapter 5 Community Capabilities:
- NFIP: needs to fall under building inspector and maybe under Planning as well. Road commission, fire, and police go out to look for damage after an event.
- Send along information regarding what happens when a plan comes in to build in the floodplain. Doesn't seem like there's a process to record or review elevation certificates. No process for reviewing permitting in the floodplain. No compliance issues bc no repetitive loss issues
- Will rewrite NFIP section to include need for more robust floodplain management program
- Town has regular department head and staff meetings, response teams consistently communicate during emergencies. Jennie can write this narrative based on Jason's comments.

- Plan Maintenance Chapter: need to identify a champion who is in charge of this plan. Need to send an update to MVP at least once a year. Town Administrator has been assigned this role.
- Use the excel database to track the progress of mitigation actions
- Discussed when updates need to occur to the plan
- Integrating the MVP/HMP: updating the open space plan so will integrate there
- Public participation through plan maintenance: providing information to the public ahead of time and allowing for public comment on mitigation actions

- Adoption: do you want to have select board approval to submit the draft plan?
- Jennie explained the MEMA/EEA review process and timeline. Then explained FEMA review process and timeline. Town thinks that Select Board should be aware of it, but not sure a whole public hearing is needed.

MVP- HMP Mitigation Actions — 35 Minutes

1. Review spreadsheet
2. Confirm plan for completion (if needed)

- Chapter 6: some mitigation actions we didn't get a consensus on and they were deferred. So they carry forward into this HMP. Want to confirm that we should carry these forward or if we shouldn't explain why we should remove them.
- Prepare a flooding study along main street/sweets pond: delete bc new culvert installed and flooding has been mitigated
- Consider joining CRS: defer bc need a FEMA/NFIP person to join staff
- Join FireWise: ask fire chief
- Potentially partner with Pepperell for damage assessment
- Deleted actions from the 2016 plan that were no longer relevant or necessary

- Jennie showed mitigation action spreadsheet. Came from CRB workshop and carried over from old plan. Delete what we decided to delete. Town has taken a first pass at the spreadsheet. Explained how to prioritize actions. Then explained what is needed for each action that is selected for inclusion in the plan.
- Jennie: what is the best way to get this spreadsheet done?

- Reviewed MVP action requirements vs FEMA action requirements

Jennie will send out the action plan for people to review

Final Steps to Complete Draft Plan — 10 Minutes

1. Provide draft plan to the public
    a. Public Review Period dates?
    b. Outreach approach?
    c. Survey to collect comments?
        i. Yes, please keep it simple
    d. Send draft to CRB workshop attendees
    e. Send draft to EEA with clarification on MVP sections
2. 1 hour listening session (Town to lead)
    a. When to hold?
        i. Thursday April 11, 6 to 7 PM
    b. Who will lead presentation?
        i. TBD - Town
    c. Survey on mitigation actions?
        i. Include in overall survey
3. Core team meeting #3 to review and incorporate comments
    a. Date TBD
4. BoS vote to send to MEMA? Not required but may want them to understand this process is in progress
    a. Decided no formal vote, but do want to make them aware it is happening
5. Submit to EEA as draft and MEMA as draft by June 30, 2024

APPENDIX B: COMMUNITY RESILIENCE BUILDING WORKSHOPS

Community Resilience Building (CRB) & HMP Stakeholder Workshop
Day 1

Location: Dunstable Town Hall (511 Main St, Dunstable, MA 01827)
Friday October 20, 8:30 AM to 12:30 PM

8:30 AM Registration & Refreshments (10 Minutes)

8:40 AM Welcome & Introductions (10 Minutes)

- Town Appointed Official
- MVP Regional Coordinator
- MVP/HMP Core Team/Committee Members
- Consulting Team
- Participant Introductions

8:50 AM MVP/HMP Workshop Purpose & Overview (45 Minutes)

- Hazards
- Existing Climate
- Projected Climate

9:35 AM Large Group Exercise #1 (20 Minutes)

- Identify Major Hazards
- Prioritize Top Four Hazards

9:55 AM BREAK (10 Minutes)

10:05 AM Presentation: Risk Matrix Overview (15 Minutes)

- Hazards
- Features
    - People, Structures, Systems, Historic/Cultural/Natural Resources, Economy & Activities that have Value to Community
    - Vulnerability or Strength
    - Location
    - Ownership
- Overview of Data and Maps Being Used During Workshop

10:20 AM Small Group Exercise #1 (1.5 Hours)

- People
    - Vulnerability and/or Strength, Location, Ownership
- Structures
    - Vulnerability and/or Strength, Location, Ownership
- Systems
    - Vulnerability and/or Strength, Location, Ownership
- Historical/Cultural/Natural Resources
    - Vulnerability and/or Strength, Location, Ownership
- Economy & Activities that have Value to the Community
    - Vulnerability and/or Strength, Location, Ownership

11:50 AM Large Group Exercise #2: Report Out (30 Minutes)

- Each group present a few examples of their groups assets and strengths/vulnerabilities

12:20 PM Day 1 Wrap Up & Closing Remarks (10 Minutes)

12:30 PM Adjourn

Community Resilience Building (CRB) & HMP Stakeholder Workshop Day 2

Location: Dunstable Town Hall (511 Main St, Dunstable, MA 01827)
Thursday October 26, 8:30 AM to 12:30 PM

8:30 AM Registration & Refreshments (10 Minutes)

8:40 AM Welcome & Introductions (10 Minutes)

- Town Appointed Official
- MVP Regional Coordinator
- MVP/HMP Core Team/Committee Members
- Consulting Team
- Participant Introductions

8:50 AM Reminder: MVP/HMP Workshop Purpose & Overview (15 Minutes)

- Review of Hazards
- Review of Existing Climate
- Review of Projected Climate
- Review of Data and Maps Being Used During Workshop

9:05 AM Presentation: Mitigation Strategies/Community Actions (30 minutes)

9:35 AM Small Group Exercise #2 (1.25 Hours)

- Define HMP Mitigation Strategies/MVP Community Actions

10:50 AM BREAK (10 minutes)

11:00 AM Large Group Exercise #3 (60 Minutes)

- Prioritization Criteria
- Identify High Priority HMP Strategies/MVP Priority Actions

12:00 PM Workshop Wrap Up & Next Steps for MVP/HMP (30 Minutes)

12:30 PM Adjourn

Town of Dunstable Assets

Assets are organized into the following five categories (FEMA, 2022). These categories represent the wide variety of perspectives, purposes, and goals that assets can include.

While assets may fall into multiple categories, they will be listed under just one. The categories are used for organizational purposes only and will not impact the mitigation actions or vulnerability assessments of any assets.

- People (including underserved communities and socially vulnerable populations): "Assets that serve populations that are more vulnerable to disaster (e.g., elderly, children, visiting populations) and/or serve densely populated areas."

- Structures (including facilities, lifelines, and critical infrastructure): "Built facilities that provide community lifeline services. A community lifeline enables the continuation of critical government and business functions and is essential to human health and safety or economic security."

- Systems (including networks and capabilities): "A collection of components that perform a critical service for the community. Systems are linear type assets. Systems may include horizontal assets associated with linear type assets."

- Natural resources. "Natural Resources are

    - areas that provide protective function to reduce magnitude of hazard impact and increase resiliency.
    - areas of sensitive habitat that are vulnerable to hazard events,
    - protection of areas that are important to community objectives, such as the protection of sensitive habitat, provide socio-economic benefits, etc."

- Historical and Cultural Resources: "Assets that possess historical, cultural, archaeological or paleontological significance, including sites, contextual information, structures, districts, and objects significantly associated with or representative of earlier people, cultures, maritime heritage, and human activities and events."

- Economic and Community Assets: Economic assets are defined as entities that produce a financial benefit for the owner or community, while community assets are defined as "Activities that benefit the community by increasing community morale and well-being. Activities may include education and knowledge transfer."

Assets in the Town of Dunstable have been identified utilizing the newest MassGIS data, the most up to date MassGIS L3 Parcel data, and the asset inventory presented in the 2015 Hazard Mitigation Plan. This section provides summary tables of critical assets in Dunstable.

"People" Assets

Asset Type	Name	Address	Community Lifeline
Schools/Daycare	Swallow Union Elementary School	518 Main Street	Food, Hydration, Shelter
	Maple Village Preschool	518 Main Street	
	Groton-Dunstable Regional High School	703 Chicopee Row, Groton MA	Food, Hydration, Shelter
	Patricia Crandall	147 Hardy Street	
Religious Centers	Dunstable Congregational Church	516 Main Street	Food, Hydration, Shelter
Recreation	Y Camp	234 Hall Street	
Priority Populations	Senior Center at Dunstable Free Public Library	511 Main Street	
Environmental Justice (EJ) Communities	There are no mapped EJ Communities within Dunstable		

"Structures" Assets

Asset Type	Name	Address	Community Lifeline
Emergency Response	Police Station	23 Pleasant Street	Safety & Security
	Fire Station	28 Pleasant Street	Safety & Security
Emergency Shelters	Swallow Union School	518 Main Street	Food, Hydration, Shelter
	Dunstable Congregational Church	516 Main Street	Food, Hydration, Shelter
	Town Hall	511 Main Street	Safety & Security

Asset Type	Name	Address	Community Lifeline
Town Facilities	Town Hall	511 Main Street	Safety & Security
	Dunstable Free Public Library	588 Main Street	
	DPW Garage	107 Pleasant Street	
	DPW Garage	589 Pleasant Street	
	Storage Barn for Highway and Police	91 River Street	
Post Office	Dunstable Post Office	170 Pleasant Street	
Animal Clinics	Dunstable Animal Clinic	386 Main Street	
Food & Pharmacy	Dunstable General Store & Dunkin'	238 Pleasant Street	Food, Hydration, Shelter
	Tully Farms Dairy Store	446 Pleasant Street	Food, Hydration, Shelter
	The Farmhouse Café	17 Pleasant Street	Food, Hydration, Shelter
Dams	Massapoag Pond Dam (Private) Low Hazard	Off Lower Dam Way	
	Woodwards Mill Dam (Town-owned) Low Hazard	Approximate Intersection of Pond Street and Pleasant Street	
	Joint Grass Brook Dam (Private) Low Hazard	Mills Street just north of Swallow Lane	
	Locust Pond Dam (Private) Significant Hazard	Locust Ave, Tyngsborough	
	Upper Flint Pond Dam (State-Owned) Significant Hazard	End of Flint Pond Road, Tyngsborough	

Asset Type	Name	Address	Community Lifeline
	Lower Flint Pond Dam (State-owned) Low Hazard	Intersection of Kendall Rd & Middlesex Rd, Tyngsborough	

"Systems" Assets

Asset Type	Name	Address	Community Lifeline
Primary Evacuation Routes	Pleasant Street (Route 113) Groton Street High Street Lowell Street Westford Street		Transportation
Culvert & Bridges	All across town		
Pump Stations	Drinking Water (2)	One at each well	Water Infrastructure
Water Tower	Water Tower	108 Pleasant Street (Simmons Way)	Water Infrastructure
Drinking Water Supply Wells	Salmon Brook Well #1	711 Main Street (and associated Zone I and Zone II)	Water Infrastructure
	Salmon Brook Well #2	711 Main Street (and associated Zone I and Zone II)	Water Infrastructure
Natural Gas	National Grid	Town-wide	Energy
Electricity	National Grid	Town-wide	Energy
Cable	Charter	Town-wide	Communications
	Verizon	Town-wide	Communications

Asset Type	Name	Address	Community Lifeline
Communications	Cell Tower	583 Pleasant Street	Communications
	Cell Tower at Dunstable Congregational Church	516 Main Street	Communications
Gas Stations	Irving Oil	238 Pleasant Street	Energy
Closed Landfill	Dunstable Transfer Station & Landfill	Depot Street	Hazardous Materials
Hazardous Materials Site	Charles George Landfill Superfund Site	Cummings Road	Hazardous Materials
Solar	Solar installation (private)	Back of 11 Cummings Road, Tyngsborough (0 Blodgett Street, 0 Lowell Street)	Energy
	Solar installation (private)	Back of 377 Groton Street	Energy
	Solar installation (private)	11 Blodgett Street	Energy

Natural Resources Assets

Asset Type	Name	Address	Community Lifeline
Natural Resources	Canyons Lake		
	Black Brook		
	Hauk Brook		
	Lower Massapoag Pond		
	Upper Massapoag Pond		

Asset Type	Name	Address	Community Lifeline
	Nashua River		
	Bass Pond		
	Joint Grass Brook		
	Unkety Brook (Cold Water Fishery)		
	Nissitisset River (Scenic & Protected River)		
	Kennedy Conservation Area		
	Proctor Conservation Area		
	Dunstable Brook Wildlife Management Area		
	English Wildlife Refuge		
	Spaulding-Proctor Reservation		
	Larter Field		
	Pierce Town Forest		
	Hauk Swamp Wildlife Management Area		
	Unkety Brook Wildlife Management Area		
	Priority Habitat of Rare Species	Town-wide	
	Estimated Habitats of Rare Wildlife	Town-wide	
	Certified Vernal Pools	Town-wide	

Asset Type	Name	Address	Community Lifeline
	Potential Vernal Pools	Town-wide	
Open Space	Article 97 Land	Town-wide	
	Horse Hill Quarry Conservation Area (Dunstable Rural Land Trust)	Hall Street	
	Flat Rock Hill Conservation Area (Dunstable Rural Land Trust)	Mill Street	
	Unquetynasset Brook Meadow (Dunstable Land Trust)	Groton Street	
	Tully Wildlife Refuge (Dunstable Land Trust)	Main Street	

Cultural and Historic Resources

Asset Type	Name	Address	Community Lifeline
Cultural Resources	Little Red Schoolhouse	64 Main Street	
	Stone Arch Bridge	Salmon Brook, north end of Town	
Historic Resources	West Dunstable - River Road Area		
	Meetinghouse Hill		
	East Main Street Area		
	YMCA Camp Massapoag Family Outdoor Center		

Asset Type	Name	Address	Community Lifeline
	Dunstable Center Historic District		
	Pond and Pleasant Street Area		
	Massachusetts Historic Commission Inventory Properties	Town-wide	
	National Register of Historic Places	Town-wide	
Cemeteries	Blood Cemetery	580 Hollis Street	
	1754 Meetinghouse Hill Cemetery	200 - 296 Main Street	
	Mt. Hermon Cemetery	Brook Street & Depot Street	
	Swallow Cemetery	Brook Street	
	Central Cemetery	Westford Street & Route 113	

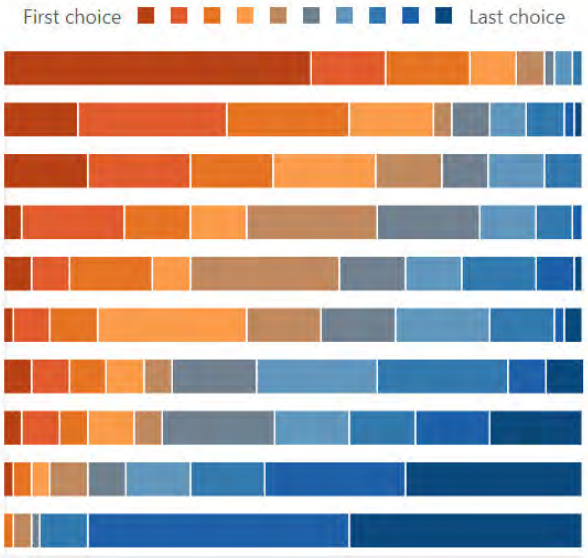
Economic and Community Assets

Asset Type	Name	Address	Community Lifeline
Rail Trail	Nashua River Rail Trail		
Top Employers	Town of Dunstable		
	School Department		

Dunstable Survey Results Summarized

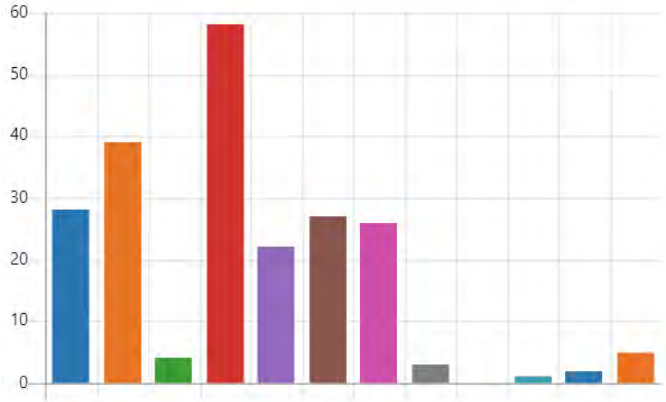
1. Which natural hazards are you most concerned about? Rank 1 for most concerned and 10 for least concerned.

Rank	Options
1	Winter Storm / Nor'easters
2	Hurricane / Tropical Storm
3	Extreme Temperatures (Heat / ...
4	Flooding
5	Wildfire / Brush Fires
6	Drought
7	Invasive Species
8	Tornadoes
9	Earthquakes
10	Landslides



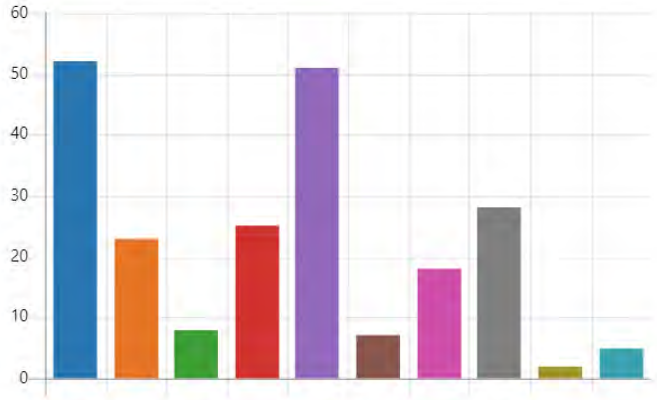
2. If any, which natural hazards have you experienced in Dunstable?

Hurricanes / Tropical Storm	28
Extreme Temperatures (Heat/...	39
Earthquakes	4
Winter Storm / Nor'easters	58
Flooding	22
Drought	27
Invasive Species	26
Wildfire / Brush Fire	3
Landslides	0
Tornadoes	1
None	2
Other	5



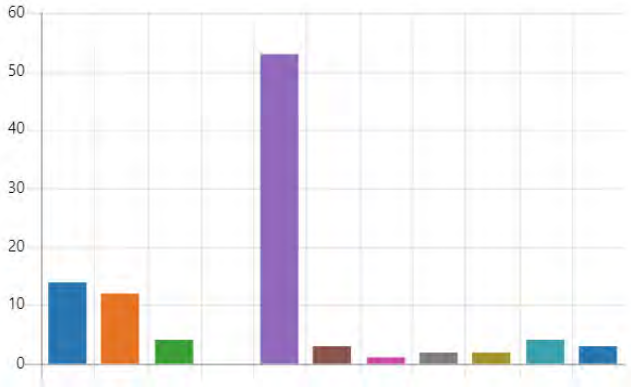
4. What problems from natural hazards concern you the most?

My home being damaged	52
My home becoming isolated ...	23
My job being affected	8
Limited access to food or sup...	25
Power outage	51
Limited access to transportation	7
Limited access to medical care	18
Contaminated drinking water	28
Limited options for childcare	2
Other	5



5. If any, what problems from natural hazards have you experienced in Dunstable?

My home was damaged	14
My home became isolated du...	12
My job was affected	4
Limited access to food or sup...	0
Power outage(s)	53
Limited access to transportation	3
Limited access to medical care	1
Contaminated drinking water	2
Limited options for childcare	2
None	4
Other	3



6. Tell us more about how experiences with natural hazards have impacted your life.

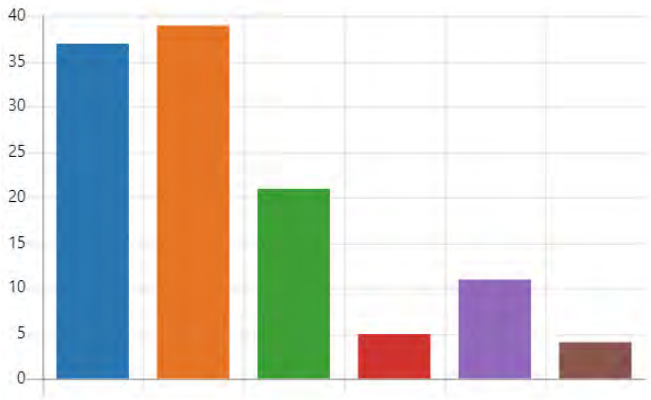
- Unable to leave home for days at a time, loss of power, food spoiled, no drinking water
- Got a generator.
- High winds caused branch from tree to fall and tear window screen/leave pine pitch on window. Power was out for 2 days last winter when storms caused branches to take down power lines.
- Losing electricity is the worst of it, but a generator would solve that piece. I'm largely home-bound so unless it affects my property directly, I don't have much experience with these hazards.
- I've only been in Dunstable 3 years, but we had more extensive problems with our house flooding and water damage previously, in Billerica. We also dealt with roof damage from snow

load. In this house we've lost power (luckily never more than a couple hours) and it's tough having a well that relies on power for water.

- Last year I could not get into/out of my road as it is a dead end and was blocked by 2 downed trees and 1 power line.
- We have had several power outages and trees down during storms which also causes school closures
- Power outage is the one that affects us from time to time but we do have a portable generator to get us over the hump (well and heat).
- Climate change is a money grab!
- Without electricity, no heat, lights, access to information.
- We had to purchase a generator due to power outages the first few winters in Dunstable. Generators are great, but loud & exhaust fumes.
- We live in town center, so thankfully our experiences have been limited as we have had few long power outages and being on town water, limited disruption besides the one time there was contamination that had to be fixed.
- We have a well. No power means no water.
- I've been in Dunstable for less than a year so have limited experience. However we have had several power and internet outages. Our road has been barely passable all Sumer but has recently been improved.
- Torrential rain as well as snow caused large trees to fall over which brought down some cable & power lines and also prevented us and 3 other families from leaving our homes, or from having anyone come to our home for any reason . . . this lasted 3-days around Christmas. We had to have a Verizon special team fixed lines as well as National Grid. We also had a huge expense for the large tree removal.
- We have experienced flooding/water in the basement, leading to damage.
- High winds have damaged roof. We rarely lose power but its happened before.
- Multiple, multiple power outages, some taking 2 weeks to repair. A real issue for those with septic systems and oil heat furnaces.
- Luckily, power outages for us have been few and far between, and very brief. We had a storm bring down a tree across our driveway, but it was manageable on our own.
- During an ice storm a tree branch fell and disconnected just the neutral wire to the house. This is catastrophic and caused around $20.000 in damage to electrical appliances and devices.
- Love the wild weather!

7. What do you do to prepare for a natural hazard event?

I have an emergency kit with s...	37
I have a back up generator in ...	39
I check on a vulnerable neigh...	21
A neighbor checks on me to o...	5
I do not prepare differently	11
Other	4



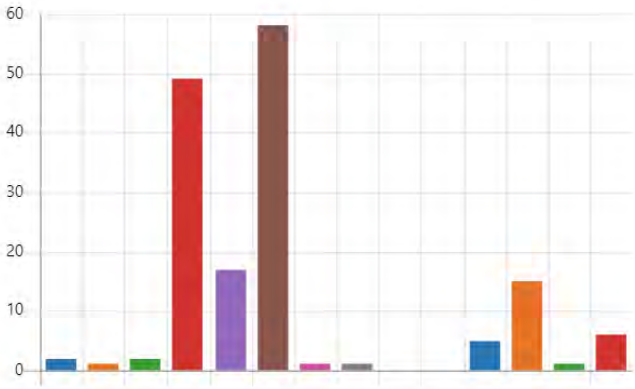
8. In my community, I know where the...

nearest shelter is.	8
evacuation routes are.	5
cooling station is.	2
warming station is.	2



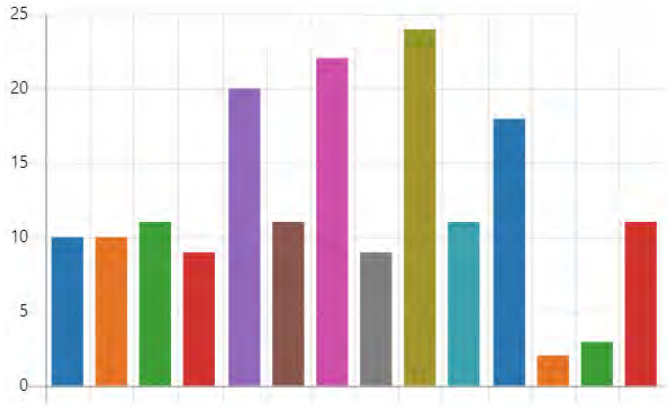
9. What does the Town do well to prepare for natural hazards?

Sets up warming stations	2
Sets up cooling stations	1
Sets up shelters	2
Snow removal/preparedness	49
Public notifications of upcomi...	17
Treats winter roads (salting an...	58
Plans for climate resilience	1
Plants trees (reducing urban h...	1
Implements renewable energy	0
Provides flood protection and ...	0
Prioritizes vulnerable populati...	5
Provides green space (reducin...	15
Provides reliable public transp...	1
Other	6



10. What could the Town improve on to prepare for natural hazards?

Set up warming stations	10
Set up cooling stations	10
Set up shelters	11
Snow removal/preparedness	9
Public notifications of upcomi...	20
Treat winter roads (salting and...	11
Plan for climate resilience	22
Plant trees (reducing urban he...	9
Implement renewable energy	24
Provide flood protection and r...	11
Prioritize vulnerable populatio...	18
Provide green space (reducing...	2
Provide reliable public transpo...	3
Other	11



H-**M**-**L** priority for action over the **S**hort or **L**ong term (and **O**ngoing)
V = Vulnerability **S** = Strength

Top Priority Hazards (tornado, floods, wildfire, hurricanes, earthquake, drought, sea level rise, heat wave, etc.)

Assets	Location	Ownership	V or S	Severe Weather/ Nor'easters	Invasive Species	Flooding from Precipitation	Extreme Temps	Priority H - M - L	Time Short Long Ongoing
People: Assets that serve populations that are more vulnerable to disaster and/or serve densely populated areas (e.g., schools and daycares, senior centers, religious centers etc.)									
School	518 Main St	Town	V & S						
Larder Field	Groton St	Town	S						
Library	588 Main St	Town	V & S						
YMCA Camp	234 Hall St	Private	V						
Home daycares	Multiple	Private	V						
Council on Aging (senior lunches)	511 Main St	Town, work w/ region	S						
Special Needs Seniors	Townwide		V						
No Emergency Shelter in Town			V						
Grange - agriculture	Townwide	Community	S						
Public Safety	Townwide	Town	S						
Meals on Wheels	Townwide	Private	V						
PACH Food Bank	Pepperell	Volunteer	V						
Veterans		Town	V						
Senior Population	Office, Townwide		V						
Emergency Shelters in Other Communities	Tyngsborough, Groton	Region	S						
Volunteer force	Townwide	Private	S						

H-**M**-**L** priority for action over the **S**hort or **L**ong term (and **O**ngoing)
V = Vulnerability **S** = Strength

Top Priority Hazards (tornado, floods, wildfire, hurricanes, earthquake, drought, sea level rise, heat wave, etc.)

Assets	Location	Ownership	V or S	Severe Weather/ Nor'easters	Invasive Species	Flooding from Precipitation	Extreme Temps	Priority H - M - L	Time Short Long Ongoing
Structures: Built facilities or critical infrastructure that provide community lifeline services (e.g., police and fire stations, emergency shelters, town facilities, dams etc.)									
Police Station	23 Pleasant	Town	S						
Church	518 Main St	Private	S & V						
Fire Station	28 Pleasant St	Town	V & S						
Town Hall	511 Main St	Town	S						
School/Emergency Shelters (Tyngs, Groton)	344 Main St	Town/ District	S						
Highway Department	511 Main St	Town	S & V						
Cow Pond Brook Dam (Salmon Brook)	Groton / Tyngs	Lake Massapoag Rod & Gun	V						
Lower Massapoag Dam	Dunstable	Lake Massapoag Rod & Gun Club Town	S						
Library	588 Main St	Town	S						
Post Office	170 Pleasant St	Fed	S						
Gas Station	238 Pleasant St	Private	S						
Farmhouse Café	17 Pleasant St	Private	S						
Joint Grass Brook Dam	Mill Street	Private	V						
Woodwards Pond Dam	Pond & Pleasant St.	Town	V						

H-**M**-**L** priority for action over the **S**hort or **L**ong term (and **O**ngoing)
V = Vulnerability **S** = Strength

Top Priority Hazards (tornado, floods, wildfire, hurricanes, earthquake, drought, sea level rise, heat wave, etc.)

Assets	Location	Ownership	V or S	Severe Weather/ Nor'easters	Invasive Species	Flooding from Precipitation	Extreme Temps	Priority H - M - L	Time Short Long Ongoing
Systems: Systems include networks and capabilities; it is a collection of components that perform a critical service for the community (e.g., evacuation routes, electricity grid, water supply									
Water Tower	108 Pleasant St	Town	S						
Water Mains/ Town Wells	area of Town	Town	V						
Private Wells	Throughout	Private	B						
Roads (Route 113, Main Street)		Town/ State	S & V						
Power / Electric Grid	across town	Nat. Grid	V						
TV, Special public access		Town	S						
Reverse 911		Town	S						
Private Roads/Dirt Roads not maint.	Throughout town	Private	N/A						
Natural Gas	1/3 of town	Nat. Grid	V						
Cell Towers	583 Pleasant St, 516 Main St	Private	S						
Website & Email		Town & School	S						
Solar	Scattered	Private	S						
Internet	Townwide	Charter/ Verizon	B						

H-**M**-**L** priority for action over the **S**hort or **L**ong term (and **O**ngoing)
V = Vulnerability **S** = Strength

Top Priority Hazards (tornado, floods, wildfire, hurricanes, earthquake, drought, sea level rise, heat wave, etc.)

