Chapter 4. State Capability and Adaptive Capacity Analysis

Prepared for:

Massachusetts Emergency Management Agency
400 Worcester Road (Route 9 East)
Framingham, MA 01702-5399

Massachusetts Executive Office of Energy and Environmental Affairs
100 Cambridge Street, Suite 900
Boston, MA 02114

Prepared by:

Eastern Research Group, Inc. (ERG)
561 Virginia Road, Building 4 – Suite 300
Concord, MA 01742

This page intentionally left blank.

Contents

Figures

Tables

Abbreviations

ASCE	American Society of Civil Engineers
BBRS	Board of Building Regulations and Standards
BEH	Bureau of Environmental Health
BBRS	Board of Building Regulations and Standards
BMPs	best management practices
CECP	Clean Energy and Climate Plan
CERT	Community Emergency Response Teams
CMR	Code of Massachusetts Regulations
CRS	Community Rating System
CZM	Office of Coastal Zone Management
DCAMM	Division of Capital Asset Management and Maintenance
DCR	Department of Conservation and Recreation
DER	Division of Ecological Restoration
DMF	Division of Marine Fisheries
DER	Division of Ecological Restoration
DoD	U.S. Department of Defense
DOER	Department of Energy Resources
EOEEA	Executive Office of Energy and Environmental Affairs
EOHED	Executive Office of Housing and Economic Development
FCPA	Massachusetts Forest Cutting Practices Act
FEMA	Federal Emergency Management Agency
FHMP	Flood Hazard Management Program
FIRM	Flood Insurance Rate Map
FMA	Flood Mitigation Assistance
FY	fiscal year
GHG	greenhouse gas
GIS	geographic information system
HMA	Hazard Mitigation Assistance

HMGP	Hazard Mitigation Grant Program
ICC	International Code Council
LIDAR	LIght Detection and Ranging
LiMWA	Limit of Moderate Wave Action
MA SHMCAP	State Hazard Mitigation and Climate Adaptation Plan
MAPC	Metropolitan Area Planning Council
MassECAN	Massachusetts Ecosystem Climate Adaptation Network
MassDEP	Massachusetts Department of Environmental Protection
MassDOT	Massachusetts Department of Transportation
MassECAN	Massachusetts Ecosystem Climate Adaptation Network
MBTA	Massachusetts Bay Transportation Authority
MDAR	Massachusetts Department of Agricultural Resources
MEMA	Massachusetts Emergency Management Agency
MEPA	Massachusetts Environmental Policy Act
MGL	Massachusetts General Laws
MSBC	Massachusetts State Building Code
MVP	Municipal Vulnerability Preparedness
NFIP	National Flood Insurance Program
NOAA	National Oceanic and Atmospheric Administration
NWS	National Weather Service
PDM	Pre-Disaster Mitigation
Risk MAP	Risk Mapping, Assessment, and Planning
RL	repetitive loss
RMAT	Resilient MA Action Team
SFHA	Special Flood Hazard Area
SMART	Solar Massachusetts Renewable Target
SRL	severe repetitive loss
TERT	Telecommunicator Emergency Response Taskforce
WPA	Wetlands Protection Act

4.1 State Capability and Adaptive Capacity Analysis

4.1.1 Introduction and Purpose

The purpose of this state capability and adaptive capacity analysis is to identify the areas in which the Commonwealth of Massachusetts and individual state agencies can take action to reduce risks and increase resilience from the hazard and climate vulnerabilities and consequences identified in the risk assessment. To develop an effective hazard mitigation and climate adaptation strategy that the Commonwealth can implement, Massachusetts has assessed its current and future risk from hazards and climate change and analyzed its current capability and capacity to address risks through existing resources, as well as identify challenges and gaps. The Commonwealth will use this analysis to determine the actions necessary to improve state capability and adaptive capacity to address the risks identified in the MA SHMCAP and can incorporate these actions in the plan. This analysis also allowed the Commonwealth and its state agencies to identify innovative and strategic actions to improve coordination and implementation across sectors, agencies, and jurisdictions.

The capability and adaptive capacity analysis includes two components: (1) a *capability assessment* that evaluates the Commonwealth's existing capabilities to enable and implement hazard mitigation and climate adaptation actions across agencies on a statewide level, and (2) an *adaptive capacity analysis* that includes an analysis of individual state agencies, as well as identifying trends and themes across agencies.

As defined for the purposes of this plan, **state capabilities** include the authorities, laws, policies, programs, staff, funding, and other resources available to the Commonwealth to support hazard mitigation and climate adaptation efforts. **Adaptive capacity** is the ability of state agencies (including their key physical and nonphysical assets and services, functions, missions, and programs) to adjust or modify their operations, policies, or other functions to adapt to changes to the frequency, severity, and extent of hazards, and to consider climate change projections for vulnerabilities and impacts in the near, mid-, and long terms.

In combination with the risk assessment, this analysis:

- **Supports identifying specific actions** to include in the hazard mitigation and climate adaptation strategy to increase the ability of the Commonwealth and its agencies to effectively take action to reduce risks identified in the risk assessment, and the specific capabilities or resources required for implementation.
- **Evaluates existing state capabilities and capacity** that improve or impede resilience and reduce risks across the Commonwealth and within each agency in the near, mid-, and long terms.
- **Identifies the challenges and opportunities** within and between each agency that improve or impede resilience to future natural hazard events and other future conditions, including the effects of climate change.
- **Identifies ways the state's capabilities can support hazard mitigation and climate adaptation efforts** at all scales, with a focus on environmental justice and other priority populations, sustainable approaches, and the leveraging of federal, state, and local partnerships.

4.1.1.1 Major State Capability and Adaptive Capacity Chapter Updates Since 2018

Major updates to the components of the state capability and adaptive capacity analysis since 2018 include the following:

- **Updated Appendix 4.A** on the Commonwealth's primary hazard mitigation and climate adaptation capabilities and approaches, including updates on effectiveness of all MA SHMCAP actions and capabilities since 2018.
- **Highlighted recent examples** of state-supported initiatives and activities, laws and policies, as well as state agency partnerships and initiatives, such as Executive Order 604 (*Establishing the Office of Climate Innovation and Resilience Within the Office of the Governor*), Bill H.5060 (*An Act Driving Clean Energy and Offshore Wind*), the 2022 Climate Law, and the Clean Energy and Climate Plan (CECP) for 2050.
- **Described the adaptive capacity of state agencies**, based on a survey (Appendix 4.B) conducted with agencies in fall 2022, including strengths, capacity ratings, how agencies incorporate hazard mitigation and climate adaptation into existing programs,

current obstacles and challenges, and key opportunities and ways to address resource needs.

- **Updated details** on how the Commonwealth administers the National Flood Insurance Program (NFIP) and Federal Emergency Management Agency (FEMA) mitigation programs.
- **Added a section and Appendix 4.C** on funding sources for hazard mitigation and climate adaptation actions.
- **Updated local capabilities and coordination** details, including roles of local jurisdictions, Tribal governments, and regional planning agencies, as well as current challenges and opportunities of local jurisdictions and Tribal governments.

4.1.2 State Capabilities and Adaptive Capacity

In strengthening capabilities since the 2018 MA SHMCAP to increase capacity to advance effective climate adaptation and hazard mitigation in Massachusetts, the Commonwealth has made many improvements that have contributed to the success of the overall program. The significant progress provides the Commonwealth with a strong foundation to build upon and provides state agencies and others with a lot to leverage as Massachusetts seeks to identify projects and actions that will result in state agencies and others implementing hazard mitigation and climate adaptation actions. Some key highlights include:

- Between the 2018 MA SHMCAP and 2023 MA SHMCAP update, agencies have identified over **180 existing capabilities and approaches** to reducing hazard risk and vulnerability, including strengthening engagement within Department of Conservation and Recreation's (DCR's) Flood Hazard program with FEMA Region 1 and proposed resilience-focused amendments to waterway regulations by the Massachusetts Department of Environmental Protection (MassDEP; see Appendix 4.A for more details).
- **Over 90 new capabilities and approaches** to reducing hazard risk and vulnerability have been added by state agencies to this 2023 MA SHMCAP update, such as developing the Resilient MA Action Team (RMAT) and the Massachusetts Department of Transportation (MassDOT) Rail Division's pilot Cape Main Line project, which identifies hot spots susceptible to embankment failures due to drought conditions (see Appendix 4.A for more details).
- **Updated and new policies, procedures, and standards** have been created by state agencies since 2018 to increase effectiveness for reducing risk and vulnerability across the Commonwealth, such as the current adoption process underway for the 2021 edition of the International Code Council (ICC) model building codes (see the examples highlighted throughout this section for more details).
- **Increased funding, support, technical assistance, outreach, and education to local jurisdictions** that has strengthened community capacity to implement local climate

adaptation and hazard mitigation projects, such as ongoing outreach from the DCR Flood Hazard Management Program (FHMP) to local officials around capacity building, partnerships, risk reduction, and resilience building (see Section 4.1.3, "Local Capabilities and Coordination," for more details).

- **Gaps still exist** in staffing, skills, authority, funding, data and information, and coordination, when it comes to agencies' adaptive capacity to reduce climate risks and improve resilience (see "Current Obstacles, Challenges, and Needs" in Section 4.1.2.2 for more details).
- **Moving forward, key opportunities to address gaps** include coordinating and engaging with the Office of Climate Innovation and Resilience and the Climate Chief (which is the nation's first such position at the cabinet level), building staff technical skills and knowledge areas, prioritizing agency funding to focus on hazard mitigation and climate adaptation gap areas, addressing data and information gaps, and continuing support and engagement in interagency collaborations and partnerships, as well as with local jurisdictions and environmental justice and other priority populations to fully leverage resources and build capacity (see "Opportunities and Ways to Address Resource Needs" in Section 4.1.2.2 for more details).

4.1.2.1 Existing State Capabilities

The Commonwealth of Massachusetts has a diversity and breadth of policies, programs, and other capabilities and approaches to adapt to a changing climate and mitigate hazards and vulnerabilities that are most consequential to its communities, environment, and economy (e.g., coastal erosion, coastal flooding, drought, earthquakes, flooding from precipitation, groundwater rise, hurricanes, invasive species, landslides and mudflows, other severe weather, extreme temperature, tornadoes, tsunamis, wildfires, winter storms). While some of these capabilities and approaches focus exclusively on hazard mitigation and climate adaptation, many provide a range of equitable benefits to communities and environmental justice and other priority populations, the economy, the natural environment, and critical assets and services throughout the Commonwealth. For more information on addressing equity in strategy implementation for hazards, please see Chapter 7 (State Strategy, Actions, and Implementation Plan).

Appendix 4.A summarizes the Commonwealth's hazard mitigation and climate adaptation capabilities and approaches. The appendix has been updated for the 2023 MA SHMCAP with the most current information on hazard mitigation and climate adaptation capabilities and approaches, as well as 2023 update notes, effectiveness, and opportunities for improvement. Existing capabilities and approaches are organized under five categories:

- **Planning and regulatory.** State laws, regulations, Executive Orders, enabling legislation, plans, policies, strategies, and guidelines that support risk reduction for the built environment and natural systems. This category includes hazard-related plans

and policies that improve or impede resilience to future hazard events and other future conditions, including the effects of climate change.

- **Administrative and technical.** State staff and technical resources or programs, including the expertise, data, tools, partnerships, and other capabilities that support institutional capacity building, including the capacity to design and implement actions to reduce risk and build resilience. These actions include land use policies and regulations, buy-outs, community engagement, infrastructure projects, green infrastructure, and climate adaptation for short-, medium- and long-term resilience.
- **Capital projects and asset management.** Capital improvement programs or other investments that support risk reduction, hazard mitigation, and climate adaptation for key state assets or critical infrastructure.
- **Financial.** Grants, capital projects/improvements, land acquisition, and other monetary investments by the Commonwealth that support hazard mitigation and climate adaptation for the built environment (recent and future developments), economy, jobs, communities, and natural systems, with a focus on environmental justice and other priority populations and sustainable approaches.
- **Education, outreach, and capacity building.** Technical assistance, training, education and awareness initiatives, public–private partnerships, Tribal partnerships and engagement, community partnerships and engagement, and nonregulatory incentives that support external capacity building.

Key new or major updates since 2018 on the existing capabilities and approaches are highlighted in the Section 4.1.2.2 below.

4.1.2.1.1 Comprehensive Statewide Program—State Agency Partnerships and Initiatives

The Commonwealth has a long history of demonstrating its commitment to advancing risk reduction and resilience across the state. This work encompasses a broad range of state-supported initiatives and activities that include a combination of outreach, training, technical assistance, funding, partnerships, research, and analysis to advance understanding of specific hazards and climate change influences, regulatory codes and statutes, infrastructure projects, and other activities to increase statewide resilience. Some specific examples that are either new or have major updates since 2018 are listed in Table 4-1; for a full list, see Appendix 4.A.

Table 4-1. Key New or Major Updates to State-Supported Climate Adaptation and Hazard Mitigation Initiatives and Activities Since 2018

Examples	Description
RMAT	The RMAT was launched in 2019 (as required by Executive Order 569) and is led by the Executive Office of Energy and Environmental Affairs (EOEEA) and the Massachusetts Emergency Management Agency (MEMA). An expanded version of its predecessor, the State Hazard Mitigation Interagency Committee, the RMAT is an interagency team composed of representatives from each Secretariat Climate Office, called Climate Change Coordinators, who are supported by agency staff, stakeholders, and subject matter experts. The RMAT is tasked with monitoring and tracking the MA SHMCAP implementation process, supporting and making recommendations on MA SHMCAP plan updates, and facilitating coordination across state government and with stakeholders. The RMAT led initiatives such as the climate communication workgroup, development of the Climate Resilience Design Standards Tool, and the 2022 MA Climate Assessment (see below).
EOEEA 2022 Massachusetts Climate Change Assessment	The 2022 Massachusetts Climate Change Assessment is a statewide analysis detailing how Massachusetts' people, environments, economy, and infrastructure may be affected by climate change and its related hazards through the end of the century. The assessment directly informed the 2023 MA SHMCAP update. The 2022 MA Climate Assessment includes updated statewide climate change projections to identify climate impacts across the Commonwealth's regions and sectors, as well as data-driven climate risk consequence and urgency ratings. The project was informed by Municipal Vulnerability Preparedness (MVP) Program plans and assessments as well as FEMA-approved Local Hazard Mitigation Plans and was guided by a stakeholder working group, an equity advisory group, and a series of regional conversations and workshops.
MassDOT Capital Investment Plan	Released in June 2022, the 2023–2027 Capital Investment Plan reflects the first five-year plan since the fiscal year (FY) 2020–2024 Capital Investment Plan, and the first since the COVID-19 pandemic began. A total of $14.9 billion is committed to investing in the Commonwealth's capital needs over the next five years. Approximately 52 percent of investments focus on improving the reliability and resilience of the existing core transportation system. For example, new highway formula funds from the Bipartisan Infrastructure Law will support climate change mitigation (carbon reduction and electric vehicle charging infrastructure) and address resilience of transportation assets.

Examples	Description
Model Building Code	The Commonwealth requires local governments to use a nationally applicable model building code that addresses hazards (including wind, flood, snow, seismic, and other hazards) as a basis for design and construction of new buildings and any state-sponsored mitigation projects. The Ninth Edition of the State Building Code became effective October 20, 2017, and is based on modified versions of the 2015 International Codes, as published by the ICC. Under the Ninth Edition, the design and construction of buildings and structures located in flood hazard areas must be in accordance with American Society of Civil Engineers (ASCE) standards, which are consistent with, and in some cases exceed, minimum NFIP requirements. As of November 2022, the Commonwealth is in the process of adopting the 2021 ICC model codes as the Massachusetts Tenth Edition, which has further improvements for design and construction requirements for buildings and structures in flood hazard areas. See the "Massachusetts Building Code Update and Enhancement" section below for more details on these upcoming updates.
Climate Resilience Design Standards and Guidance Tool	The Climate Resilience Design Standards and Guidance Tool is advancing prioritized cross-agency actions included in the 2018 MA SHMCAP. In spring 2021, state infrastructure grant programs piloted use of the tool, including the MVP Program and the MassWorks Infrastructure Program, offered though the Community One Stop for Growth. This effort has developed climate resilience design standards and guidance in the form of an online tool for state agencies in order to incorporate climate resilience into the Commonwealth's capital planning process and grant-making for local capital projects. The tool outputs are generated using best available climate science data for Massachusetts and can be enhanced over time to incorporate new science, additional or changing climate hazards, and ongoing stakeholder feedback. In October 2021, initial application of the tool to private and public projects was piloted through the Massachusetts Environmental Policy Act (MEPA) Interim Protocol on Climate Change Adaptation and Resiliency.

Examples	Description
DOER Leading by Example Program	Established by Executive Order 594 in 2021, the Department of Energy Resources' (DOER's) Leading by Example Program requires state agencies to prioritize practices and programs that address resource use at state facilities, including a reduction in energy consumption derived from fossil fuels and emissions associated with such consumption. The Executive Order also mentions the MA SHMCAP: "whereas, the Massachusetts Integrated State Hazard Mitigation and Climate Adaptation Plan directs the Commonwealth to continue to prioritize investments in clean energy resilience infrastructure projects at state facilities."
Local Hazard Mitigation Planning Equity Program	Initially supported by funding from EOEEA and the Emergency Management Grant Program, MEMA launched the Local Hazard Mitigation Planning Pilot Program in FY 2022. The program is now administered annually and provides funding to develop or update Local Hazard Mitigation Plans for Massachusetts cities and towns with environmental justice and other priority populations. One goal of the program is to demonstrate increased equity in mitigation planning and participation, and to prepare communities to apply for federal Hazard Mitigation Assistance (HMA) pre- and post-disaster funding allocated to the Commonwealth.
Massachusetts Drought Management Plan	The Massachusetts Drought Plan was updated in 2019 and was developed to maximize the state's ability to effectively prepare for and respond to drought conditions. The plan aims to minimize drought impacts to the Commonwealth by improving agency coordination; enhancing monitoring and early drought warning capabilities; and outlining preparedness, response, and recovery activities for state agencies, local communities, and other entities affected by drought. The plan lays out an integrated, multiagency approach to managing drought, with an emphasis on state-led preparedness and response actions as drought conditions change.

Examples	Description
Executive Order 604: Establishing the Office of Climate Innovation and Resilience Within the Office of the Governor	To support strategic, integrated action to meet the Commonwealth's climate goals, the Executive Order issued in 2023 directed the creation of an Office of Climate Innovation and Resilience, which will direct and advance climate innovation, mitigation, adaptation, and resilience policies. The Executive Order also created the appointment of a Climate Chief to lead this office and serve as a climate officer within the governor's cabinet, providing advice on climate-related policy, regulations, legislation, and initiatives, as well as guidance on potential funding or capital investment opportunities. In addition, each Cabinet Secretary was required to appoint a Secretariat Climate Officer charged with developing agency-specific climate plans and tracking, coordinating, and managing actions to advance the climate goals and policies laid out in the Executive Order and by the Office of Climate Innovation and Resilience.
Bill S.9: An Act Creating a Next-Generation Roadmap for Massachusetts Climate Policy	Pursuant to the Global Warming Solutions Act, as amended in 2021 by An Act Creating a Next-Generation Roadmap for Massachusetts Climate Policy, the Secretary of EOEEA adopted the interim 2025 statewide greenhouse gas (GHG) emissions limit of 33 percent below 1990 levels and the interim 2030 statewide GHG emissions limit of 50 percent below 1990 levels. In compliance with the new law, EOEEA developed and finalized the CECP for 2025 and 2030 (the 2025/2030 CECP; see more details later in this section).
Bill H.5060: An Act Driving Clean Energy and Offshore Wind	Passed in 2022, this law reinforced the Commonwealth's commitment to reaching emissions reduction targets of 50 percent by 2030. An Act Driving Clean Energy and Offshore Wind directed the further development of clean energy infrastructure, including for offshore wind, and supported measures for transportation electrification and building decarbonization. Interagency collaboration across the Commonwealth is essential to meet the goals outlined in this act.

The Commonwealth continues to take many steps to enhance its hazard mitigation and climate adaptation efforts through direct actions, partnerships, and coordination within and across Massachusetts, as well as with other states in the Northeast. Some state agencies and offices regularly engage in efforts to incorporate hazard mitigation and climate resilience as part of their organizational missions. See Appendix 4.A for descriptions of many of the agencies' functions, including their enabling legislation and current hazard mitigation and climate resilience efforts. Many of the Commonwealth's initiatives to strengthen resilience to hazards and climate change have been accomplished through partnerships and coordination between state agencies, such as the RMAT, which has expanded the Commonwealth's ability to coordinate actions (e.g., cross-government actions) across agencies. These initiatives include efforts to expand planning and

programmatic development, provide funding opportunities, and develop policies and procedures to enhance resilience at a statewide level, including those highlighted in Table 4-1 above. Other examples of these policies, interagency partnerships, and initiatives are described below.

Executive Order 569: Establishing an Integrated Climate Change Strategy for the Commonwealth

In September 2016, building on the Commonwealth's leadership to mitigate and adapt to climate change, former Governor Charlie Baker signed an Executive Order that included a comprehensive approach to further reduce GHG emissions; safeguard residents, municipalities, and businesses from the impacts of climate change; and build a more resilient Commonwealth. Executive Order 569, *Establishing an Integrated Climate Change Strategy for the Commonwealth*, was designed to be a collaboration between the Office of the Governor, EOEEA, the Executive Office of Public Safety and Security, MEMA, and other key state, local, and environmental stakeholders.

The Executive Order ensured Massachusetts will continue to lead state and local officials by example, including through collaborating across state government to reduce GHG emissions and build resilience within government operations and across the Commonwealth. It also directed EOEEA and the Executive Office of Public Safety and Security to lead development and implementation of a statewide comprehensive climate adaptation plan (i.e., the 2018 MA SHMCAP) to provide a blueprint for protecting the built and natural environment of the Commonwealth, based on the best available data on existing and projected climate change impacts. Additionally, each Executive Office was required to designate a Climate Change Coordinator to work to complete a vulnerability assessment for each office and assist with implementing and coordinating adaptation and mitigation efforts across state government. The 2018 MA SHMCAP, along with the separate vulnerability assessment reports created for state agencies as part of the plan development process, were developed pursuant to the Executive Order's framework.

Municipal Vulnerability Preparedness Program

Launched in 2017 in support of Executive Order 569, the MVP Program provides support for cities and towns in Massachusetts to plan for and implement actions to increase local resilience. Under the MVP Program, the Commonwealth awards funding to communities to complete vulnerability assessments and develop and implement resilience plans. The program helps communities: (1) define extreme weather and natural and climate-related hazards, (2) identify existing and future vulnerabilities and strengths, (3) develop and prioritize actions for each community, and (4) identify opportunities to take action to reduce risk and build resilience. A community that completes the MVP process becomes designated as MVP Community and is eligible for MVP Action Grant funding to implement the priority actions identified in its resilience plan.

The sixth round of MVP planning grants was awarded on August 30, 2022, totaling more than $32.8 million. Since the program's 2017 inception, approximately $100 million has been awarded to 349 towns or cities, or 99 percent of communities in the Commonwealth. In addition, more than 360 people have been trained in workshops across the state to provide technical assistance to communities to aid in the developing local assessment and resilience plans. In 2022, of the $32.8 million in grants announced, $32.6 million was awarded to 73 municipal projects that build local resilience to climate change. Additionally, $157,700 was awarded to six towns to pursue a community-led planning process to identify vulnerabilities to climate change and develop priority actions to respond to identified vulnerabilities.

Although administered primarily through EOEEA, the MVP Program is supported by other state agencies/offices that review applications, including MEMA, DCR, MassDEP, the Division of Ecological Restoration (DER) in the Department of Fish and Game, and the Office of Coastal Zone Management (CZM). For example, MEMA mitigation staff work closely with EOEEA to ensure opportunities to leverage existing mitigation planning efforts and resources are effectively coordinated at both the state and municipal levels. This work includes promoting the integration of MVP with existing processes to develop or update local hazard mitigation plans. Other technical assistance providers include representatives from regional planning agencies, local municipalities, nonprofit organizations, community organizations, academia, and private-sector companies.

Silver Jackets Team

The Massachusetts Silver Jackets Team launched in 2016 with the goal of reducing the risk of flooding and other natural disasters by bringing together multiple federal and state agencies. The interagency team facilitates a collaborative process of strategic and integrated mitigation actions to reduce the threat, vulnerability, and consequences of flooding in the Commonwealth of Massachusetts. Through the process of sharing and combining resources, funding, programs, and technical expertise, the team works toward the goal of proactively reducing flood risk.

In 2022, the team re-established legacy high water marks on publicly visible and publicly owned infrastructure in downtown Boston, helping the city engage the public in flood risk awareness and the need to take action to reduce these risks. From 2022 into 2023, the team also collaborated with partners on the Massachusetts Historic Structure Assessment Project to create guidance on floodproofing options and cost estimates that will help preserve historic buildings and properties on Cape Cod.

Floodplain Management Initiatives

Federal Executive Orders 11988 (*Floodplain Management*) and 11990 (*Protection of Wetlands*) require federal agencies to avoid direct or indirect support of development in the floodplain, and work to minimize harm to floodplains and wetlands. State agencies

reviewing federally funded projects or receiving federal grants for projects must take these Executive Orders into consideration.

Federal Executive Order 13690 (January 2015, rescinded in 2017, reinstated in 2021) established a higher level of federal flood risk management, including outlining the establishment of the floodplain, and a set of requirements for enhanced stakeholder engagement in these processes. Executive Order 13690 states, "It is the policy of the United States to improve the resilience of communities and Federal assets against the impacts of flooding. These impacts are anticipated to increase over time due to the effects of climate change and other threats. Losses caused by flooding affect the environment, our economic prosperity, and public health and safety, each of which affects our national security." The Commonwealth adopts the practices outlined in this Executive Order when considering floodplain requirements for projects under federal mitigation grants.

Numerous state agencies within the Commonwealth are involved in reviewing state and federal projects in the floodplain, as well as establishing and implementing the following Massachusetts state laws and policies regarding floodplain management:

- **Massachusetts Executive Order 149.** Enacted in 1978, Massachusetts Executive Order 149, *State Coordination and Participation with the Federal Administration Under the National Flood Insurance Act*, designates the Massachusetts Water Resources Commission as the state agency to implement floodplain management programs in Massachusetts. The Office of Water Resources in DCR provides technical and staff support to the commission, including scientists, hydrogeologists, and water policy specialists who undertake activities of the Commission. In addition to floodplain management technical assistance (per NFIP regulations) offered to local governments, residents, other agencies, nonprofit organizations, and industry professionals, DCR staff also review floodplain development proposals that trigger MEPA review. Since 2018, the number of requested MEPA projects for review have more than tripled, with this work becoming a major component of the work of FHMP staff.
- **Massachusetts Executive Order 181.** Enacted in 1980, Massachusetts Executive Order 181, *Barrier Beaches*, recognized the vulnerability of barrier beaches and the important role natural barriers play in providing storm damage prevention and flood control. To mitigate future loss of life and property, Executive Order 181 prohibited new development in velocity zones or on primary dunes, as well as seawalls and revetments on barrier beaches. It constrains the use of state funds and federal grants for construction projects that could encourage growth and development in barrier beach areas. CZM was tasked with barrier beach policy coordination and continues to provide technical assistance to local and state agencies on barrier beach management.
- **Wetlands Protection Act (WPA).** Massachusetts was one of the first states in the nation to pass wetlands protection laws, in the early 1960s. The WPA, found in Massachusetts General Laws (MGL) Chapter 131, Section 40, was codified as 310 Code of Massachusetts Regulations (CMR) Section 10.00. These regulations protect wetlands,

wetland functions, and public interest in wetlands, including flood control, pollution and storm damage prevention, and protection of water supplies and other natural resources and habitats. Multiple state agencies review actions that may alter wetlands, floodplains, lands under water, waterways, salt ponds, fish runs, and the ocean under the WPA.

- **Massachusetts Rivers Protection Act.** Enacted in 1996, the Massachusetts Rivers Protection Act (Chapter 258 of the Acts of 1996) amended the WPA to provide protection to approximately 9,000 miles of Massachusetts riverbanks. The act created a 200-foot riverfront area that extends on both sides of rivers and streams in the Commonwealth, protecting water quality benefits, preserving habitat, and providing flood risk reduction to surrounding lands.
- **Massachusetts State Building Code (MSBC).** MSBC 780 CMR (further described in the following section) is a statewide mandated construction code that is updated periodically, based on the ICC's recommended codes; it includes most of the federal construction requirements listed in the U.S. Code of Federal Regulations Title 44, Section 60.3 for floodplains as defined by FEMA Flood Insurance Rate Maps (FIRMs) under the NFIP. Other NFIP development requirements are included in the WPA or in the Commonwealth's Title V (310 CMR 15) requirements for sewage treatment and disposal. Finally, remaining NFIP standards can be found in the 2020 state model floodplain ordinance; these standards must be adopted at the community level, typically through municipal zoning bylaws. The Commonwealth monitors changes to the local codes as they pertain to mapped floodplain changes or related local practices.
- **Massachusetts Model Floodplain Bylaws.** Updated in 2020 (version 2), the Massachusetts Model Floodplain Bylaws is used to review local community bylaws or ordinances as part of the local map adoption process. The model helps local communities participating in the NFIP to understand the proper language for compliance with the NFIP.

Additionally, many local jurisdictions throughout the Commonwealth have adopted laws, regulations, and policies to advance hazard mitigation and climate adaptation across Massachusetts.

Massachusetts Building Code Update and Enhancement

The State Board of Building Regulations and Standards (BBRS) administers the MSBC (found at 780 CMR), which consists of a series of international model codes and any state-specific amendments adopted by the BBRS during the promulgation process. The BBRS regularly updates relevant provisions of the MSBC as new information and technology become available.

The Commonwealth requires mandatory enforcement of the statewide building code and does not allow local amendments to this code. The Commonwealth adopts a plumbing and electrical code that provides requirements and certifications for plumbers and

electricians working in Massachusetts. The Commonwealth also has a program in place for building code inspection certification, which includes taking classes prior to examination and certification, requires continuing education, and allows consumers to file complaints against inspectors. Massachusetts also requires licensing of general, plumbing, electrical, and roofing contractors; requires licensing candidates to pass an examination prior to licensing; and requires continuing education.

The current Ninth Edition of the MSBC (issued in 2017; see note below on upcoming Tenth Edition) is based on the 2015 ICC's recommend International Codes. There are currently three tiers of building energy efficiency code options available to municipalities in Massachusetts. While as a baseline, all municipalities must comply with the Base Energy Code; one step beyond these requirements is the Stretch Code. First adopted by Massachusetts in 2009, and updated every few years since, the Stretch Code contains additional amendments that provide for constructing buildings that are more energy efficient than those built to the base specifications. Above the Stretch Code, and available only as of 2023, is the Specialized Energy Code. This code contains all the amendments of the Stretch Code as well as additional requirements to ensure new construction is consistent with state GHG limits. Municipalities must vote to adopt the Stretch and Specialized codes in place of the Base Energy Code. As of February 2023, 296 municipalities in the Commonwealth have adopted the Stretch Code. In addition, four municipalities have adopted the Specialized Energy Code.

The Ninth Edition of the MSBC also contains a series of requirements for flood-resistant design and construction that are in accordance with the ASCE 24 standard, which incorporates—and in certain areas exceeds—FEMA's NFIP construction standards. Highlights of ASCE 24 that complement the NFIP minimum requirements include requirements for building performance; flood damage–resistant materials, utilities and service equipment, and siting considerations. Specific requirements for designing flood elevations and using flood-resistant materials may be found in the ASCE tables included in 780 CMR Section 1612.4. Additional state-specific higher standards for flood-resistant construction in coastal dunes may be found in Appendix G of the MSBC. For example, the state requires the use of pilings in coastal dune areas, even if the areas are not in a mapped velocity flood zone (V Zone) and has higher elevation requirements than the NFIP (the lowest floor must be built to at least 2 feet above a dune). Freeboard requirements are found in all FEMA 1 percent annual chance floodplain areas.

Specific requirements in the Ninth Edition Building Code that affect development and redevelopment in coastal flood zones include: (1) in new or substantially improved buildings in V Zones, utilities may no longer be located below the FEMA base flood (1 percent annual chance) elevation, and (2) new or substantially improved buildings in A Zones (areas inundated by the base flood with no base flood elevations determined) must be elevated so the lowest floor surface is at least 1 foot above the FEMA base flood elevation. New or substantially improved (i.e., 50 percent or more of the market value)

buildings in V Zones must continue to be elevated so the bottom of the lowest horizontal member is at least 2 feet above the FEMA base flood elevation.

As of November 2022, the Commonwealth is in the process of adopting the 2021 edition of the ICC model codes (Tenth Edition of the MSBC), which have further improvements for design and construction requirements for buildings and structures in flood hazard areas. Example improvements include:

- Defined the new Specialized Opt-in Code, which allows municipalities that wish to adopt stricter local building codes to go beyond the Base Energy and Stretch codes.
- Updated the 2021 International Building Code snow map to match ASCE 7-16 snow maps and updated secondary rain loads to be consistent with ASCE 7.
- Added frost protection for egress doors to the foundati
- on requirements.
- Added additional freeboard in all FEMA Special Flood Hazard Areas.
- Included the International Building Code regulations for coastal A Zones.

In addition, in 2023, the Executive Office of Housing and Economic Development (EOHED) plans to conduct a statewide building code study and develop a local floodplain management action guide (see text box to right).