Assets	Location	Ownership	V or S	Severe Weather/ Nor'easters	Invasive Species	Flooding from Precipitation	Extreme Temps	Priority H - M - L	Time S hort L ong O ngoing
Historic/Cultural/Natural Resources: Assets that possess historical or cultural significance, or areas that provide protective function that increase resiliency (e.g., open space, historic district, wildlife refuge)									
Trees	Town Wide	Public & Private	V						
Tully Wildlife Refuge		Dunstable Rural Land Trust	S						
Swimming Areas (lack of)	Massapoag Pond	N/A	V						
Town Common	510 Main St.	Town	S						
Farms	Various locations	Private	V & S						
Tennis Courts	Larder Field	Town	S						
Nashua River		N/A	V & S						
Morgan's Pond	Mill St	Private	S						
Historical Society	Town-wide	Town	S						
McLoon's Barn (DRLT)	370 Thornedike	DRLT	S						
Swallow Union School	508 Main St	Town	V & S						
Cemeteries	Various locations	Town	S						
Rural Land Trust	1076 Main Street	Private	S						
Green Space near River	Various locations	Town	S						
Little Red School House	64 Main St		V						
Wetland Bylaws	Townwide	Town	S						
Open Space	Townwide	Town	S						
ACEC	Mapped	N/A	V						

H-**M**-**L** priority for action over the **S**hort or **L**ong term (and **O**ngoing)
V = Vulnerability **S** = Strength

Top Priority Hazards (tornado, floods, wildfire, hurricanes, earthquake, drought, sea level rise, heat wave, etc.)

Assets	Location	Ownership	V or S	Severe Weather/ Nor'easters	Invasive Species	Flooding from Precipitation	Extreme Temps	Priority H - M - L	Time Short Long Ongoing
Economic and Community Activities: Assets that produce a financial benefit, or activities that increase community morale and well-being (e.g., commercial districts, community special events)									
Farms	Throughout town		V & S						
Town Common	510 Main St	Town	S						
Summer Concert Series		Town	S						
Strawberry Fest		Town	S						
Fall Fest		Town	S						
Winter Fest		Town	S						
Rail Trail			S						
Grange			S						
Larder Field	80 Groton St	Town	S						
Housing (Affordable, Senior/Assisted)			V						
Ag Commission	Town-wide	Town	S						
Memorial Day Parade		Town	S						
Jingle Fest		Community	S						
Santa on Fire Truck		Town	S						
Tully Farm Open House	446 Pleasant St., 291	Private	S						
Local Businesses		Private	S						

Community Resilience Building Risk Matrix

www.CommunityResilienceBuilding.org

H-**M**-**L** priority for action over the **S**hort or **L**ong term (and **O**ngoing)
V = Vulnerability **S** = Strength

Top Priority Hazards (tornado, floods, wildfire, hurricanes, earthquake, drought, sea level rise, heat wave, etc.)

Assets	Location	Ownership	V or S					Priority H - M - L	Time Short Long Ongoing
People: Assets that serve populations that are more vulnerable to disaster and/or serve densely populated areas (e.g., schools and daycares, senior centers, religious centers etc.)									
Structures: Built facilities or critical infrastructure that provide community lifeline services (e.g., police and fire stations, emergency shelters, town facilities, dams etc.)									
Systems: Systems include networks and capabilities; it is a collection of components that perform a critical service for the community (e.g., evacuation routes, electricity grid, water supply wells)									
Historic/Cultural/Natural Resources: Assets that possess historical or cultural significance, or areas that provide protective function that increase resiliency (e.g., open space, historic district, wildlife refuge)									
Ecomonic and Community Activities: Assets that produce a financial benefit, or activities that increase community morale and well-being (e.g., commercial districts, community special events)									

New Hampshire

N

Pepperell

Groton

Tyngsborough

Robbins Farm Road
Century Way
Sky Top Lane
Nashua River
Bass Pond
Fletcher Street
Joint Grass Brook
Main Street
Mill Street
River Street
Woodland Drive
Swallow Lane
High Street
French Court
Hardy Street
Maple Street
Pine Street
Thorndike Street
French Street
Oak Street
Depot Street
Sweets Pond Way
Highland Street
Common Street
Hillcrest Street
Hauk Brook
Brook Street
Canyons Lake
Lowell Street
Blodgett Street
Pleasant Street
113
Upton Street
Cross Street
Dogwood Lane
Woods Court
Kimberly Lane
Brittany Lane
Jamie Road
Adams Street
Black Brook
Parkhurst Road
Forest Street
Pond Street
Westford Street
Trask Way
Valley Street
Lower Massapoag Pond
Forsely Brook
Groton Street
School Street
Lake Street
Lower Dam Way
Off Pond Street
Lake Circle
Horse Hill Street
Hall Street
Massapoag Way
Upper Massapoag Pond
Kemp Street

- NHESP Certified Vernal Pools
- Potential Vernal Pools
- NHESP Natural Communities
- NHESP Priority Habitats of Rare Species
- NHESP Estimated Habitats of Rare Wildlife

MassDOT Roads

Administrative Type
- State Route
- Non-numbered Road

DEP Wetlands and Waterbodies
- Hydrologic Connection
- Marsh/Bog
- Wooded marsh
- Open Water

Aquifers
- Medium Yield

Note: Outstanding Resource Waters layer is not located within the town boundary.

1,100 0 1,100
Scale In Feet

FIGURE 1

TOWN OF DUNSTABLE, MASSACHUSETTS HAZARD MITIGATION PLAN

ENVIRONMENTAL RESOURCES MAP

AUGUST 2023 SCALE: NOTED

HOYLE TANNER Weston & Sampson

New Hampshire

N

Pepperell

Groton

Tyngsborough

Nashua River

Robbins Farm Road

Century Way

Sky Top Lane

West Dunstable - River Road Area

Fletcher Street

Joint Grass Brook

Bass Pond

Main Street

Mill Street

River Street

Woodland Drive

Swallow Lane

Hollis Street

Oak Street

Depot Street

Sweets Pond Way

Highland Street

Hardy Street

French Court

Thorndike Street

Maple Street

Pine Street

High Street

French Street

Meetinghouse Hill

East Main Street Area

Dunstable Center Historic District

Pond and Pleasant Streets Area

Hawk Brook

Brook Street

Pleasant Street

Upton Street

Crase Street

Dogwood Lane

Woods Court

Kimberly Lane

Brittany Lane

Jamie Road

Adams Street

Groton Street

School Street

Lake Street

Lower Dam Way

Lake Circle

Off Pond Street

Horse Hill Street

Hall Street

Unkety Brook

Kemp Street

Swallow Brook Way

YMCA Camp Massapoag Family Outdoor Center

Upper Massapoag Pond

Lower Massapoag Pond

Parkhurst Road

Pond Street

Westford Street

Hillcrest Street

Canyons Lake

Black Brook

Lowell Street

Bluestart Street

Forest Street

Trask Way

Valley Street

113

Rivers/Streams

Open Water

MassDOT Roads

Administrative Type

State Route

Non-numbered Road

FEMA National Flood Hazard Layer

A: 1% Annual Chance of Flooding, no BFE

AE: 1% Annual Chance of Flooding, with BFE

AE: Regulatory Floodway

X: 0.2% Annual Chance of Flooding

MassHistoric Commission Inventory

National Register of Historic Places

Preservation Restriction

Inventoried Property

National Register of Historic Places

Inventoried Property

1,100 0 1,100

Scale In Feet

FIGURE 3

TOWN OF DUNSTABLE, MASSACHUSETTS HAZARD MITIGATION PLAN

HISTORIC RESOURCES MAP

AUGUST 2023 SCALE: NOTED

HOYLE TANNER Weston & Sampson

New Hampshire

N

Pepperell

Groton

Tyngsborough

Nashua River

Unkety Brook

Joint Grass Brook

Bass Pond

Hauk Brook

Lower Massapoag Pond

Upper Massapoag Pond

Black Brook

Canyons Lake

Lake Cora

Robbins Farm Road
Century Way
Sky Top Lane
Fletcher Street
Mill Street
Main Street
Woodland Drive
Swallow Lane
Depot Street
Pleasant Street
Lowell Street
Blodgett Street
Hollis Street
River Street
Oak Street
Brook Street
Sweets Pond Way
Highland Street
Common Street
Hillcrest Street
High Street
French Street
Hardy Street
French Court
Thorndike Street
Maple Street
Pine Street
Upton Street
Cross Street
Dogwood Lane
Woods Court
Kimberly Lane
Brittany Lane
James Road
Adams Street
Groton Street
School Street
Lake Street
Lower Dam Way
Off Pond Street
Horse Hill Street
Hall Street
Kemp Street
Parkhurst Road
Pond Street
Westford Street
Forest Street
Flagg Way
Valley Street

Nashua River Access - Dunstable
Blood Cemetery
Conservation Area
Tully Wildlife Refuge
Trinity Group Realty Cr
Tully George E Sr Apr
Rideout Cemetery
Nashua River Rail Trail
Flat Rock Hill Quarry Conservation Area
Chaney Park
Flat Rock Hill Conservation Area
Salmon Brook Conservation Area
Archeo Bridge Conservation Area
Sky Meadow Golf Course
Kennedy A Donald Apr
Hardy Street Conservation Area
Gage Town Forest
Spectacle Hill Conservation Area
Howard's Brook Conservation Area
Basbanes Conservation Area
Joint Grass Brook Conservation
Proctor-grater Conservation Area
Stoddard Cr
Hogg Conservation Area
Urghart Conservation
New Town Area Well Field
Sargent Lavrakas Cr Conservation Area
High Street Conservation Area
Meeting House Hill Cemetery
Larter Edward A Jr Apr
Lupien Parcel
Swallow Cemetery
Sawyer Conservation Area
Larter Cr
Miller Cr
Hauk Swamp Wma
Best Triangle Conservation Area
Gardner Conservation Area
Swallow Union Elementary School Playground
Bacon Conservation Area
Shaw Conservation Area
Central Cemetery
Lower Massapoag
Westford Road Cr
Pierce Town Forest
Spaulding-proctor Reservation
Goldthwaite Conservation Area
Biron Conservation Area
Westford Street Cr
Dunstable Brook Wma
Allgrove Conservation Area
Keyes Meadow Conservation Area
Unkety Brook Conservation Area
Unquetymasset Brook Meadow
Horse Hill Quarry Conservation Area
Unkety Brook Wma
Camp Massapoag
Staples Cr
Farnsworth Wildlife Refuge
Elbow Meadow Wma
English Wildlife Refuge
Applewood Construction Corp Property
Swallow Union Elementary School Playground

Trails
Permanently Protected Land
Land with Limited Protection
Unprotected Land
Dunstable Rural Land Trust Properties
DEP Wetlands and Waterbodies
Hydrologic Connection
Marsh/Bog
Wooded marsh
Open Water
MassDOT Roads
Administrative Type
State Route
Non-numbered Road

1,100 0 1,100
Scale In Feet

FIGURE 2

TOWN OF DUNSTABLE, MASSACHUSETTS HAZARD MITIGATION PLAN

NATURAL RESOURCES MAP

AUGUST 2023 SCALE: NOTED

HOYLE TANNER Weston & Sampson

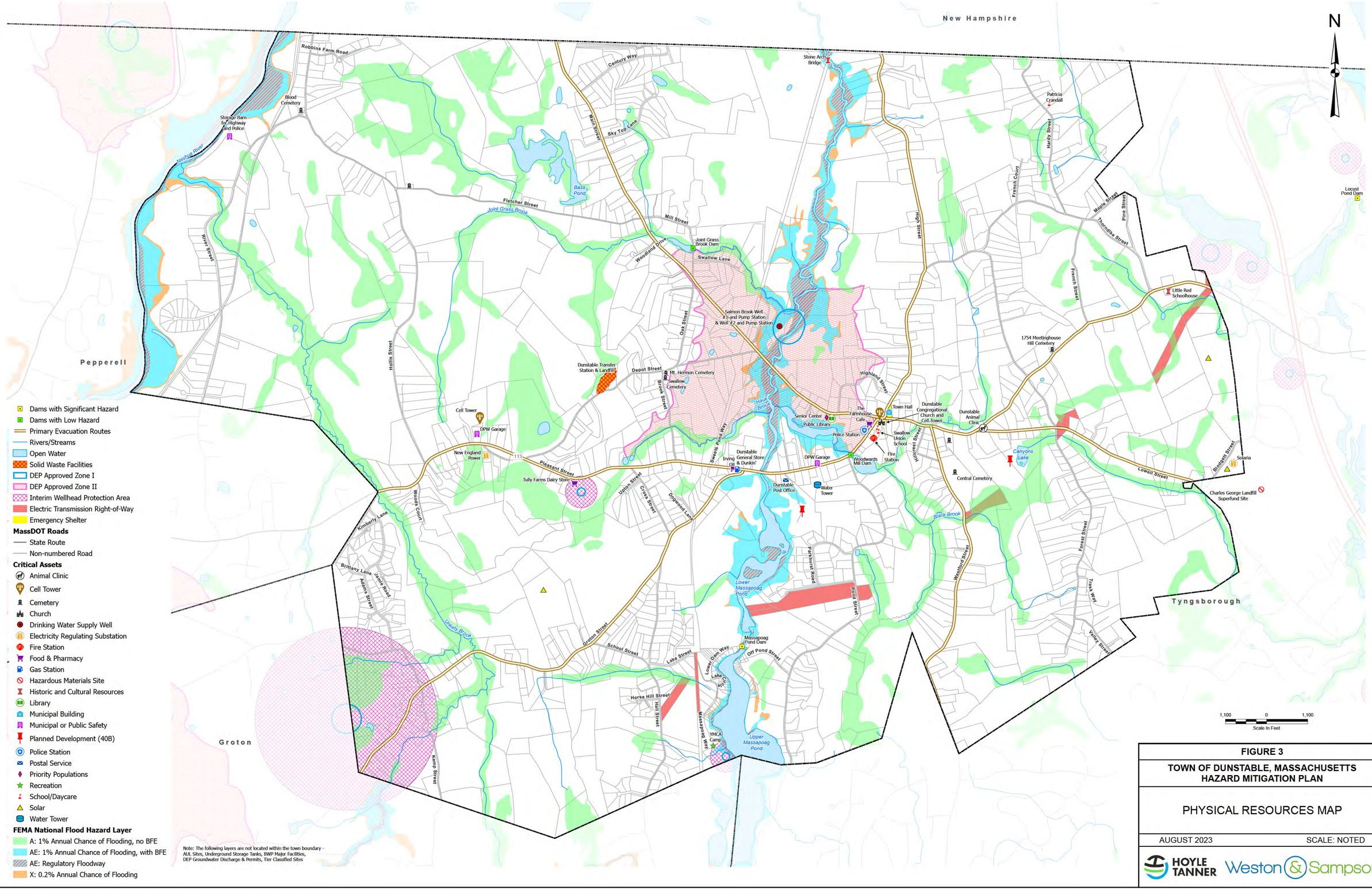


FIGURE 3

TOWN OF DUNSTABLE, MASSACHUSETTS HAZARD MITIGATION PLAN

PHYSICAL RESOURCES MAP

AUGUST 2023 SCALE: NOTED

HOYLE TANNER Weston & Sampson

H-**M**-**L** priority for action over the **S**hort or **L**ong term (and **O**ngoing)
V = Vulnerability **S** = Strength

Top Priority Hazards (tornado, floods, wildfire, hurricanes, earthquake, drought, sea level rise, heat wave, etc.)

Assets	Location	Ownership	V or S	Severe Weather/ Nor'easters	Invasive Species	Flooding from Precipitation	Extreme Temps	Priority H - M - L	Time Short Long Ongoing
People: Assets that serve populations that are more vulnerable to disaster and/or serve densely populated areas (e.g., schools and daycares, senior centers, religious centers etc.)									
School (No AC)	518 Main St	Town	V & S	Cancel School during weather	" "	Elevated Shelter (Maybe already is elevated) Identify Evacuation Route	Look @ putting AC in parts of school. Cancel school ahead of time	H	S + Ongoing
Larder Field	Groton St	Town	S					L	
Library	588 Main St	Town	V & S	No Generator | Closed	—		+ Has AC + Handicap Accessible	H	S
YMCA Camp	234 Hall St	Private	V			Call of Camp			
Home daycares	Multiple	Private	V						
Council on Aging (senior lunches)	511 Main St	Town, work w/ region	S	Located in Library Limited Access to facility		Create an Exception to Policy to allow Sr. Ctr to be open longer / after Library hours		H	S
Special Needs Seniors	Townwide		V						
No Emergency Shelter in Town			V						
Grange - agriculture	Townwide	Community	S						
Public Safety	Townwide	Town	S						
Meals on Wheels	Townwide	Private	V						
PACH Food Bank	Pepperell	Volunteer	V						
Veterans		Town	V						
Senior Population	Office, Townwide		V						
Emergency Shelters in Other Communities	Tyngsborough, Groton	Region	S	Develop List of Emergency Shelters include Pepperell				H	Ongoing
Volunteer force	Townwide	Private	S						

TABLE 1

H-**M**-**L** priority for action over the **S**hort or **L**ong term (and **O**ngoing)
V = Vulnerability **S** = Strength

Top Priority Hazards (tornado, floods, wildfire, hurricanes, earthquake, drought, sea level rise, heat wave, etc.)

Assets	Location	Ownership	V or S	Severe Weather/ Nor'easters	Invasive Species	Flooding from Precipitation	Extreme Temps	Priority H - M - L	Time Short Long Ongoing
Structures: Built facilities or critical infrastructure that provide community lifeline services (e.g., police and fire stations, emergency shelters, town facilities, dams etc.)									
Police Station (Has Water, Generator)	23 Pleasant	Town	S	Small - could take only small crowd		Flooding: Perimeter Drains Is this fixed Do we need to raise mechanicals	Has AC	L	Ongoing
Church	518 Main St	Private	S & V	Is this on the Emergency Management Plan?				H	S
Fire Station (Has Portable Generator)	28 Pleasant St	Town	V & S	Brace the walls due to study Hire Architect to draft plans			Temps cause fires. Need showers to remove chemical residue	H/M	Long *
Town Hall	511 Main St	Town	S	No Generator			Use TH as shelter during extreme heat	L	L
School/Emergency Shelters (Tyngs, Groton)	344 Main St	Town/ District	S						
Highway Department (No Generator)	511 Main St	Town	S & V	No fuel during the storm Partner w/ Groton for fueling Add Generator for fueling		Create rain garden on land behind the facility		M	L
Cow Pond Brook Dam (Salmon Brook)	Groton / Tyngs	Lake Massapoag Rod & Gun	V			Discuss Condition of dam w/ owner		L	L
Lower Massapoag Dam	Dunstable	Lake Massapoag Rod & Gun Club Town	S			" "		L	L
Library	588 Main St	Town	S						
Post Office	170 Pleasant St	Fed	S						
Gas Station	238 Pleasant St	Private	S						
Farmhouse Café	17 Pleasant St	Private	S						
Joint Grass Brook Dam	Mill Street	Private	V			If dam is taken out Main Street wells go dry fix / maintain dam?		M	S
Woodwards Pond Dam (Shut down when Pepperell shuts down @ town line to Wore on culvert)	Pond & Pleasant St.	Town	V			On evacuation route Need to Study Area for Wore Sink Holes If it breaches would be public		H	S Ongoing *

Phase II assessment

TABLE 1

H-**M**-**L** priority for action over the **S**hort or **L**ong term (and **O**ngoing)
V = Vulnerability **S** = Strength

Top Priority Hazards (tornado, floods, wildfire, hurricanes, earthquake, drought, sea level rise, heat wave, etc.)

Assets	Location	Ownership	V or S	Severe Weather/ Nor'easters	Invasive Species	Flooding from Precipitation	Extreme Temps	Priority H - M - L	Time S Short L Long O Ongoing
Systems: Systems include networks and capabilities; it is a collection of components that perform a critical service for the community (e.g., evacuation routes, electricity grid, water supply									
Water Tower	108 Pleasant St	Town	S	Install a mixer in the tank to prevent ice buildup			Install Mixer / Generator (for mixer)	M	S *
Water Mains/ Town Wells	area of Town	Town	V			Stagnant Water due to beaver dams - trapping animals for relocation.	Frost causing breaks / Need to replace some	L	Ongoing
Private Wells	Throughout	Private	B	Power Outage = No Power Creating places to get town water. Infrastructure expansion			Dry wells = Identify places to get water	L	L
Roads (Route 113, Main Street) Woodwards Dam / JGB Dam	Townwide	Town/ State	S & V			Townwide Road Assessment Identify alternative routes		H	S *
Power / Electric Grid	across town	Nat. Grid	V	Tree Maintenance (Town not the power company)	Remove Bittersweet			L	Ongoing
TV, Special public access		Town	S						
Reverse 911		Town	S						
Private Roads/Dirt Roads not maint.	Throughout town	Private	N/A						
Natural Gas	1/3 of town	Nat. Grid	V						
Cell Towers	583 Pleasant St, 516 Main St	Private	S	Add Cell Towers for equal service in case of emergencies				M	Ongoing
Website & Email		Town & School	S						
Solar	Scattered	Private	S			Need Better Drainage on Pleasant / Groton St.		L	Ongoing
Internet (tried to power)	Townwide	Charter/ Verizon	B						

TABLE 3.1

H-**M**-**L** priority for action over the **S**hort or **L**ong term (and **O**ngoing)
V = Vulnerability **S** = Strength

Top Priority Hazards (tornado, floods, wildfire, hurricanes, earthquake, drought, sea level rise, heat wave, etc.)

Assets	Location	Ownership	V or S	Severe Weather/ Nor'easters	Invasive Species	Flooding from Precipitation	Extreme Temps	Priority H - M - L	Time S Short L Long O Ongoing
Historic/Cultural/Natural Resources: Assets that possess historical or cultural significance, or areas that provide protective function that increase resiliency (e.g., open space, historic district, wildlife refuge)									
Trees	Town Wide	Public & Private	V, S	Trim Trees | Maintenance Inventory | Assessment	" Bittersweet | Knot Weed	Harding Street | Leaning Trees + Flood Plains – Inventory	Educating public on Red Oak trees + Viability	M	Ongoing
Tully Wildlife Refuge		Dunstable Rural Land Trust	S						
Swimming Areas (lack of) Cooling Areas	Massapoag Pond	N/A	V				Splash pad @ larter field Town Beach	M	Ongoing
Town Common	510 Main St.	Town	S						
Farms	Various locations	Private	V & S		Beavers, flood fields Agricultural Commission on how town residents support	Education!!! Field flooding		M	Ongoing
Tennis Courts	Larder Field	Town	S						
Nashua River		N/A	~~V~~ & S						
Morgan's Pond	Mill St	Private	S						
Historical Society	Town-wide	Town	S						
McLoon's Barn (DRLT)	370 Thornedike	DRLT	S						
Swallow Union School	508 Main St	Town	V & S	Actions from Assessment to maintain structure				H	S *
Cemeteries	Various locations	Town	S						
Rural Land Trust	1076 Main Street	Private	S						
Green Space near River	Various locations	Town	S						
Little Red School House	64 Main St		V						
Wetland Bylaws	Townwide	Town	S						
Open Space	Townwide	Town	S						
ACEC Area of Critical Environmental Concern	Mapped	N/A	V						
Fire | Woods | Access Roads to Open Spaces	Town Wide	Town				Add culverts to some areas | Need Assessment	Maintain Roads for access in emergencies	H	S ongoing *

TABLE 1

H-**M**-**L** priority for action over the **S**hort or **L**ong term (and **O**ngoing)
V = Vulnerability **S** = Strength

Top Priority Hazards (tornado, floods, wildfire, hurricanes, earthquake, drought, sea level rise, heat wave, etc.)

Assets	Location	Ownership	V or S	Severe Weather/ Nor'easters	Invasive Species	Flooding from Precipitation	Extreme Temps	Priority H - M - L	Time S Long O ngoing
Economic and Community Activities: Assets that produce a financial benefit, or activities that increase community morale and well-being (e.g., commercial districts, community special events)									
Farms	Throughout town		V & S						
Town Common	510 Main St	Town	S	Repair Bandstand for long term use				M	Ongoing *
Summer Concert Series		Town	S						
Strawberry Fest		Town	S						
Fall Fest		Town	S						
Winter Fest		Town	S						
Rail Trail			S			Evaluate area crossings to prevent failure		L	Ongoing
Grange			S						
Larder Field	80 Groton St	Town	S						
Housing (Affordable, Senior/Assisted)			V	Affordable Housing not available look @ mud district as it relates to dam/flooding		Maintain Communication/Transportation Access		H	Ongoing *
Ag Commission	Town-wide	Town	S						
Memorial Day Parade		Town	S						
Jingle Fest		Community	S						
Santa on Fire Truck		Town	S						
Tully Farm Open House	~~446~~ Pleasant St., 291	Private	S						
Local Businesses		Private	S						

TABLE 1

Highly used areas

New Hampshire

N

Nashua River Access - Dunstable

Robbins Farm Road

Century Way

Blood Cemetery

Conservation Area

Tully Wildlife Refuge

Trinity Group Realty Cr

Sky Top Lane

Chaney Park

Flat Rock Hill Quarry Conservation Area

Arched Bridge Conservation Area

Sky Meadow Golf Course

Hardy Street Conservation Area

Gage Town Forest

Spectacle Hill Conservation Area

Howard's Brook Conservation Area

Tully George Dr Apr

Rideout Cemetery

Bass Pond

Fletcher Street

Joint Grass Brook

Flat Rock Hill Conservation Area

Salmon Brook Conservation Area

Kennedy A Donald Apr

Basbanes Conservation Area

French Court

Hardy Street

Thorndike Street

Maple Street

Pine Street

Nashua River

Nashua River Rail Trail

River Street

Main Street

Mill Street

Joint Grass Brook Conservation

Proctor-grater Conservation Area

Woodland Drive

Stoddard

Failing Culvert

Swallow Lane

Hollis Street

Oak Street

High Street

French Street

Little Red School House

Hogg Conservation Area

Urqhart Conservation Area

New Town Well Field

Sargent Conservation Area

Lavrakas Cr

High Street Conservation Area

Meeting House Hill Cemetery

Pepperell

Depot Street

Swallow Cemetery

Sawyer Conservation Area

Highland Street

Miller Cr

Larter Cr

Larter Edward A Jr Apr

Lupien Parcel

Hauk Swamp Wma

Sweets Pond Way

Brook Street

Hauk Brook

Common Street

Swallow Union Elementary School Playground

Bacon Conservation Area

Shaw Conservation Area

Central Cemetery

Best Triangle Conservation Area

Canyons Lake

Lowell Street

Blodgett Street

Unkety Brook

Gardner Conservation Area

Pleasant Street

Union Street

Cross Street

Dogwood Lane

Lower Massapoag

Wood Court

Kimberly Lane

Westford Road Cr

Forest Street

Pierce Town Forest

Larter Edward Jr Apr high use

Spaulding-proctor Reservation

Lower Massapoag Pond

Parkhurst Road

Goldthwaite Conservation Area

Biron Conservation Area

Westford Street Cr

Dunstable Brook Wma

Brittany Lane

Jamie Road

Adams Street

Allgrove Conservation Area

Keyes Meadow Conservation Area

Linkety Brook Conservation Area

Pond Street

Westford Street

Black Brook

Trask Way

Tyngsborough

School Street

Lake Street

Lower Dam Way

Off Pond Street

Valley Street

Groton Street

Unquetynasset Brook Meadow

Farnsworth Wildlife Refuge

English Wildlife Refuge

Applewood Construction Corp Property

Horse Hill Street

Horse Hill Quarry Conservation Area

Linkety Brook Wma

Massapoag Way

Upper Massapoag Pond

Camp Massapoag

Staples Cr

Elbow Meadow Wma

Unkety Brook

Kemp Street

Groton

Trails
Permanently Protected Land
Land with Limited Protection
Unprotected Land
Dunstable Rural Land Trust Properties

DEP Wetlands and Waterbodies
Hydrologic Connection
Marsh/Bog
Wooded marsh
Open Water

MassDOT Roads
Administrative Type
State Route
Non-numbered Road

1,100 0 1,100
Scale in Feet

FIGURE 2

TOWN OF DUNSTABLE, MASSACHUSETTS HAZARD MITIGATION PLAN

NATURAL RESOURCES MAP

AUGUST 2023 SCALE: NOTED

HOYLE TANNER Weston & Sampson

TABLE 1

New Hampshire

Pepperell

Groton

Tyngsborough

N

Dams with Significant Hazard
Dams with Low Hazard
Primary Evacuation Routes
Rivers/Streams
Open Water
Solid Waste Facilities
DEP Approved Zone I
DEP Approved Zone II
Interim Wellhead Protection Area
Electric Transmission Right-of-Way
Emergency Shelter

MassDOT Roads

State Route
Non-numbered Road

Critical Assets

Animal Clinic
Cell Tower
Cemetery
Church
Drinking Water Supply Well
Electricity Regulating Substation
Fire Station
Food & Pharmacy
Gas Station
Hazardous Materials Site
Historic and Cultural Resources
Library
Municipal Building
Municipal or Public Safety
Planned Development (40B)
Police Station
Postal Service
Priority Populations
Recreation
School/Daycare
Solar
Water Tower

FEMA National Flood Hazard Layer

A: 1% Annual Chance of Flooding, no BFE
AE: 1% Annual Chance of Flooding, with BFE
AE: Regulatory Floodway
X: 0.2% Annual Chance of Flooding

Note: The following layers are not located within the town boundary - ALL Sites, Underground Storage Tanks, BWP Major Facilities, DEP Groundwater Discharge & Permits, Tier Classified Sites

1,100 0 1,100
Scale in Feet

FIGURE 3

TOWN OF DUNSTABLE, MASSACHUSETTS HAZARD MITIGATION PLAN

PHYSICAL RESOURCES MAP

AUGUST 2023 SCALE: NOTED

HOYLE TANNER Weston & Sampson

TABLE1

H-**M**-**L** priority for action over the **S**hort or **L**ong term (and **O**ngoing)
V = Vulnerability **S** = Strength

Top Priority Hazards (tornado, floods, wildfire, hurricanes, earthquake, drought, sea level rise, heat wave, etc.)