MCBS Study and Local Floodplain Management Action Guide

Starting in 2023, EOHED plans to undertake a building code study that includes:

- Assessing the MSBC for needs and options to improve floodplain management standards, taking into account best available statewide climate change projections
- Developing a guidance document to assist municipalities to take impactful local action to improve floodplain management standards within their geographic jurisdictions

Coastal Management Initiatives

With more than 1,500 miles of coastline in Massachusetts—much of it vulnerable to hazards and climate change—the Commonwealth's coastal management initiatives are critical to consider in the context of risk reduction and climate resilience. CZM is the lead policy, planning, and technical assistance agency on coastal issues in EOEEA. Hazard mitigation and climate change adaptation are fundamental to CZM's mission and program areas, which play a strong role in various risk reduction activities at state, regional, and local levels. Some of the more notable initiatives include:

- **StormSmart Coasts.** This national model launched by CZM in 2008 is designed to help communities and homeowners address coastal erosion, storm damage, flooding, and related issues. The StormSmart Coasts website includes information on assessing the vulnerability of coastal properties to erosion and flooding, tools for local officials to improve coastal floodplain management, options for coastal property owners to

reduce erosion and storm damage while minimizing impacts to shoreline systems, landscaping options for controlling erosion and storm damage, interactive maps of Massachusetts coastal erosion, and available grants.

- **Shoreline Change Project.** CZM developed and maintains the Shoreline Change Project in cooperation with the U.S. Geological Survey to inform vulnerability assessments and planning. Historical shorelines from the mid-1800s to 2018 have been delineated and used to compute long-term (100+ years) and short-term (approximately 30 years) rates of erosion.
- **Sea Level Rise and Coastal Flooding Viewer.** CZM developed this online tool to support the assessment of coastal flooding vulnerability for community facilities and infrastructure, consistent with Executive Order 569. The viewer launched in 2017 with interactive maps of flooding associated with National Oceanic and Atmospheric Administration (NOAA) sea level rise scenarios, FEMA coastal flood zones, and current worst-case hurricane storm surge modeled by the U.S. Army Corps of Engineers. In March 2023, CZM released an updated viewer with future storm surge scenarios produced from the Massachusetts Coast Flood Risk Model. Locations consisting of a wide range of public facilities and infrastructure assist state, regional, and local planners and other stakeholders in conducting vulnerability assessments to these coastal hazards and climate effects.
- **Coastal A Zone Mapping.** To improve coastal flood hazard mapping in Massachusetts, DCR Flood Hazard Management and CZM partnered in 2015 to delineate the Limit of Moderate Wave Action (LiMWA) for 15 coastal communities. FEMA updated these maps in July 2021. LiMWA is the inland limit of the area expected to receive 1.5-foot or greater breaking waves during the 1 percent annual chance flood event. FEMA FIRMs that went into effect in 2009–2013 for Massachusetts coastal counties were based on studies initiated in 2005 and did not include LiMWA lines. The addition of the LiMWA to FIRMs allows communities and individuals to better understand the flood risks to their property. To make the most accessible and accurate information on coastal A Zone boundaries available, DCR and CZM use information on coastal A Zone boundaries for the entire Massachusetts coast from FEMA's published Flood Insurance Studies. Through this initiative, the LiMWA was mapped based on the coastal storm surge and wave modeling data from the most recent FEMA coastal Flood Insurance Studies for coastal communities. The data have since been approved and incorporated into FEMA's National Flood Hazard Layer as of 2021.
- **Increasing Resilience Through Application of Nature-Based Infrastructure.** From 2015–2022, CZM participated in a Northeast Regional Ocean Council effort to increase resilience to sea level rise in New England through the effective use of nature-based infrastructure for reduced erosion and enhanced wave attenuation. The effort included region-specific information on suitable natural infrastructure types (i.e., "living shorelines"), and the council partnered with several communities to implement and monitor a range of nature-based coastal infrastructure projects. The experience and

lessons gained through this project help identify successful approaches and models to reduce coastal erosion and flooding.

- **Metro Boston Coastal Resilience Study.** The Commonwealth received an authorization through the 2020 Water Resources Development Act that allows for a funding agreement with the U.S. Army Corps of Engineers to conduct a planning study to address climate resilience at a regional scale. The study includes a regional vulnerability assessment and identifies recommended regional adaptation strategies and an implementation framework that builds on existing local plans and priorities.

Energy Resilience Initiatives

There are several agencies in the Commonwealth that design, implement, and/or manage programs and initiatives focused on energy resilience. For example, DOER develops and implements policies and programs aimed at ensuring the adequacy, security, diversity, and cost-effectiveness of the Commonwealth's energy supplies to create a clean, affordable, and resilient energy future for all residents, businesses, communities, and institutions. Examples of new or key updates since 2018 to agency efforts to advance energy resilience in Massachusetts are highlighted in Table 4-2.

Table 4-2. Key New or Major Updates to Energy Resilience Initiatives Since 2018

Initiative	Description
Section 40101(d) of the Bipartisan Infrastructure Law: Preventing Outages and Enhancing the Resilience of the Electric Grid Formula Grants to States and Indian Tribes	The Department of Energy will provide grants to states, U.S. territories, and Indian Tribes to improve the resilience of their electric grids. States and Indian Tribes may further allocate funds to "eligible entities," as defined by Section 40101(d). These grants offer a unique opportunity to advance the capabilities of states and Indian Tribes, as well as their communities, to address not only current, but future resilience needs. Applicants shall provide a "Head of Government Letter" documenting their appointment as the sole entity within the state or Indian Tribe to apply for, receive, and administer the award and a "Program Narrative" to define a planning framework for resilience to address all hazards including future climate implications by March 31, 2023, for the first two years of program funding. The Massachusetts Clean Energy Center and DOER hosted a public webinar on potential program design in January 2023.
Clean Energy Results Program and Gap III Energy Grant Program	Led by MassDEP, the Clean Energy Results Program is a partnership with DOER and the Massachusetts Clean Energy Center that reduces regulatory or other barriers to clean and energy-efficient development across the state. The Gap Grant is a streamlined energy grant funding model that has helped municipal water utilities reduce their energy usage and operating costs, as well as improve the environment. In January 2023, an expanded Gap III Energy Grant Program provided $8.1 million of grant awards to 62 organizations, including 40 municipal drinking water and

Initiative	Description
	wastewater facilities, 12 nonprofit affordable multi-family housing organizations, seven agricultural and food-producing nonprofits, and three small businesses. These projects are anticipated to save these organizations up to $1,642,963 in annual energy cost savings and more than 9,000 megawatt hours in annual electricity savings or on-site generation of clean energy, as well as reduce carbon emissions by 3,359 metric tons annually.
Clean Energy and Climate Plan	The 2025/2030 CECP, released in June 2022, provides details on the actions the Commonwealth will undertake through the next decade to ensure the 2025 and 2030 emissions limits are met. The 2025/2030 CECP development is informed by the 2050 Decarbonization Roadmap. Furthermore, the CECP for 2050, released in December 2022, provides details on the actions the Commonwealth will undertake to be on a pathway to achieve net zero GHG emissions by 2050.
Clean Peak Energy Standard	The Clean Peak Energy Standard was established by DOER in 2021 and designed to provide incentives to clean energy technologies that can supply electricity or reduce demand during seasonal peak demand.
Regional Greenhouse Gas Initiative	As a nation-leading energy efficiency program, DOER held hearings in 2018 on proposed amendments to the Regional Greenhouse Gas Initiative program. The overall changes to the program "will cause real reductions in greenhouse gas emissions and, in accordance with the Green Communities Act, the economic proceeds will be invested in programs to promote energy efficiency, conservation and demand response."
Clean Energy Standard	MassDEP finalized amendments to the Clean Energy Standard in November 2022, which "improve consistency with federal requirements, reflect the GHG reporting program's transition to a new electronic platform, and remove requirements that are burdensome to facilities." The Clean Energy Standard requires retail electricity sellers to demonstrate the use of clean energy to generate a specified percentage of their electricity sales on an annual basis.

Other ongoing state agency energy resilience initiatives include:

- **Community Clean Energy Resiliency Initiative.** The Community Clean Energy Resiliency Initiative was designed to help address service interruptions to critical infrastructure caused by hazards and climate change. The $40 million grant program funded technical assistance, as well as project implementation, for police and fire

dispatch, emergency shelters, hospitals, and critical water infrastructure facilities to use clean energy technologies—including combined heat and power, solar photovoltaic, and energy storage technologies—to mitigate and address the impacts of climate change. As of 2023, funding is no longer available from this program, but grant recipients are continuing to implement their funded projects.

- **Energy Storage Initiative.** The Energy Storage Initiative was a $20 million grant program designed to demonstrate how energy storage can improve grid operations, reduce energy costs, provide backup power through storms, and benefit the local economy. The initiative aims to make the Commonwealth a national leader in the emerging energy storage market, requiring a 1,000 megawatt hour energy storage target to be achieved by December 31, 2025.
- **Solar Massachusetts Renewable Target (SMART) Program.** Launched in 2017, the SMART Program provides incentives to advance development of distributed solar photovoltaic electricity generation across the Commonwealth. The DOER regulation in 225 CMR 20.00 sets the regulatory framework for the program. The SMART Program is the nation's first to incorporate an incentive to pair energy storage with solar technology. Incorporating energy storage with distributed solar generation can enable the solar technology and the stored energy to continue serving on-site loads through a power outage, improving a facility's energy resilience.

Transportation Resilience Initiatives

Established in 2018 through Executive Order 579, the Commission on the Future of Transportation in the Commonwealth advises the Administration on future transportation needs and challenges. The commission is focusing on five key areas to improve transportation resilience: climate change and resilience; transportation electrification; autonomous and connected vehicles, including ride-sharing services; transit and mobility services; and analysis of the relationship between transportation and land use and demographic trends, with a focus on technology, climate, and new business models. The commission delivered a report that included, among others, a recommendation to substantially reduce GHG emissions from the transportation sector while accelerating efforts to make transportation infrastructure more resilient. This included a sub-recommendation to complete vulnerability assessments of all publicly owned or funded transportation infrastructure to inform capital planning and disseminate resilience-oriented design standards for transportation infrastructure. By 2020, it recommended no transportation infrastructure should be built that does not conform to these standards.

MassDOT's 2050 Statewide Long-Range Transportation Plan, entitled Beyond Mobility, launched in October 2021 and will articulate a set of priority areas and actions that reflect MassDOT's values, vision for the future of transportation, and existing problems based on public input and data analysis. Other tasks include public engagement, scenario planning, financial planning, needs assessment, and recommendations. MassDOT has intentionally

placed public engagement at the center of the Beyond Mobility planning process with a focus on equitable and inclusive outreach.

The draft priority areas include resilience as an important area for MassDOT to address through potentially identifying uses of new federal resilience funding, as well as future studies that could inform other initiatives. The final plan will also consider electrification across all modes and technological changes as important areas for MassDOT to address through its ongoing work, largely through actions that are aligned with those included in the 2025/2030 CECP.

Annually, MassDOT includes resilience in its Capital Investment Plan by proposing investments that help to mitigate the impacts of climate change and/or improve the resilience of our transportation network to better withstand natural hazards.

Key new MassDOT resilience efforts since 2018 include:

- Announced in 2021, the city of Boston, the Boston Planning & Development Agency, MassDOT, EOEEA, and DCR launched a joint planning effort to **evaluate and recommend transportation and infrastructure improvements** intended to enhance mobility and safety for pedestrians, transit users, cyclists, and motorists, and strengthen climate resilience at Dorchester's Kosciuszko Circle and along Morrissey Boulevard.
- In 2020, MassDOT awarded $806,880 in grants to support **culvert replacement projects that reduce flood risks** to municipal roads and river health in communities across the Commonwealth.
- MassDOT is conducting a **Flood Risk Assessment** to understand inland and coastal vulnerability of critical assets, including National Highway System roads, bridges, and large culverts; railroads; staff and equipment facilities; and public-use airports. It assesses damage and repair costs and time estimates for repairs, in addition to considering the consequences from loss of service.
- In collaboration with the Woods Hole Group, MassDOT developed the Massachusetts Coastal Flood Risk Model in 2019 to help anticipate how climate-related hazards (i.e., sea level rise and coastal storm events) will influence future coastal flood risks in the Commonwealth and assess potential flooding vulnerabilities to transportation infrastructure throughout the coastline.
- Since 2018, the Massachusetts Bay Transportation Authority (MBTA) has completed **climate change vulnerability assessments** and **flood screening reports** of its entire operations and continues to assess its system for vulnerabilities by conducting more detailed assessments (see a complete list of MBTA's vulnerability assessments here). Executed and coordinated by its Environmental Department, MBTA is eager to adopt and operationalize the findings from the most recent assessments, completed between January 2021 and August 2022, and focused on data and decision-making tools, strategic planning, capital planning, asset management, engineering and design,

emergency and risk management, and interagency collaborations. For more details on MBTA's capabilities, see Appendix 4.A.

4.1.2.2 Adaptive Capacity of State Agencies

Following is an analysis of the adaptive capacity of individual state agencies[1] informed by a survey conducted with the agencies in fall 2022, in which 85 of 94 agencies responded (Appendix 4.B).[2] **State agency adaptive capacity** is defined as the ability of state agencies (including their assets, functions, missions, services/programs, and service populations and customers) to adjust or modify their operations, policies, or other functions to adapt to changing hazards and climate change impacts, in the short, medium, and long terms. Example updates of state agency adaptive capacity and MA SHMCAP actions since 2018 are highlighted in Figure 4-1 below.

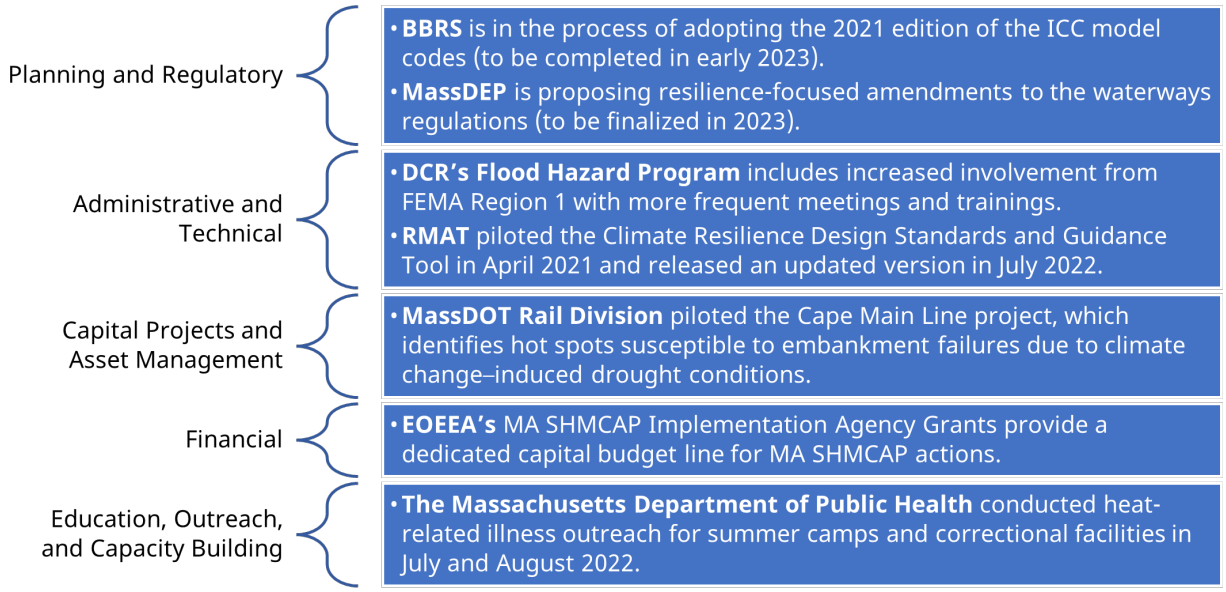


Figure 4-1. Example updates since 2018 on agency actions to increase adaptive capacity.

[1] "Agency" is used here as a term to encompass the various departments, divisions, offices, boards, bureaus, committees, and commissions surveyed.

[2] Given nine agencies did not respond, some results may be skewed. Additional agency data collected as part of the state agency survey include information related to the continuity of agency operations and functions during a hazard event that result in damage, disruption, or loss of state agency physical and nonphysical assets and service, as well as restoration times, and other strategies to reduce state agency vulnerabilities. Since these responses relate more directly to the vulnerability and resilience of state assets and functions, this information is included in Chapter 6 (State Agency Vulnerabilities).

Key findings from document review and agency survey responses are highlighted below. Notable examples or additional comments on specific agency capabilities, plans, policies, or other available resources to support agencies' adaptive capacity to reduce risk and increase climate and hazard resilience are highlighted in text boxes.

Spotlight: Massachusetts Telecommunicator Emergency Response Taskforce (TERT) Program

The Massachusetts Executive Office of Public Safety and Security and State 911 Department plan to implement the TERT Program on December 1, 2022. Developed in partnership with the Statewide Office of Public Safety Interoperability and the Massachusetts Chapter of National Emergency Number Association, the program is a team of certified and credentialed public safety telecommunicators who respond, relieve, assist, and/or augment public safety answering points affected by human-made or natural disasters.