Assets	Location	Ownership	V or S	Severe Weather/ Nor'easters	Invasive Species	Flooding from Precipitation	Extreme Temps	Priority H - M - L	Time Short Long Ongoing
People: Assets that serve populations that are more vulnerable to disaster and/or serve densely populated areas (e.g., schools and daycares, senior centers, religious centers etc.)									
School	518 Main St	Town (less to Dist)	V & S	Add generator		NBS evaluation & implementation		M	S
Larcter Field	Groton St	Town	S ✓		not affecting use				
Library	588 Main St	Town	V & S	resilience Add generator?		N/A-town	has AC & Heat - S		
YMCA Camp (summer)	234 Hall St	Private	V						
Home daycares (Preschool, Daycare)	Multiple	Private	V						
Council on Aging (senior lunches)	511 Main St	Town, work w/ region	S						
Special Needs Seniors	Townwide		V						
No Emergency Shelter in Town			V						
Grange - agriculture	Townwide	Community	S						
Public Safety	Townwide	Town	S						
Meals on Wheels	Townwide	Private	V						
PACH Food Bank	Pepperell	Volunteer	V						
Veterans		Town	V						
Senior Population (is a resource)	Office, Townwide		V	already volunteer register to neighbor			Library has space for cooling, cooking, child Programs. Embed (community plan	H	S
Emergency Shelters in Other Communities	Tyngsborough, Groton	Region	S						
Volunteer force	Townwide	Private	S						

2

H-**M**-**L** priority for action over the **S**hort or **L**ong term (and **O**ngoing)
V = Vulnerability **S** = Strength

Top Priority Hazards (tornado, floods, wildfire, hurricanes, earthquake, drought, sea level rise, heat wave, etc.)

Assets	Location	Ownership	V or S	Severe Weather/ Nor'easters	Invasive Species	Flooding from Precipitation	Extreme Temps	Priority H - M - L	Time Short Long Ongoing
Structures: Built facilities or critical infrastructure that provide community lifeline services (e.g., police and fire stations, emergency shelters, town facilities, dams etc.)									
Police Station (land donated for Public Safety Bldg) log water	23 Pleasant	Town	S			Small - not enough parking Floods close Site specific study			
Church	518 Main St	Private	S & V						
Fire Station (old building)	28 Pleasant St	Town	V & S	Concerns - rebuild of building OSHA					
Town Hall	511 Main St	Town	S			No flooding. no plans to expand parking	has		
School/Emergency Shelters (Tyngs, Groton)	344 Main St	Town/ District	S						
Highway Department (too small)	511 Main St	Town	S & V			Salt shed - relocation? potential future flooding			
Cow Pond Brook Dam (Salmon Brook)	Groton / Tyngs	Lake Massapoag Rod & Gun	V			(coordin w/ other towns)		H	S
Lower Massapoag Dam	Dunstable	Lake Massapoag Rod & Gun Club Town	S			(In good shape - work in past 5 yrs)			
Library	588 Main St	Town	S			has trees			
Post Office	170 Pleasant St	Fed	S						
Gas Station	238 Pleasant St	Private	S	Coordination of property owner. Buffer storage, soils?	access to gas tanks			H	L
Farmhouse Café	17 Pleasant St	Private	S						
Joint Grass Brook Dam	Mill Street	Private	V						
Woodwards Pond Dam (Stow Pond)	Pond & Pleasant St.	Town	V			Phase 2 in progress. Town wide Study floodings & come up w/ solutions w/ NRS			
Town Common Area	(mayo's Pond Dam mill St) (no issue)	Town	✓					M	S

2

H-**M**-**L** priority for action over the **S**hort or **L**ong term (and **O**ngoing)
V = Vulnerability **S** = Strength

Top Priority Hazards (tornado, floods, wildfire, hurricanes, earthquake, drought, sea level rise, heat wave, etc.)

Assets	Location	Ownership	V or S	Severe Weather/ Nor'easters	Invasive Species	Flooding from Precipitation	Extreme Temps	Priority H - M - L	Time Short Long Ongoing
Systems: Systems include networks and capabilities; it is a collection of components that perform a critical service for the community (e.g., evacuation routes, electricity grid, water supply									
Water Tower	108 Pleasant St	Town	S						
Water Mains/ Town Wells	area of Town	Town	V				Have generators age of wells in concern Resident Resident Power for Pmps		
Private Wells	Throughout	Private	B	Improved communication re wells & generators			have propane gen.		
Roads (Route 113, Main Street)		Town/ State	S & V			Comprehensive study on flooding/roads			
Power / Electric Grid	across town	Nat. Grid	V	Townhall already improved Program for free trimming Tree gone removed			Add dist. storage Add solar + battery		
TV, Special public access		Town	S						
Reverse 911		Town	S	Enhanced in person communication approach					
Private Roads/Dirt Roads not maint.	Throughout town	Private	N/A						
Natural Gas	1/3 of town	Nat. Grid	V				generator Town hall in Nov 6th.		
Cell Towers	583 Pleasant St, 516 Main St	Private	S	Improve cell service RFP for work done					
Website & Email		Town & School	S						
Solar	Scattered	Private	S						
Internet	Townwide	Charter/ Verizon	B						
Culverts -						town wide assy on culverts & streams			

2

H-**M**-**L** priority for action over the **S**hort or **L**ong term (and **O**ngoing)
V = Vulnerability **S** = Strength

Top Priority Hazards (tornado, floods, wildfire, hurricanes, earthquake, drought, sea level rise, heat wave, etc.)

Assets	Location	Ownership	V or S	Severe Weather/ Nor'easters	Invasive Species	Flooding from Precipitation	Extreme Temps	Priority H - M - L	Time Short Long Ongoing
Historic/Cultural/Natural Resources: Assets that possess historical or cultural significance, or areas that provide protective function that increase resiliency (e.g., open space, historic district, wildlife refuge)									
Trees	Town Wide	Public & Private	V		Communication about changes in environment				
Tully Wildlife Refuge		Dunstable Rural Land Trust	S		Ed & Outreach				
Swimming Areas (lack of)	Massapoag Pond	N/A	V						
Town Common	510 Main St.	Town	S						
Farms	Various locations	Private	V & S						
Tennis Courts	Larder Field	Town	S						
Nashua River		N/A	V & S						
Morgan's Pond	Mill St	Private	S						
Historical Society	Town-wide	Town	S						
McLoon's Barn (DRLT)	370 Thornedike	DRLT	S						
Swallow Union School	508 Main St	Town	V & S						
Cemeteries	Various locations	Town	S						
Rural Land Trust	1076 Main Street	Private	S						
Green Space near River	Various locations	Town	S						
Little Red School House	64 Main St		V						
Wetland Bylaws	Townwide	Town	S	Resilient Bylaw Review - wetlands, Planning, Sw.					
Open Space	Townwide	Town	S	Increased open space protection Plan/Evaluation		Agree OS in Conserv/OSRP			
ACEC	Mapped	N/A	V						
All natural resources					Education Plan re Invasives & Poison Ivy				

2

H-**M**-**L** priority for action over the **S**hort or **L**ong term (and **O**ngoing)
V = Vulnerability **S** = Strength

Top Priority Hazards (tornado, floods, wildfire, hurricanes, earthquake, drought, sea level rise, heat wave, etc.)

Assets	Location	Ownership	V or S	Severe Weather/ Nor'easters	Invasive Species	Flooding from Precipitation	Extreme Temps	Priority H - M - L	Time Short Long Ongoing
Economic and Community Activities: Assets that produce a financial benefit, or activities that increase community morale and well-being (e.g., commercial districts, community special events)									
Farms	Throughout town		V & S						
Town Common	510 Main St	Town	S				Shade trees? Planting plan		
Summer Concert Series		Town	S						
Strawberry Fest		Town	S						
Fall Fest		Town	S						
Winter Fest		Town	S						
Rail Trail			S						
Grange			S						
Larder Field (Pessinger)	80 Groton St	Town	S						
Housing (Affordable, Senior/Assisted)			V				Shade safety & spash pads		
Ag Commission	Town-wide	Town	S						
Memorial Day Parade		Town	S						
Jingle Fest		Community	S						
Santa on Fire Truck		Town	S						
Tully Farm Open House	~~446~~ Pleasant St., 201	Private	S						
Local Businesses		Private	S						

Water access to pas - farmers

Shaded sdw parking lot in back of school

New Hampshire

N

Pepperell

Groton

Tyngsborough

PROTECTED

Robbins Farm Road
Blood Cemetery
Century Way
Stone Arch Bridge
Patricia Crandall
Storage Barn for Highway and Police
Nashua River
Sky Top Lane
Main Street
Bass Pond
Fletcher Street
Joint Grass Brook
Mill Street
River Street
Woodland Drive
Joint Grass Brook Dam
Swallow Lane
High Street
French Court
Hardy Street
Maple Street
Pine Street
Thorndike Street
Locust Pond Dam
Salmon Brook Well #1 Hand Pump Station & Well #2 and Pump Station
Oak Street
Little Red Schoolhouse
French Street
1754 Meetinghouse Hill Cemetery
Hollis Street
Dunstable Transfer Station & Landfill
Depot Street
Mt. Hermon Cemetery
Swallow Cemetery
Brook Street
Highland Street
Cell Tower
DPW Garage
New England Power
Senior Center
Public Library
The Farmhouse Cafe
Town Hall
Dunstable Congregational Church and Cell Tower
Dunstable Animal Clinic
Police Station
Swallow Union School
Fire Station
Hillcrest Street
Spectacle Pond Way
Dunstable General Store Irving Oil & Dunkin'
DPW Garage
Woodwards Mill Dam
Canyons Lake
Central Cemetery
Lowell Street
Blodgett Street
Scania
Pleasant Street
Tully Farms Dairy Store
Upton Street
Cross Street
Dogwood Lane
Dunstable Post Office
Water Tower
Charles George Landfill Superfund Site
Wood Court
Kimberly Lane
Black Brook
Parkhurst Road
Forest Street
Westford Street
Brittany Lane
Jamie Road
Adams Street
Lower Massapoag Pond
Ponset Street
Truck Trail
Gorely Brook
Groton Street
School Street
Massapoag Pond Dam
Off Pond Street
Lake Street
Lower Dam Way
Valley Street
Horse Hill Street
Hall Street
Massapoag Way
YMCA Camp
Upper Massapoag Pond
Kemp Street

- Dams with Significant Hazard
- Dams with Low Hazard
- Primary Evacuation Routes
- Rivers/Streams
- Open Water
- Solid Waste Facilities
- DEP Approved Zone I
- DEP Approved Zone II
- Interim Wellhead Protection Area
- Electric Transmission Right-of-Way
- Emergency Shelter

MassDOT Roads

- State Route
- Non-numbered Road

Critical Assets

- Animal Clinic
- Cell Tower
- Cemetery
- Church
- Drinking Water Supply Well
- Electricity Regulating Substation
- Fire Station
- Food & Pharmacy
- Gas Station
- Hazardous Materials Site
- Historic and Cultural Resources
- Library
- Municipal Building
- Municipal or Public Safety
- Planned Development (40B)
- Police Station
- Postal Service
- Priority Populations
- Recreation
- School/Daycare
- Solar
- Water Tower

FEMA National Flood Hazard Layer

- A: 1% Annual Chance of Flooding, no BFE
- AE: 1% Annual Chance of Flooding, with BFE
- AE: Regulatory Floodway
- X: 0.2% Annual Chance of Flooding

Note: The following layers are not located within the town boundary - AUL Sites, Underground Storage Tanks, BWP Major Facilities, DEP Groundwater Discharge & Permits, Tier Classified Sites

1,100 0 1,100
Scale in Feet

FIGURE 3

TOWN OF DUNSTABLE, MASSACHUSETTS HAZARD MITIGATION PLAN

PHYSICAL RESOURCES MAP

AUGUST 2023 SCALE: NOTED

HOYLE TANNER Weston & Sampson

New Hampshire

N

Pepperell

Groton

Tyngsborough

Robbins Farm Road
Century Way
Sky Top Lane
Nashua River
Bass Pond
Fletcher Street
Joint Grass Brook
Main Street
Mill Street
River Street
Woodland Drive
Swallow Lane
High Street
Thorndike Street
French Court
Hardy Street
Maple Street
Pine Street
French Street
SWEET'S POND DAM (PRIVATE)
Hollis Street
Depot Street
Oak Street
Highland Street
Common Street
Sweets Pond Way
Hauk Brook
Brook Street
Pleasant Street
Interest Street
Canyons Lake
Lowell Street
Blodgett Street
Woods Court
Upton Street
Cross Street
Dogwood Lane
Kimberly Lane
Black Brook
Forest Street
Brittany Lane
James Road
Adams Street
Parkhurst Road
Pond Street
Westford Street
Frank Way
Valley Street
Lower Massapoag Pond
Groton Street
School Street
Lake Street
Lower Dam Way
Off Pond Street
Lake Circle
Horse Hill Street
Hall Street
Massapoag Lake Boatstore
Upper Massapoag Pond
Kimmis Street

- NHESP Certified Vernal Pools
- Potential Vernal Pools
- NHESP Natural Communities
- NHESP Priority Habitats of Rare Species
- NHESP Estimated Habitats of Rare Wildlife

MassDOT Roads

Administrative Type

- State Route
- Non-numbered Road

DEP Wetlands and Waterbodies

- Hydrologic Connection
- Marsh/Bog
- Wooded marsh
- Open Water

Aquifers

- Medium Yield

Note: Outstanding Resource Waters layer is not located within the town boundary.

1,100 0 1,100
Scale in Feet

FIGURE 1

TOWN OF DUNSTABLE, MASSACHUSETTS HAZARD MITIGATION PLAN

ENVIRONMENTAL RESOURCES MAP

AUGUST 2023 SCALE: NOTED

HOYLE TANNER Weston & Sampson

H-**M**-**L** priority for action over the **S**hort or **L**ong term (and **O**ngoing)
V = Vulnerability **S** = Strength

Top Priority Hazards (tornado, floods, wildfire, hurricanes, earthquake, drought, sea level rise, heat wave, etc.)

Assets	Location	Ownership	V or S	Severe Weather/ Nor'easters	Invasive Species	Flooding from Precipitation	Extreme Temps	Priority H - M - L	Time S Short L Long O Ongoing
Historic/Cultural/Natural Resources: Assets that possess historical or cultural significance, or areas that provide protective function that increase resiliency (e.g., open space, historic district, wildlife refuge)									
Trees	Town Wide	Public & Private	V	Ongoing Inspection/Maintenance of trees surrounding critical facilities + OHW utilities, esp. before storms				M	O *
Tully Wildlife Refuge		Dunstable Rural Land Trust	S						
Swimming Areas (lack of)	Massapoag Pond	N/A	V						
Town Common	510 Main St.	Town	S						
Farms	Various locations	Private	V & S						
Tennis Courts	Larder Field	Town	S						
Nashua River		N/A	V & S						
Morgan's Pond	Mill St	Private	S						
Historical Society	Town-wide	Town	S						
McLoon's Barn (DRLT)	370 Thornedike	DRLT	S						
Swallow Union School	508 Main St	Town	V & S						
Cemeteries	Various locations	Town	S						
Rural Land Trust	1076 Main Street	Private	S						
Green Space near River	Various locations	Town	S						
Little Red School House	64 Main St		V						
Wetland Bylaws	Townwide	Town	S						
Open Space	Townwide	Town	S	Improve Communication w/ dif. Owners to get access to Emergency Management plans + ensure access prior to emergency events					
ACEC	Mapped	N/A	V						
Acess to Natural Areas				Improve Roadway access to natural areas for emergency response + fire protection				H	S/O *
Larter Field							Splash Pad		

TABLE 3

H-**M**-**L** priority for action over the **S**hort or **L**ong term (and **O**ngoing)
V = Vulnerability **S** = Strength

Top Priority Hazards (tornado, floods, wildfire, hurricanes, earthquake, drought, sea level rise, heat wave, etc.)

Assets	Location	Ownership	V or S	Severe Weather/ Nor'easters	Invasive Species	Flooding from Precipitation	Extreme Temps	Priority H - M - L	Time Short Long Ongoing
Systems: Systems include networks and capabilities; it is a collection of components that perform a critical service for the community (e.g., evacuation routes, electricity grid, water supply									
Water Tower	108 Pleasant St	Town	S						
Water Mains/ Town Wells	area of Town	Town	V						
Private Wells	Throughout	Private	B						
Roads (Route 113, Main Street)		Town/ State	S & V			Roadway + Drainage Study + Prioritization for Upgrades		~~M~~ H	S/O *
Power / Electric Grid	across town	Nat. Grid	V						
TV, Special public access		Town	S						
Reverse 911		Town	S						
Private Roads/Dirt Roads not maint.	Throughout town	Private	N/A						
Natural Gas	1/3 of town	Nat. Grid	V						
Cell Towers	583 Pleasant St, 516 Main St	Private	S						
Website & Email		Town & School	S	Encourage sign ups for outreach systems in emergency situations	residents + external relatives	community members/			
Solar	Scattered	Private	S						
Internet	Townwide	Charter/ Verizon	B						
HYDRANTS	Downtown			Hydrants old/Broken - make sure all (30-40) hydrants work + have flow		Peppercell (~~Peppett~~ district)		H	S *

TABLE 3

H-**M**-**L** priority for action over the **S**hort or **L**ong term (and **O**ngoing)
V = Vulnerability **S** = Strength

Top Priority Hazards (tornado, floods, wildfire, hurricanes, earthquake, drought, sea level rise, heat wave, etc.)

Assets	Location	Ownership	V or S	Severe Weather/ Nor'easters	Invasive Species	Flooding from Precipitation	Extreme Temps	Priority H - M - L	Time S Short L Long O Ongoing
Structures: Built facilities or critical infrastructure that provide community lifeline services (e.g., police and fire stations, emergency shelters, town facilities, dams etc.)									
Police Station	23 Pleasant	Town	S			Needs new structure - floods constantly (roof) + surrounding area		H	L
Church	518 Main St	Private	S & V						
Fire Station	28 Pleasant St	Town	V & S	Needs Permanent generator			Upgrading Bay Heaters after flood damage	H	
Town Hall	511 Main St	Town	S	↓ Same					
School/Emergency Shelters (Tyngs, Groton) SWALLOW UNION	344 Main St	Town/ District	S	Create Heating + Cooling Shelter with permanent generator and community awareness program				~~H~~ M	S
Highway Department/DPW	511 Main St	Town	S & V						
Cow Pond Brook Dam (Salmon Brook)	Groton / Tyngs	Lake Massapoag Rod & Gun	V						
Lower Massapoag Dam	Dunstable	Lake Massapoag Rod & Gun Club Town	S						
Library	588 Main St	Town	S				Cooling Shelter awareness programs		
Post Office	170 Pleasant St	Fed	S						
Gas Station	238 Pleasant St	Private	S	Have to go to Tyngsboro for gas (non-diesel) during power outages - add gas pump to DPW station				L	L
Farmhouse Café	17 Pleasant St	Private	S						
Joint Grass Brook Dam	Mill Street	Private	V						
Woodwards Pond Dam	Pond & Pleasant St.	Town	V			Dam Failure Risk Needs (in Stage 2)	In progress, but need immediate Plan for preventing failure		

*1 *1 (people) *2

TABLE 3

H-**M**-**L** priority for action over the **S**hort or **L**ong term (and **O**ngoing)
V = Vulnerability **S** = Strength

Top Priority Hazards (tornado, floods, wildfire, hurricanes, earthquake, drought, sea level rise, heat wave, etc.)

Assets	Location	Ownership	V or S	Severe Weather/ Nor'easters	Invasive Species	Flooding from Precipitation	Extreme Temps	Priority H - M - L	Time Short Long Ongoing
People: Assets that serve populations that are more vulnerable to disaster and/or serve densely populated areas (e.g., schools and daycares, senior centers, religious centers etc.)									
School	518 Main St	Town	V & S						
Larder Field	Groton St	Town	S						
Library	588 Main St	Town	V & S						
YMCA Camp	234 Hall St	Private	V						
Home daycares	Multiple	Private	V						
Council on Aging (senior lunches)	511 Main St	Town, work w/ region	S						
Special Needs Seniors	Townwide		V						
No Emergency Shelter in Town			V	Swallow Union Generator					
Grange - agriculture	Townwide	Community	S						
Public Safety	Townwide	Town	S	Improve Communication Networks + Vuln. pop. lists	Tick prevention	Sump Pump Services for Community SOP *		M	S
Meals on Wheels	Townwide	Private	V						
PACH Food Bank	Pepperell	Volunteer	V						
Veterans		Town	V						
Senior Population	Office, Townwide		V						
Emergency Shelters in Other Communities	Tyngsborough, Groton	Region	S						
Volunteer force	Townwide	Private	S		Invasive removal workforce			L	O

2

TABLE 3

H-**M**-**L** priority for action over the **S**hort or **L**ong term (and **O**ngoing)
V = Vulnerability **S** = Strength

Top Priority Hazards (tornado, floods, wildfire, hurricanes, earthquake, drought, sea level rise, heat wave, etc.)

Assets	Location	Ownership	V or S	Severe Weather/ Nor'easters	Invasive Species	Flooding from Precipitation	Extreme Temps	Priority H - M - L	Time S Long O ngoing
Economic and Community Activities: Assets that produce a financial benefit, or activities that increase community morale and well-being (e.g., commercial districts, community special events)									
Farms	Throughout town		V & S						
Town Common	510 Main St	Town	S						
Summer Concert Series		Town	S						
Strawberry Fest		Town	S						
Fall Fest		Town	S	Adapt seasonal/weather dependent festivals to the current weather reality (pond skating, etc)					
Winter Fest		Town	S						
Rail Trail			S						
Grange			S						
Larder Field	80 Groton St	Town	S						
Housing (Affordable, Senior/Assisted)			V	Improve/Create affordable Senior Housing options so that elderly residents are not forced to leave town					
Ag Commission	Town-wide	Town	S						
Memorial Day Parade		Town	S						
Jingle Fest		Community	S						
Santa on Fire Truck		Town	S						
Tully Farm Open House	~~446~~ Pleasant St., ~~201~~	Private	S						
Local Businesses		Private	S						

TABLE 3

Town of Dunstable Community Resilience Building Workshop
Friday, October 20, 2023 8:30 am – 12:30 pm

Table Number	Name		Affiliation	Email address	Signature
Facilitators					
Born	Rowden	Michelle	MVP Regional Coordinator	[redacted]	
2	Moonan	Janet	Weston & Sampson		
1	Langlais	David	Hoyle Tanner		
1	Davis	Nichole	Hoyle Tanner		
Participants					
2	Basbanes	Leah	Dunstable Board of Selectmen	[redacted]	
1	Crandall	Jon	Dunstable Emergency Management Director		
2	Hoar	Erik	Dunstable Chief of Police		
2	Hughes	Jon	Commissioner of Trust Funds		
2	Fayne	Sue	Dunstable Executive Assistant BOS / Resident		
1	Ferrari	Joan	Dunstable BOH Administrative Assistant		
1	Foster	Katharine	Tyngsborough Assistant Town Manager		
2	Lotito	Dean	Dunstable Resident		
2	Martin	Mike	Dunstable Road Commission Chair		

Don't see your name? Ask one of the facilitators where you should sit!

MVP Weston & Sampson

Town of Dunstable Community Resilience Building Workshop
Friday, October 20, 2023 8:30 am – 12:30 pm

Table Number	Name		Affiliation	Email address	Signature
1	Psaledakis	Bill	Dunstable Resident	[redacted]	
1	Psaledakis	Sue	Dunstable Resident		Susan K. Psaledakis
2	Rock	Carol	Dunstable Planning Board		
1	Silva	Jason	Town Administrator		
2	Tometich	Leo	ZBA Chair		Leo Tometich
1	Tully	David	Highway Foreman		
1	Simmons	Joan	Planning Board Commiss		
2	Simmons	Harold	Advisory Board Financ		
1	Chaney	Alan	Conservation Commissio		
1	Cranney	Matthew	Merrimack River Watershed Council		

Don't see your name? Ask one of the facilitators where you should sit!

MVP

Weston & Sampson

Town of Dunstable Community Resilience Building Workshop
Thursday, October 26, 2023 8:30 am – 12:30 pm

Table Number	Name		Affiliation	Email address	Signature
Facilitators					
Both	Rowden	Michelle	MVP Regional Coordinator	[redacted]	
2	Moonan	Janet	Weston & Sampson		
3	Jenkins	Doris	Weston & Sampson		
1	Langlais	David	Hoyle Tanner		
1	Davis	Nichole	Hoyle Tanner		
Participants					
1	Asciola	Mike	NMCOG	[redacted]	
3	Bacon	Carol	Master Planning Committee		
2	Basbanes	Leah	Dunstable Board of Selectmen		
1	Chaney	Alan	Conservation Commission		
1	Crandall	Jon	Dunstable Emergency Management Director		
2	Escalada	Tristan	Dunstable Resident		
3	Fayne	Sue	Dunstable 350th Anniversary Celebration Committee		
3	Ferrari	Joan	Dunstable BOH Administrative Assistant		

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MVP Weston & Sampson

Town of Dunstable Community Resilience Building Workshop
Thursday, October 26, 2023 8:30 am – 12:30 pm

Table Number	Name		Affiliation	Email address	Signature
1	Foster	Katharine	Tyngsborough Assistant Town Manager	[redacted]	
3	Hoar	Erik	Dunstable Chief of Police		
2	Hughes	Jon	Dunstable Commissioner of Trust Funds		
3	Kerrigan	Patrick	Dunstable Deputy Fire Chief		
2	Lotito	Dean	Dunstable Resident		
2	Martin	Mike	Dunstable Road Commission Chair		
1	Psaledakis	Sue	Dunstable Resident		
1	Silva	Jason	Town Administrator		
2	Simmons	Harold	Advisory Board Finance		
3	Simmons	Joan	Community Preservation Committee		
3	Tometich	Leo	ZBA Chair		
1	Tully	David	Highway Foreman		

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2	Lotito	Dean	Dunstable Resident		
2	Martin	Mike	Dunstable Road Commission Chair		

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MVP Weston & Sampson

Dunstable Massachusetts

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Friday, October 20, 2023 8:30 am – 12:30 pm

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1	Psaledakis	Sue	Dunstable Resident		Sue K. Psaledakis
2	Rock	Carol	Dunstable Planning Board		
1	Silva	Jason	Town Administrator		
2	Tometich	Leo	ZBA Chair		Leo Tometich
1	Tully	David	Highway Foreman		
1	Simmons	Joan	Planning Board Commin		
2	Simmons	Harold	Advisory Board finan		
1	Chaney	Alan	Conservation Commissio		
1	Cranney	Matthew	Merrimack River Watershed Counci	org	

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MVP

Weston & Sampson

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1	Davis	Nichole	Hoyle Tanner		
Participants					
1	Asciola	Mike	NMCOG	[redacted]	
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2	Basbanes	Leah	Dunstable Board of Selectmen		
1	Chaney	Alan	Conservation Commission		
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MVP

Weston & Sampson

APPENDIX C: PUBLIC OUTREACH AND ENGAGEMENT

It's not too late to help Dunstable be more resilient to extreme weather events!

Take the survey today!

POSTED ON: SEPTEMBER 29, 2023 - 4:48PM

Help Dunstable be more resilient to extreme weather events. Take this survey to share your experiences and help the Town improve its planning and response to winter storms, extreme heat, drought, and many other natural hazards. You can find the survey here: tinyurl.com/DunstableHMPsurvey or by using the QR code. The survey closes on Friday, October 13.



Town of Dunstable
511 Main Street, Dunstable MA 01827
(978) 649-4514

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Board/Committee Member Contact Information

Capital Improvement Plan - FY24-FY28

FY24 Budget Reductions

FY24 Goals and Objectives

FY24 Operational Budget Presentations

FY25 - FY28 Financial Forecast

FY25 Budget Presentations

Invitations to Bid & Requests for Proposals

Job Opportunities

Municipal Vulnerability Preparedness Plan

Municipal Vulnerability Preparedness Plan

The Town secured a Municipal Vulnerability Preparedness (MVP) program grant from the Executive Office of Energy and Environmental Affairs (EOEEA) in the amount of $37,000 to complete a community resiliency and hazard mitigation planning process and, in addition, to examine the community's vulnerabilities and strengths and identify priority actions to build resilience as the climate changes.

Communities that complete the MVP program become certified as an MVP community and are eligible for MVP Action Grant funding and other opportunities. For more information please visit EOEEA's website at https://www.mass.gov/municipal-vulnerability-preparedness-mvp-program.

Attachment	Size
Municipal Vulnerability Plan Survey Information	140.79 KB
Community Resilience Building workshop - Day 1 Agenda	138.64 KB

Town Administrator Reports

Town Administrator's First Six Months - December - May

Walk Dunstable

Attachment	Size
Community Resilience Building workshop - Day 1 Presentation	3.16 MB
Community Resilience Building workshop - Day 1 Meeting Notes	391.11 KB
Community Resilience Building workshop - Day 2 Agenda	118.01 KB
Community Resilience Building workshop - Day 2 Presentation	4.8 MB

Contact Info

Phone:
(978) 649-4514 Ext. 242

Fax:
(978) 649-8893

Address:
511 Main St
Dunstable, MA 01827
United States
See map: Google Maps

Municipal Vulnerability Preparedness Public Meeting

November 7 at 5 PM

POSTED ON: OCTOBER 30, 2023 - 10:09AM

Join us at the next Board of Selectmen meeting on Tuesday, November 7 at 5 PM for a presentation and discussion on the Town's Municipal Vulnerability Preparedness planning work to-date. You can RSVP here: tinyurl.com/DunstablePublicMeeting. If you haven't completed the MVP survey, we've extended the deadline until November 7 so there's still time. You can find it here: tinyurl.com/DunstableHMPsurvey.

The Town secured a Municipal Vulnerability Preparedness (MVP) program grant from the Executive Office of Energy and Environmental Affairs (EOEEA) in the amount of $37,000 to complete a community resiliency and hazard mitigation planning process and, in addition, to examine the community's vulnerabilities and strengths and identify priority actions to build resilience as the climate changes.