4.1.2.2.1 Current Strengths

Based on agency survey responses, the following strengths represent key themes around agency abilities to address current hazard risks that are increasing in frequency, intensity, duration, and/or geographic location due to climate change.

Agencies' existing available resources to reduce hazard and climate risks are mainly directed toward emergency preparedness and response. However, agencies that are prepared for and mitigate hazard risks subsequently reduce overall risk impacts and costs. In order to manage repeated hazards, agencies regularly monitor their assets and unique vulnerabilities. For example, they may regularly test emergency power sources, survey properties for potential sources of damage, and ensure communication modes are functional. Many also have backup power sources and secure online file storage to be prepared for emergency situations. Another key strategy is utilizing technology to build capacity for remote work and creating plans to shift to remote operations when needed. Some agencies currently conduct a significant portion of their work remotely, while others ensure the option is available for emergency situations. Agencies also frequently reported that they have plans for how to respond in an emergency, and some have additional plans for how to adapt to overall changing conditions. These plans include support for keeping Continuity of Operations and/or Emergency Response Plans in place and up to date to direct operations during emergency response actions. In cases when hazards are likely to occur repeatedly, agencies often review and update these plans to address the most current conditions. While the majority of these resources are focused on emergency response, they are important building blocks to increasing hazard mitigation and climate adaptation implementation in Massachusetts.

Furthermore, there are ongoing state interagency collaborations and partnerships designed to advance hazard mitigation and climate adaptation understanding, funding, and actions. Some of these interagency partnerships support the reduction of risk from hazards and climate change through managing ecosystems. Other partnerships coordinate responses to emergencies and ensure the timely recovery of essential services.

Example Interagency Collaborations and Partnerships

- 2022 MA Climate Assessment
- Drought Management Task Force
- Massachusetts Silver Jackets, New England District
- MEMA State Emergency Response Commission
- Resilient Lands Initiative
- RMAT
- HMA Interagency Review Panel
- Coordinated Statewide Emergency Preparedness in Massachusetts

For more information on challenges and opportunities of interagency collaborations and partnerships, see the subsections below.

The Commonwealth's whole-of-government approach to climate action is exemplified by the establishment, in 2023 through Executive Order 604, of the Office of Climate Innovation and Resilience within the Governor's Office. The Office is led by the Climate Chief, who advises the governor on climate-related matters and coordinates policies across state agencies and communities. Additionally, there are collaborations that focus on drought, reducing flood risk, increasing community resilience, protecting public health, and obtaining federal hazard mitigation grants, among other topics. One example is the Drought Management Task Force (DMTF) chaired by EOEEA and MEMA. The DMTF consists of officials from state and federal agencies and professional organizations with responsibility for geographic areas and social and environmental issues likely to be affected by drought conditions. The drought task force also includes representatives with technical expertise, drought response roles, public health agencies, and public safety responsibilities. The DMTF collects information and makes recommendations for drought management in the Commonwealth.

In addition to partnerships and collaborations, some state agencies have added full-time staff positions, contractor support, or part-time roles to support and advance hazard mitigation and climate adaptation work. For example, DER has added 10 new positions since 2018 to increase capacity to address current risks and respond to and plan for climate change, as well as provide enough capacity to support building capacity in external partner organizations and agencies.

4.1.2.2.2 Overall Capacity Rating

The overall capacity rating is a self-assessment rating of the agency's overall capacity and capability to reduce impacts from current and future hazards. Ratings were identified in response to a closed-ended survey question with the following potential ratings:

- **Adequate.** The resource is available and accessible to my agency; my agency is not constrained in its implementation of climate adaptation and hazard mitigation actions,

strategies, and projects based on a lack of this resource or the ability and authority to use it.

- **Limited.** The resource is available and accessible in a limited way to my agency; my agency has some limits regarding availability, access, or capacity related to this resource. These limits have an effect on my agency's ability to implement climate adaptation and hazard mitigation actions, strategies, and projects.
- **Constrained.** This resource is not available and/or accessible to my agency; my agency is constrained in its implementation of climate adaptation and hazard mitigation actions, strategies, and projects based on the lack of this resource and/or the ability and authority to use it.

Agencies self-assess the rating of their overall capacity and capability to reduce impacts from current and future hazards in the resource categories of funding, staff, data/information, expertise/skills, authority, and infrastructure/hardware. Agencies identified specific resource types in each of these categories to rate whether their capacity and capability is adequate, limited, or constrained (see definitions above). Table 4-3 below highlights the high-level resource category ratings, where funding and staff are most constrained (and a significant challenge to acquire), and infrastructure/hardware and authority are adequate (and a less significant challenge to acquire).

Table 4-3. Overview on Ratings of Agencies' Self-Assessed Capacity and Capability in General Resource Categories (Out of 85 Participants)

Resource Category	Does your agency have the resource?	My agency has capacity and capability to reduce impacts from current/ future hazards	This is a significant challenge for our agency
Funding (e.g., hazard mitigation planning funds, operating budget, capital budget, grants, bonds)	Y = 39% N = 61%	Adequate = 35% Limited = 42% Constrained = 23%	31%
Staff (e.g., skilled staff, dedicated staff, hazard mitigation staff, data analysts, emergency response coordinator)	Y = 40% N = 60%	Adequate = 36% Limited = 34% Constrained = 30%	29%
Data/information (e.g., monitoring data, data sharing, vulnerability and hazard response data, climate-based emergency/climate modeling, climate communications)	Y = 29% N = 71%	Adequate = 43% Limited = 34% Constrained = 23%	25%

Resource Category	Does your agency have the resource?	My agency has capacity and capability to reduce impacts from current/ future hazards	This is a significant challenge for our agency
Expertise/skills (e.g., climate science/adaptation/ mitigation, project management, grant writing, LIDAR)	Y = 25% N = 75%	Adequate = 43% Limited = 25% Constrained = 32%	22%
Infrastructure/hardware (e.g., backup generator, portable heating/cooling units, hatchery retrofits, email firewall and security infrastructure, drones/sensors, sandbags)	Y = 23% N = 77%	Adequate = 58% Limited = 25% Constrained = 17%	21%
Authority (e.g., Continuity of Operations Plan, policy, laws, programs)	Y = 17% N = 83%	Adequate = 55% Limited = 23% Constrained = 22%	19%

4.1.2.2.3 Incorporating Hazard Mitigation and Climate Adaptation into Existing Programs

This section describes current agency efforts to incorporate hazard mitigation and climate change adaptation into existing programs.

Agencies consider hazards and climate change impacts in their work in a variety of ways, depending on the services they provide, their assets and functions, their service populations, and their customers, as well as what each agency relies upon to function, and who and what relies on them. The most frequent ways agencies reported incorporating hazard mitigation and climate adaptation include:

- Developing specific policies, plans, or programs or integrating hazard and climate into existing policies, plans, or programs.
- Planning for and responding to hazard events through preparation, response, and recovery.
- Providing maintenance, operation, and repair for their assets and services to reduce current and future risk and considering replacement schedules and lifecycle with hazards and climate change in mind.
- Providing funding for hazard mitigation and adaptation efforts, either internally to advance agency mitigation actions or externally through grant programs.

In addition to the bulleted actions described above, some agencies conduct work that, by definition, addresses hazard mitigation and climate adaptation. For example, DER's primary role is to plan and implement ecological restoration projects, many of which deal with aquatic environments. These restored ecosystems can mitigate climate risks such as flooding and sea level rise, as well as provide additional ecological benefits. Similarly, DCR enforces the Massachusetts Forest Cutting Practices Act (FCPA; MGL Chapter 132). The FCPA was created to ensure the continuation of long-term public benefits provided by forests, which requires rehabilitating, maintaining, and protecting forestlands for a multitude of purposes (e.g., conserving water, preventing floods and soil erosion, improving conditions for wildlife and recreation, ensuring a continuous supply of wood). The FCPA ensures these services continue to be provided and upheld through a required permitting process, which is applicable to commercial timber harvests on both public and private forestland.

Spotlight: MBTA Climate Change Vulnerability Assessments

MBTA conducts assessments to understand the risks posed by climate change to its transportation system assets. The findings of these assessments inform a variety of MBTA's plans and projects, including its five-year Capital Investment Plan, infrastructure design and construction standards, and emergency management activities.

For other agencies, considering future risks and climate resilience is essential for planning future projects or improvements. For instance, when scoring long-term infrastructure project proposals, EOHED includes climate resilience as a consideration to ensure their investments will be worthwhile. Similarly, the Department of Housing and Community Development assists Local Housing Authorities with ensuring they identify potential hazards to new developments and that structures are sited and designed to minimize these risks.

Examples of Federal, State, Regional, and Local Efforts to Support Hazard Mitigation and Climate Adaptation in Massachusetts

Below are examples of efforts being conducted by the Commonwealth and others that support the state's efforts on hazard mitigation and climate adaptation (as identified by survey respondents and document review). For a more comprehensive list, see Appendix 4.A.

- BEH Environmental Toxicology Program Statewide Survey of Local Health Department Capacity to Address the Health Impacts of Climate Change
- Bureau of the State House Hazards and Vulnerabilities Assessment
- Cape Cod Climate Action Plan
- Community Wildfire Protection Plans
- DCAMM Climate Resilience Checklist and the Asset Risk Ratings
- DCR Charles River Vegetation Management Plan
- DCR Forest Action Plan
- DCR Forest Cutting Practices Act
- DCR Land Protection Strategy
- DCR Office of Cultural Resources Cultural Resources Inventory
- DCR Standards for Trail Crossings
- DCR Watershed Protection Plan
- DER Restoration Potential Model tool
- DMF Boating Infrastructure Grants
- DMF Clean Vessel Act
- DoD Climate Assessment Tool
- DOER State Energy Security Plan
- EOEEA 2022 MA Climate Assessment
- EOEEA 2025/2030 Clean Energy and Climate Plan
- EOEEA 2050 Clean Energy and Climate Plan
- EOEEA Healthy Soils Action Plan
- EOEEA Resilient Land Initiative
- EOEEA Statewide Comprehensive Outdoor Recreation Plan Massachusetts Coast Flood Risk Model
- Massachusetts Local Food Action Plan
- Massachusetts Silver Jackets Team
- Massachusetts Threat Hazard Identification and Risk Assessment
- MassDEP Asset Management Planning Grant Program
- MassDEP Climate and Hydrologic Risk Project
- MassDOT & DEP Statewide River Hydraulic Model
- MassDOT Aeronautics Drone Program
- MassDOT fluvial geomorphology training program
- MassDOT Pilot Deerfield Watershed Vulnerability Assessment
- MassDOT Transportation Asset Vulnerability Assessment
- MassECAN Coldwater Habitat Working Group
- MassECAN Salt Marsh Working Group
- MassWildlife Prescribed Fire Plans
- MassWildlife Project Screening Tool
- MassWildlife State Wildlife Action Plan
- MDAR Farmland Action Plan
- MEMA Comprehensive Emergency Management Plan
- MEMA Local Hazard Mitigation Planning Program
- MEMA Massachusetts State Hazard Mitigation and Climate Adaptation Plan
- MEPA Interim Climate Adaptation and Resiliency Policy
- National Fish, Wildlife, and Plants Climate Adaptation Network
- National Wildlife Federation's Climate Adaptation for DoD Natural Resource Managers Guide
- Northeast Climate Change Working Group
- Special Legislative Commission on Ocean Acidification's Report

4.1.2.2.4 Current Obstacles, Challenges, and Needs

Below are existing barriers to an agency's ability to reduce risks to agency assets, functions, missions, services and programs, and service populations and customers

through hazard mitigation and climate adaptation actions designed to increase climate and hazard resilience.

The key challenges state agencies face to effectively address hazard mitigation and climate adaptation are:

- **Funding.** Agencies have limited capital and operating budgets to address hazard mitigation and climate adaptation. Agencies need more funding from all sources, including federal, state, and grant funding to support specific projects and programs, as well as broader hiring, planning, research, and implementation.
- **Staff.** Many agencies do not have adequate staff to address hazard mitigation and climate adaptation. Difficulties include limited financial resources to support additional staff, challenges hiring and retaining qualified staff, and general staffing shortages. For those staff that do work on hazard mitigation and climate adaptation, often this is not their full-time responsibility but rather one of many priorities they must fit into an already significant workload.
- **Expertise and skills.** Agencies need additional hazard and climate expertise in topics including information technology, climate adaptation, resilience assessments, LIght Detection and Ranging (LIDAR) analysis, disaster recovery planning, water resources and hydrology, flooding and droughts, water use and efficiency across multiple sectors, nexus between land use development and water, stormwater management, and marine fisheries and aquaculture.
- **Data and information.** Agencies lack climate-specific information including climate modeling data, climate science and resilience data and metrics, and communication and engagement strategies about climate change and adaptation, as well as current and future risk. Additionally, agencies need to conduct assessments such as surveys, risk analyses, and vulnerability assessments to generate information on the specific hazards they face and impacts on environmental justice and other priority populations, such as developing overlays on increased flooding vulnerabilities across the Commonwealth and, in particular, where vulnerabilities intersect with at-risk populations. Agencies also need to create and update data repositories, such as statewide databases on water use and management in multiple sectors (e.g., municipal, district, commercial, institutional, industrial, public sector). Data for strategic planning that integrates considerations of hazard mitigation and climate adaptation is also lacking, including data for master planning, budgets and grants, geographic information systems (GIS), and asset management.

Similarly, the top challenges of current interagency collaborations and partnerships (as identified by surveyed agency representatives) included staffing/skills, authority/ bureaucracy, funding, data (including data communication), and coordination.

In addition to the obstacles, challenges, and needs described above, it is important to consider the effects that constrained state agency resources have on environmental

justice and other priority populations. Many communities that have faced past discrimination, environmental and social injustice, and a lack of investment are at greater risk from hazards and climate change at both a community and individual level. With limited resources to reduce risks and increase resilience, these communities will continue to face disproportionate risks, which will increase with climate change. This issue must be assessed when evaluating the resources available to advance hazard mitigation and climate adaptation, including where to prioritize any available resources.

4.1.2.2.5 Funding Sources for Hazard Mitigation and Climate Adaptation Actions

Given the hazards that are most consequential for Massachusetts and the geographies and physical and non-physical assets at risk, the Commonwealth should focus on funding sources available to reduce coastal and inland flood risk, address invasive species, provide resources to prepare for extreme heat and wildfire risks, and build resilience for coastal resources. Federal funding programs and agencies that support these issues include NOAA and U.S. Environmental Protection Agency funds for coastal and wetland resilience, as well as green infrastructure strategies. The U.S. Department of Agriculture has federal programs to address invasive species through its National Invasive Species Information Center. In addition, urban heat island funding is available through the Inflation Reduction Act's Neighborhood Access and Equity Grants, which include funding for transportation improvements and heat mitigation projects, and the U.S. Forest Service's Urban and Community Forestry Program, which is also receiving substantial funding from the Inflation Reduction. With a significant amount of infrastructure at risk, the Commonwealth should prioritize funding sources for transportation projects, such as the U.S. Department of Transportation's Rebuilding American Infrastructure with Sustainability and Equity program and its Infrastructure for Rebuilding America program. Some funding sources that can be used to address inland flood risk include U.S. Housing and Urban Development grants, as well as grants available through the U.S. Environmental Protection Agency.

For a more comprehensive view of funding options, Appendix 4.C showcases a funding database for the 2023 MA SHMCAP that builds on a federal resilience funding study conducted by EOEEA in 2021. This funding database provides an inventory of existing federal, state, local, and private funding sources that could support climate adaptation and hazard mitigation). The inventory includes information for each funding source, including the funding source focus (climate adaptation, hazard mitigation, or both), a brief description, the administering body, relevant sectors, and if the funding source includes a focus on social vulnerabilities.

4.1.2.2.6 Opportunities and Ways to Address Resource Needs

This section highlights identified opportunities or ways to address resource needs to increase the adaptive capacity of an agency or an interagency collaboration or partnership to reduce risks and increase resilience.

To help address the challenges above, agency representatives that answered the survey identified ways the Commonwealth can increase capacity and capabilities to support risk reduction and increase resilience. Agencies and interagency collaborations or partnerships can leverage some available resources to reduce climate risks and direct existing capabilities toward updated approaches. In addition, opportunities exist across multiple focus areas to increase the capacity of agencies and interagency collaborations or partnerships to reduce climate risks and improve resilience. See Table 4-4 for more details.