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What's Going on in Dunstable?

THE DUNSTABLE SELECT BOARD'S QUARTERLY NEWSLETTER

JULY 24, 2023

INSIDE THIS ISSUE:

AARP Community Challenge Grant	2
MVP Process Underway	2
FY24 Budget Reductions Recap	3
FY24 Goals and Priorities	3
PFAS at the High School	4
New Fire Rescue Truck arrives in Dunstable	4
Upcoming 350th Anniversary Events	5

Union Building planning process underway

The Union Building Rehabilitation Committee, responsible for making recommendations on the rehabilitation, restoration, and re-use of the Union Building, has been hard at work creating a plan for their work and developing early concepts on re-use options for the Union Building.

The Committee is partnering with the Northern Middlesex Council of Governments (NMCOG), to assist with organizing, managing, and facilitating the community engagement and outreach portion of the project.



A Request for Proposals has been issued seeking architectural/planning services to create a Restoration Plan and Re-Use Feasibility Study for the Building. Proposals are due on July 26. The Committee hosted a site visit of the property for any potentially interested firms on Monday, July 17. We anticipate members of the Committee, NMCOG, and the architect will work closely on the project to determine a path forward for the building's restoration and future use.

Keep your eye out on future opportunities to get involved in the process and provide your ideas and feedback.

Financial Forecast for FY25 updated

The Select Board and Town Administrator have started the process to update the Financial Forecast for FY25 through FY28.

This updated Financial Forecast will assist the Town with its budget preparation and planning for the upcoming fiscal year, FY25, and in future fiscal years. It is meant to provide information so the Town can make informed decisions on future spending obligations - forecasting both revenue and expenditures assuming current service levels are maintained.

The Financial Forecast allows the Town to evaluate the impact of various decisions over time. It can also help analyze where current trends are leading and estimate if funding will be available for budget spending.

For FY25, using the same spending and revenue assumptions as during the FY24 budget cycle, the Town has an anticipated deficit of $399,491. The Financial Forecast, generally speaking, projects increases in spending between 1% (general expenses) to 2% (salaries), with some outliers with higher increases estimated. It includes a set aside of $119,344 for Town Meeting Article expenses (capital), reduces use of free cash to balance the budget from $574,343 to $524,343 by $50,000, and assumes a 6% increase for the regional school district.

AARP Community Challenge Grant awarded

The Town of Dunstable has been selected to receive a Capacity-Building Microgrant of $2,500 through the 2023 AARP Community Challenge Grant Program. The grant will support a walkability project to conduct 3 walk audits in our town center with a focus on connections with public facilities, conservation trails, and our small business community. The Town plans to recruit aging residents and volunteers, those who frequent the library and participants of our senior programming, and others to participate. The Town will host a minimum of 2 community meetings with walk audit participants, residents, business owners and Town departments to discuss how to incorporate the walk audit findings in future planning.

Fortunately, Northern Middlesex Council of Governments (NMCOG) will be partnering with the Town and AARP to assist in executing the project which will run through the end of the calendar year.

Municipal Vulnerability Preparedness planning process moving forward

Last week, the Town hosted a meeting to kickoff the Municipal Vulnerability Preparedness (MVP) planning process with core stakeholders, Hoyle Tanner, Weston and Sampson, the Town's engineering consultants, and the Executive Office of Energy and Environmental Affairs (EOEEA).

At this time, the project schedule includes another meeting with core stakeholders in August, followed by an initial kickoff meeting in September, and a workshop with a broader group of stakeholders in October. Once we complete the MVP Plan, we will have access to grant funding opportunities we currently are not able to access.

As a reminder, the Town secured a Municipal Vulnerability Preparedness program grant in the amount of $37,000 from EOEEA to complete a community resiliency and hazard mitigation planning process, and an expanded scope that will examine the community's vulnerabilities and strengths and identify priority actions to build resilience as the climate changes.

Stay updated on what's happening in Town!

Stay updated on what's happening in the Town of Dunstable and the work of your local government! There are many ways to stay informed:

- Sign-up to receive email notification on our website, www.dunstable-ma.gov/subscribe, provide your email in the appropriate fields, and check off any notices you would like to receive.
- Follow us on Facebook: @dunstablema and Instagram: @townofdunstable
- Subscribe to our Youtube Channel: @townofdunstable3179

Questions? Email selectmen@dunstable-ma.gov

FY24 Budget reductions take effect

The outcome of the Proposition 2 ½ General Override failing on Election Day is the reduction of the Town's FY24 Operating Budget. The resulting cuts in public safety, highway, and at town hall went into effect on July 1, 2023. They are as follows:

Police Department | *Staffing, Supply, and Equipment Reductions*
$84,874

The Department has **lost 1 police officer position** causing a reduction in coverage on the overnight shift from 2 to 1 officer, Monday through Friday. When receiving multiple calls for emergency response, this will result in an increased reliance on mutual aid, expected to affect response times.

Fire Department | *Staffing, Supply, and Equipment Reductions*
$52,824

The Department has **reduced the per diem firefighter schedule from 2 to 1** from 8 AM to 4 PM, 7 days per week causing an increased reliance on on-call firefighters and mutual aid. This is expected to affect response times and the ability to respond with limited staff back-up and support

Highway Department| *Additional staffing and expenses*
$73,464

Without the addition of the new employee, the Department will continue to have 1 employee work alone much of the time, restricting the type of work that can be performed. Communication improvements and required stormwater maintenance were cut.

Parks, Selectmen, Treasurer/ Collector Departments| *Staffing, Landscaping, and Professional Development Reductions*
$15,000

The Parks Department experienced a reduction in requested landscaping and irrigation maintenance funding, Selectmen Department has reduced professional development and training, and Treasurer/Collector has less funding than requested for staffing support..

Goals and priorities set for FY24

The Town of Dunstable, through its Select Board, and by working with the Town Administrator, has created goals and priorities for the FY24 budget year, aimed at:

- Clarifying direction and purpose;
- Setting benchmarks for measuring progress;
- Providing motivation and sense of accomplishment;
- Ensuring alignment on vision and direction;
- Helping to guide decision-making; and
- Allowing for ongoing evaluation of progress and performance.

There are 6 goal categories which include: citizen engagement, communication, and transparency; employee engagement and team building; long-term financial stability; infrastructure and capital planning; service delivery and operational improvements; and planning initiatives.

You can view the goals and priorities in more detail on the Town website at https://www.dunstable-ma.gov/sites/g/files/vyhlif4361/f/pages/goals_priorities_slide_deck_7_11_23.pdf or by visiting www.dunstable-ma.gov, going to the Town Administrator's department page, and clicking on the FY24 Goals and Objectives tab.


@townofdunstable3179


@townofdunstable


@dunstablema

New Fire Rescue Truck arrives in Dunstable

A new fire rescue truck arrived at the Fire Station this month. It received an inspection and now the Fire Department is working to outfit the truck with new equipment. The purchase of this truck was made possible by a debt exclusion override approved by residents of the Town of Dunstable in the amount of $190,565 and a supplemental appropriation of $15,000.

Since the cost of the truck was $180,000, the balance remaining of $25,000 will be needed to cover the additional cost of the equipment on the truck.

The truck is expected to carry: attack hose, water supply hose, vehicle extrication equipment (Jaws of Life), vehicle stabilization, portable ground ladders, emergency medical equipment, technical rescue equipment, water rescue equipment, various firefighting hand tools, scene lighting.

This truck will be used as the Department's primary use vehicle, first out for most calls. It is smaller, easier to maneuver, and can be driven without a CDL license. It is even more critical to have this truck with the staff coverage being reduced in the Department.



PFAS at the High School update

Over the course of the last year, town officials have been meeting with representatives from the Towns of Pepperell and Groton, as well as the School District, to discuss, review, and analyze solutions to the problem of PFAS contamination at the high school.

At the present time, there is consensus among all parties that the most cost effective and time efficient solution is a phased approach to bring water to the high school. The first phase would make a water connection from Pepperell to the high school and, the second phase, would construct a larger loop connecting the water infrastructure and water supplies of the Towns of Pepperell and Dunstable from Route 113, Groton and Kemp Streets in Dunstable, and Jersey Street in Pepperell.

The connection from Pepperell to the high school will avoid a lengthy and costly permitting process and is the most affordable option. The project is estimated to cost +/- $7 million which also includes a contribution to Pepperell's Jersey Street PFAS Filtration Plant upgrades.

The proposed approach will have the Town of Groton design the initial phase, making the connection to the high school from Pepperell, with the design and specifications requiring approval from the Town of Pepperell.

An overview of the remaining items that still need to be finalized is as follows:

- Size of pipe – Accommodate flow for fire, irrigation, and/or domestic.
- Cost Sharing – Groton will pay for the project (+/- $7 million) and will negotiate with Dunstable on cost share which will likely be 77/23 split mimicking the proportional costs of the school district.
- PFAS Filtration System at Jersey Street – The method to contribute to the cost of the PFAS Filtration Plant still needs to be finalized. Discussion includes providing an upfront payment to cover capital costs or pay over time through the water rates.
- Memorandum of Understanding – Begin to outline a Memorandum of Understanding to provide a framework for an Intermunicipal Agreement.
- Intermunicipal Agreement – Determine if there should be one agreement between all communities or separate agreements.

The details of the second phase of the project between Dunstable and Pepperell will require more discussion, as a group, to determine a path forward. This will take place in conjunction with Phase 1 but the Town doesn't want it to hold up the advancement of Phase 1. To permit the Dunstable/Pepperell connection will require a longer and more complex process, which will begin in tandem with Phase 1 moving forward.

Volunteer for the Town!

There are many openings on Town Boards and Committees. Visit the Town's website at www.dunstable-ma.gov to check out the vacancies. If interested, please send an email to selectmen@dunstable-ma.gov! We hope you'll apply to serve!

350th Anniversary upcoming events!

Wednesday August 16th - Dunstable's Summer Extravaganza: Music, Food Trucks & Fireworks: The Dunstable 350th Anniversary Committee has been busy at work planning an amazing evening to remember in honor of our Town's Anniversary. We hope you can join us on the Town Common where we will be offering a variety of food trucks, music by local band, The Shakerz, games and raffles, and fireworks at 9 PM! The rain date will be Thursday, August 17.

Saturday, August 19 - Dunstable Farm Days: The Tyngsboro-Dunstable Historical Society, the Dunstable Rural Land Trust, and the Dunstable 350th Anniversary Committee have partnered to create some old fashioned hands on demonstrations and experiences for all ages.

Sunday, September 10 - Grand Town Parade and Ice Cream Social: Line up on Main Street for a Grand Parade celebrating our Town's 350th anniversary. Wave town flags, check out the floats and vehicles, and head to the Town Common for an Ice Cream Social sponsored by Tully Farm. Rain date is Sunday, September 17.

Saturday, October 14th Grand Finale, Historic Hoedown, BBQ and Fireworks: Come on down to Larter Field for our grand finale. Music, line dancing, lawn and family games, and BBQ. Bring your own drinks, and enjoy a fireworks display to cap off our year of celebrations! The rain date is Friday, October 13.

Route 113 project almost complete

The Route 113 Improvement Project is close to complete! Final pavement was installed this month.

Looking ahead, the contractor plans to paint street lines and, in the coming days, they will be spreading loam and seeding in front of Town Hall and other areas within the project limits, and completing driveway transitions.

Thank you to the Roads Commission, Dunstable Police and Highway Departments, and MassDOT for their hard work in ensuring this project is completed ahead of schedule and well within budget. but please continue to be patient with traffic delays, road detours, and reduced access to the town. Thank you for your continued cooperation and patience!



Fire Station's rubber roof replaced

Over the last week, the Fire Station's rubber roof was replaced. The Town issued an Invitation for Bids for the replacement of the roof and the lowest, qualified bidder was Signature Roofing at a cost of $26,800, which is less than originally anticipated.

This project is being paid for through American Rescue Plan Act (ARPA) funding the Town received from the federal government.

MCO Associates MUD District

The Town is close to finalizing both a Land Development Agreement and a Lease Agreement with MCO Associates for the development of 44 rental housing units in the MUD District, 25% or 11 units will be affordable. Once these documents are finalized, approved by the Select Board, and signed by both parties, MCO will then prepare a Local Initiative Program application, through the 40B program, and submit the application to the Executive Office of Housing and Livable Communities jointly with the Town of Dunstable.

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2 likes

townofdunstable It's not too late to help Dunstable be more resilient to extreme weather events. Take this survey to share your experiences and help the Town improve its planning and response to winter storms, extreme heat, drought, and many other natural hazards. You can find the survey here: tinyurl.com/DunstableHMPsurvey or by using the QR code below. The survey closes on Friday, October 13.

September 23

Town of Dunstable

Posts About Videos More

Town of Dunstable
Oct 30 ·

Join us at the next Board of Selectmen meeting on Tuesday, November 7 at 5 PM for a presentation and discussion on the Town's Municipal Vulnerability Preparedness planning work to-date. You can RSVP here: tinyurl.com/DunstablePublicMeeting. If you haven't completed the MVP survey, we've extended the deadline until November 7 so there's still time. You can find it here: tinyurl.com/DunstableHMPsurvey.



townofdunstable

Help Dunstable be more resilient to extreme weather events.

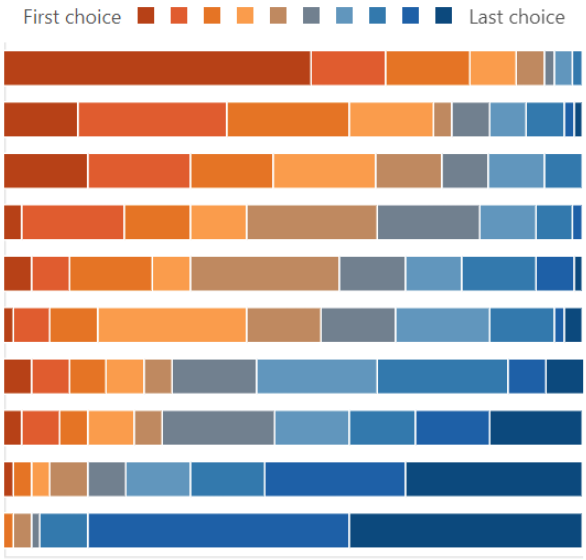
Attend a public meeting to learn what the Town is doing to improve its planning and response to winter storms, extreme heat, drought, and many other natural hazards. The public meeting will be held at the Town Hall on November 7th at 5 pm.

RSVP at tinyurl.com/DunstablePublicMeeting

Dunstable Survey Results Summarized

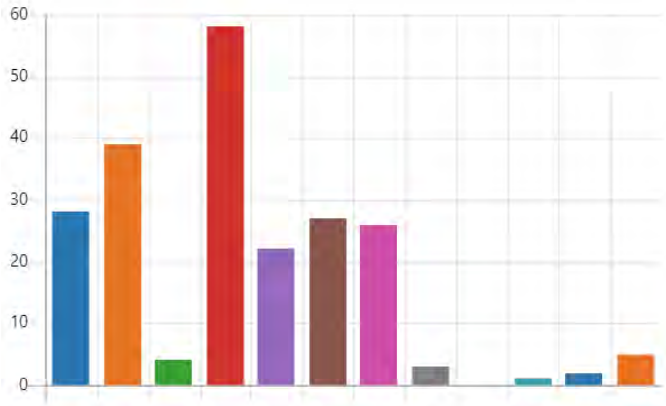
1. Which natural hazards are you most concerned about? Rank 1 for most concerned and 10 for least concerned.

Rank	Options
1	Winter Storm / Nor'easters
2	Hurricane / Tropical Storm
3	Extreme Temperatures (Heat / ...
4	Flooding
5	Wildfire / Brush Fires
6	Drought
7	Invasive Species
8	Tornadoes
9	Earthquakes
10	Landslides



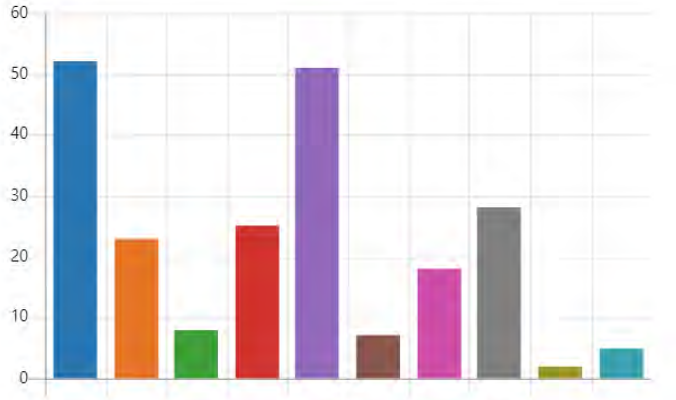
2. If any, which natural hazards have you experienced in Dunstable?

Hurricanes / Tropical Storm	28
Extreme Temperatures (Heat/...	39
Earthquakes	4
Winter Storm / Nor'easters	58
Flooding	22
Drought	27
Invasive Species	26
Wildfire / Brush Fire	3
Landslides	0
Tornadoes	1
None	2
Other	5



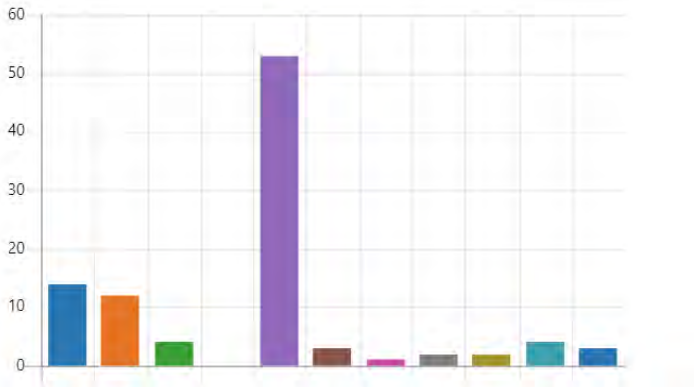
4. What problems from natural hazards concern you the most?

My home being damaged	52
My home becoming isolated ...	23
My job being affected	8
Limited access to food or sup...	25
Power outage	51
Limited access to transportation	7
Limited access to medical care	18
Contaminated drinking water	28
Limited options for childcare	2
Other	5



5. If any, what problems from natural hazards have you experienced in Dunstable?

My home was damaged	14
My home became isolated du...	12
My job was affected	4
Limited access to food or sup...	0
Power outage(s)	53
Limited access to transportation	3
Limited access to medical care	1
Contaminated drinking water	2
Limited options for childcare	2
None	4
Other	3



6. Tell us more about how experiences with natural hazards have impacted your life.

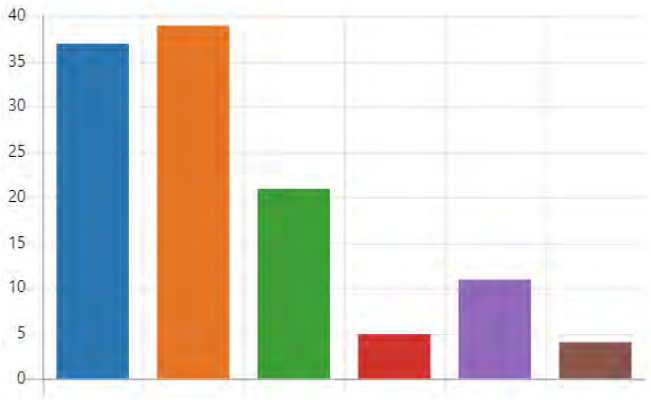
- Unable to leave home for days at a time, loss of power, food spoiled, no drinking water
- Got a generator.
- High winds caused branch from tree to fall and tear window screen/leave pine pitch on window. Power was out for 2 days last winter when storms caused branches to take down power lines.
- Losing electricity is the worst of it, but a generator would solve that piece. I'm largely home-bound so unless it affects my property directly, I don't have much experience with these hazards.
- I've only been in Dunstable 3 years, but we had more extensive problems with our house flooding and water damage previously, in Billerica. We also dealt with roof damage from snow

load. In this house we've lost power (luckily never more than a couple hours) and it's tough having a well that relies on power for water.

- Last year I could not get into/out of my road as it is a dead end and was blocked by 2 downed trees and 1 power line.
- We have had several power outages and trees down during storms which also causes school closures
- Power outage is the one that affects us from time to time but we do have a portable generator to get us over the hump (well and heat).
- Climate change is a money grab!
- Without electricity, no heat, lights, access to information.
- We had to purchase a generator due to power outages the first few winters in Dunstable. Generators are great, but loud & exhaust fumes.
- We live in town center, so thankfully our experiences have been limited as we have had few long power outages and being on town water, limited disruption besides the one time there was contamination that had to be fixed.
- We have a well. No power means no water.
- I've been in Dunstable for less than a year so have limited experience. However we have had several power and internet outages. Our road has been barely passable all Sumer but has recently been improved.
- Torrential rain as well as snow caused large trees to fall over which brought down some cable & power lines and also prevented us and 3 other families from leaving our homes, or from having anyone come to our home for any reason . . . this lasted 3-days around Christmas. We had to have a Verizon special team fixed lines as well as National Grid. We also had a huge expense for the large tree removal.
- We have experienced flooding/water in the basement, leading to damage.
- High winds have damaged roof. We rarely lose power but its happened before.
- Multiple, multiple power outages, some taking 2 weeks to repair. A real issue for those with septic systems and oil heat furnaces.
- Luckily, power outages for us have been few and far between, and very brief. We had a storm bring down a tree across our driveway, but it was manageable on our own.
- During an ice storm a tree branch fell and disconnected just the neutral wire to the house. This is catastrophic and caused around $20.000 in damage to electrical appliances and devices.
- Love the wild weather!

7. What do you do to prepare for a natural hazard event?

I have an emergency kit with s...	37
I have a back up generator in ...	39
I check on a vulnerable neigh...	21
A neighbor checks on me to o...	5
I do not prepare differently	11
Other	4



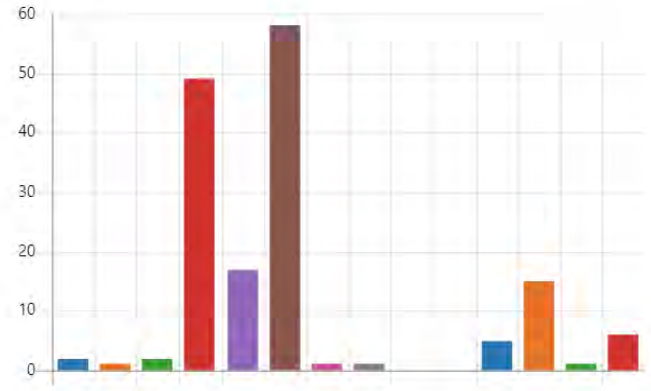
8. In my community, I know where the...

nearest shelter is.	8
evacuation routes are.	5
cooling station is.	2
warming station is.	2



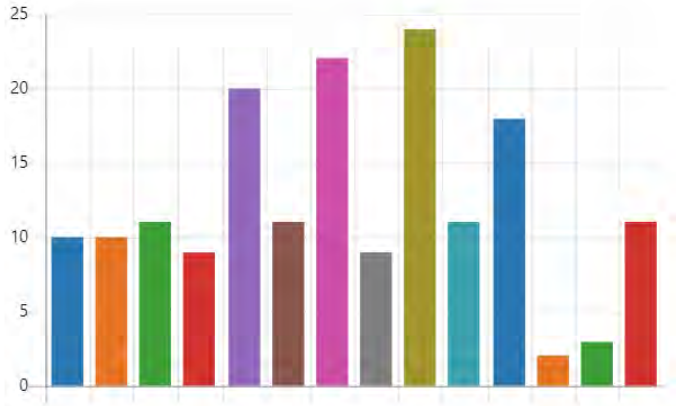
9. What does the Town do well to prepare for natural hazards?

Sets up warming stations	2
Sets up cooling stations	1
Sets up shelters	2
Snow removal/preparedness	49
Public notifications of upcomi...	17
Treats winter roads (salting an...	58
Plans for climate resilience	1
Plants trees (reducing urban h...	1
Implements renewable energy	0
Provides flood protection and ...	0
Prioritizes vulnerable populati...	5
Provides green space (reducin...	15
Provides reliable public transp...	1
Other	6

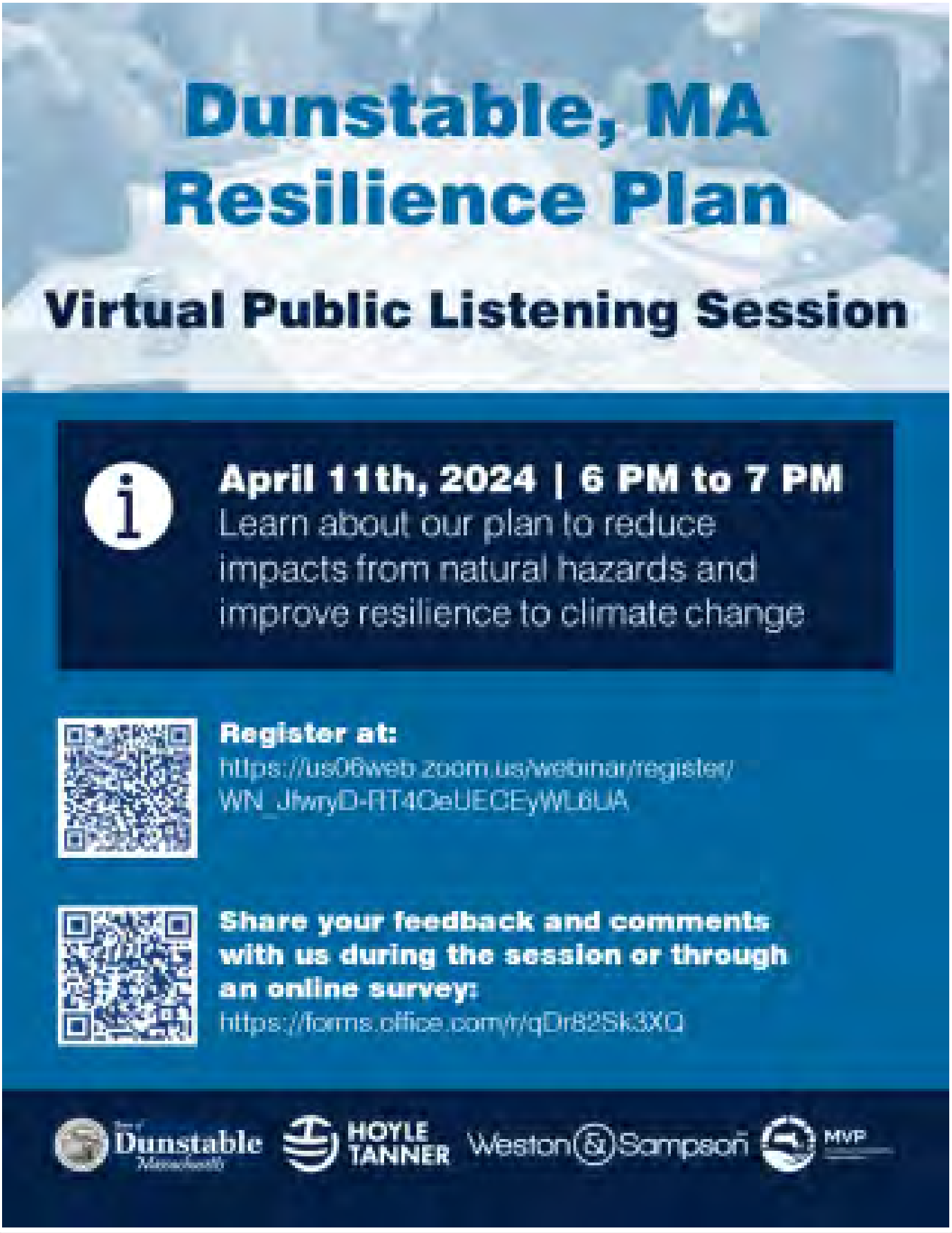


10. What could the Town improve on to prepare for natural hazards?

Set up warming stations	10
Set up cooling stations	10
Set up shelters	11
Snow removal/preparedness	9
Public notifications of upcomi...	20
Treat winter roads (salting and...	11
Plan for climate resilience	22
Plant trees (reducing urban he...	9
Implement renewable energy	24
Provide flood protection and r...	11
Prioritize vulnerable populatio...	18
Provide green space (reducing...	2
Provide reliable public transpo...	3
Other	11



Municipal Vulnerability Preparedness Plan



The Town secured a Municipal Vulnerability Preparedness (MVP) program grant from the Executive Office of Energy and Environmental Affairs (EOEEA) in the amount of $37,000 to complete a commu-

nity resiliency and hazard mitigation planning process and, in addition, to examine the community's vulnerabilities and strengths and identify priority actions to build resilience as the climate changes.

Communities that complete the MVP program become certified as an MVP community and are eligible for MVP Action Grant funding and other opportunities. For more information please visit EOEEA's website at https://www.mass.gov/municipal-vulnerability-preparedness-mvp-program.

Over the last year, Dunstable has worked to undertake a Community Resilience Building process to prepare a Hazard Mitigation Plan, compliant with state and federal requirements, and document the planning process in a joint Summary of Findings report (HMP-MVP Report). The draft is available for review and we are looking for your input before we submit this to our regulators.

Review the Hazard Mitigation Plan and a Summary of Findings Report available below and provide your feedback. You are welcome to submit comments on the draft plan during the listening session and/or through an online survey: https://forms.office.com/r/qDr82Sk3XQ.

Attachment	Size
Municipal Vulnerability Preparedness and Hazard Mitigation Plan Draft Report	9.38 MB
Municipal Vulnerability Preparedness and Hazard Mitigation Plan Draft Report - Appendix A	36.07 MB
Municipal Vulnerability Preparedness and Hazard Mitigation Plan Draft Report - Appendix B	34.38 MB
Municipal Vulnerability Preparedness and Hazard Mitigation Plan Draft Report - Appendix C	1.9 MB
Municipal Vulnerability Preparedness and Hazard Mitigation Plan Draft Report - Appendix D	1.95 MB
Municipal Vulnerability Preparedness and Hazard Mitigation Plan Draft Report - Appendix E	4.32 MB
Hazard Mitigation Plan Action Items	26.6 KB
Municipal Vulnerability Plan Survey Information	140.79 KB
Community Resilience Building workshop - Day 1 Agenda	138.64 KB
Community Resilience Building workshop - Day 1 Presentation	3.16 MB
Community Resilience Building workshop - Day 1 Meeting Notes	391.11 KB
Community Resilience Building workshop - Day 2 Agenda	118.01 KB
Community Resilience Building workshop - Day 2 Presentation	4.8 MB
Community Resilience Building workshop - Day 2 Meeting Notes	1.33 MB
MVP Public Meeting Presentation - November 7, 2023	1.17 MB
MVP Listening Session Presentation - April 11, 2024	2.7 MB

Town Budget Information

2023 Year in Review

Board/Committee Member Contact Information

Capital Improvement Plan - FY24-FY28

FY24 Goals and Objectives

Financial Reporting

Invitations to Bid & Requests for Proposals

Job Opportunities

Municipal Vulnerability Preparedness Plan

Town Administrator Reports

Town Administrator's First Six Months - December - May

Town of Dunstable Resident Survey Results

Walk Dunstable

Contact Info

Phone:
(978) 649-4514 Ext. 242

Fax:
(978) 649-8893

Address:
511 Main St
Dunstable, MA 01827
United States
See map: Google Maps



Dunstable, MA Resilience Plan

Virtual Public Listening Session

April 11th, 2024 | 6 PM to 7 PM

Learn about our plan to reduce impacts from natural hazards and improve resilience to climate change

Register at:
https://us06web.zoom.us/webinar/register/WN_JfwryD-RT4OeUECEyWL6UA

Share your feedback and comments with us during the session or through an online survey:
https://forms.office.com/r/qDr82Sk3XQ

Town of Dunstable Massachusetts | HOYLE TANNER | Weston & Sampson℠ | MVP Municipal Vulnerability Preparedness

Moonan, Janet

From: Jason Silva <jsilva@dunstable-ma.gov>
Sent: Monday, April 1, 2024 10:52 AM
To: Jason Silva
Subject: Municipal Vulnerability Preparedness Public Listening Session - April 11 from 6 to 7 PM

You're invited!

Hello there -

The Town of Dunstable thanks you for your participation in the Municipal Vulnerability Preparedness (MVP) planning process and extends an invitation to a pivotal virtual public listening session focused on the MVP planning process. This session is scheduled on April 11th, 6:00 – 7:00 PM. We are eager to hear your experiences, insights, and innovative ideas about how we can enhance Dunstable's climate adaptation strategies. This is a unique opportunity for you to contribute to shaping a resilient future for our town.

This meeting will be held on Zoom. To register, go to https://www.dunstable-ma.gov/town-administrator/pages/municipal-vulnerability-preparedness-plan. **We hope you'll attend and please share with your networks.**

Attendees are invited to submit comments on the Hazard Mitigation Plan and a Summary of Findings Report during the listening session and/or through an online through an online survey: https://forms.office.com/r/qDr82Sk3XQ .

Jason Silva
Town Administrator
Town of Dunstable
(978) 743-6340
www.dunstable-ma.gov

"I've got a theory that if you give 100 percent all of the time, somehow things will work out in the end." – Larry Bird

Town of Dunstable
April 12 at 10:18 AM ·

Over the last 9 months, the Town of Dunstable has been working to create a Municipal Vulnerability Preparedness (MVP) Plan. At the same time, in parallel, the Town is also updating its Hazard Mitigation Plan. Last night, the Town hosted an MVP Listening Session; the process to finalize the plans is wrapping up. If you weren't able to attend the Listening Session last night, you can view the presentation given last night and the draft MVP and HMP Plan Report here: https://www.dunstable-ma.gov/home/news/icymi-municipal-vulnerability-preparedness-listening-session.

It's also not too late to provide feedback! The Town has issued a survey on the Municipal Vulnerability Plan and Hazard Mitigation Plan which you can find here: https://forms.office.com/r/qDr82Sk3XQ or by using this QR code. We hope you can find the time to complete this quick and important survey to help inform the Town's final plans. The survey will close on Friday, April 19.

Town of Dunstable
April 19 at 9:38 AM ·

REMINDER: Today is your last chance to complete the survey on the Town's draft MVP and HMP Report. See below for details.

The Town has issued a survey on the Municipal Vulnerability Plan and Hazard Mitigation Plan which you can find here: https://forms.office.com/r/qDr82Sk3XQ or by using this QR code. We hope you can find the time to complete this quick and important survey to help inform the Town's final plans. The survey will close on Friday, April 19.



Dunstable Hazard Mitigation Plan Survey

The Town of Dunstable has drafted a Hazard Mitigation Plan and a Summary of Findings Report to build Community Resilience. Please review the report located at https://www.dunstable-ma.gov/town-administrator/pages/municipal-vulnerability-preparedness-plan and provide comments using the following survey. This work was funded through a Municipal Vulnerability Preparedness (MVP) planning grant from the

Overall Input on the Draft HMP-MVP

Please use the following questions and answers to submit comments on the draft HMP-MVP document. Please reference a page number or a Section number in any comments you provide.

1. Please submit any questions on or comments about Chapter 1: Introduction

2. Please submit any questions on or comments about Chapter 2: Planning Process

3. Please submit any questions on or comments about Chapter 3: Risk Assessment: Community Assets

4. Please submit any questions on or comments about Chapter 4: Risk Assessment: Natural Hazards, Asset Vulnerabilities, and Community Impacts

5. Please submit any questions on or comments about Chapter 5: Community Capabilities

6. Please submit any questions on or comments about Chapter 6: Mitigation Actions

7. Please submit any questions on or comments about Chapter 7: Plan Maintenance

8. Please submit any questions on or comments about Chapter 8: Adoption

Mitigation Actions

With input from stakeholders and the public, the Town has identified numerous potential actions to take over the next five years to reduce the risk to residents and businesses, and overall community, from natural hazards like snow and ice storms, heavy rains, and extreme temperatures.

Please review the actions describe below and indicate if you are in support of the Town proceeding with this action. If you want to share the basis of your decision, please feel free.

9. Would you support the Town proceeding with the mitigation action of adapting
   community activities to seasons/weather (time to avoid natural hazards)

- ◯ Yes
- ◯ No
- ◯ Maybe (I would need more information)"
- ◯ No preference

10. Feel free to explain your decision, if desired.

11. Would you support the Town proceeding with the mitigation action of adding AC
to school for shelter use/ designation

- ◯ Yes
- ◯ No
- ◯ Maybe (I would need more information)"
- ◯ No preference

12. Feel free to explain your decision, if desired.

13. Would you support the Town proceeding with the mitigation action of adding cell tower for equal service in case of emergencies

- ◯ Yes
- ◯ No
- ◯ Maybe (I would need more information)"
- ◯ No preference

14. Feel free to explain your decision, if desired.

15. Would you support the Town proceeding with the mitigation action of beavering management planning

- ◯ Yes
- ◯ No
- ◯ Maybe (I would need more information)”
- ◯ No preference

16. Feel free to explain your decision, if desired.

17. Would you support the Town proceeding with the mitigation action of communication plan for priority populations

- ◯ Yes
- ◯ No
- ◯ Maybe (I would need more information)”
- ◯ No preference

18. Feel free to explain your decision, if desired.

19. Would you support the Town proceeding with the mitigation action of completing a review of bylaws and regulations for climate resilience?

- ◯ Yes
- ◯ No
- ◯ Maybe (I would need more information)”
- ◯ No preference

20. Feel free to explain your decision, if desired.

21. Would you support the Town proceeding with the mitigation action of creating cooling areas (e.g., natural approaches & structures) at Larter Field, Town Common, school parking lot

- ◯ Yes
- ◯ No
- ◯ Maybe (I would need more information)"
- ◯ No preference

22. Feel free to explain your decision, if desired.

23. Would you support the Town proceeding with the mitigation action of creating culverts & dams: inventory & evaluation and flood study regarding prevention

- ◯ Yes
- ◯ No
- ◯ Maybe (I would need more information)"
- ◯ No preference

24. Feel free to explain your decision, if desired.

25. Would you support the Town proceeding with the mitigation action of developing List of Emergency Shelters in other communities (including Pepperell)

- ◯ Yes
- ◯ No
- ◯ Maybe (I would need more information)"
- ◯ No preference

26. Feel free to explain your decision, if desired.

27. Would you support the Town proceeding with the mitigation action of developing policies for use for Library/Council on Aging?

- ◯ Yes
- ◯ No
- ◯ Maybe (I would need more information)”
- ◯ No preference

28. Feel free to explain your decision, if desired.

29. Would you support the Town proceeding with the mitigation action of developing procedure and obtain equipment for fire department to pump basements?

- ◯ Yes
- ◯ No
- ◯ Maybe (I would need more information)"
- ◯ No preference

30. Feel free to explain your decision, if desired.

31. Would you support the Town proceeding with the mitigation action of distributing educational information to residents and businesses on protecting life and property from severe winter storm events?

- ◯ Yes
- ◯ No
- ◯ Maybe (I would need more information)"
- ◯ No preference

32. Feel free to explain your decision, if desired.

33. Would you support the Town proceeding with the mitigation action of creating downtown flooding study?

- ◯ Yes
- ◯ No
- ◯ Maybe (I would need more information)”
- ◯ No preference

34. Feel free to explain your decision, if desired.

35. Would you support the Town proceeding with the mitigation action of improving education & outreach for invasives, wells, trees, flooding?

- ◯ Yes
- ◯ No
- ◯ Maybe (I would need more information)"
- ◯ No preference

36. Feel free to explain your decision, if desired.

37. Would you support the Town proceeding with the mitigation action of encouraging sign ups for outreach systems, priority populations in particular?

- ◯ Yes
- ◯ No
- ◯ Maybe (I would need more information)"
- ◯ No preference

38. Feel free to explain your decision, if desired.

39. Would you support the Town proceeding with the mitigation action of ensuring that administrators of schools, businesses, and municipal buildings have a shelter plan in the event of a tornado warning?

- ◯ Yes
- ◯ No
- ◯ Maybe (I would need more information)"
- ◯ No preference

40. Feel free to explain your decision, if desired.

41. Would you support the Town proceeding with the mitigation action of improving Fire Department Station/ Lot Resilience?

- ◯ Yes
- ◯ No
- ◯ Maybe (I would need more information)”
- ◯ No preference

42. Feel free to explain your decision, if desired.

43. Would you support the Town proceeding with the mitigation action of developing Flood study for DPW?

- ◯ Yes
- ◯ No
- ◯ Maybe (I would need more information)”
- ◯ No preference

44. Feel free to explain your decision, if desired.

45. Would you support the Town proceeding with the mitigation action of creating Gas / power / energy resilience study?

- ◯ Yes
- ◯ No
- ◯ Maybe (I would need more information)”
- ◯ No preference

46. Feel free to explain your decision, if desired.

47. Would you support the Town proceeding with the mitigation action of improving generators for heating/cooling at critical buildings?

- ◯ Yes
- ◯ No
- ◯ Maybe (I would need more information)”
- ◯ No preference

48. Feel free to explain your decision, if desired.

49. Would you support the Town proceeding with the mitigation action of improving hydrant inventory & code identification?

- ◯ Yes
- ◯ No
- ◯ Maybe (I would need more information)”
- ◯ No preference

50. Feel free to explain your decision, if desired.

51. Would you support the Town proceeding with the mitigation action of implementing Building Envelop Actions at Union School

- ◯ Yes
- ◯ No
- ◯ Maybe (I would need more information)”
- ◯ No preference

52. Feel free to explain your decision, if desired.

53. Would you support the Town proceeding with the mitigation action of improving access roads to open / wooded spaces for fire management and emergency response?

- ◯ Yes
- ◯ No
- ◯ Maybe (I would need more information)"
- ◯ No preference

54. Feel free to explain your decision, if desired.

55. Would you support the Town proceeding with the mitigation action of improving and create affordable senior housing options?

- ◯ Yes
- ◯ No
- ◯ Maybe (I would need more information)"
- ◯ No preference

56. Feel free to explain your decision, if desired.

57. Would you support the Town proceeding with the mitigation action of incorporating Hazard Mitigation into subdivision regulations, Master Plan, and Open Space Plan updates?

- ◯ Yes
- ◯ No
- ◯ Maybe (I would need more information)"
- ◯ No preference

58. Feel free to explain your decision, if desired.

59. Would you support the Town proceeding with the mitigation action of increasing public awareness of the dangers of extreme temperatures and outline locations where vulnerable populations (elderly and those with health issues) can have access to air conditioning or shelter from the cold?

- ◯ Yes
- ◯ No
- ◯ Maybe (I would need more information)"
- ◯ No preference

60. Feel free to explain your decision, if desired.

61. Would you support the Town proceeding with the mitigation action of creating in-person emergency communications plan?

- ◯ Yes
- ◯ No
- ◯ Maybe (I would need more information)"
- ◯ No preference

62. Feel free to explain your decision, if desired.

63. Would you support the Town proceeding with the mitigation action of inspecting public buildings to evaluate the capacity to withstand snow loads and prevent roof collapse. Develop plans to clear roofs of excessive snow accumulations to prevent collapse?

- ◯ Yes
- ◯ No
- ◯ Maybe (I would need more information)"
- ◯ No preference

64. Feel free to explain your decision, if desired.

65. Would you support the Town proceeding with the mitigation action of installing mixer at water tower?

- ◯ Yes
- ◯ No
- ◯ Maybe (I would need more information)”
- ◯ No preference

66. Feel free to explain your decision, if desired.

67. Would you support the Town proceeding with the mitigation action of mitigating potential impacts of flooding and other natural hazards at new development projects?

- ◯ Yes
- ◯ No
- ◯ Maybe (I would need more information)”
- ◯ No preference

68. Feel free to explain your decision, if desired.

69. Would you support the Town proceeding with the mitigation action of increasing ongoing maintenance of trees surrounding critical facilities, pre storm event?

- ◯ Yes
- ◯ No
- ◯ Maybe (I would need more information)"
- ◯ No preference

70. Feel free to explain your decision, if desired.

71. Would you support the Town proceeding with the mitigation action of participating in DCR's Fire Wise Program for the forested sections of town?

- ◯ Yes
- ◯ No
- ◯ Maybe (I would need more information)"
- ◯ No preference

72. Feel free to explain your decision, if desired.

73. Would you support the Town proceeding with the mitigation action of increasing police Department resilience study?

- ◯ Yes
- ◯ No
- ◯ Maybe (I would need more information)"
- ◯ No preference

74. Feel free to explain your decision, if desired.

75. Would you support the Town proceeding with the mitigation action of providing access to drinking water from town on public properties (e.g., water fountains, fill stations)?

- ◯ Yes
- ◯ No
- ◯ Maybe (I would need more information)"
- ◯ No preference

76. Feel free to explain your decision, if desired.

77. Would you support the Town proceeding with the mitigation action of improving Regional Coordination for Cow Pond Dam?

- ◯ Yes
- ◯ No
- ◯ Maybe (I would need more information)”
- ◯ No preference

78. Feel free to explain your decision, if desired.

79. Would you support the Town proceeding with the mitigation action of improving Resilient Bandstand at Town Common?

- ◯ Yes
- ◯ No
- ◯ Maybe (I would need more information)”
- ◯ No preference

80. Feel free to explain your decision, if desired.

81. Would you support the Town proceeding with the mitigation action of improving Road infrastructure evaluation and management plan?

- ◯ Yes
- ◯ No
- ◯ Maybe (I would need more information)”
- ◯ No preference

82. Feel free to explain your decision, if desired.

83. Would you support the Town proceeding with the mitigation action of adding Splash pad at Larter Field?

- ◯ Yes
- ◯ No
- ◯ Maybe (I would need more information)”
- ◯ No preference

84. Feel free to explain your decision, if desired.

85. Would you support the Town proceeding with the mitigation action of studying the Community Rating System to determine appropriateness for Dunstable?

- ◯ Yes
- ◯ No
- ◯ Maybe (I would need more information)”
- ◯ No preference

86. Feel free to explain your decision, if desired.

87. Would you support the Town proceeding with the mitigation action of studying the establishment of a mutual aid agreement with neighboring communities to administer NFIP following a major storm event?

- ◯ Yes
- ◯ No
- ◯ Maybe (I would need more information)"
- ◯ No preference

88. Feel free to explain your decision, if desired.

89. Would you support the Town proceeding with the mitigation action of proceeding Woodwards Mill Pond Dam Repairs?

- ◯ Yes
- ◯ No
- ◯ Maybe (I would need more information)”
- ◯ No preference

90. Feel free to explain your decision, if desired.

91. Would you support the Town proceeding with the mitigation action of working with DCR Office of Dam Safety to ensure that the inspections of all dams are current.

- ◯ Yes
- ◯ No
- ◯ Maybe (I would need more information)”
- ◯ No preference

92. Feel free to explain your decision, if desired.

This content is neither created nor endorsed by Microsoft. The data you submit will be sent to the form owner.

Microsoft Forms

Dunstable Hazard Mitigation Plan Survey

2 Responses | 46:06 Average time to complete | Active Status

1. Please submit any questions on or comments about Chapter 1: Introduction

1 Responses

Latest Responses

"*Will this raise my high taxes more?* "

2. Please submit any questions on or comments about Chapter 2: Planning Process

1 Responses

Latest Responses

"*Will this raise my high taxes more?* "

3. Please submit any questions on or comments about Chapter 3: Risk Assessment: Community Assets

1 Responses

Latest Responses

"*Will this raise my high tax rate more?* "

4. Please submit any questions on or comments about Chapter 4: Risk Assessment: Natural Hazards, Asset Vulnerabilities, and Community Impacts

1 Responses

Latest Responses

"*Will this raise my high tax rate more?* "

5. Please submit any questions on or comments about Chapter 5: Community Capabilities

1 Responses

Latest Responses

"*Will this raise my high tax rate more?* "

6. Please submit any questions on or comments about Chapter 6: Mitigation Actions

1 Responses

Latest Responses

"*Will this raise my high tax rate more?* "

7. Please submit any questions on or comments about Chapter 7: Plan Maintenance

1
Responses

Latest Responses
"*Will this raise my high tax rate more?* "

8. Please submit any questions on or comments about Chapter 8: Adoption

1
Responses

Latest Responses
"*Will this raise my high tax rate more?* "

9. Would you support the Town proceeding with the mitigation action of adapting community activities to seasons/weather (time to avoid natural hazards)

Yes	1
No	0
Maybe (I would need more infor...	1
No preference	0



10. Feel free to explain your decision, if desired.

0
Responses

Latest Responses

11. Would you support the Town proceeding with the mitigation action of adding AC to school for shelter use/ designation

Yes	1
No	0
Maybe (I would need more infor...	1
No preference	0



12. Feel free to explain your decision, if desired.

0
Responses

Latest Responses

13. Would you support the Town proceeding with the mitigation action of adding cell tower for equal service in case of emergencies

Yes	1
No	1
Maybe (I would need more infor...	0
No preference	0



14. Feel free to explain your decision, if desired.

1
Responses

Latest Responses

"*Cell phone communication is critical during emergency situations.* "

15. Would you support the Town proceeding with the mitigation action of beavering management planning

Yes	1
No	1
Maybe (I would need more infor...	0
No preference	0



16. Feel free to explain your decision, if desired.

0
Responses

Latest Responses

17. Would you support the Town proceeding with the mitigation action of communication plan for priority populations

Yes	1
No	1
Maybe (I would need more infor...	0
No preference	0



18. Feel free to explain your decision, if desired.

0
Responses

Latest Responses

19. Would you support the Town proceeding with the mitigation action of completing a review of bylaws and regulations for climate resilience?

Yes	1
No	1
Maybe (I would need more infor...	0
No preference	0



20. Feel free to explain your decision, if desired.

1
Responses

Latest Responses

"Climate change is is not real and it's only used to make us poorer! "

21. Would you support the Town proceeding with the mitigation action of creating cooling areas (e.g., natural approaches & structures) at Larter Field, Town Common, school parking lot

Yes	1
No	1
Maybe (I would need more infor...	0
No preference	0



22. Feel free to explain your decision, if desired.

1
Responses

Latest Responses

"Is this a joke??? Unnecessary and complete waste of my tax dollars! "

23. Would you support the Town proceeding with the mitigation action of creating culverts & dams: inventory & evaluation and flood study regarding prevention

Yes	1
No	1
Maybe (I would need more infor...	0
No preference	0

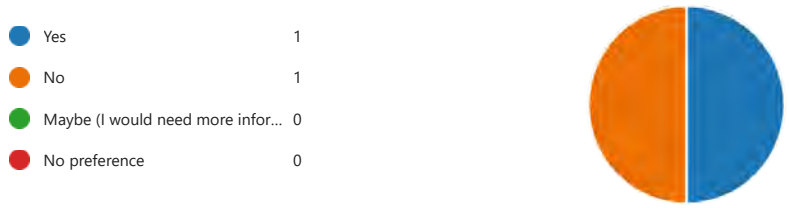


24. Feel free to explain your decision, if desired.

0
Responses

Latest Responses

25. Would you support the Town proceeding with the mitigation action of developing List of Emergency Shelters in other communities (including Pepperell)



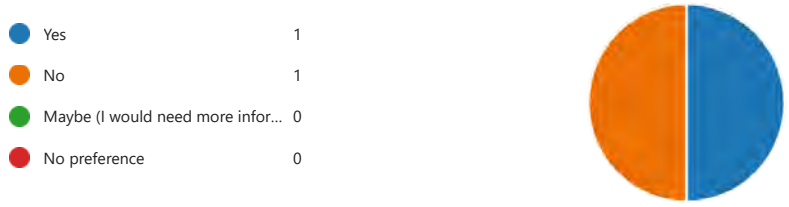
26. Feel free to explain your decision, if desired.

1
Responses

Latest Responses

"You mean for illegal immigrants it would really be used for. Fix the roads an...

27. Would you support the Town proceeding with the mitigation action of developing policies for use for Library/Council on Aging?

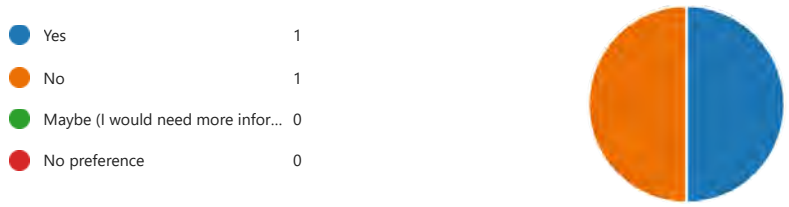


28. Feel free to explain your decision, if desired.

0
Responses

Latest Responses

29. Would you support the Town proceeding with the mitigation action of developing procedure and obtain equipment for fire department to pump basements?



30. Feel free to explain your decision, if desired.

1
Responses

Latest Responses

"That's what they make sump pumps for. Home owners responsibility. "

31. Would you support the Town proceeding with the mitigation action of distributing educational information to residents and businesses on protecting life and property from severe winter storm events?

Yes	1
No	1
Maybe (I would need more infor...	0
No preference	0



32. Feel free to explain your decision, if desired.

1
Responses

Latest Responses
"Another waste of my tax dollars. "

33. Would you support the Town proceeding with the mitigation action of creating downtown flooding study?

Yes	0
No	1
Maybe (I would need more infor...	1
No preference	0



34. Feel free to explain your decision, if desired.

1
Responses

Latest Responses
"There no flooding downtown. Less government please. "

35. Would you support the Town proceeding with the mitigation action of improving education & outreach for invasives, wells, trees, flooding?

Yes	1
No	1
Maybe (I would need more infor...	0
No preference	0



36. Feel free to explain your decision, if desired.

1
Responses

Latest Responses
"Same response as last question. Waste of my tax dollars. "

37. Would you support the Town proceeding with the mitigation action of encouraging sign ups for outreach systems, priority populations in particular?

Yes	1
No	1
Maybe (I would need more infor...	0
No preference	0



38. Feel free to explain your decision, if desired.

1
Responses

Latest Responses
"What the hell does that even mean?? "

39. Would you support the Town proceeding with the mitigation action of ensuring that administrators of schools, businesses, and municipal buildings have a shelter plan in the event of a tornado warning?

Yes	2
No	0
Maybe (I would need more infor...	0
No preference	0



40. Feel free to explain your decision, if desired.

1
Responses

Latest Responses
"Even though they already do have a plan. "

41. Would you support the Town proceeding with the mitigation action of improving Fire Department Station/ Lot Resilience?

Yes	1
No	1
Maybe (I would need more infor...	0
No preference	0



42. Feel free to explain your decision, if desired.

0
Responses

Latest Responses

43. Would you support the Town proceeding with the mitigation action of developing Flood study for DPW?

Yes	1
No	1
Maybe (I would need more infor...	0
No preference	0



44. Feel free to explain your decision, if desired.

0
Responses

Latest Responses

45. Would you support the Town proceeding with the mitigation action of creating Gas / power / energy resilience study?

Yes	1
No	1
Maybe (I would need more infor...	0
No preference	0



46. Feel free to explain your decision, if desired.

1
Responses

Latest Responses

"You just want us on all electrical so you can control us. "

47. Would you support the Town proceeding with the mitigation action of improving generators for heating/cooling at critical buildings?

Yes	1
No	1
Maybe (I would need more infor...	0
No preference	0



48. Feel free to explain your decision, if desired.

0
Responses

Latest Responses

49. Would you support the Town proceeding with the mitigation action of improving hydrant inventory & code identification?

Yes	2
No	0
Maybe (I would need more infor...	0
No preference	0



50. Feel free to explain your decision, if desired.

0
Responses

Latest Responses

51. Would you support the Town proceeding with the mitigation action of implementing Building Envelop Actions at Union School

Yes	2
No	0
Maybe (I would need more infor...	0
No preference	0



52. Feel free to explain your decision, if desired.

0
Responses

Latest Responses

53. Would you support the Town proceeding with the mitigation action of improving access roads to open / wooded spaces for fire management and emergency response?

Yes	1
No	1
Maybe (I would need more infor...	0
No preference	0



54. Feel free to explain your decision, if desired.

0
Responses

Latest Responses

55. Would you support the Town proceeding with the mitigation action of improving and create affordable senior housing options?



56. Feel free to explain your decision, if desired.

0
Responses

Latest Responses

57. Would you support the Town proceeding with the mitigation action of incorporating Hazard Mitigation into subdivision regulations, Master Plan, and Open Space Plan updates?



58. Feel free to explain your decision, if desired.

0
Responses

Latest Responses

59. Would you support the Town proceeding with the mitigation action of increasing public awareness of the dangers of extreme temperatures and outline locations where vulnerable populations (elderly and those with health issues) can have access to air conditioning or shelter from the cold?

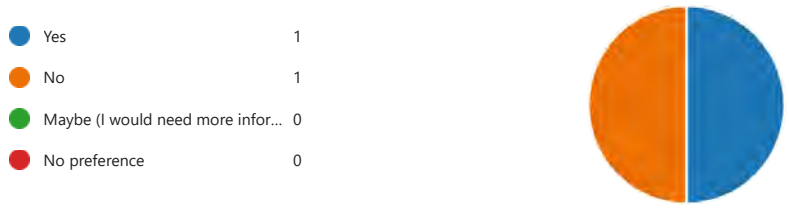


60. Feel free to explain your decision, if desired.

0
Responses

Latest Responses

61. Would you support the Town proceeding with the mitigation action of creating in-person emergency communications plan?

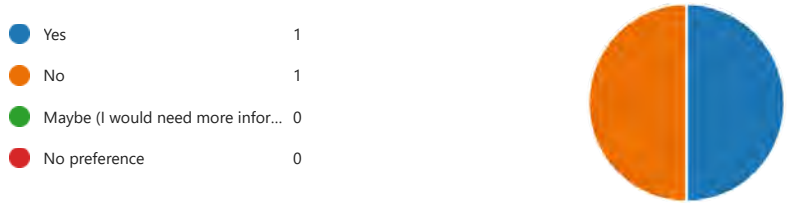


62. Feel free to explain your decision, if desired.

0
Responses

Latest Responses

63. Would you support the Town proceeding with the mitigation action of inspecting public buildings to evaluate the capacity to withstand snow loads and prevent roof collapse. Develop plans to clear roofs of excessive snow accumulations to prevent collapse?

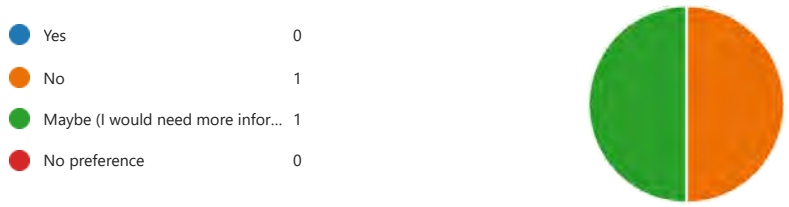


64. Feel free to explain your decision, if desired.

0
Responses

Latest Responses

65. Would you support the Town proceeding with the mitigation action of installing mixer at water tower?



66. Feel free to explain your decision, if desired.

0
Responses

Latest Responses

67. Would you support the Town proceeding with the mitigation action of mitigating potential impacts of flooding and other natural hazards at new development projects?

Yes	1
No	1
Maybe (I would need more infor...	0
No preference	0



68. Feel free to explain your decision, if desired.

0
Responses

Latest Responses

69. Would you support the Town proceeding with the mitigation action of increasing ongoing maintenance of trees surrounding critical facilities, pre storm event?

Yes	2
No	0
Maybe (I would need more infor...	0
No preference	0



70. Feel free to explain your decision, if desired.

0
Responses

Latest Responses

71. Would you support the Town proceeding with the mitigation action of participating in DCR's Fire Wise Program for the forested sections of town?