Table 4-4. Summary of Key Opportunities

Key Opportunities
Staff, Skills, and Expertise
Ensure hazard mitigation and climate adaptation staff positions are competitive; write job announcements to attract skills and experience that is currently limited or lacking (rather than general environmental science or policy); develop positions with higher salary caps to attract and maintain qualified full-time employees; ensure that funding is available for ongoing training, conferences, and learning opportunities that provide knowledge transfer and information on best practices and best available data and professional development with others in similar positions across the country. **Invest in full-time, dedicated staff with expertise in key knowledge areas, technical skills, and/or competencies** in hazard mitigation and climate adaptation, as well as contractor and consultant support where necessary to increase capacity for major projects or technical and scientific expertise. Staff expertise in areas identified by state agencies as current gaps (e.g., GIS data and mapping, information technology, climate adaptation, resilience assessments, LIDAR analysis, disaster recovery planning, water resources and hydrology, flooding and droughts, water use and efficiency across multiple sectors, the nexus between land use development and water, stormwater management, and marine fisheries and aquaculture) can be further developed through trainings, seminars, partnerships with nonprofits and academic institutions, as well as peer-to-peer learning with other agencies, states, and federal partners to address capacity limitations and increase staff capabilities over time. **Add more full-time staff with hazard mitigation and climate resilience expertise within agencies responsible for critical physical and non-physical assets and functions** in order to support assessments; planning; program development; funding strategies; operations and maintenance changes; repair and replacement strategies; development of regulations, policies, and design and construction standards; and other efforts to increase resilience within and across agencies in Massachusetts. Bringing hazard mitigation and climate adaptation experience in house will allow these agencies to integrate risk reduction into all parts of their planning, funding, maintenance and operations, staffing, and decision-making, as well as provide resources that enable informed engagement and collaboration on these issues across state agencies and with local and regional organizations.
Authority and Bureaucracy
Building on Executive Order 604, coordinate with the Office of Climate Innovation and Resilience and the Climate Chief to set long-range goals, objectives, and priorities for hazard

Key Opportunities

mitigation and climate adaptation for the Commonwealth to provide guidance across and within state agencies. Engage with the Office of Climate Innovation and Resilience to focus on advancing global actions that will unlock state, regional, and local capacity to reduce risks from the most urgent and consequential impacts and vulnerabilities. Based on the findings regarding Massachusetts vulnerabilities, consequences, and needs, there are several areas that would benefit from focus and support from the Office of Climate Innovation and Resilience. These areas include:

- Advancing the science and research on the effects of sea level rise and climate change on coastal erosion rates and the impact of drought and sea level rise on groundwater, in addition to building off recent research to better understand inland flood risk.
- Providing technical support and capacity building to state agencies that lack the resources to integrate hazard mitigation and climate adaptation into their core responsibilities, particularly those with roles in public health and social and child services, as well as public safety.
- Based on the cultural and economic importance of Massachusetts' natural resources, including agriculture and fisheries, initiate a statewide natural and working lands and waters plan to develop system-scale climate resilience for these resources.
- Work with state agencies to develop and adopt resilient codes and standards for new buildings and infrastructure and for retrofits and lifecycle replacements that would reduce system- and network-scale risks from coastal and inland flooding, high winds, extreme temperatures, and other likely and consequential hazards.
- Develop a prioritization approach for state funding and support that ensures that funds go to agencies, municipalities, and other organizations that are factoring social vulnerability and environmental justice objectives into hazard mitigation and climate adaptation programs, policies, funding, regulations, and other efforts.
- Consider developing a response plan for geographic areas, critical assets, or lifeline networks and systems that are at high risk for damage, disruption, or loss to provide a clear roadmap for rebuilding and repairs to critical assets.

Continue cross-agency participation and engage with the Office of Climate Innovation and Resilience in developing new or amending existing regulatory, policy, and design and construction standards; zoning and code requirements; and other efforts that could significantly increase hazard and climate resilience in the Commonwealth, especially environmental justice and other priority populations. Building on an increased understanding of climate change impacts from the 2022 MA Climate Assessment and improved collaboration of state agencies through the development of the RMAT, identify actions agencies can take together to reduce risks to critical systems and assets such as affordable housing, transportation, energy, and flood management infrastructure. Move beyond agency strengths in emergency response and preparedness and focus on actions to advance pre-disaster resilience and adaptation to increasing risks due to climate change, which will reduce the costs, risks to public safety, and time that it takes to recover from a disaster or climate impact.

Work with the Office of Climate Innovation and Resilience to write new legislative language that supports agency coordination and partnership, including sharing assets (e.g., equipment to maintain or restore access to critical roads, emergency lifelines, and community facilities; management of natural resources; other specialized equipment), sharing resources (e.g., outreach and education best practices, staff resources, contracting capacity, technical expertise, federal relationships), and leveraging funding and phasing work to increase the associated benefits (e.g.,

Key Opportunities
engaging community and interested parties together, conducting mutually beneficial projects together such as wetlands restoration efforts in combination with transportation resilience projects, designing research to benefit multiple agencies) in an efficient, easy, and cost-effective manner. **Continue emphasizing the need to track and quantify the impact of past, current and projected impacts of hazards** and climate change and the outcomes of hazard mitigation and climate adaptation efforts through the Office of Climate Innovation and Resilience. Develop a tool that provides a way to track impacts of hazards to state assets and services in a post-hazard evaluation of extent of damage, length of disruptions, and amount and type of loss. Include progress toward reducing risks through pre-disaster actions led by state agencies, and support and identify the assets, populations, services, geographies, and additional benefits of each pre-disaster action. Use this tool to provide critical post-disaster data and metrics, identify pre-disaster benefits, and track progress on reducing risks to the Commonwealth across physical, social, and economic dimensions using the 2022 MA Climate Assessment priority impacts and vulnerabilities to inform key objectives. Some examples of such tools include Scotland's use of indicators and trends to assess progress on how well the country is measuring the impacts of climate change, C40s Monitoring, Evaluation, and Reporting Framework, or simpler frameworks that focus on tracking progress toward the 2022 MA Climate Assessment priority impacts and the 2023 MA SHMCAP goals.
Funding
Prioritize annual agency funding to support staffing, operations, and programming needs focused on hazard mitigation and climate adaptation efforts, including for specific projects and programs, hiring, planning, research, implementation, and capacity strengthening of local jurisdictions. While harder to plan around and count on, agencies can use federal, state, and private grants to support hazards and climate work. **Create a state-appropriated funding source** that eliminates restrictions or barriers to agency actions on hazard mitigation and climate adaptation. Leverage, facilitate, and implement effective hazard mitigation and climate adaptation strategies at local, regional, and state scales (e.g., implementation of the $14.9 billion committed to investing in the Commonwealth's capital needs over the next five years from the 2023–2027 Capital Investment Plan, the 2021 amending of An Act Creating a Next-Generation Roadmap for Massachusetts Climate Policy).
Data and Communication
Encourage consistent collection and use of data. Effective data management and information technology structures are essential to assess, evaluate, adopt, implement, monitor, and track hazard mitigation and climate adaptation efforts and actions. Existing tools, such as the MA SHMCAP, the 2022 MA Climate Assessment, and the Climate Resilience Design Standards and Guidance Tool, can be used for consistent direction and guidance across diverse agencies. Many agencies are already conducting studies or developing plans on hazard mitigation and climate adaptation, which will generate data, information, and findings that will be useful to the agencies across state and local governments in the Commonwealth. **Conduct a statewide loss avoidance study** to help quantify the losses avoided (e.g., damage prevented, benefits) due to the implementation of the Commonwealth's hazard mitigation and climate adaptation projects, as well as to help run scenarios of the different risks and vulnerabilities

Key Opportunities
associated with varying implementation strategies. For example, given that most agencies do not currently analyze the social and economic costs avoided by reducing risk, conducting these analyses can provide key information to support operational change and make it more compelling. As of January 2023, MEMA is currently in the early stages of designing a loss avoidance study for HMA projects; however, the Commonwealth could benefit from a statewide loss avoidance study. **Address data and information gaps by investing and supporting studies to collect and assess climate-specific information,** including climate modeling data, climate science and resilience data and metrics, and communication and engagement strategies about climate change and adaptation, as well as current and future risk. Conduct assessments such as surveys, risk analyses, and vulnerability assessments to generate information on the specific hazards agencies face and the impacts on environmental justice and other priority populations. **Create and update data repositories,** such as statewide databases on water use and management in multiple sectors (e.g., municipal, district, commercial, institutional, industrial, public). Ensure data are available and accessible for strategic planning that integrates considerations of hazard mitigation and climate adaptation, including for master planning, budgets and grants, GIS, and asset management. **Increase use of Climate Resilience Design Standards and Guidance Tool** to facilitate consistency across state agencies and incorporate climate resilience into capital planning processes and grant-making for local capital projects, as well as overall project design and implementation.
Coordination and Capacity-Building
Ensure at least one full-time, permanent staff position for all state agencies, such as a climate resilience officer, dedicated to interagency coordination of hazard mitigation and climate adaptation for each state agency and among partners, as well as setting formalized and routine meetings. **Build local capabilities by providing tools and technical support** to local jurisdictions, Tribal Nations, and Indigenous communities. Opportunities for the state's capabilities to support hazard mitigation and climate adaptation efforts more holistically and comprehensively in these communities include: • Promote using the 2022 MA Climate Assessment to understand the priority risks and impacts within these communities. • Leverage the Commonwealth's MVP Program and its technical assistance, training, and other resources. • Increase awareness and accessibility of guidance, grant funding, and technical assistance to local communities where it is needed most. • Share adequate and reliable information about hazards and climate projections, as well as best practices and tools on interpreting and translating the data for local agencies.

4.1.2.3 The National Flood Insurance Program in Massachusetts

The Water Resources Commission staff at the DCR Office of Water Resources' FHMP is the state coordinating office for the NFIP. The NFIP is a federal program that makes flood

insurance available in communities that agree to adopt floodplain management regulations that will reduce future flood damage. The program is intended to be a partnership between the federal government, states, and participating local jurisdictions. Congress created the NFIP in 1968 through the National Flood Insurance Act, which was passed to address the fact that homeowner's insurance did not usually cover flood damage, leaving much of the burden of flood recovery to taxpayers and individual homeowners through federal disaster relief programs. NFIP flood insurance is available virtually anywhere, with limited exceptions (e.g., buildings entirely underground or entirely over water are not insurable), in an NFIP participating community, regardless of the flood risk zone. Federal law requires that flood insurance be purchased as a condition of federally insured financing used for purchasing buildings in an identified Special Flood Hazard Area (SFHA), which is the area subject to inundation from the 1 percent annual chance flood (also known as the base flood or the 100-year flood).

Currently, 341 out of 351 Massachusetts communities participate in the NFIP. As of December 2022, there were more than 53,000 NFIP policies in place, with $14,352,713,100 in total insurance coverage and $69.6 million in annual premiums paid. From 1978 to 2021, there have been more than 34,500 total claims, and more than $422.7 million has been paid for insured flood losses. For the sake of comparison, Louisiana has the most claims with the program, at 478,779 between 1978 and 2021.

FHMP staff work with FEMA and officials from NFIP-participating local communities to implement the NFIP in Massachusetts. The FHMP is a technical assistance program and has no regulatory authority, but staff provide a range of assistance to local communities in support of their floodplain management efforts. This assistance includes, but is not limited to, the following activities:

- Conducting Community Assistance Visits and Community Assistance Contacts in coordination with FEMA, as well as supporting the FEMA Region 1 Risk Analysis Branch with mapping updates.
- Supporting FEMA in local compliance matters.
- Providing support to local governments for bylaw compliance and adoption processes.
- Conducting and/or supporting technical workshops and training events for local officials and supporting communities participating in the Community Rating System (CRS) program with the program's higher standards and with CRS compliance documentation.
- Providing on-call and as-needed assistance to all interested parties on issues such as the NFIP, floodplain management, floodplain building requirements, floodplain mapping, flood mitigation, and flood insurance.
- Reviewing floodplain development proposals through MEPA and supporting partners with other state agency grantors such as MEMA, CZM, DER, and EOEEA (e.g., the MVP Program).

- Coordinating with other state and federal agencies on floodplain development issues.
- Supporting MEMA and local governments during post-flood activities.

FHMP staff also support and work with state agencies on revisions or improvements to applicable state regulations, such as the MSBC and WPA. FHMP staff also offer expert testimony at Building Code Advisory Board hearings regarding floodplain variance requests. Program staff are also heavily engaged with state hazard mitigation and climate adaptation planning and project activities in concert with MEMA. In addition to working within the Commonwealth to advance best floodplain management practices, the FHMP looks for opportunities to coordinate with federal agencies such as the U.S. Geological Survey and U.S. Army Corps of Engineers for effective floodplain and flood event work.

Snapshot of Structures at High Risk of Flooding (Repetitive Loss Structures)

FEMA defines a repetitive loss (RL) structure as "any insurable building for which two or more claims of more than $1,000 were paid by the NFIP within any 10-year rolling period since 1978". As of July 2022, there are 3,529 structures designated as RL structures in Massachusetts, and 499 of these are severe repetitive loss (SRL) structures[3] (see Table 4-5 for the top 10 communities with RL and SRL structures). Other than Billerica, all top 10 communities are in the coastal zone. An example of an effort underway to reduce the number of these structures is a MEMA effort to conduct a structure-level analysis of buildings impacted by flooding using the Massachusetts Coast Flood Risk Model.

Table 4-5. Top 10 MA Communities with RL and SRL Structures (as of December 2022)

Community	Number of RL Structures
1. Scituate	553
2. Revere	303
3. Hull	262
4. Marshfield	207
5. Quincy	206
6. Winthrop	156
7. Nantucket	79
8. Duxbury	66
9. Billerica	50
10. Nahant	49
Community	**Number of SRL Structures**

[3] As defined by the Flood Insurance Reform Act of 2004, an SRLs is a one- to four-family residence that has had four or more claims of more than $5,000 or at least two claims that cumulatively exceed the building's value.

Community	Number of RL Structures
1. Scituate	159
2. Marshfield	43
3. Revere	36
4. Hull	33
5. Quincy	22
6. Peabody	17
7. Nahant	13
8. Nantucket	11
9. Duxbury	11
10. Winthrop	11

Source: Massachusetts Emergency Management Agency—Mike Enko, personal communication, January 24, 2023.

4.1.2.3.1 Flood Insurance Rate Maps

FEMA produces FIRMs based on technical studies that identify and map the SFHAs where development is regulated in order to reduce flood risk. As mentioned above, the SFHA determines where flood insurance is required as a condition of a federally insured loan through the NFIP mandatory purchase requirement. The geographic boundaries of the SFHA determine where NFIP floodplain management requirements must be enforced by jurisdictions and governments that participate in the program. These requirements include design and construction standards as codified in state regulations and per local flood damage prevention ordinances in compliance with minimum NFIP standards.

FIRMs are made available to view through online mapping viewers or downloadable files provided through municipal websites, publicly accessible computer stations, and/or links from FEMA's Map Service Center website. FIRM maps can be amended or revised through a process (e.g., letter of map amendment, letter of map revision, letter of map change) intended to reflect existing topography or changes in flood characteristics.

4.1.2.3.2 Risk Mapping, Assessment, and Planning

Risk Mapping, Assessment, and Planning (Risk MAP) is a FEMA program that builds on the products of the Flood Map Modernization Program that was created in 2004 to update, modernize, and digitize the nation's flood maps. FEMA's Risk MAP products are nonregulatory resources that supplement the flood hazard information produced by the regulatory FIRMs, the Flood Insurance Study, and FIRM database products.

Examples of FEMA's Risk MAP efforts in the Commonwealth include:

- Development of a discovery report for the Middle Connecticut watershed (i.e., the Connecticut River and surrounding Massachusetts counties of Franklin, Hampden, Hampshire, and Worcester), completed in March 2020. Discovery is the first step in a Risk MAP process and during this phase, FEMA works with local jurisdictions, communities, and other interested parties to collect community knowledge, apply the best scientific knowledge for the area, and identify areas where the risks and consequences from flooding may be greatest. Discovery meetings for the Middle Connecticut watershed took place in November 2018, and a discovery report was issued in March 2020.
- Discovery meetings took place in January 2019 for the Deerfield River watershed. In December 2020, FEMA provided notification of the Deerfield River Watershed study, and in November 2022 held Study Work Map meetings.
- FEMA has created a Coastal Erosion Hazard Map for Region 1, including coastal communities in Massachusetts such as Barnstable, Dukes, Nantucket, Plymouth, Essex, Suffolk, and Norfolk counties. The nonregulatory study included projections of the extent of coastal erosion by the years 2030, 2050, and 2100 along the coast of New England, including Massachusetts. FEMA completed a coastal erosion hazard mapping pilot study in Nantucket in 2019, as well as in Rockingham County, New Hampshire, in 2022. FEMA also conducted community outreach on June 26, 2018, to discuss the coastal erosion hazard mapping in Nantucket.
- FEMA is updating flood hazard determinations for communities of the Quinebaug River watershed across counties in Massachusetts, Connecticut, and Rhode Island. FEMA completed its field survey and hydrologic analysis at the end of 2017. Hydraulic analysis was completed in late 2018 and floodplain mapping commenced shortly after. On December 21, 2021, a notice in the Federal Register was published indicating the preliminary FIRMs and Flood Insurance Studies have been issued for communities in the Quinebaug watershed. FEMA collected comments on the proposed flood hazard determinations by March 2022. The 90-day appeal period ran from April 21 till July 20, 2022.
- The Charles River watershed community work map review meeting occurred on July 9 and 10, 2018. The comment period ended on August 10, 2018. Several communities have requested and were granted extensions for providing comments. FEMA released preliminary revised FIRMs for the Charles watershed in June 2020. FEMA collected feedback during the 90-day appeal period from March 2021 to June 2021.
- For the Merrimack River watershed, FEMA conducted analysis of draft maps throughout 2017 and 2018. Draft work maps were reviewed by FEMA, Massachusetts, and New Hampshire in late fall 2018. Community outreach for the work map review meeting proceeded approximately six weeks later. Community meetings to review work map changes were held in July 2019.
- FEMA issued revised Cape Cod watershed FIRMs in July 2021.