Yes	0
No	1
Maybe (I would need more infor...	1
No preference	0

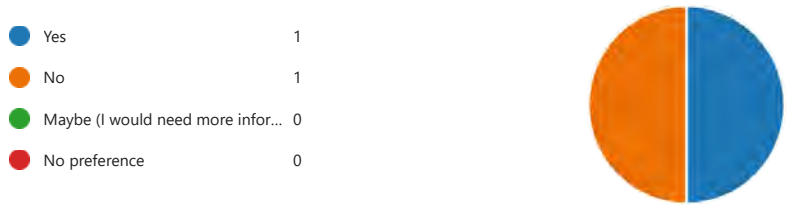


72. Feel free to explain your decision, if desired.

0
Responses

Latest Responses

73. Would you support the Town proceeding with the mitigation action of increasing police Department resilience study?

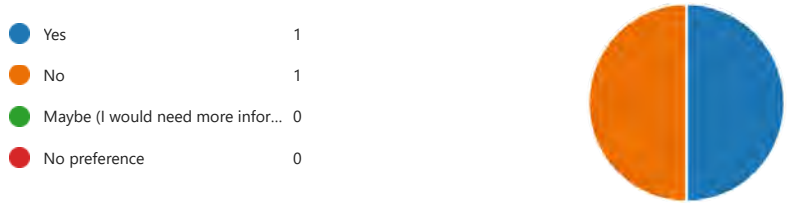


74. Feel free to explain your decision, if desired.

0
Responses

Latest Responses

75. Would you support the Town proceeding with the mitigation action of providing access to drinking water from town on public properties (e.g., water fountains, fill stations)?

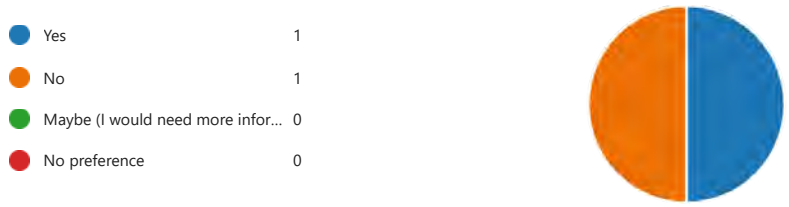


76. Feel free to explain your decision, if desired.

0
Responses

Latest Responses

77. Would you support the Town proceeding with the mitigation action of improving Regional Coordination for Cow Pond Dam?



78. Feel free to explain your decision, if desired.

0
Responses

Latest Responses

79. Would you support the Town proceeding with the mitigation action of improving Resilient Bandstand at Town Common?

Yes	0
No	1
Maybe (I would need more infor...	1
No preference	0



80. Feel free to explain your decision, if desired.

1
Responses

Latest Responses

"No danger of loss of life or long term effect."

81. Would you support the Town proceeding with the mitigation action of improving Road infrastructure evaluation and management plan?

Yes	1
No	0
Maybe (I would need more infor...	0
No preference	0



82. Feel free to explain your decision, if desired.

0
Responses

Latest Responses

83. Would you support the Town proceeding with the mitigation action of adding Splash pad at Larter Field?

Yes	1
No	1
Maybe (I would need more infor...	0
No preference	0



84. Feel free to explain your decision, if desired.

0
Responses

Latest Responses

85. Would you support the Town proceeding with the mitigation action of studying the Community Rating System to determine appropriateness for Dunstable?

Yes	1
No	1
Maybe (I would need more infor...	0
No preference	0



86. Feel free to explain your decision, if desired.

0
Responses

Latest Responses

87. Would you support the Town proceeding with the mitigation action of studying the establishment of a mutual aid agreement with neighboring communities to administer NFIP following a major storm event?

Yes	0
No	1
Maybe (I would need more infor...	1
No preference	0



88. Feel free to explain your decision, if desired.

0
Responses

Latest Responses

89. Would you support the Town proceeding with the mitigation action of proceeding Woodwards Mill Pond Dam Repairs?

Yes	1
No	1
Maybe (I would need more infor...	0
No preference	0

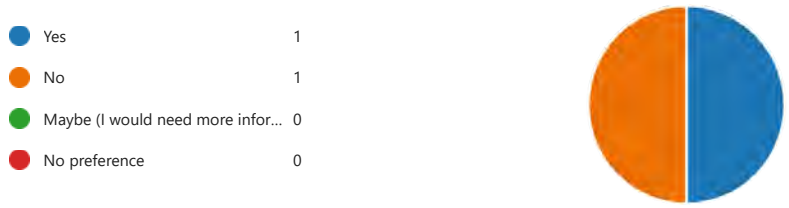


90. Feel free to explain your decision, if desired.

0
Responses

Latest Responses

91. Would you support the Town proceeding with the mitigation action of working with DCR Office of Dam Safety to ensure that the inspections of all dams are current.



92. Feel free to explain your decision, if desired.

0
Responses

Latest Responses

APPENDIX D: PUBLIC MEETINGS

Help Dunstable be more resilient to extreme weather events.

Attend a public meeting to learn what the Town is doing to improve its planning and response to winter storms, extreme heat, drought, and many other natural hazards. **The public meeting will be held at the Town Hall on November 7th at 5 pm.**



RSVP at tinyurl.com/DunstablePublicMeeting

TOWN OF DUNSTABLE
511 Main Street
Dunstable, MA 01827

NOTICE OF A PUBLIC MEETING POSTED IN ACCORDANCE WITH THE PROVISIONS OF MGL 30A §18 – 25

BOARD/COMMITTEE/COMMISSION:	**Board of Selectmen**
SUBMITTED TO TOWN CLERK:	November 2, 2023 11:00 am
MEETING DATE:	**Tuesday, November 7, 2023**
TIME:	**5:00 pm**
LOCATION:	**Dunstable Town Hall – 511 Main Street**

Topics the Chair Reasonably Anticipates will or could be Discussed:

Note: All topic placement & times are estimated and may vary *tremendously* from projections

SCHEDULED AGENDA ITEMS

1.	***Call to Order***
2.	***Public Forum***
3.	***350th Anniversary Committee Recognition***
4.	***Appointment of Robert Rafferty to the Advisory Board and Alan Chase to the Conservation Commission****
5.	***MVP Update and Public Comments***
6.	***Discussion: Withdrawal from or modification of Groton Dunstable Regional School District Agreement***
7.	***November Special Town Meeting Warrant and Resident Question and Answer Period****
8.	***Special Town Election - Early Voting****
9.	***Town Administrator Report***
10.	***Adjourn***

*Votes likely to be taken

(Note: This listing of matters reflects those reasonably anticipated by the chair which may be discussed at the meeting. Not all items listed may in fact be discussed and other items not listed may also be brought up for discussion to the extent permitted by law.)

You can watch Board of Selectmen meetings at the following link: https://www.youtube.com/@townofdunstable3179/

PUBLIC MEETING

HAZARD MITIGATION PLAN 2023 UPDATE & MVP COMMUNITY RESILIENCE BUILDING PROCESS

Dunstable, Massachusetts

November 8, 2023

1

WELCOME & INTRODUCTIONS



David Langlais, PE
Town Engineer
Hoyle Tanner



Janet Moonan, PE
Project Technical Lead
Weston & Sampson

Dunstable's MVP/HMP Core Team:

Jason Silva
Town Administrator

Bridget Baley
Health Agent

Nichole Davis
Hoyle Tanner

Maria Amodei
Board of Health

Leah Basbanes
Selectboard & Con Com

William Farrell
Dunstable Fire Dept

Dave Tulley
Highway Department

John O'Brien
Water Commission

Erik Hoar
Police Chief

Jon Crandall
Emergency Management Director

Mike Martin
Road Commission Chair

Thank you to the Executive Office of Energy and Environmental Affairs for the MVP Planning Grant Funding for this work

Michelle Rowden
MVP Regional Coordinator
EEA

2

MVP + HMP UPDATE UNDERWAY

Town of Dunstable Undertaking:

- ✓ Community Resilience Building (CRB) process through EEA's Municipal Vulnerability Preparedness (MVP) Planning Grant to obtain Community Designation

MVP Municipal Vulnerability Preparedness

- ✓ Preparation of a natural Hazard Mitigation Plan (HMP) compliant with the Federal Emergency Management Agency (FEMA)

FEMA

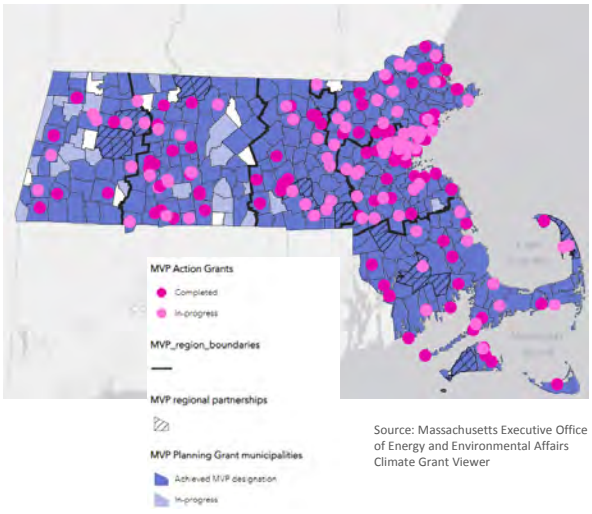
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3

WHAT IS MUNICIPAL VULNERABILITY PREPAREDNESS (MVP)?

- Improved resilience and preparedness
- Collaboration with stakeholders
- Increased education, planning, and implementation
- Funding for resilience-related actions





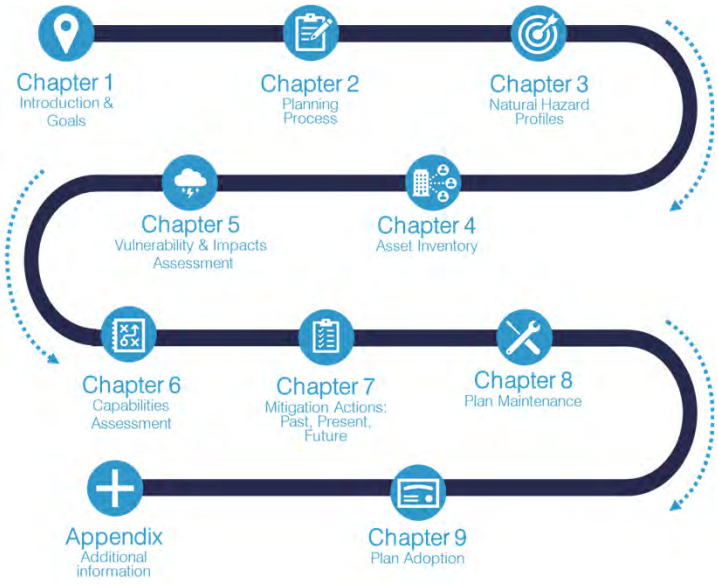
Source: Massachusetts Executive Office of Energy and Environmental Affairs Climate Grant Viewer

Weston & Sampson HOYLE TANNER

4

4

WHAT IS A HAZARD MITIGATION PLAN (HMP)?



5

WHAT IS THE VALUE OF THIS WORK?

- Health & safety
- Grant eligibility
- Equitable outcomes
- Preparedness planning
- Building consensus



EVERY $1 SPENT ON MITIGATION

SAVES $6 ON DISASTER RECOVERY

Weston & Sampson | HOYLE TANNER

6

DUNSTABLE'S MILESTONE SCHEDULE



Weston & Sampson HOYLE TANNER

7

Before we move on…

We want your input

Help Dunstable be more resilient to extreme weather events. Take this survey to share your experiences and help the Town improve its planning and response to winter storms, extreme heat, drought, and many other natural hazards.



tinyurl.com/DunstableHMPsurvey

Weston & Sampson HOYLE TANNER

8

WHY WE'RE HERE

Weather projections:

Changes in precipitation

- 12-42% more winter precipitation by 2070.
- EJ and Priority Populations have a 57% higher risk of flood damage than the rest of the Commonwealth.
- Annual economic flood damage increase by $9.3 million by 2030 in MA.

Rising temperatures

- 23-29 high heat days expected by 2050.
- Annual average temperature increase of 5.9 to 7.9 F by 2050.
- Extreme temps will increase annual transportation infrastructure maintenance cost by over $140 million

Severe Weather

- Precipitation amounts from heaviest storms increased by 55% since 1958.
- Lightning was responsible for $20.4 million in damage between 2002 and 2022.

Regional changes

- Increase in frequency and magnitude of hurricanes and nor'easters
- More risk to experiencing tornados.
- Increased fire potential.

Source: ResilientMass Plan (2023)

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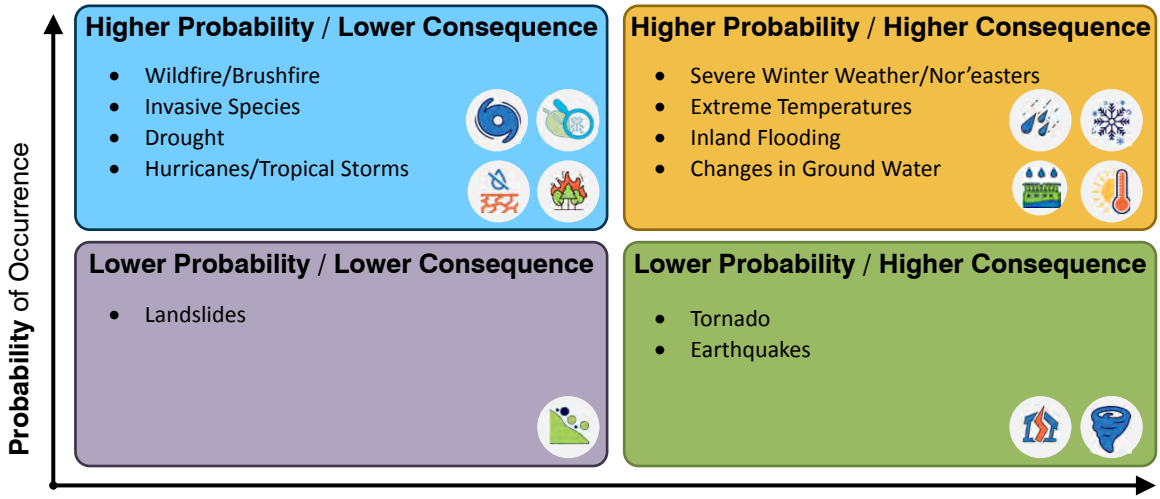
9

NATURAL HAZARDS IMPACTING DUNSTABLE



10

RISKS AND VULNERABILITIES



Weston & Sampson HOYLE TANNER

11

COMMUNITY ASSET CATEGORIES

EXAMPLES

People

- Youth, elderly, priority populations
- School
- Daycares
- Y Camp
- Senior Center at Library
- Volunteers

Structures

- Police, Fire, Town Hall, Library
- School
- Water Tower
- Dams
- Highway Department
- Church

Systems

- Water system
- Electric grid
- Communications (cable, internet, social media, sign board)
- Roadways & culverts

Economy & Community Activities

- Local Businesses
- Gas Station
- Summer Concerts
- Festivals
- Scouts
- Agriculture

Historic / Cultural / Natural Resources

- Extensive open/forested space
- Town Common
- Historic District
- Rail Trail
- Larder Fields
- Little Red Schoolhouse
- Rural Land Trust
- Historic Society

Weston & Sampson HOYLE TANNER

12

MITIGATION ACTION

A mitigation action is a measure, project, plan, or activity proposed to reduce current and future vulnerabilities to natural hazards. These actions will create resilience for Dunstable (ability to withstand and swiftly recover from an extreme event). These actions will support adaptation to climate change.

Before an event
Local code and regulations
Maintenance
Proactive Infrastructure Projects

During an event
Warnings
Protection of critical facilities
Emergency response

Following an event
Clean up
Restoration
Enhancement

COMMUNICATIONS

13

DUNSTABLE'S DRAFT MITIGATION ACTIONS

Top Actions

- ✓ Fire Department Station/ Lot Resilience
- ✓ Road infrastructure evaluation and management plan
- ✓ Woodwards Mill Pond Dam Repairs
- ✓ Communication plan for priority populations





Weston & Sampson HOYLE TANNER

14

MITIGATION ACTIONS FROM WORKSHOPS

Top Actions

- ✓ Create cooling areas (e.g., natural approaches & structures) at Larter Field, Town Common, School parking lot
- ✓ Culverts & Dams: inventory & evaluation and flood study regarding prevention
- ✓ Education & Outreach for:
  - Invasives
  - Wells
  - Trees



Weston & Sampson HOYLE TANNER

15

MITIGATION ACTIONS FROM WORKSHOPS

Top Actions

- ✓ Install mixer at water tower
- ✓ Complete a review of bylaws & regulations for climate resilience
- ✓ Add AC to school for shelter use/ designation





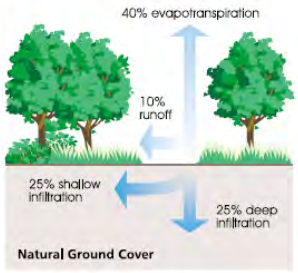
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16

MITIGATION ACTIONS FROM WORKSHOPS

Other Actions

- ✓ Implement Building Envelop Actions at Union School
- ✓ Improve access roads to open / wooded spaces for fire management and emergency response
- ✓ Mitigate potential impacts of flooding and other natural hazards at new development projects
- ✓ Flood study for DPW
- ✓ Develop policies for use for Library/Council on Aging





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17

MITIGATION ACTIONS FROM WORKSHOPS

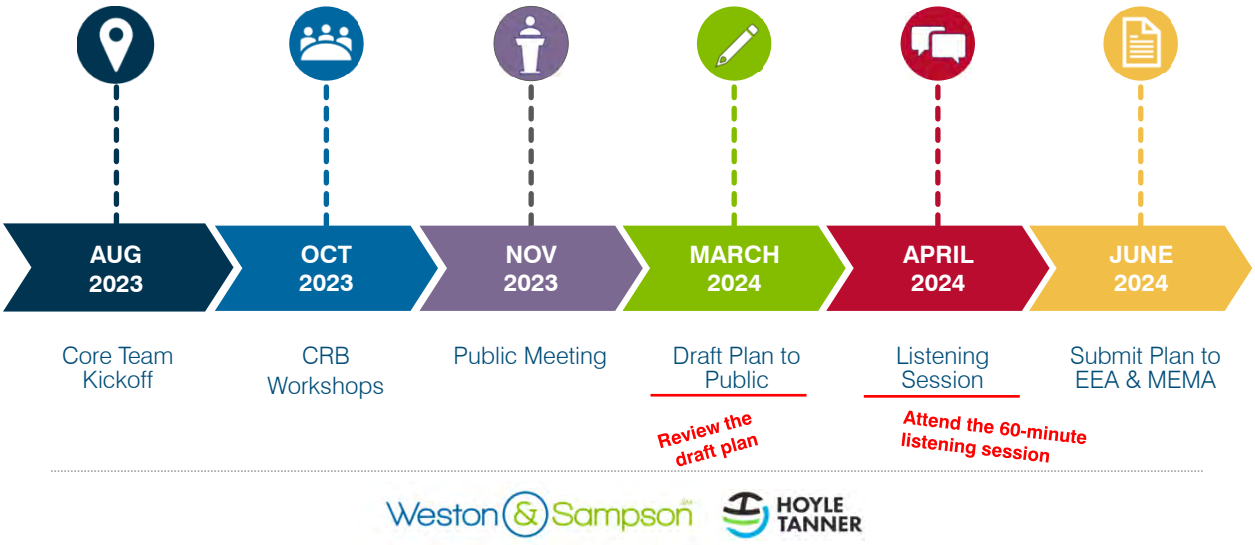
- ✓ Provide access to drinking water from town on public properties (e.g., water fountains, fill stations)
- ✓ Improve and create affordable senior housing options
- ✓ Adapt community activities to seasons/weather (time to avoid natural hazards)
- ✓ Develop procedure and obtain equipment for fire department to pump basements
- ✓ Gas / power / energy resilience study
- ✓ Regional Coordination re Cow Pond Dam
- ✓ Police Department resilience study
- ✓ Hydrant inventory & code identification
- ✓ In-person emergency communications plan
- ✓ Encourage sign ups for outreach systems, priority populations in particular
- ✓ Downtown flooding study
- ✓ Generators for heating/cooling at critical buildings
- ✓ Beaver management planning
- ✓ Ongoing maintenance of trees surrounding critical facilities, pre storm event
- ✓ Resilient Bandstand at Town Common



Weston & Sampson HOYLE TANNER

18

WAYS TO STAY INVOLVED



19

Thank you!

Questions?

westonandsampson.com

Weston & Sampson

Jason Silva

Town Administrator

20

MVP LISTENING SESSION

Town of Dunstable, Massachusetts
Thursday, April 11, 2024
6:00 – 7:00 PM

AGENDA

01 Welcome & Introductions

02 About MVP and HMPs

03 Climate Change Projections for Top Hazards in Dunstable

04 Dunstable's HMP-MVP Plan

05 Questions and Discussion

AGENDA

01 Welcome & Introductions

02 About MVP and HMPs

03 Climate Change Projections for Top Hazards in Dunstable

04 Dunstable's HMP-MVP Plan

05 Questions and Discussion

MEET THE CORE TEAM

Dunstable's MVP/HMP Core Team:

Jason Silva
Town Administrator

Bridget Baley
Health Agent

Maria Amodei
Board of Health

Leah Basbanes
Selectboard & Con Com

William Farrell
Dunstable Fire Chief

Dave Tully
Highway Superintendent

John O'Brien
Water Commission

Erik Hoar
Police Chief

Jon Crandall
Emergency Management Director

Mike Martin
Road Commission Chair

Town of Dunstable Massachusetts

MVP Municipal Vulnerability Preparedness

Weston & Sampson℠

HOYLE TANNER

MEET THE SUPPORT TEAM



Janet Moonan, PE
Project Technical Lead
Weston & Sampson



Nichole Davis
Community Outreach Coordinator
Hoyle Tanner



David Langlais, PE
Town Engineer
Hoyle Tanner



Michelle Rowden
MVP Regional Coordinator
EOEEA

Thank you to the Executive Office of Energy and Environmental Affairs for the MVP Planning Grant Funding for this work

Town of Dunstable Massachusetts

MVP Municipal Vulnerability Preparedness

Weston & Sampson℠

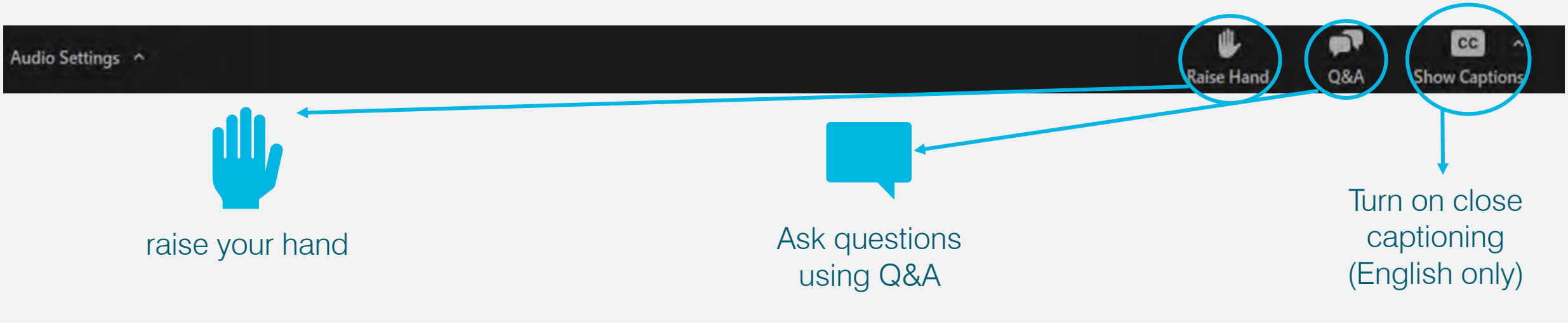
HOYLE TANNER

ZOOM WEBINAR WORKSHOP LOGISTICS

Webinar attendees will only see panelists

Please use Q&A for ongoing questions

Please raise your hand to speak, and we will un-mute you for a brief duration



AGENDA

01 Welcome & Introductions

02 About MVP and HMPs

03 Climate Change Projections for Top Hazards in Dunstable

04 Dunstable's HMP-MVP Plan

05 Questions and Discussion

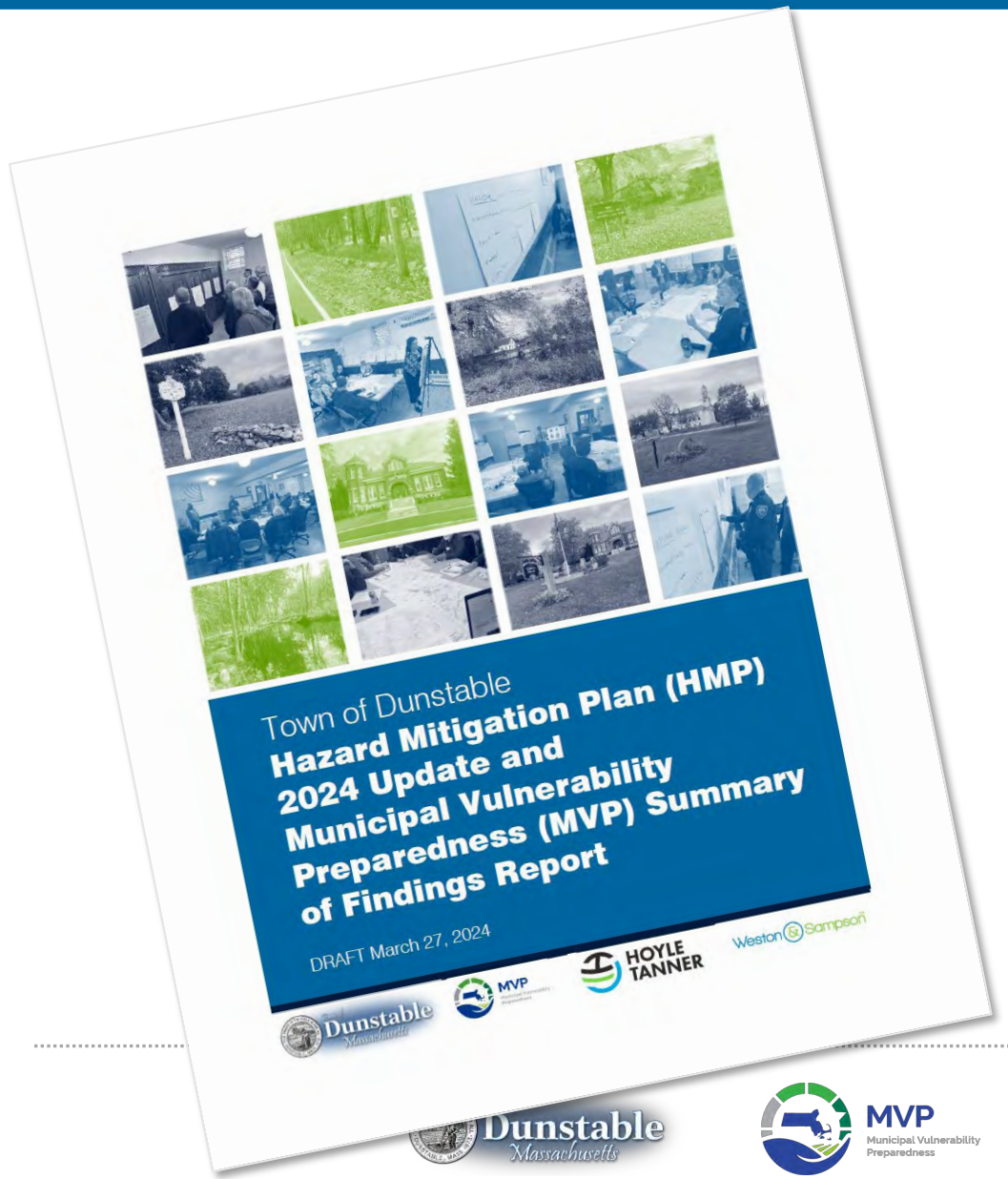
MVP + HMP UPDATE UNDERWAY

Town of Dunstable Undertaking:

- ✓ Community Resilience Building (CRB) process through EEA's Municipal Vulnerability Preparedness (MVP) Planning Grant to obtain Community Designation

- ✓ Preparation of a natural Hazard Mitigation Plan (HMP) consistent with the Federal Emergency Management Agency (FEMA) requirements

DRAFT PLAN



- Available online at:

  https://www.dunstable-ma.gov/town-administrator/pages/municipal-vulnerability-preparedness-plan

Dunstable Massachusetts

MVP Municipal Vulnerability Preparedness

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KEY TERMS

NATURAL HAZARDS: A source of harm or difficulty created by a meteorological, environmental or geological event. Natural hazards, such as flooding and earthquakes, impact the built environment, including dams and levees.

CLIMATE ADAPTATION: Actions taken at the individual, local, regional, state, and national levels to reduce risks from changing climate conditions and prepare for impacts from additional changes projected for the future.

CLIMATE RESILIENCE: The ability to prepare for, recover from, and adapt to climate change and associated impacts.

PRIORITY POPULATIONS: People or communities who are disproportionately impacted by climate change due to life circumstances that systemically increase their exposure to climate hazards or make it harder to respond.

COMMUNITY ASSETS: People, structures (buildings and facilities), systems, natural/historic/cultural resources, the economy, and activities that have value to the community.

HAZARD MITIGATION: Actions taken to reduce or eliminate the long-term risk to human life and property from natural hazards.

WHAT IS MVP?