- FEMA completed a discovery project for the Nashua River watershed in 2016. Surveying and base-level engineering are completed. Hydrology and hydraulics were completed in fall 2018. Updated flood analyses were completed in spring 2019, and community meetings to review work maps were held in November 2019.

4.1.2.3.3 Community Rating System

CRS is a voluntary FEMA program within the NFIP that encourages floodplain management activities that exceed minimum NFIP requirements. Flood insurance premiums are discounted to reflect the reduced flood risk resulting from community actions to meet the following CRS goals:

- Reduce and avoid flood damage to insurable property.
- Strengthen and support the insurance aspects of the NFIP.
- Foster comprehensive floodplain management.

For participating communities, flood insurance premium rates are discounted in increments of 5 percent. The discount given depends on a community's designated CRS Class, determined by credit points awarded for flood management activities, with greater discounts given to communities conducting more activities. For example, a Class 1 community receives a 45 percent premium discount, while a Class 9 community receives a 5 percent discount. Class 10 communities are those that were once in the CRS program but have not continued to provide documentation to remain in the program; they receive no discount. The CRS classes are based on 19 activities in the following categories:

- Public information activities
- Mapping and regulations
- Flood damage reduction activities
- Warning and response

As of October 1, 2022, there are 22 Massachusetts communities actively participating in the CRS program, as listed in Table 4-6. The CRS classifications in Massachusetts currently range from Class 9 (5 percent discount) to Class 7 (15 percent discount). FEMA updates these classifications semiannually in May and October of each year.

Table 4-6. Participating CRS Communities in Massachusetts (as of 10/1/22)

NFIP #	Community	CRS Entry Date	Current Effective Date	Current Class	% Discount for SFHA	% Discount for Non-SFHA
250233	Braintree	10/1/92	05/1/18	7	15	5
250003	Brewster	05/1/18	05/1/18	9	5	5
250186	Cambridge	10/1/15	10/1/15	9	5	5

NFIP #	Community	CRS Entry Date	Current Effective Date	Current Class	% Discount for SFHA	% Discount for Non-SFHA
250004	Chatham	10/1/92	10/1/2022	7	15	5
250006	Eastham	10/1/17	10/1/17	8	10	5
250008	Harwich	10/1/95	05/1/20	7	15	5
250085	Haverhill	10/1/92	10/1/92	9	5	5
250269	Hull	05/1/08	10/1/18	7	15	5
250273	Marshfield	10/1/15	10/1/20	7	15	5
250009	Mashpee	10/1/17	10/1/17	8	10	5
250167	Northampton	05/1/17	05/1/17	8	10	5
250060	Norton	10/1/91	10/1/91	9	5	5
250010	Orleans	10/1/93	10/1/18	7	15	5
250278	Plymouth	10/1/91	10/1/91	9	5	5
255218	Provincetown	10/1/11	04/1/21	8	10	5
255219	Quincy	10/1/93	05/1/19	7	15	5
250103	Salisbury	05/1/16	05/1/16	8	10	5
250012	Sandwich	05/1/19	05/1/19	7	15	5
250282	Scituate	10/1/91	05/1/17	7	15	5
250014	Wellfleet	05/1/17	05/1/17	8	10	5
250228	Winchester	10/1/13	05/1/18	7	15	5
250349	Worcester	10/1/95	10/1/20	7	15	5

4.1.2.3.4 CRS Credit for Local Higher Standards Activities and Requirements

The CRS program provides credit to communities that enforce certain state laws, regulations, and standards regarding local floodplain management within the state that have proven effective in reducing flood damage. State-based credit is awarded to communities for activities that are implemented and enforced by the local community (e.g., freeboard standards in the MSBC). This type of CRS credit is verified by Insurance Services Office, Inc., annually.

4.1.2.4 Administering FEMA Mitigation Programs

4.1.2.4.1 Hazard Mitigation Assistance

Currently, there are four HMA programs available to states through FEMA that provide funding for eligible mitigation planning and projects that reduce disaster losses and protect life and property from future disaster damages. The four programs are:

- **Hazard Mitigation Grant Program (HMGP).** Assists in implementing long-term hazard mitigation planning and projects following a major Presidentially Declared Disaster. **HMGP Post-Fire** assistance is available to communities that have been impacted specifically by wildfire disasters. HMGP funding is generally 15 percent of the total amount of federal assistance provided to a state, territory, or federally recognized Tribe following a major disaster declaration.
- **Building Resilient Infrastructure and Communities (BRIC) program.** Prioritizes proactive investments in community resilience through public infrastructure projects, nature-based solutions, the adoption of modern building codes, as well as projects that support essential government and business services. BRIC is currently funded as a 6 percent set-aside taken from federal post-disaster grant funds.
- **Flood Mitigation Assistance (FMA) programs.** Provide funds for mitigation planning and projects on an annual basis, with a focus on reducing flood hazard risks to buildings that are insured under the NFIP. FMA funding depends on the amount Congress appropriates each year to the program.
- **Pre-Disaster Mitigation (PDM) program.** Was effectively replaced by BRIC in FY 2020, though PDM grants made during FY 2019 and earlier continue to be managed under this program. However, the Consolidated Appropriations Act of 2022 authorized $154 million in federal funding for 68 PDM projects designed to reduce risks from natural disasters.

Although FEMA's HMA programs are federally funded and managed, they must be administered by the state (i.e., Recipient), which in turn coordinates with eligible sub-applicants (i.e., Subrecipients). FEMA must regularly certify that a state has demonstrated it has the capability to effectively manage FEMA-funded HMA grant programs.

Since 1991, Massachusetts has supported more than 465 hazard mitigation projects and plans with more than $128 million in federal funding from pre-disaster and post-disaster hazard mitigation grant programs, as summarized in Table 4-7 and Table 4-8 below. Since 2018, nearly three-quarters of projects related to FEMA-assigned disaster numbers 4372, 4379, and 4496 were focused on new or updated local hazard mitigation plans, with a few projects focused on critical facility updates (e.g., replacement generators), infrastructure retrofits to build resilience, and localized flood risk reduction (e.g., culvert replacements). A statewide losses avoided study (as mentioned under "Opportunities and Ways to Address Resource Needs" in Section 4.1.2.2 above) can help highlight how much the Commonwealth saved from implementing these projects.

Table 4-7. Summary of Mitigation Projects Funded Through Post-Disaster Grant Programs

Disaster Event	Disaster Number	Federal Fundinga	# of Projects
Hazard Mitigation Grant Program			
Hurricane Bob, August 1991	914	$651,881	16
Winter Storm, October 1991	920	$621,066	10
Winter Storm, December 1992	975	$322,963	7
Flooding, October 1996	1142	$11,891,758	35
Flooding, June 1998	1224	$1,669,157	18
Flooding, April 2001	1364	$1,615,134	14
Flooding, April 2004	1512	$8,570	1
Flooding, October 2005	1614	$556,944	4
Flooding, May 2006	1642	$1,880,803	12
Nor'easter, April 2007	1701	$439,397	5
Ice Storm, December 2008	1813	$5,612,828	24
Flooding, March 2010	1895	$11,151,438	28
Snowstorm, March 2011	1959	$1,524,502	10
Tornadoes, June 2011	1994	$7,260,627	10
Tropical Storm Irene, September 2011	4028	$4,495,094	7
Snowstorm, January 2012	4051	$9,112,075	20
Hurricane Sandy, October 2012	4097	$1,766,463	5
Snowstorm, February 2013	4110	$3,554,386	21
Snowstorm, January 2015	4214	$9,530,860	22
Nor'easter, March 2018	4372	$2,384,567	7
Nor'easter, March 2018	4379	$1,827,435	11
COVID-19 pandemic, January 2020	4496	$2,841,446	6

Source: Federal Emergency Management Agency (2022).

[a] Federal funding includes project-specific funding as well as obligated administrative costs and management costs.

Table 4-8. Summary of Mitigation Projects Funded Through Non-Disaster Grant Programs

Grant Type	Fiscal Year (FY)	Federal Funding[a]	# of Projects
Flood Mitigation Assistance (FMA)	FY 97	$276,798	4
FMA	FY 98	$310,700	3
FMA	FY 99	$407,501	4
FMA	FY 00	$358,075	8
FMA	FY 01	$110,304	5
FMA	FY 03	$407,277	3
FMA	FY 04	$325,589	3
FMA	FY 05	$321,246	3
FMA	FY 06	$1,300,225	3
FMA	FY 07	$1,070,205	6
FMA	FY 08	$225,720	2
FMA	FY 09	$263,051	2
FMA	FY 10	$51,560	1
FMA	FY 13	$2,155,932	2
FMA	FY 15	$675,410	2
FMA	FY 16	$360,501	2
FMA	FY 17	$185,323	2
FMA	FY 18	$269,918	3
FMA	FY 19	$212,839	2
Pre-Disaster Mitigation (PDM)	FY 00	$400,195	5
PDM	FY 03	$1,125,344	5
PDM	FY 05	$5,297,305	15
PDM	FY 06	$281,325	3
PDM	FY 07	$212,310	4
PDM	FY 08	$4,433,023	7
PDM	FY 09	$678,325	7
PDM	FY 10	$1,449,584	5
PDM	FY 11	$335,764	5

Grant Type	Fiscal Year (FY)	Federal Funding[a]	# of Projects
PDM	FY 13	$288,095	6
PDM	FY 14	$959,377	8
PDM	FY 15	$183,406	6
PDM	FY 16	$651,691	5
PDM	FY 17	$469,885	3
PDM	FY 18	$1,388,069	6
PDM	FY 22	$7,927,196	9
Severe Repetitive Loss (SRL) Program	FY 08	$714,993	2
SRL	FY 12	$301,197	1
Building Resilient Infrastructure and Communities (BRIC)	FY 19	$11,688,944	10

Source: Federal Emergency Management Agency (2022).

[a] Federal funding includes project-specific funding as well as obligated administrative costs and management costs.

Note: This data set contains data from the HMA grant programs that were eliminated by the Disaster Recovery Reform Act of 2018 (i.e., PDM grant program) and by the Biggert Water Flood Insurance Reform Act of 2012 (i.e., the Repetitive Flood Claims grant program and SRL grant program). PDM numbers include PDM and Legislative Pre-Disaster Mitigation grants.

The Commonwealth typically receives applications for amounts far in excess of the amount of available FEMA funding and grants and works closely with applicants to ensure requests are consistent with state and local priorities and that applicants are a good match for the grant. The Commonwealth selects and recommends funding for only the most cost-effective projects.

The Commonwealth has had a FEMA-approved Administrative Plan for HMGP since the federal program was authorized in 1988. Most recently updated in August 2022, the plan was prepared in response to Federal-State Agreement Number FEMA-4651-DR-MA (January 2022 snowstorms) and details the process and criteria for prioritizing post-disaster mitigation funding of local mitigation projects. Massachusetts uses similar criteria to prioritize pre-disaster grant applications (e.g., BRIC, PDM, FMA).

To facilitate effective administration of these hazard mitigation grant programs, MEMA staff provide technical assistance to state agencies, local jurisdictions, and Tribes for

mitigation planning and project applications. The staff generally provide any assistance requested by sub-applicants to complete a successful application.

Since 1997, the Commonwealth has been providing grant funding for local mitigation plans, formerly flood mitigation plans, along with technical support and assistance. Today (as updated in the 2022 HMGP Administration Plan), the State Hazard Mitigation Officer and other members of MEMA help communities working on developing or updating hazard mitigation plans that may be funded through any of FEMA's mitigation grant programs.

In 1999, MEMA developed a comprehensive database to track and monitor all open and completed hazard mitigation project and planning grants funded under the HMGP, FMA, PDM, and U.S. Department of Housing and Urban Development programs. This database has allowed the Commonwealth to track and monitor project and plan timelines and completion dates, as well as track projects and plans by a specific grant program, community, project type, project cost balance, and other related data. For instance, the database allows tracking by project type, such as dam improvements, stormwater management, and elevation.

4.1.2.4.2 Mitigation in Post-Disaster Recovery Operations

Hazard mitigation is an integral part of the Commonwealth's post-disaster recovery operations. Following Presidential Disaster Declarations, staff from the MEMA Mitigation and Recovery Unit co-locate with mitigation staff from FEMA at joint field offices, in addition to staff from other state agencies that may have an interest or jurisdiction in recovery operations. State and FEMA staff work to identify mitigation opportunities that can be leveraged through the Individual Assistance program or through Section 406 of the Public Assistance program, in addition to the subsequent HMGP program.

During post-disaster recovery operations, program staff members often provide mitigation information to disaster survivors. State and federal mitigation staff work together to identify public education needs or opportunities. Public Assistance program staff encourage applicants seeking to repair or rebuild damaged structures and buildings to identify mitigation elements in their projects, including through Public Assistance Section 406. Mitigation and Public Assistance program staff often jointly conduct applicant briefings to discuss mitigation opportunities through both Public Assistance program grants and the HMGP. State mitigation staff quickly disseminate letters of intent and information on the grant opportunities to potential applicants and provide technical assistance for the grant application process.

MEMA's Grant Support Unit ensures all disaster and non-disaster FEMA funding is obligated and disbursed in accordance with all federal, state, and local regulations. Having a singular contracting and fiscal approval process ensures proper fiscal management. The Assistant Director for Mitigation and Recovery also oversees the Grant Support Unit and leads contracting and disbursement, providing seamless coordination with the

implementation of the FEMA Public Assistance, Individual Assistance, and mitigation programs (Public Assistance coordinators review all expenditures).

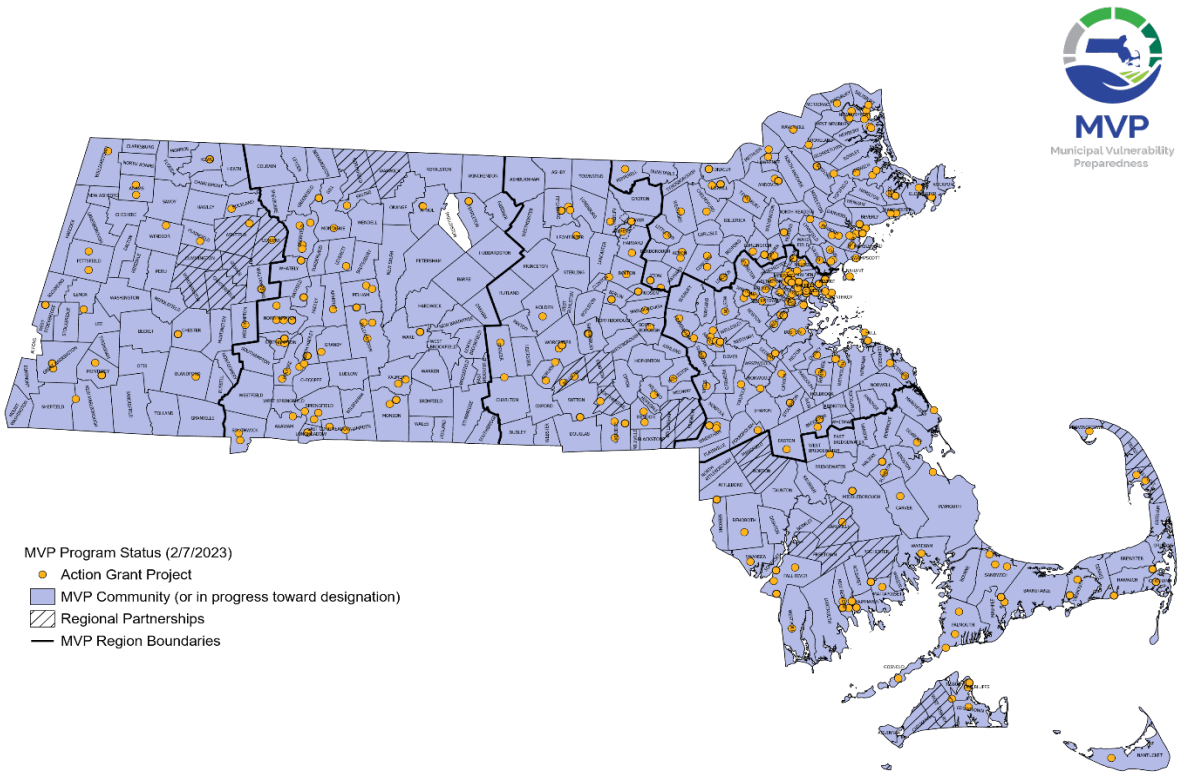
4.1.3 Local Capabilities and Coordination

The local capability assessment is an opportunity for the Commonwealth to examine the effectiveness of local and Tribal governments in hazard mitigation and climate adaptation to reduce risks and build resilience. As a home rule state, Massachusetts cities and towns self-govern and enact their own legislation on many subjects (as long as they align with federal and state law). Even with home rule, some local actions still require state legislature approval, while other local actions are allowed only if the local jurisdictions accept of state statutes. States regularly support local and Tribal governments with reducing risks from hazards and climate change by providing research, modeling, statewide plans and programs to guide mitigation and adaptation action development, training, technical assistance, and funding. This section aims to provide a view of local capabilities across the state.

Overview of Local Jurisdiction Status

The below list highlights the number of jurisdictions that have (1) enrolled in the MVP program as of February 7, 2023; (2) approved local hazard mitigation plans as of December 31, 2022; and (3) have a combined approved local hazard mitigation plan as of December 31, 2022, and are enrolled in the MVP program as of February 7, 2023. The number of jurisdictions meeting these criteria include:

- **349** jurisdictions (99 percent) enrolled in the MVP program. Figure 4-2 below identifies all communities that have achieved MVP designation and the communities in progress of achieving designation in the MVP program as of February 7, 2023.
- **212** jurisdictions (60 percent) have approved local hazard mitigation plans (and/or multijurisdictional hazard mitigation plans).
- **54** jurisdictions (15 percent) have a combined approved local hazard mitigation plan and are enrolled in the MVP program.



Source: MA MVP Program.

Figure 4-2. Map of MVP communities.

Roles of Local Jurisdictions and Tribal Governments

Massachusetts has 351 cities and towns, three federally recognized Tribal Nations, and eight Indigenous communities, each of which develop and enforce local laws and policies related to hazard mitigation and climate adaptation and/or conduct their own local hazard mitigation planning efforts. MGL Title VII: Cities, Towns, and Districts outlines the powers and duties of cities and towns. Included in MGL Chapter 40 are powers related to public authority for construction of public works, growth and development policy committees, public safety mutual aid agreements, municipal waterway improvement and maintenance funds, prevention of forest fires, land purchase conditions and limitations, protection of the water supply, and building permit restrictions.

At the statewide level, Massachusetts created the Commission on Indian Affairs in 1974 to "assist Native American individuals, tribes, and organizations in their relationship with state and local government agencies and to advise the Commonwealth in matters pertaining to Native Americans." In addition, the North American Indian Center of Boston was created in 1969 "to empower the Native American community with the goal of improving the quality of life of Indigenous peoples." The Tribal Nations that are federally recognized by the U.S. Bureau of Indian Affairs have jurisdiction over their reservation lands, meaning the right to self-govern, as well as certain benefits that include funding and services from the bureau and other federal agencies, either directly or through contracts, grants, or compacts. Tribes can develop and organize hazard mitigation plans that best capture their own history, culture, hazards, and mitigation efforts and what works within their governance and tradition.

Indigenous Communities and Federally Recognized Tribal Nations in Massachusetts

- Abenaki Communities
- Chappaquiddick Tribe of the Wampanoag Nation
- Chappaquiddick Tribe of the Wampanoag Nation, Whale Clan
- Chaubunagungamaug Nipmuc Indian Council
- Hassanamisco Nipmuc
- Herring Pond Wampanoag Tribe
- Mashpee Wampanoag Tribe*
- Massachusetts Tribe at Ponkapoag
- Pocasset Wampanoag Tribe
- Stockbridge-Munsee Community Band of Mohican Indians*
- Wampanoag Tribe of Gay Head (Aquinnah)*

*Denotes federally recognized Tribe.

In addition, regional planning agencies frequently support communities with hazard mitigation, climate adaptation, land use, transportation, environmental, water, and utilities planning, and many agencies have extensive GIS capabilities. For example, the Metropolitan Area Planning Council (MAPC) has worked extensively with the 101 cities and towns in the greater Boston area to mitigate risk and adapt to climate change. MAPC's Technical Assistance and District Local Technical Assistance programs provide technical expertise to cities and towns for planning and implementing community-based projects,

which can help advance climate resilience goals. MAPC has supported its communities with developing master plans, hazard mitigation plans, open space plans, and zoning and land use regulations. MAPC conducts research and analysis on hazards and climate change that can support more robust vulnerability and risk assessments at the local level. In 2021, MAPC developed the Municipal Net Zero Playbook, which provides local communities with actionable strategies, tools, and training to achieve their climate goals and reduce carbon emissions efficiently and equitably.

Additionally, metropolitan planning organizations are regional transportation policy-making organizations that help with land use and transportation planning, ensure planning processes are in compliance with federal requirements, and conduct research

and studies. The 13 metropolitan planning organizations in Massachusetts help engage local jurisdictions and other partners and stakeholders in regional decision-making. For example, the Cape Cod Commission, which coordinates transportation planning activities under the Cape Cod Metropolitan Planning Organization, engaged with community stakeholders and partners to update the Regional Policy Plan in 2021 with goals, objectives, and actions that address climate change.

Tribal Mitigation Plan Spotlight: Mashpee Wampanoag Tribe Multi-Hazard Mitigation Plan

In 2019, the Mashpee Wampanoag Tribe developed a multi-hazard mitigation plan that includes the following topics:

- Introduction (including what hazard mitigation can do for the Mashpee Wampanoag Tribe)
- Risk assessment
- Capability assessment
- Mitigation strategy
- Plan implementation and maintenance

In preparing local hazard mitigation plans, many local governments use the following four categories to assess their capabilities, strengths, and challenges: (1) planning and regulatory, (2) administrative and technical, (3) financial, and (4) education and outreach (see Table 4-9). For the purposes of the 2023 MA SHMCAP, the Commonwealth has examined local capabilities in terms of these four categories. The NFIP is included in planning and regulatory. Currently, based on the FEMA 2023 Local Mitigation Planning Policy Guide, plans "must describe the effects of future conditions, including climate change, for the identified hazards, as it relates to location, extent, and probability of future hazard occurrences."

Table 4-9. Categories of Local Capability

Category	Description
Planning and regulatory	Includes capabilities based on the jurisdiction's implementation of ordinances, policies, local laws and state statutes, and plans and programs that relate to guiding and managing growth and development. Also includes plans and policies related to hazards that improve or impede resilience to future hazard events and other future conditions, including the effects of climate change.
Administrative and technical	Includes capabilities associated with the jurisdiction's staff and their skills and tools that can be used for mitigation planning and to implement specific mitigation actions. Also includes processes and tools to support local and Tribal climate mitigation and adaptation plans.
Financial	Refers to the fiscal resources that a jurisdiction has access to or is eligible for in order to fund mitigation actions. Includes public (i.e., federal, state, and local) funding capabilities for hazard mitigation actions and projects.
Education and outreach	Refers to education and outreach programs and methods already in place that jurisdictions could use to implement mitigation activities and communicate hazard-related information.

4.1.3.1 Planning and Regulatory

A local jurisdiction's planning and regulatory policies related to growth and development generally include land use, zoning, utilities, infrastructure, community development, open space and recreation, natural environment and resource management, coastal planning and management, and hazard and risk zoning. Jurisdictions often have many plans that guide the above, including a comprehensive plan, general plan, master plan, specific or community plan, open space and recreation plan, harbor plan, economic development plan, stormwater management plan, historic preservation plan, coastal zone management plan, climate change adaptation plan, and others.

Linking Local and Tribal Mitigation Plans with the MA SHMCAP: Process and Timeframe

Below are the key process steps to receive approval on local and tribal mitigation plans. A full planning process typically takes a year, with up to six months required for FEMA approval and any revisions. Local and tribal communities should look to the MA SHMCAP in the planning and development process of their mitigation plan to align on any relevant mutual goals and objectives. In addition, communities should consider incorporating Traditional Ecological Knowledge when planning for and applying nature-based solutions and management of the natural environment. The steps are:

1. Submit local/tribal plan to MEMA for review, including a completed plan review tool checklist from FEMA.
2. If the local/tribal plan is found to satisfactorily meet all requirement elements, MEMA will send it to FEMA for review. Otherwise, revisions will be required at this step.
3. If FEMA finds the plan satisfactorily meets all required elements, FEMA will issue an Approvable Pending Adoption notice. Otherwise, revisions will be required at this step.
4. Local and tribal communities adopt plans and submit resolutions.
5. FEMA issues approval letter and final review tool to the MEMA. MEMA completes the process by emailing both documents to communities.

Jurisdictions can use planning and zoning along with other regulations and policies to effectively advance hazard mitigation and climate adaptation. For example, the town of Scituate updated its zoning bylaws in 2019 (approved by the Attorney General in 2020) allowing elevation of existing structures to a maximum height of 50 feet to achieve base flood elevation as determined by the current national FIRMs.

Planning boards typically oversee the preparation of comprehensive plans or master plans. They also often coordinate the hazard mitigation and climate adaptation planning process and the implementation of hazard mitigation and/or climate adaptation plans. These boards provide professional expertise in plan development, bylaw drafting, and grant application. A review of local hazard mitigation plans (74 were updated from February 2018 through July 2022) received by the state indicates most local governments minimally include hazards and hazard mitigation in their local comprehensive or master plan. In recent years, communities have begun developing coastal resilience and climate

adaptation plans, as well as incorporating more details on pandemics (e.g., COVID-19) and recent extreme temperatures. For instance, in 2021, the town of Nantucket developed a coastal resilience plan to provide an implementation roadmap for flood control and adaptation approaches. In 2022, the city of Boston prepared a report titled Heat Resilience Solutions for Boston to help prepare the city for hotter summers. It also announced *Coastal Resilience Solutions for East Boston and Charlestown (Phase II),* a framework to understand coastal flood risk, resilience solutions, and implementation timelines for parts of the East Boston and Charlestown coastlines.

A planning board is the primary local vehicle to ensure new development incorporates federal and state best management practices (BMPs). Planning boards maintain floodplain bylaws and ordinances to address current floodplain issues and update them to ensure compliance with state and federal regulations. Planning boards may propose, review, make recommendations, or hold hearings on zoning ordinances and zoning changes. Regulations may be included in building codes, zoning bylaws, subdivision regulations, floodplain regulations, open space preservation, and wetlands regulations.

To encourage communities to adopt BMPs for hazard mitigation and climate adaptation, state agency programs provide technical assistance and funding to municipalities, including the previously mentioned FHMP. Examples include:

- The MVP Program, which provides municipalities with planning and action grants to implement adaptation and resilience strategies.
- CZM's Coastal Resilience Grant Program, which provides grants and technical assistance for local and regional efforts to increase community understanding of coastal storm and climate impacts, evaluate vulnerabilities, conduct adaptation planning, redesign and retrofit vulnerable public facilities and infrastructure, and restore shorelines to enhance natural resources and provide storm damage protection.
- The Community Compact Program, in which communities agree to adopt and implement BMPs in a wide range of municipal services and receive state assistance.
- DOER's Green Community Designation and Grant Program (previously the Green Communities Program), which provides municipalities with funding and technical assistance for energy conservation and efficiency projects to reduce the energy demand of municipal facilities and require communities to adopt ordinances and bylaws for renewable energy siting and the Stretch Code.

Local Planning and Regulatory Support from DCR's FHMP

Examples of FHMP offerings include:

- Substantial damage training/ messaging post-disaster
- 1206 training and assistance
- Training for CRS user groups
- Ordinance or bylaws assistance for floodplain districts
- Technical assistance for floodplain management questions
- Liaison between community and FEMA on mapping activities
- MEPA (and other) project review

- DCR's Floodplain Management Program, which provides multiple types of assistance for local communities. In terms of substantial damage[4] administration, the Massachusetts Local Guidance for NFIP Substantial Damage Planning is a comprehensive guide and tool for communities to assure that certain practices and a post-disaster plan will be in place to implement the substantial improvement/ substantial damage requirements of NFIP and as stated in the MSBC.

Completed in June 2020, the town of Concord's climate action and resilience plan, titled *Sustainable Concord*, maps out a five-year action plan for climate mitigation and adaptation. With $100,095 in supporting grant funds from the MVP Program, the resulting plan includes 22 priority actions organized into five plan elements with goals for each, as well as three leadership priorities. This effort ensured that previous town planning efforts and reports—such as Envision Concord, which is the town's most recent long-range plan, as well as regional studies to identify climate actions and risks—were fully integrated and aligned with the final plan.

Zoning regulations under MGL Chapter 40A give cities and towns the authority to adopt ordinances and bylaws to regulate the use of land, buildings, and structures. Planning boards may recommend land use regulations to protect public health, safety, and welfare, including measures for hazard mitigation and climate adaptation.

Spotlight: Town of Barnstable

The town of Barnstable, the largest town on Cape Cod, is highly susceptible to coastal flooding and erosion. The town has conducted several recent projects to assess the risks posed by flooding and other hazards. In 2019, the Commonwealth designated the town as an MVP Community for its efforts in building community resilience. In 2022, the town completed and formally adopted an updated hazard mitigation plan to replace its 2010 plan. The 2022 plan includes updated vulnerability assessments and plans for mitigation projects to address a variety of climate hazards. Current actions in progress to mitigate flooding include developing additional Coastal Resources Management Plans and pursuing actions to qualify the town for NFIP's CRS. In addition, Barnstable's 2023 coastal resilience project focuses on designing and permitting a preferred alternative solution that uses nature-based measures and reconfigures the Sandy Neck Beach Facility to enhance storm damage protection to infrastructure and natural resources.

MGL 40R encourages "smart growth" to preserve open space, while increasing affordable housing. A smart growth zone must be located either near a transit station, in an area of already-concentrated development, or in another area that—due to transit, infrastructure, or other utilizable resources—is able to support additional growth. A planning board can

[4] As defined by FEMA, substantial damage "applies to a structure in a Special Flood Hazard Area—or floodplain—for which the total cost of repairs is 50 percent or more of the structure's market value before the disaster occurred, regardless of the cause of damage."

adopt its own subdivision rules and regulations without an action at the town meeting. Cities and towns may not adopt higher standards than the Ninth Edition of the MSBC, to help avoid any potential unintended consequences and ensure consistency in standards across the state and competitive advantages in attracting development and investment to the Commonwealth.[5]

Cities and towns in Massachusetts have local boards of health and municipal conservation commissions that take on planning and regulatory responsibilities, as well as administrative and technical responsibilities. Each local community determines the roles of its board of health; some may manage school health programs or assist with community-based health improvement planning, policy and program development, or prevention activities. The local board of health implements the State Environmental Code, including Title 5 relating to sewage disposal. Title 5 protects public health and mitigates losses due to adverse effects of improper sewage treatment in high hazard areas.

Town of Plymouth's Open Space and Recreation Plan: Climate Change Resiliency Addendum

In 2020, the town of Plymouth recognized the need to address potential climate change impacts and created recommendations for increasing resilience and adaptability in the town through a climate change resilience addendum. The town examined the relationships between open space and climate resilience and identified strategies to fulfill the linkages in building and promoting resilience.

Local conservation commissions are required to review development that may impact rivers, streams, ponds, and wetlands. These commissions play a role in enforcing regulations that minimize flood impacts and have primary responsibility for implementing the Massachusetts Rivers Protection Act (MGL Chapter 258; 310 CMR 10.58) and the WPA (MGL Chapter 131, Section 40; 310 CMR 10.00). A conservation commission reviews, approves, or denies applications for any project in the regulatory 100-year floodplain, in the floodplain of a small water body not covered by a FEMA study, or within 100 feet of any wetland or 200 feet of any river or stream (except in the case of densely developed urban areas, where buffers may extend only 25 feet from a river or stream). The Massachusetts Association of Conservation Commissions has guidebooks and model bylaws for local governments to use when enforcing or strengthening their adherence to the WPA.

[5] Massachusetts is in the process of adopting the 2021 edition of the ICC model codes, which is intended to be complete in early 2023.

The Green Communities Act, Chapter 169, signed into law July 2, 2008, increases opportunities for energy efficiency and renewable energy generation, aligns the MSBC with the International Energy Conservation Code, and provides new programs for municipal clean energy development. The Massachusetts Department of Energy's Green Communities Division provides grants, technical assistance, and local support from Regional Coordinators to help municipalities reduce energy use and costs by implementing clean energy projects in municipal buildings, facilities, and schools.

Massachusetts Community Preservation Act

This act encourages cities and towns to undertake the purchase of open space to preserve natural resources. The Commonwealth continues to provide technical assistance to participating communities and other communities interested in adopting the Community Preservation Act. Currently, EOEEA is working with the city of Holyoke's Conservation Commission to ensure any new EOEEA construction does not interfere or impact any of the wetlands on or near the property.