OFFERED BY Governor Maura Healey and Lt. Governor Kim Driscoll | Executive Office of Energy and Environmental Affairs

PRESS RELEASE

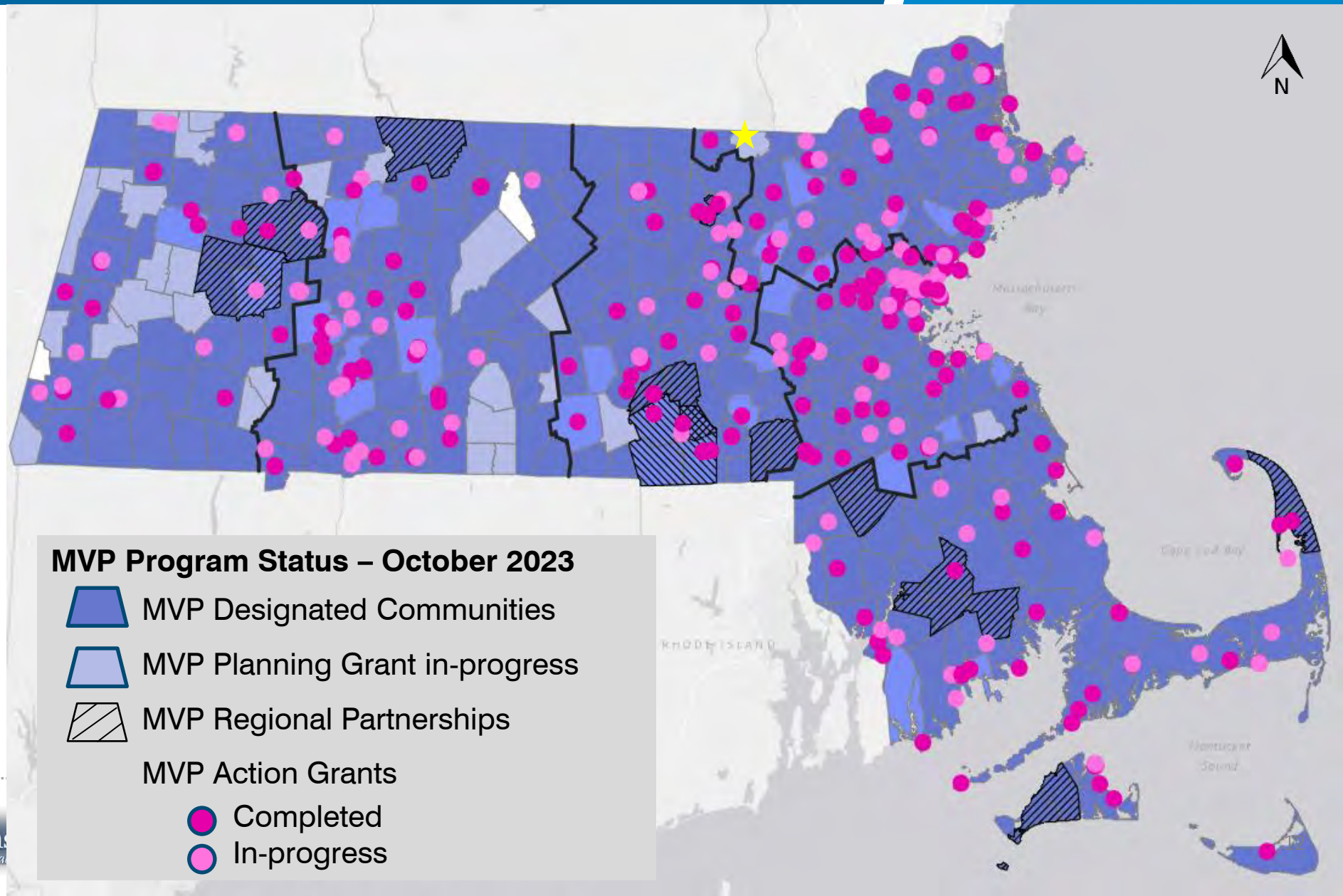
Healey-Driscoll Administration Awards $31.5 Million in Climate Resiliency Funding to Communities

- The Executive Office of Energy and Environmental Affairs' MVP grant and designation program, which builds on Governor Baker's Executive Order 569 as well as other administration-led state and local partnerships, provides communities with **technical support, climate change data and planning tools** to identify hazards and develop strategies to **improve resilience**.

- "Our Administration is committed to partnering with cities and towns to develop **practical and cost-effective solutions** to build the **climate-resilient communities** of tomorrow," said Lieutenant Governor Karyn Polito.

WHAT IS MVP?

- Improved resilience and preparedness
- Collaboration with stakeholders
- Increased education, planning, and implementation
- Funding for resilience-related actions



WHAT IS MVP?

1. MVP Planning Grant

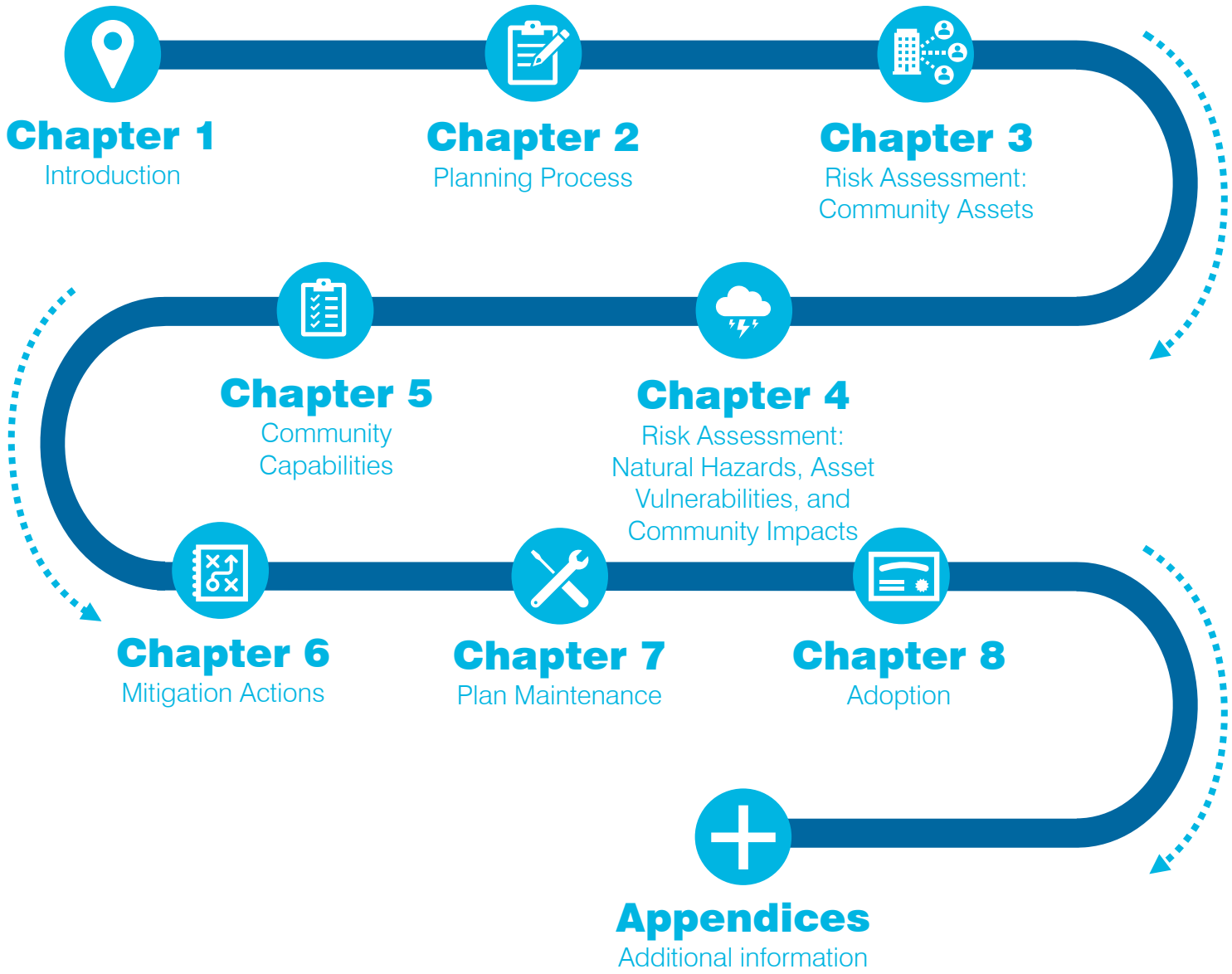
- Define climate hazards
- Identify community vulnerabilities and strengths
- Develop and prioritize mitigation actions
- Receive MVP designation

2. MVP Action Grant

- Implement priority adaptation actions identified during the planning process

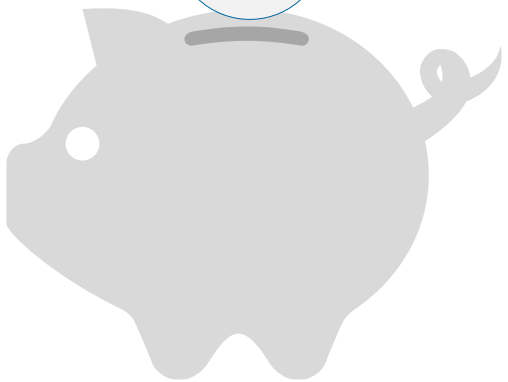


WHAT IS A HAZARD MITIGATION PLAN (HMP)?



WHAT IS THE VALUE OF THIS WORK?

- Health & safety
- Grant eligibility
- Equitable outcomes
- Preparedness planning
- Building consensus



EVERY $1 SPENT ON MITIGATION



SAVES $6 ON DISASTER RECOVERY



Town of Dunstable Massachusetts

MVP Municipal Vulnerability Preparedness

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WHY WE'RE HERE

Weather projections:

Changes in precipitation

- 12-42% more winter precipitation by 2070.
- Priority Populations have a 57% higher risk of flood damage than the rest of the Commonwealth.
- Annual economic flood damage increase by $9.3 million by 2030 in MA.

Rising temperatures

- 23-29 high heat days expected by 2050.
- Annual average temperature increase of 5.9 to 7.9 F by 2050.
- Extreme temps will increase annual transportation infrastructure maintenance cost by over $140 million

Severe Weather

- Precipitation amounts from heaviest storms increased by 55% since 1958.
- Lightning was responsible for $20.4 million in damage between 2002 and 2022.

Regional changes

- Increase in frequency and magnitude of hurricanes and nor'easters
- More risk to experiencing tornados.
- Increased fire potential.

Source: ResilientMass Plan (2023)

Town of Dunstable Massachusetts | MVP Municipal Vulnerability Preparedness | Weston & Sampson | HOYLE TANNER

TOP HAZARDS IN DUNSTABLE



Severe Winter Storms



Precipitation Flooding



Extreme Temperatures



Invasive Species

SEVERE WINTER STORMS

Description	• Ice storms, nor'easters, heavy snow, blowing snow, and other extreme forms of winter precipitation
Location	• Town-wide
Previous Occurrences	• There have been 35 days of extreme winter weather since 2015 • Halloween Storm of 2009- power out for almost a week • Large Ice Storm in 2010/2011 – long power outage • Early 2013 storm – nearly 3 feet of snow
Probability of future occurrences, including climate change impacts	• More intense storms • Unclear if frequency of storms will change • May be more ice and freezing rain than snow

SEVERE WINTER STORMS

While many residents have generators, attendees recalled there have been recent storms that caused power outages of over a week in length across Dunstable.
- CRB Workshop Attendees

Residents noted how quickly the community comes together to assist with snow removal for the elderly and infirmed.
- CRB Workshop Attendees

No power often means no water.
- Survey Respondent

Winter storms can impact anyone in Dunstable: their safety or health. It can be hard to get emergency services during and after a winter storm.
-Survey Respondent

PRECIPITATION BASED FLOODING

Description	• Flooding from rivers, stormwater runoff, ice jams, and dam failure
Location	• Current FEMA Flood Zones and potentially expanded flood zones
Previous Occurrences	• There have been 38 days of extreme flooding since 2015 • 13 of those days resulted in property damage • Summer 2023 torrential rains caused flooding
Probability of future occurrences, including climate change impacts	• More total precipitation annually • More intense rain events • Greater consecutive dry days, as well

FLOODING FROM PRECIPITATION

FEMA Flood Zones

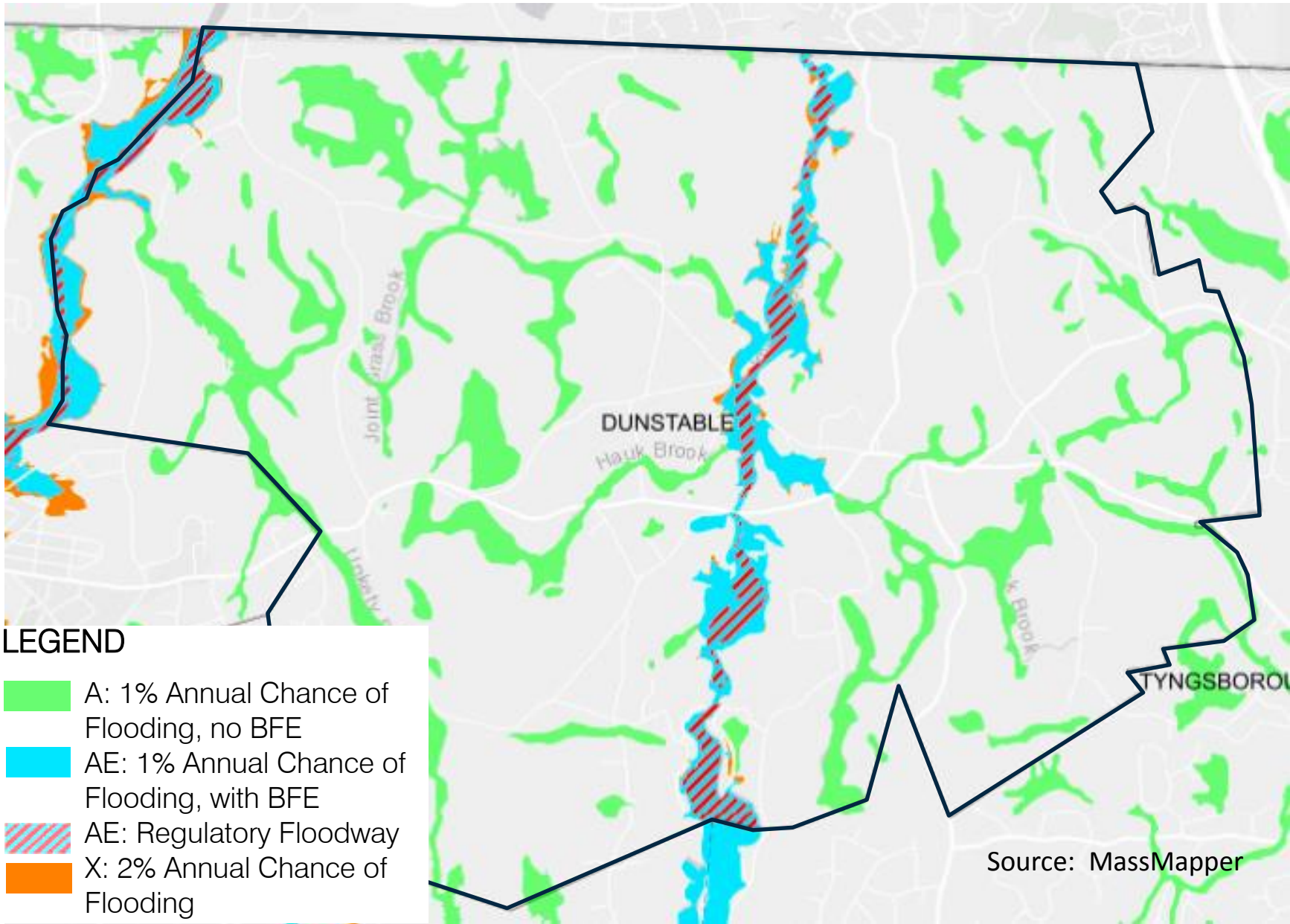
Geographic areas that FEMA has defined according to varying levels of flood risk

500-year Storm: 0.2% annual chance of occurring

100-year Storm: 1% annual chance of occurring

25-year Storm: 4% annual chance of occurring

10-year Storm: 10% annual chance of occurring



PRECIPITATION BASED FLOODING

The increase and rapid rainfall quickly causes flash flooding on our town streets and can result in flooded basements.
- Survey Respondent

The torrential rains during summer 2023 caused significant erosion across town and locations of periodic flooding on side streets.
- Survey Respondent

The Fire Department faces basement flooding due to water levels in nearby Salmon Brook.
- CRB Workshop Attendees

Heavy rains have caused "gullies" alongside roadways, due to country drainage. This has created concerning infrastructure conditions and heavy maintenance and repair needs. .
- CRB Workshop Attendees

EXTREME TEMPERATURES

Description	• Extreme heat: period of excessively hot weather (daily high temperature above 90 °F and high humidity • Extreme cold: period of excessively low temperatures, especially with additional wind chill (−15°F.)
Location	• Town-wide
Previous Occurrences	• 10 heat warnings and 17 cold warnings since 2018 • Over 25 days of record-setting heat since 2005
Probability of future occurrences, including climate change impacts	• Days above 95 °F are predicted to go from 3 to 27 annually on average by end of century • Days below 32 °F are predicted to go from -28 to -79

EXTREME TEMPERATURES

There are concerns regarding a lack of air conditioning in the schools. Residents were highly concerned about power outages during days of extreme heat that could become dangerous to students in the schools.
- CRB Workshop Attendees

The farming community notices the "kill frost." It used to occur by mid-September and now it is late October or early November.
- CRB Workshop Attendees

Extreme heat affects everyone at this point and AC is becoming as much a necessity as heat.
- Survey Respondent

Dunstable residents noted the increase in the elderly population that would be particularly vulnerable to both extreme cold and extreme heat.
-Survey Respondents and CRB Workshop Attendees

INVASIVE SPECIES

Description	• Flora and fauna • non-indigenous to Massachusetts, demonstrates the potential for rapid and widespread dispersion and establishment, has the potential to disperse over spatial gaps, and exists in high numbers in natural habitats.
Location	• Town-wide
Previous Occurrences	• Increasing presence of Garlic Mustard, Bittersweet, Japanese Knotweed, Milfoil and Curly Leaf Pondweed, Wintercreeper, new jumping worm
Probability of future occurrences, including climate change impacts	• Earlier start to season may make invasives more competitive • Warmer winter temperatures may mean less pest are killed

INVASIVE SPECIES

There is concern about both Japanese knotweed and bittersweet. The new jumping worm is having severe impacts on soil quality.
- CRB Workshop Attendees

Recently we are seeing an impact to wooded areas in Dunstable due to non-native species.
- Survey Respondents

Invasive species Wintercreeper (Euonymus fortunei) evergreen vine and Japanese Knotweed are becoming quite prevalent along roadsides. – CRB Workshop Attendees

Garlic Mustard, Bittersweet, Japanese Knotweed, Milfoil and Curly Leaf Pondweed in the Lake Massapoag area are problematic.
-Survey Respondent

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CHAPTER 1: INTRODUCTION

DUNSTABLE'S NATURAL HAZARD MITIGATION AND CLIMATE ADAPTATION GOALS

1. **Protect Health and Safety:** Ensure that people, structures, systems, natural/cultural/historic resources and the overall health and safety of Dunstable are protected from natural hazards.
2. **Increase Outreach and Education:** Increase awareness and support for natural hazard mitigation among private organizations, businesses, and area residents through outreach and education.
3. **Increase Response Capacity:** Increase Dunstable's community's capacity for responding to a natural hazard event.
4. **Protect Priority Populations:** Implement a broad range of mitigation measures that protect the Town's priority populations.
5. **Consider the Economy:** Develop a mitigation strategy that considers area businesses and protects the economic vitality of the Town.
6. **Integrate Climate Change:** Implement mitigation strategies to protect the community from the impacts of climate change.
7. **Encourage Smart Development:** Discourage future development in hazard prone areas, such as flood plains.
8. **Increase Coordination:** Increase coordination between the Federal, State, regional and local levels of government.
9. **Keep the Plan Relevant:** Update and maintain the Plan as resources permit.
10. **Be Sustainable:** Encourage sustainability of the Town.

CHAPTER 2: PLANNING PROCESS

Town Staff



Core Team

10 key Town staff

who guide the planning process and endorse draft Goals

4 Meetings & 2 Workshops

Stakeholders



Community Resilience Building Workshops (MVP)

20 stakeholders

including advocates, residents, business-owners, state and local agency representatives, and people from various other organizations.

2 Workshops

Public



Public Engagement

Everyone

Results from public meetings and other feedback are integrated into the final report.

2 Public Meetings
80 Survey Responses

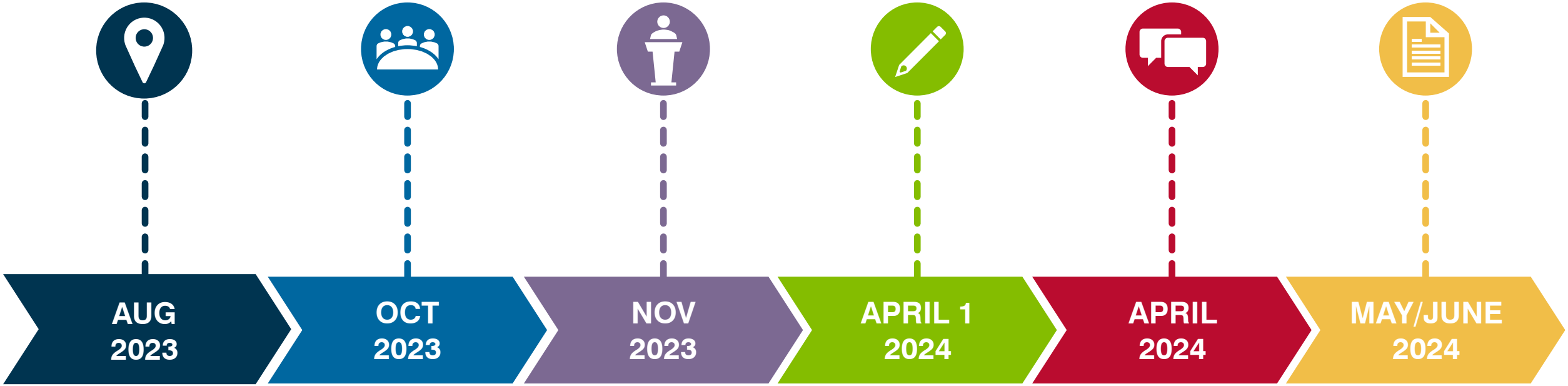
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CHAPTER 2: PLANNING PROCESS



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CHAPTER 2: PLANNING PROCESS

COMMUNITY RESILIENCE BUILDING WORKSHOP #1

October 20, 2023

- 19 participants
- 4 hours
- Identified top priority hazards in Dunstable
- Identified community assets





CHAPTER 2: PLANNING PROCESS

COMMUNITY RESILIENCE BUILDING WORKSHOP #2

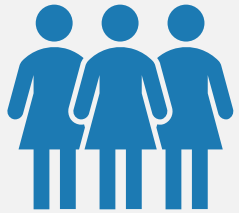
October 26, 2023

- 21 participants
- 4 hours
- 30 Priority Action ideas generated to make Dunstable more resilient to natural hazards and climate change





CHAPTER 3: RISK ASSESSMENT:
COMMUNITY ASSETS



People

- Youth, elderly, priority populations
- School
- Daycares
- Y Camp
- Senior Center at Library
- Volunteers



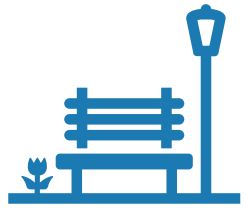
Structures

- Police, Fire, Town Hall, Library
- School
- Water Tower
- Dams
- Highway Department
- Church



Systems

- Water system
- Electric grid
- Communications (cable, internet, social media, sign board)
- Roadways & culverts



Economy & Community Activities

- Local Businesses
- Gas Station
- Summer Concerts
- Festivals
- Scouts
- Agriculture



Historic / Cultural / Natural Resources

- Extensive open/forested space
- Town Common
- Historic District
- Rail Trail
- Larter Fields
- Little Red Schoolhouse
- Rural Land Trust
- Historic Society

CHAPTER 4: RISK ASSESSMENT: NATURAL HAZARDS, ASSET VULNERABILITIES, AND COMMUNITY IMPACTS



Average / Extreme Temperatures



Changes in Groundwater



Drought



Earthquakes



Flooding from Precipitation



Hurricanes / Tropical Cyclones



Invasive Species



Landslides/Mudflows



Other Severe Weather



Severe Winter Storms



Tornadoes



Wildfire

CHAPTER 4: RISK ASSESSMENT: NATURAL HAZARDS, ASSET VULNERABILITIES, AND COMMUNITY IMPACTS

Probability of Occurrence

Consequence of Occurrence

Higher Probability / Lower Consequence

- Wildfires
- Invasive Species
- Drought
- Hurricanes/Tropical Storms



Higher Probability / Higher Consequence

- Severe Winter Storms
- Average/Extreme Temperatures
- Flooding from Precipitation
- Changes in Groundwater
- Other severe weather



Lower Probability / Lower Consequence

- Landslides/Mudflows



Lower Probability / Higher Consequence

- Tornados
- Earthquakes



Town of Dunstable Massachusetts

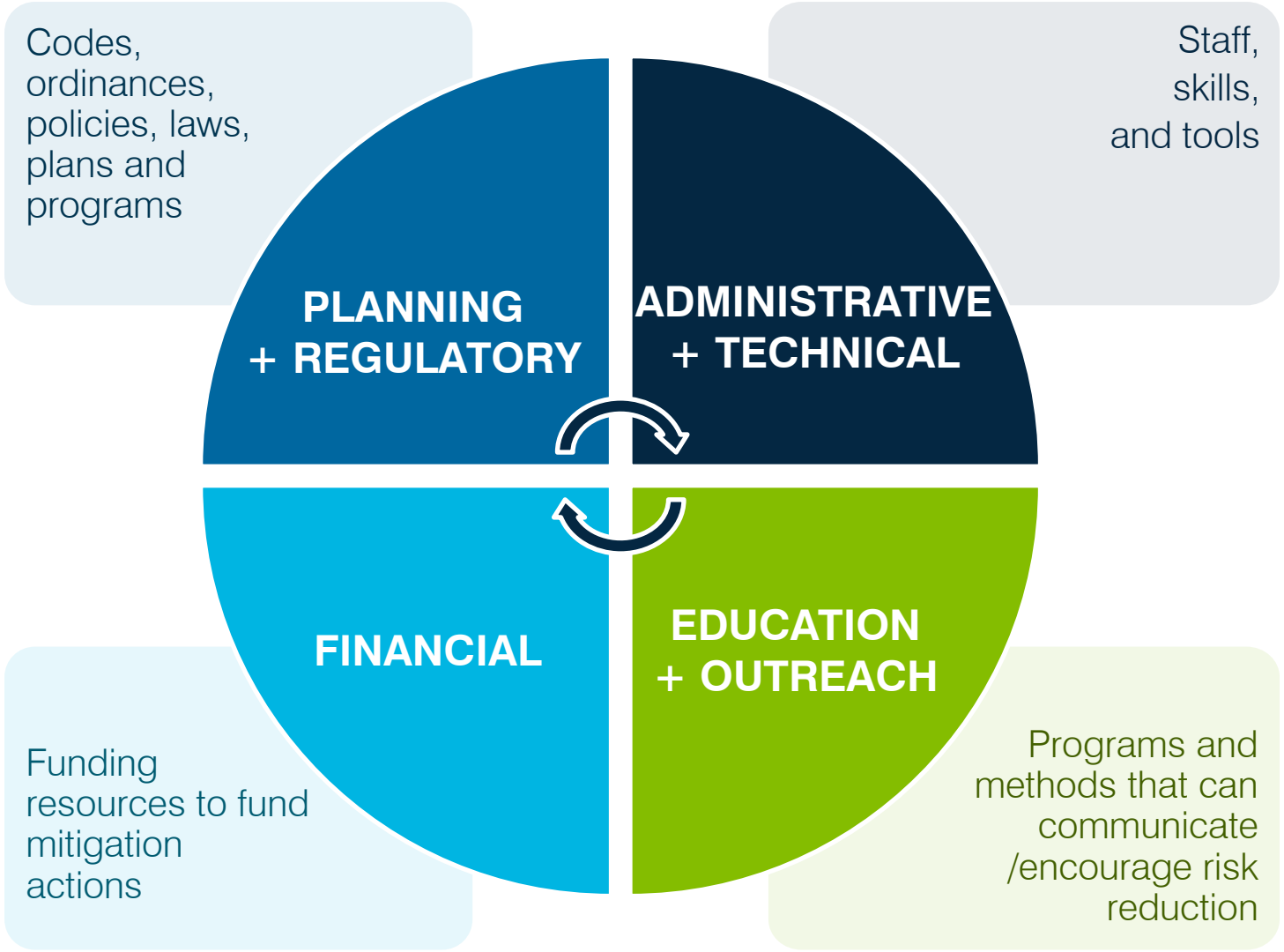
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CHAPTER 5: COMMUNITY CAPABILITIES

The Town of Dunstable has a unique set of capabilities, in the form of laws, policies, programs, staff, funding and other resources, ***to carry out the HMP and increase resilience.***



What we've heard from you

Summary of Public Survey Results

What does the Town do well to prepare for natural hazards?

- ✓ Treats winter roads
- ✓ Snow removal/preparedness
- ✓ Public notifications of upcoming extreme events
- ✓ Provides green space

What could the Town improve on to prepare for natural hazards?

- ❑ Implement renewable energy
- ❑ Plan for climate resilience
- ❑ Public notifications of upcoming extreme events
- ❑ Prioritize vulnerable populations

CHAPTER 5: MITIGATION ACTIONS

A mitigation action is a measure, project, plan, or activity proposed to reduce current and future vulnerabilities to natural hazards. These actions will create resilience for Dunstable (ability to withstand and swiftly recover from an extreme event). These actions will support adaptation to climate change.

Before an event

Local code and regulations
Maintenance
Proactive Infrastructure Projects

During an event

Warnings
Protection of critical facilities
Emergency response

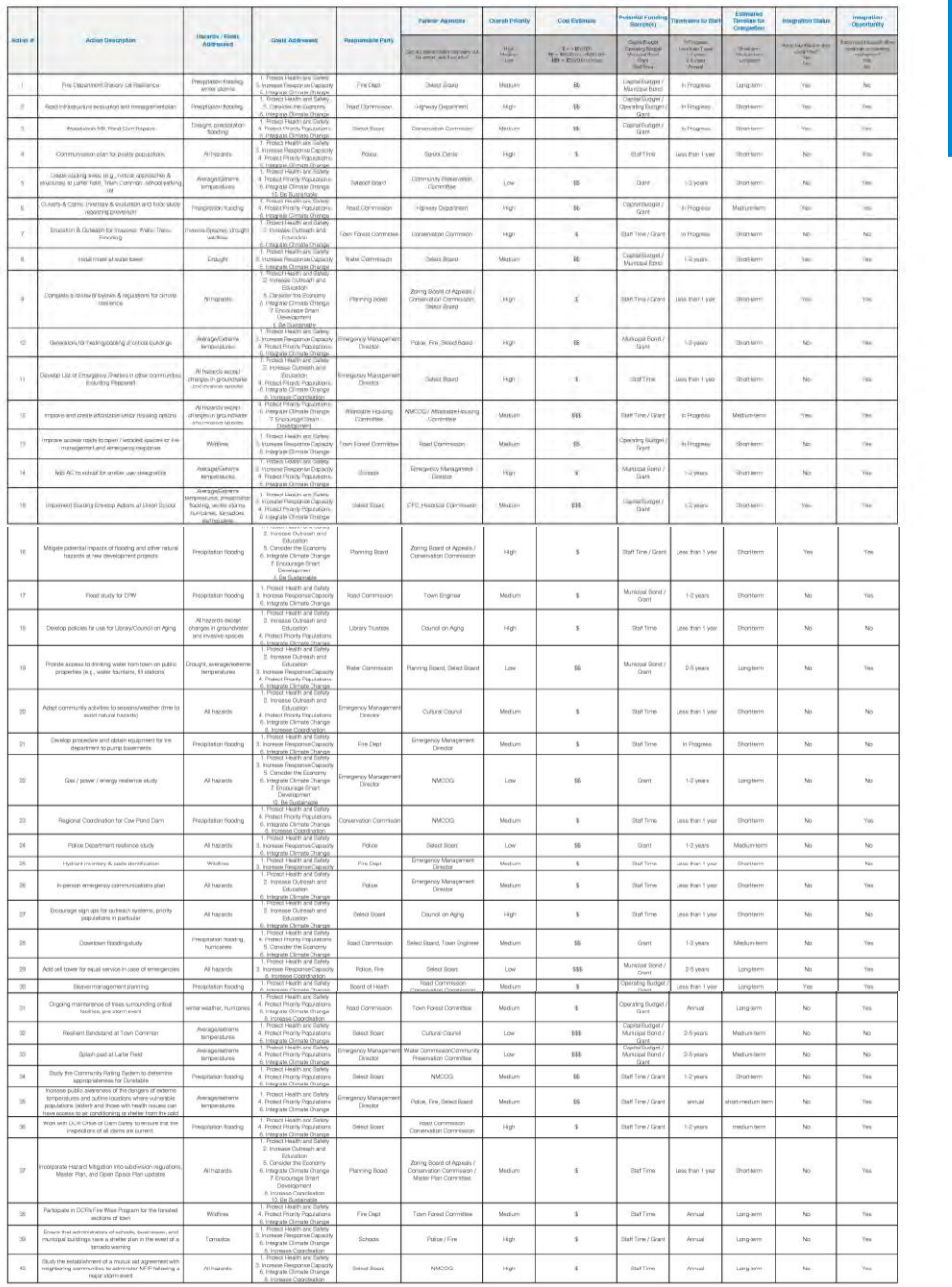
Following an event

Clean up
Restoration
Enhancement

COMMUNICATIONS

CHAPTER 6: MITIGATION ACTIONS

- **42 Draft Mitigation Actions**
- Must have at least one for each natural hazard
- Reflect community assets, risk & vulnerability assessment
- Consider CRB Workshops and Public Input



Action #	Action Description	Hazards / Risks Addressed	Goals Addressed	Responsible Party	Partner Agencies	Overall Priority	Cost Estimate	Potential Funding Source(s)	Timeframe to Start	Estimated Timeline for Completion	Integration Status	Integration Opportunity
1	Fire Department Seasonal Call Resilience	Precipitation-flooding, severe storms	1. Protect Health and Safety 5. Increase Response Capacity 6. Integrate Climate Change	Fire Dept	Select Board	Medium	$$	Capital Budget / Municipal Bond	In Progress	Long-term	Yes	No
2	Road infrastructure evaluation and management plan	Precipitation-flooding,	1. Protect Health and Safety 5. Consider the Economy 6. Integrate Climate Change	Road Commission	Highway Department	High	$$	Capital Budget / Operating Budget / Grant	In Progress	Short-term	Yes	Yes
3	Woodworth Mill Pond Dam Repairs	Drought, precipitation-flooding	1. Protect Health and Safety 4. Protect Priority Populations 6. Integrate Climate Change	Select Board	Conservation Commission	Medium	$$	Capital Budget / Grant	In Progress	Short-term	Yes	Yes
4	Communication plan for priority populations	All hazards	1. Protect Health and Safety 5. Increase Response Capacity 4. Protect Priority Populations 6. Integrate Climate Change	Police	Senior Center	High	$	Staff Time	Less than 1 year	Short-term	No	Yes
5	Create cooling areas (e.g., indoor spaces/fans & shade/misters) at Latter Field, Town Common, school parking lot	Average/extreme temperatures	1. Protect Health and Safety 4. Protect Priority Populations 6. Integrate Climate Change 10. Be Sustainable	Select Board	Community Preservation Committee	Low	$$	Grant	1-2 years	Short-term	No	Yes
6	Culverts & Catch Inventory & evaluation and flood study assessing prevention	Precipitation-flooding	1. Protect Health and Safety 4. Protect Priority Populations 6. Integrate Climate Change	Road Commission	Highway Department	High	$$	Capital Budget / Grant	In Progress	Medium-term	No	Yes
7	Education & Outreach for Invasive Pests, Trees, Flooding	Extreme Seasons, drought, wildfires,	1. Protect Health and Safety 2. Increase Outreach and Education 6. Integrate Climate Change	Open Forest Committee	Conservation Commission	High	$	Staff Time / Grant	In Progress	Short-term	No	No
8	Install meter at water tower	Drought	1. Protect Health and Safety 5. Increase Response Capacity 6. Integrate Climate Change	Water Commission	Select Board	Medium	$$	Capital Budget / Municipal Bond	1-2 years	Short-term	Yes	Yes
9	Complete a review of bylaws & regulations for climate resilience	All hazards	1. Protect Health and Safety 2. Increase Outreach and Education 5. Consider the Economy 6. Integrate Climate Change 7. Encourage Smart Development 8. Be Sustainable	Planning Board	Zoning Board of Appeals / Conservation Commission, Select Board	High	$	Staff Time / Grant	Less than 1 year	Short-term	Yes	Yes
10	Generators for heating/cooling at various buildings	Average/Extreme temperatures	1. Protect Health and Safety 5. Increase Response Capacity 4. Protect Priority Populations 6. Integrate Climate Change	Emergency Management Director	Police, Fire, Select Board	High	$$	Municipal Bond / Grant	1-2 years	Short-term	No	Yes
11	Develop List of Emergency Shelters in other communities Evacuating Personnel	All hazards except changes in groundwater and invasive species	1. Protect Health and Safety 2. Increase Outreach and Education 4. Protect Priority Populations 6. Integrate Climate Change 8. Increase Coordination	Emergency Management Director	Select Board	High	$	Staff Time	Less than 1 year	Short-term	No	Yes
12	Improve and create affordable senior housing options	All hazards except changes in groundwater and invasive species	4. Protect Priority Populations 6. Integrate Climate Change 7. Encourage Smart Development	Willowside Housing Committee	NMCOG/ Willowside Housing Committee	Medium	$$$	Staff Time / Grant	In Progress	Medium-term	Yes	Yes
13	Improve access roads to open / wooded spaces for fire management and emergency response	Wildfires	1. Protect Health and Safety 5. Increase Response Capacity 6. Integrate Climate Change	Town Forest Committee	Road Commission	Medium	$$	Operating Budget / Grant	In Progress	Short-term	No	Yes
14	Add AC to school for shelter use/ integration	Average/Extreme temperatures,	1. Protect Health and Safety 5. Increase Response Capacity 4. Protect Priority Populations 6. Integrate Climate Change	Schools	Emergency Management Director	High	$	Municipal Bond / Grant	1-2 years	Short-term	No	Yes
15	Implement Existing Drainage Actions at Union School	Average/extreme temperatures, precipitation flooding, severe storms, hurricanes, tornadoes, earthquakes	1. Protect Health and Safety 5. Increase Response Capacity 4. Protect Priority Populations 6. Integrate Climate Change	Select Board	DPW, Municipal Commission	Medium	$$$	Capital Budget / Grant	1-2 years	Short-term	Yes	Yes
16	Mitigate potential impacts of flooding and other natural hazards at new development projects	Precipitation flooding	2. Increase Outreach and Education 5. Consider the Economy 6. Integrate Climate Change 7. Encourage Smart Development 8. Be Sustainable	Planning Board	Zoning Board of Appeals / Conservation Commission	High	$	Staff Time / Grant	Less than 1 year	Short-term	Yes	Yes
17	Flood study for DPW	Precipitation flooding	1. Protect Health and Safety 3. Increase Response Capacity 6. Integrate Climate Change	Road Commission	Town Engineer	Medium	$	Municipal Bond / Grant	1-2 years	Short-term	No	Yes
18	Develop policies for use for Library/Council on Aging	All hazards except changes in groundwater and invasive species	1. Protect Health and Safety 2. Increase Outreach and Education 4. Protect Priority Populations 6. Integrate Climate Change	Library Trustees	Council on Aging	High	$	Staff Time	Less than 1 year	Short-term	No	No
19	Provide access to drinking water from town on public properties (e.g., water fountains, fill stations)	Drought, average/extreme temperatures	1. Protect Health and Safety 2. Increase Outreach and Education 3. Increase Response Capacity 4. Protect Priority Populations 6. Integrate Climate Change	Water Commission	Planning Board, Select Board	Low	$$	Municipal Bond / Grant	2-5 years	Long-term	No	Yes
20	Adapt community activities to seasons/weather (time to avoid natural hazards)	All hazards	1. Protect Health and Safety 2. Increase Outreach and Education 4. Protect Priority Populations 6. Integrate Climate Change 8. Increase Coordination	Emergency Management Director	Cultural Council	Medium	$	Staff Time	Less than 1 year	Short-term	No	No
21	Develop procedure and obtain equipment for fire department to pump basements	Precipitation flooding	1. Protect Health and Safety 3. Increase Response Capacity 6. Integrate Climate Change	Fire Dept	Emergency Management Director	Medium	$	Staff Time	In Progress	Short-term	No	No
22	Gas / power / energy resilience study	All hazards	1. Protect Health and Safety 5. Increase Response Capacity 5. Consider the Economy 6. Integrate Climate Change 7. Encourage Smart Development 10. Be Sustainable	Emergency Management Director	NMCOG	Low	$$	Grant	1-2 years	Long-term	No	No
23	Regional Coordination for Cow Pond Dam	Precipitation flooding	1. Protect Health and Safety 4. Protect Priority Populations 6. Integrate Climate Change 8. Increase Coordination	Conservation Commission	NMCOG	Medium	$	Staff Time	Less than 1 year	Short-term	No	Yes
24	Police Department resilience study	All hazards	1. Protect Health and Safety 3. Increase Response Capacity 6. Integrate Climate Change	Police	Select Board	Low	$$	Grant	1-2 years	Medium-term	No	No
25	Hydrant inventory & caste identification	Wildfires	1. Protect Health and Safety 3. Increase Response Capacity	Fire Dept	Emergency Management Director	Medium	$	Staff Time	Less than 1 year	Short-term		No
26	In-person emergency communications plan	All hazards	1. Protect Health and Safety 2. Increase Outreach and Education 6. Integrate Climate Change	Police	Emergency Management Director	Medium	$	Staff Time	Less than 1 year	Short-term	No	Yes
27	Encourage sign ups for outreach systems, priority populations in particular	All hazards	1. Protect Health and Safety 2. Increase Outreach and Education 6. Integrate Climate Change	Select Board	Council on Aging	High	$	Staff Time	Less than 1 year	Short-term	No	No
28	Downtown flooding study	Precipitation flooding, hurricanes	1. Protect Health and Safety 4. Protect Priority Populations 5. Consider the Economy 6. Integrate Climate Change	Road Commission	Select Board, Town Engineer	Medium	$$	Grant	1-2 years	Medium-term	No	Yes
29	Add cell tower for equal service in case of emergencies	All hazards	1. Protect Health and Safety 3. Increase Response Capacity 8. Increase Coordination	Police, Fire	Select Board	Low	$$$	Municipal Bond / Grant	2-5 years	Long-term	No	Yes
30	Beaver management planning	Precipitation flooding	1. Protect Health and Safety 6. Integrate Climate Change	Board of Health	Road Commission, Conservation Commission	Medium	$	Operating Budget	Less than 1 year	Long-term	Yes	Yes
31	Ongoing maintenance of trees surrounding critical facilities, pre-storm event	winter weather, hurricanes	1. Protect Health and Safety 4. Protect Priority Populations 6. Integrate Climate Change 8. Increase Coordination	Road Commission	Town Forest Committee	Medium	$	Operating Budget / Grant	Annual	Long-term	No	Yes
32	Resilient Bandstand at Town Common	Average/extreme temperatures	1. Protect Health and Safety 4. Protect Priority Populations 6. Integrate Climate Change	Select Board	Cultural Council	Low	$$$	Capital Budget / Municipal Bond / Grant	2-5 years	Medium-term	No	No
33	Splash pad at Latter Field	Average/extreme temperatures	1. Protect Health and Safety 4. Protect Priority Populations 6. Integrate Climate Change	Emergency Management Director	Water Commission/Community Preservation Committee	Low	$$$	Capital Budget / Municipal Bond / Grant	2-5 years	Medium-term	No	No
34	Study the Community Rating System to determine appropriateness for Dunstable	Precipitation flooding	1. Protect Health and Safety 4. Protect Priority Populations 6. Integrate Climate Change	Select Board	NMCOG	Medium	$$	Staff Time / Grant	1-2 years	Short-term	No	Yes
35	Increase public awareness of the dangers of extreme temperatures and outline locations where vulnerable populations (elderly and those with health issues) can have access to air conditioning or shelter from the sun	Average/extreme temperatures	1. Protect Health and Safety 4. Protect Priority Populations 6. Integrate Climate Change	Emergency Management Director	Police, Fire, Select Board	Medium	$$	Staff Time / Grant	annual	short-medium term	No	Yes
36	Work with DCR Office of Dam Safety to ensure that the inspections of all dams are current	Precipitation flooding	1. Protect Health and Safety 4. Protect Priority Populations 6. Integrate Climate Change	Select Board	Road Commission, Conservation Commission	High	$	Staff Time / Grant	1-2 years	medium term	No	Yes
37	Incorporate Hazard Mitigation into subdivision regulations, Master Plan, and Open Space Plan updates	All hazards	1. Protect Health and Safety 2. Increase Outreach and Education 5. Consider the Economy 6. Integrate Climate Change 7. Encourage Smart Development 8. Increase Coordination 10. Be Sustainable	Planning Board	Zoning Board of Appeals / Conservation Commission / Master Plan Committee	Medium	$	Staff Time	Less than 1 year	Short-term	No	Yes
38	Participate in DCR's Fire Wise Program for the forested sections of town	Wildfires	1. Protect Health and Safety 4. Protect Priority Populations 6. Integrate Climate Change	Fire Dept	Town Forest Committee	Medium	$	Staff Time	Annual	Long-term	No	Yes
39	Ensure that administrators of schools, businesses, and municipal buildings have a shelter plan in the event of a tornado warning	Tornados	1. Protect Health and Safety 3. Increase Response Capacity 6. Integrate Climate Change 8. Increase Coordination	Schools	Police / Fire	High	$	Staff Time / Grant	Annual	Long-term	No	Yes
40	Study the establishment of a mutual aid agreement with neighboring communities to administer NFIP following a major storm event	All hazards	1. Protect Health and Safety 5. Increase Response Capacity 6. Integrate Climate Change 8. Increase Coordination	Select Board	NMCOG	High	$	Staff Time	Annual	Long-term	No	Yes

Town of Dunstable Massachusetts

MVP Municipal Vulnerability Preparedness

Weston & Sampson

CHAPTER 6: MITIGATION ACTIONS

Green denotes also a MVP CRB Priority

Top Actions

- ✓ Road infrastructure evaluation and management plan
- ✓ Complete a review of bylaws & regulations for climate resilience
- ✓ Develop List of Emergency Shelters in other communities (including Pepperell)
- ✓ Add AC to school for shelter use/ designation
- ✓ Mitigate potential impacts of flooding and other natural hazards at new development projects



Town of Dunstable Massachusetts · MVP Municipal Vulnerability Preparedness · Weston & Sampson℠ · HOYLE TANNER

CHAPTER 6: MITIGATION ACTIONS

Green denotes also a MVP CRB Priority

Top Actions

- ✓ Work with DCR Office of Dam Safety to ensure that the inspections of all dams are current.
- ✓ Ensure that administrators of schools, businesses, and municipal buildings have a shelter plan in the event of a tornado warning
- ✓ Culverts & Dams: inventory & evaluation and flood study regarding prevention
- ✓ Education & Outreach for Invasives, Wells, Trees, Flooding



CHAPTER 6: MITIGATION ACTIONS

★ Green denotes also a MVP CRB Priority

Top Actions

- ✓ Encourage sign ups for outreach systems, priority populations in particular
- ✓ Communication plan for priority populations
- ✓ Generators for heating/cooling at critical buildings
- ✓ Develop policies for use for Library/Council on Aging
- ✓ In-person emergency communications plan
- ✓ Study the establishment of a mutual aid agreement with neighboring communities to administer NFIP following a major storm event

CHAPTER 7: PLAN MAINTENANCE

MONITORING THE PLAN

The Town Administrator will monitor the mitigation actions to ensure that they are going to plan.

EVALUATING THE PLAN

The Town will meet annually, and after major natural hazard events, to evaluate how well the plan is working.

UPDATING THE PLAN

The Town will continue to update the Plan every 5 years.

INTEGRATING THE PLAN

The Town will integrate data, information, and actions from the HMP into other local plans and initiatives, such as the Master Plan and the Open Space and Recreation Plan.

PUBLIC PARTICIPATION THROUGHOUT PLAN MAINTENANCE

The Town is committed to conducting equitable and impactful public participation. Public engagement activities will align with the evaluation, monitoring, and plan update meetings as well as with large natural hazard events.

CHAPTER 8: ADOPTION



AGENDA

01 Welcome & Introductions

02 About MVP and HMPs

03 Climate Change Projections for Top Hazards in Dunstable

04 Dunstable's HMP-MVP Plan

05 **Questions and Discussion**



Questions?

Share additional feedback and comments with us through an online survey:
https://forms.office.com/r/qDr82Sk3XQ



Jason Silva

Town Administrator

(978) 649 – 4514 Ext. 242

jsilva@dunstable-ma.gov

APPENDIX E: ASSET MAPS

New Hampshire

N

Pepperell

Groton

Tyngsborough

Robbins Farm Road
Century Way
Sky Top Lane
Nashua River
Bass Pond
Fletcher Street
Joint Grass Brook
Main Street
Mill Street
River Street
Woodland Drive
Swallow Lane
Holls Street
Oak Street
Depot Street
Sweets Pond Way
Hauk Brook
Brook Street
Pleasant Street
113
Upton Street
Cross Street
Dogwood Lane
Woods Court
Kimberly Lane
Brittany Lane
Jamie Road
Kamm Street
Whitney Brook
Groton Street
School Street
Lake Street
Lower Dam Way
Off Pond Street
Horse Hill Street
Hall Street
Massapoag Lake
Upper Massapoag Pond
Lower Massapoag Pond
Painhurst Road
Pond Street
Westford Street
Black Brook
Forest Street
Trask Way
Valley Street
Canyons Lake
Lowell Street
Blackgrant Street
Highland Street
Common Street
Whitcrest Street
High Street
Thorndike Street
French Street
French Court
Hardy Street
Maple Street
Pine Street

- NHESP Certified Vernal Pools
- Potential Vernal Pools
- NHESP Natural Communities
- NHESP Priority Habitats of Rare Species
- NHESP Estimated Habitats of Rare Wildlife

MassDOT Roads

Administrative Type
- State Route
- Non-numbered Road

DEP Wetlands and Waterbodies
- Hydrologic Connection
- Marsh/Bog
- Wooded marsh
- Open Water

Aquifers
- Medium Yield

Note: Outstanding Resource Waters layer is not located within the town boundary.

1,100 0 1,100
Scale In Feet

FIGURE 1

TOWN OF DUNSTABLE, MASSACHUSETTS HAZARD MITIGATION PLAN

ENVIRONMENTAL RESOURCES MAP

AUGUST 2023 SCALE: NOTED

HOYLE TANNER Weston & Sampson

New Hampshire

N

Pepperell

Groton

Tyngsborough

Nashua River

Unkety Brook

Joint Grass Brook

Bass Pond

Hauk Brook

Lower Massapoag Pond

Upper Massapoag Pond

Black Brook

Canyons Lake

Lavrakas Cr

Miller Cr

Larter Cr

Staples Cr

Lake Cr

Nashua River Access - Dunstable

Robbins Farm Road

Century Way

Sky Top Lane

Trinity Group Realty Cr

Tully Wildlife Refuge

Blood Cemetery

Conservation Area

Tully George E Sr Apr

Rideout Cemetery

Fletcher Street

Mill Street

Main Street

Flat Rock Hill Quarry Conservation Area

Chaney Park

Flat Rock Hill Conservation Area

Arched Bridge Conservation Area

Sky Meadow Golf Course

Salmon Brook Conservation Area

Kennedy A Donald Apr

Hardy Street Conservation Area

Gage Town Forest

Spectacle Hill Conservation Area

Howard's Brook Conservation Area

Hardy Street

French Court

Basbanes Conservation Area

Thorndike Street

Maple Street

Pine Street

French Street

Nashua River Rail Trail

River Street

Hollis Street

Woodland Drive

Swallow Lane

Stoddard Cr

Joint Grass Brook Conservation

Proctor-grater Conservation Area

High Street

Hogg Conservation Area

Urqhart Conservation

New Town Well Field

Sargent Conservation Area

Oak Street

Depot Street

Swallow Cemetery

Sawyer Conservation Area

Highland Street

High Street Conservation Area

Meeting House Hill Cemetery

Best Triangle Conservation Area

Larter Edward A Jr Apr

Lupien Parcel

Hauk Swamp Wma

Brook Street

Sweets Pond Way

Common Street

Swallow Union Elementary School Playground

Hillcrest Street

Bacon Conservation Area

Shaw Conservation Area

Central Cemetery

Lowell Street

Blodgett Street

Gardner Conservation Area

Pleasant Street

113

Lower Massapoag

Upton Street

Cross Street

Dogwood Lane

Woods Court

Kimberly Lane

Brittany Lane

Jamie Road

Adams Street

Allgrove Conservation Area

Keyes Meadow Conservation Area

Unkety Brook Conservation Area

Pierce Town Forest

Spaulding-proctor Reservation

Goldthwaite Conservation Area

Parkhurst Road

Pond Street

Westford Road Cr

Biron Conservation Area

Westford Street

Westford Street Cr

Forest Street

Trask Way

Valley Street

Dunstable Brook Wma

School Street

Groton Street

Lake Street

Lower Dam Way

Off Pond Street

Unquetynasset Brook Meadow

Horse Hill Street

Hall Street

Horse Hill Quarry Conservation Area

Unkety Brook Wma

Kemp Street

Massapoag Way

Camp Massapoag

Elbow Meadow Wma

Farnsworth Wildlife Refuge

English Wildlife Refuge

Applewood Construction Corp Property

Trails

Permanently Protected Land

Land with Limited Protection

Unprotected Land

Dunstable Rural Land Trust Properties

DEP Wetlands and Waterbodies

Hydrologic Connection

Marsh/Bog

Wooded marsh

Open Water

MassDOT Roads

Administrative Type

State Route

Non-numbered Road

1,100 0 1,100

Scale In Feet

FIGURE 2

TOWN OF DUNSTABLE, MASSACHUSETTS HAZARD MITIGATION PLAN

NATURAL RESOURCES MAP

AUGUST 2023 SCALE: NOTED

HOYLE TANNER Weston & Sampson

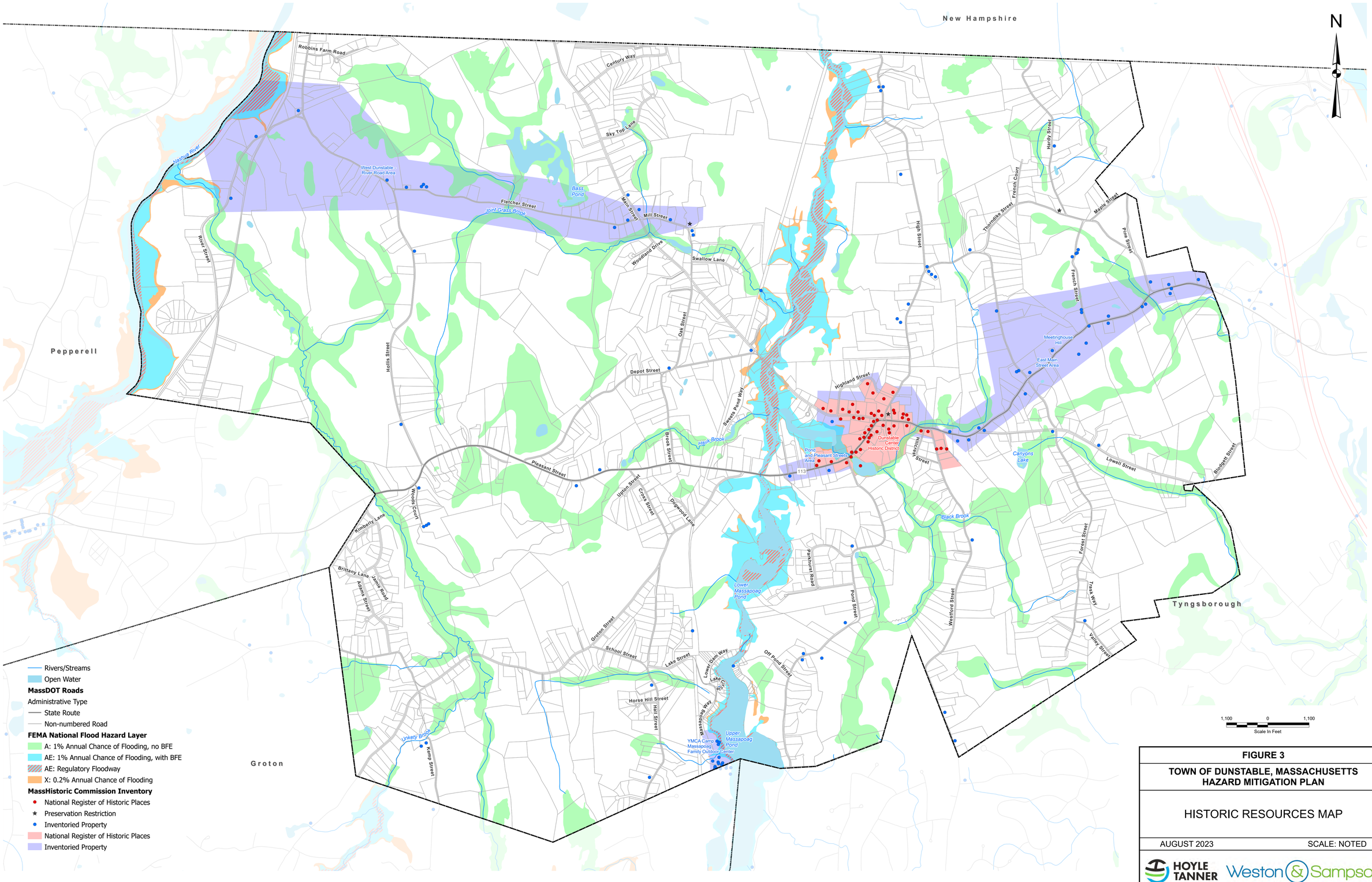


FIGURE 3

TOWN OF DUNSTABLE, MASSACHUSETTS HAZARD MITIGATION PLAN

HISTORIC RESOURCES MAP

AUGUST 2023 SCALE: NOTED

HOYLE TANNER Weston & Sampson

N

New Hampshire

Pepperell

Groton

Tyngsborough

- Dams with Significant Hazard
- Dams with Low Hazard
- Primary Evacuation Routes
- Rivers/Streams
- Open Water
- Solid Waste Facilities
- DEP Approved Zone I
- DEP Approved Zone II
- Interim Wellhead Protection Area
- Electric Transmission Right-of-Way
- Emergency Shelter

MassDOT Roads

- State Route
- Non-numbered Road

Critical Assets

- Animal Clinic
- Cell Tower
- Cemetery
- Church
- Drinking Water Supply Well
- Electricity Regulating Substation
- Fire Station
- Food & Pharmacy
- Gas Station
- Hazardous Materials Site
- Historic and Cultural Resources
- Library
- Municipal Building
- Municipal or Public Safety
- Planned Development (40B)
- Police Station
- Postal Service
- Priority Populations
- Recreation
- School/Daycare
- Solar
- Water Tower

FEMA National Flood Hazard Layer

- A: 1% Annual Chance of Flooding, no BFE
- AE: 1% Annual Chance of Flooding, with BFE
- AE: Regulatory Floodway
- X: 0.2% Annual Chance of Flooding

Note: The following layers are not located within the town boundary - AUL Sites, Underground Storage Tanks, BWP Major Facilities, DEP Groundwater Discharge & Permits, Tier Classified Sites

1,100 0 1,100
Scale In Feet

FIGURE 3

TOWN OF DUNSTABLE, MASSACHUSETTS HAZARD MITIGATION PLAN

PHYSICAL RESOURCES MAP

AUGUST 2023 SCALE: NOTED

HOYLE TANNER Weston & Sampson