4.1.3.1.1 Current Challenges and Opportunities

Many of the local governments that have submitted FEMA-approved hazard mitigation plans have adequate capacity to implement and monitor the actions in those plans. However, many of the smaller jurisdictions have limited staff or staff who serve multiple roles, meaning they have little capacity to carry out planning activities to build resilience.

Local hazard mitigation plans include a list of mitigation projects or activities for the community to pursue. For instance, the 2021 City of Attleboro Hazard Mitigation Plan Update identifies 47 mitigation actions, and the city of Revere identifies 54 mitigation actions in order of priority. However, many communities struggle with implementing these proposed mitigation measures due to limited administrative or financial capabilities, as further described in this section.

Communities also have a need for regulations and codes that address risk at the local level and a need to direct development away from current and future risk zones. The Commonwealth could play a role in moving this opportunity forward, such as developing incentives, providing funding, designing codes that make local action implementation safer, and conducting further analyses on current regulations and how to improve them. Note that, as mentioned earlier in a Section 4.1.2.1 textbox, starting in 2023, EOHED is implementing a BRIC-funded Massachusetts Building Code Study and Local Floodplain Management Action Guide building code study that will assess the state building codes and develop a guidance document to assist municipalities in taking impactful local action to improve floodplain management standards within their geographic jurisdictions.

Assessing all local planning boards could also be an opportunity to learn, in more detail, the full extent of local jurisdictions' capabilities across the Commonwealth. The responsibility of local conservation commissions, public health boards, and planning boards to mitigate risk provides an opportunity for the Commonwealth to support these

boards with funding, partnership opportunities, access to technical experts and scientific support, peer-to-peer learning opportunities, and other direct and sustained support.

An example of support at the state level is the development of the 2022 MA Climate Assessment, which communities throughout the Commonwealth can use to understand the priority risks and impacts within their communities. There is also an opportunity to foster engagement with environmental justice and other priority populations from the beginning of planning processes. The Commonwealth could help local communities with strategies, best practices, financial support, technical support, maps, data, and communication tools to engage in meaningful ways with socially vulnerable communities (see Section 4.1.3.4, Education and Outreach," for more details).

Example Planning Challenges Identified by Grantees in MVP 2.0 Planning to Action Survey (2021)

The MVP 2.0 Planning to Action process was designed for MVP certified communities to update their previously developed MVP plans (and new communities to develop their first MVP plan). A survey question focused on what support communities need (and related challenges) to be more efficient to move from planning to action.

- Lack of long-term funding and resources for projects from the planning and design stage through to implementation
- Too many planning efforts and not enough on-the-ground action (e.g., plans "sit on a shelf") and feeling of "planning fatigue"
- Limited support to assist local communities from planning to design to action, as well as complex application processes
- Limited engagement with environmental justice and other priority populations in planning processes

4.1.3.2 Administrative and Technical

A local government's ability to mitigate risk and adapt to climate change is affected by the capabilities and capacity of its staff and technical resources. In recognition of that, each Massachusetts community is required to appoint an emergency manager (Chapter 639 of the Acts of 1950) who is primarily responsible for local preparedness, mitigation, response, and recovery, as well as mutual aid for natural and human-caused hazards. Emergency managers play a primary role in developing local comprehensive emergency management plans required by Massachusetts state law, as well as other plans required by MEMA and FEMA. The Commonwealth frequently looks to the local emergency management director as the key point of contact for MEMA- or FEMA-related business. This role is critical for effective outreach and involvement in mitigation planning and grants. One challenge in many communities is that the role of an emergency management director is frequently assigned to an existing full-time employee who has a range of other responsibilities, rather than a separate full-time position. An additional factor related to this responsibility is which department hosts the emergency manager role and how well-integrated that department is with other critical functions such as land use and planning, sustainability,

coastal management, infrastructure, and utilities. These other functions are described below. Integration among all critical functions is important to effective planning, implementation, and monitoring of hazard mitigation and climate adaptation efforts.

Public works departments or water and sewer departments, which are primarily responsible for municipal drainage and stormwater management systems, take the lead in ensuring communities' compliance with the U.S. Environmental Protection Agency's Phase II Stormwater Regulations that relate to the National Pollutant Discharge Elimination System. Because stormwater is one of the major flood hazards in Massachusetts, ongoing maintenance and upgrading of local stormwater systems by public works departments is important to reducing flood risks. Public works staff are integral in implementing local hazard mitigation plans, especially in identifying and implementing local hazard mitigation projects related to infrastructure. Communities have varying degrees of capabilities, although many do maintain a significant level of engineering or public works capability through their own municipal staff, master services agreements, and/or other contractual arrangements with service providers.

Building inspectors implement and enforce the MSBC (specifically, Section 3107, "Flood Resistant Construction"), which incorporates NFIP construction standards. The MSBC includes sections on wind, snow, structural loads, and seismic retrofitting, as well as GHG mitigation via the Stretch Code. It also ensures NFIP standards and other mitigation standards are applied uniformly statewide. Building inspectors also enforce local bylaws, especially to prevent floods. For instance, building inspectors are responsible for administering municipal zoning ordinances, including those that apply to floodplains. Building inspectors also find problems or violations of the MSBC related to hazards other than flooding. Depending on local mitigation plans, administering the NFIP may fall to building inspectors, but also conservation commissions, public works staff, or local planning departments.

When drafting hazard mitigation plans, most communities request a list of RL and SRL properties from MEMA. Communities are then able to include these structures, or their general vicinities, in local risk assessments, as well as identify flood mitigation actions to prevent future losses. Some communities identify and evaluate the need to acquire, elevate, or otherwise floodproof these structures, and many communities will encourage residents to retrofit structures that suffer repeated flood damages.

City of Woburn Local Hazard Mitigation Plan

In 2021, the city of Woburn updated its hazard mitigation plan, prioritizing goals and strategies for dealing with hazards and providing a blueprint for the city to use in prioritizing grant applications and public infrastructure projects. In the summary of RL structures from 1978 to 2020, there were a total of seven properties, 17 losses, and $634,454 in claims.

The Northeast States Emergency Consortium offers no-cost technical assistance to communities to understand and mitigate their risk from hazards. Using programs such as HAZUS (updated in 2022), the consortium can

model impacts of earthquakes, hurricanes, floods, and coastal storm surge. Agencies or organizations interested in obtaining the consortium's assistance with multi-hazard risk mapping can find an application online.

Universities in Massachusetts and across the Northeast are also partners in hazard mitigation and climate adaptation by conducting research on hazards, climate change, and other areas of study, as well as providing technical expertise and scientific studies. For example, the University of Massachusetts system has developed hazard mitigation plans for each of its campuses. It has also participated in the planning process for the communities in which those campuses are located.

4.1.3.2.1 Current Challenges and Opportunities

Example Administrative and Technical Challenges Identified by MVP Grantees

- Lack of necessary staff capabilities to undertake effective grants and projects
- Limited in-house grant writing expertise and technical support around climate projections
- Lack of skilled staff to help with outreach and engagement with environmental justice and other priority populations and the general public

Municipalities in Massachusetts have a high degree of technical and administrative capability, with many local governments supported by experienced staff, citizen volunteers, and external service providers such as regional planning agencies, nonprofit organizations, academic organizations, and private sector businesses. However, many local communities, and especially environmental justice and other priority populations, lack the overall capacity to fully engage in hazard mitigation and climate adaptation planning and implementation due to a lack of time and experience, as well as a lack of access to adequate resources. The Commonwealth's MVP Program is one of the solutions to these challenges and supports local governments by providing technical assistance, training, and other resources concerning new hazard mitigation measures, as well as encouraging and increasing the local enforcement of sound building practices. Additionally, MAPC's technical assistance programming provides communities and municipalities with tools and resources they can use to conduct climate vulnerability assessments, update hazard mitigation plans, and develop climate-resilient land use and zoning regulations. For coastal communities, the CZM Coastal Resilience Grant Program can help support plans, assessments, and analyses that bolster coastal resilience and mitigate hazards such as erosion, storm damage, and flooding.

4.1.3.3 Financial

"Financial capabilities" generally refers to the monetary resources available to local governments to help fund hazard mitigation and climate adaptation actions, including changing existing processes and plans, acquiring land, redesigning a significant segment of shoreline, reconstructing a bridge to make it stronger or higher, and increasing the

capacity of a stormwater system. The costs associated with implementing these actions vary greatly.

Massachusetts municipalities have access to recurring sources of revenue through local property taxes, and some municipalities may have sources beyond that, such as local option taxes (e.g., meals tax; utility, special purpose, or development fees). The municipal budget process is the means by which local government decides on how and where available municipal funds shall be spent. For many communities in Massachusetts, all appropriations for the upcoming fiscal year must be voted on and approved in a town meeting in advance of setting a tax rate.

Example Funding Criteria for Prioritizing Jurisdictions to Receive Grants

Below are some priority criteria for the eligibility, selection, and prioritization of local jurisdictions to receive planning and project grants for the Commonwealth and agencies to consider, based on other existing federal and nonfederal programs (e.g., FEMA and Massachusetts HMA programs, the MVP Program, MassWorks). Jurisdictions should:

- ✓ Include capability- and-capacity-building activities to enhance the knowledge, skills, and expertise of the current workforce to expand or improve the administration of climate mitigation and adaptation efforts.
- ✓ Have cost-effective projects designed to increase resilience and public safety, reduce injuries and loss of life, and reduce damage and destruction to property or high-risk property, critical services, facilities, and infrastructure from severe impacts from climate change and intense development pressures.
- ✓ Determine the degree to which benefits are maximized.
- ✓ Have reasonable indirect costs, direct administrative costs, and other administrative expenses associated with the project.
- ✓ Have a FEMA-approved local hazard mitigation plan and keep it up to date.
- ✓ Include climate adaptation in the local hazard mitigation plan.
- ✓ Ensure the local hazard mitigation plan aligns with local, regional, and state priority protection and priority development areas.
- ✓ Conduct social vulnerability analyses and determine communities at the highest risk with the highest vulnerability, including environmental justice and other priority populations. Consider non-monetary benefits.
- ✓ Utilize and report from the Climate Resilience Design Standards and Guidance Tool, if the project is focused on a specific site and includes physical assets.
- ✓ Incorporate nature-based solutions (i.e., solutions that protect, restore, or manage ecological systems) into the overall project vision.
- ✓ Conduct engagement, especially with environmental justice and other priority populations.
- ✓ Demonstrate positive impacts to the community and have community support (vetted locally).

Although the communities' annual budget focuses mainly on operating expenses, most communities can use general municipal funds to support local hazard mitigation and climate adaptation efforts independently, or as the local match or cost-share often required for external grant funding. However, in most communities, there are also constant and competing demands for new or expanded services. The MVP Program and local hazard mitigation grants attempt to address some of these funding challenges by providing direct funding to communities, as well as guidance on how to make a stronger case to include these priorities in the overall municipal budgeting process, and how to do so.

Spotlight: Rural and Small Town Development Fund

This program, administered by the Division of Community Services within the Department of Housing and Community Development, provides funding for community planning projects in small towns and rural areas that may lack municipal funding to support this work. Grant projects may include infrastructure updates, public housing developments, or planning and zoning changes. Proposals that will serve Black, Latino, and/or environmental justice and other priority populations are scored favorably. Project proposals that address climate change and resilience, as well as other identified priorities for rural communities, are also scored favorably. The Division of Community Services also administers the Housing Choice Grant and the Community Planning Grant Program, both of which similarly prioritize projects that advance environmental justice.

In addition to general funds, many municipalities in Massachusetts have developed a capital improvement program to address major costs that have a multi-year impact on the finances of the municipality. A capital item is usually something that has a high acquisition cost, but also has an economic life of many years. Buildings, infrastructure, some utility replacements and upgrades, fire engines, and dump trucks are common examples of capital items—as are larger infrastructure developments or improvements such as schools or roadways. Structural hazard mitigation or climate adaptation projects such as dam repair, seawall construction, open space acquisition, stormwater system improvements, or other measures to reduce risk are also often included as capital items. Most capital improvement programs plan for five or six years into the future and schedule the acquisition of capital items sequentially to be least disruptive to any given annual budget.

For large capital expenses, many communities will seek to leverage external grant funding and/or borrow money through debt financing to pay over multiple years. Municipalities wishing to borrow money for extended periods of time issue bonds to investors, which are repaid over time with interest. State laws regulate the purposes for which municipalities may borrow, and how long such loans may last. Some cities and towns in Massachusetts typically use debt service for only a small percentage of their budgeting process, opting to maintain a structurally balanced budget where operating revenues meet or exceed operating expenses.

Example Existing Funding Sources for Hazard Mitigation and Climate Adaptation

The following state and federal funding sources/programs support Tribes, local/municipal government, communities, and/or regional partnerships:

State

- Community One Stop for Growth
- CZM Coastal Resilience Grant Program
- DER Culvert Replacement Municipal Assistance Grants
- District Local Technical Assistance
- Food Security Infrastructure Grant Program
- Gap Energy Grant Program
- MassWorks Infrastructure Program
- MEMA Emergency Management Performance Grant
- MVP Program
- Regional Restoration Partnerships Program
- State Transportation Improvement Program
- Water Utility Resilience Program

Federal

- America the Beautiful Challenge
- American Rescue Plan Act Funds
- Community Development Block Grants
- Department of Energy Low-Income Weatherization Assistance Program
- FEMA HMGP
- FEMA BRIC
- FEMA FMA
- Landscape Scale Restoration Program
- National Coastal Resilience Fund

State and federal grants, private funding, and other community resources are also available to communities for specific types of hazard mitigation and climate adaptation projects, depending on various eligibility requirements. The most common sources of state and federal grant funding for these projects in Massachusetts are identified in Appendix 4.A ("Financial" category) and Appendix 4.C ("Funding Sources for Hazard Mitigation and Climate Adaptation Actions"). Sources include, but are not limited to, the MassWorks Infrastructure Program administered by EOHED, the Commonwealth's MVP Program administered by EOEEA, the Coastal Resilience Grant Program administered by CZM, and FEMA's HMA programs administered by MEMA. Although not specifically listed in the inventory on funding sources for hazard mitigation and climate adaptation actions, funding sources and mechanisms may be available for certain local jurisdictions, such as bonds, special benefit districts, local taxes, and development fees. These funding sources and resources can be important for resilience building at the local level.

In addition to coordinating with state agencies, local communities in Massachusetts seek funding cooperatively with their regional planning agencies, neighboring municipalities, or other partners. This work often includes the application for and use of financial sources that can be leveraged to implement projects or activities that provide the benefit of hazard risk reduction and climate adaptation on a regional or multijurisdictional scale.

4.1.3.3.1 Current Challenges and Opportunities

Although most communities in Massachusetts have participated—and continue to participate—in hazard mitigation and climate adaptation efforts, many still rely heavily on external funding sources for assessments, planning, and implementation of hazard mitigation or climate adaptation projects. Communities the capacity to develop and submit competitive applications for grant programs can be successful in accessing limited funds over a specific time frame, but there are many municipalities with limited staff or other resources to compete for these grants that require additional support. For example, a new statewide program that helps build the capabilities and capacities of local planning departments could be beneficial to help increase local community access to and leverage other existing hazard mitigation, climate adaptation, and resilience funding resources, such as FEMA's HMA programs, the MVP Program, MassWorks, and CZM's grant programs. There is also the annual MA SHMCAP implementation funding and technical and policy support (e.g., grant writing through contracted vendors) that could be leveraged. The Commonwealth continues to work to increase awareness and accessibility of guidance, grant funding, and technical assistance to local communities where it is needed most.

Example Financial Challenges Identified by MVP Grantees

- Lack of funding for projects from the planning and design stage through implementation
- High construction and engineering costs for projects that cannot be covered by grants
- Lack of incentives for community members to participate in planning workshops (e.g., town halls)

4.1.3.4 Education and Outreach

Education and outreach includes programs in local communities to communicate and engage on issues related to hazard mitigation, climate adaptation, and emergency preparedness. These programs may be community groups focused on sustainability, climate adaptation, or emergency preparedness, or they may be ongoing public education campaigns or school-related safety programs. For example, the Food Security Infrastructure Grant Program invests in local food providers and supports educational programs and community gardens, which in turn engages

Spotlight: MassWorks Infrastructure Program

Administered by EOHED, this program is a significant source of funding for community infrastructure projects, especially those that support housing development. Considerations for climate resilience are incorporated into project reviews. Proposals are required to include their project's report from the Climate Resilience Design Standards and Guidance Tool and respond to relevant climate resilience questions.

residents in their local food systems. Education and outreach also includes public participation in projects such as the MassWorks Infrastructure Program, FHMP, and the MVP Program. FHMP regularly sends out messages to local officials around capacity-building, partnerships, risk reduction, and resilience building, especially messages related to floodplain development, training opportunities, funding and grants, best practices and case studies, new tools and reports, websites that offer helpful data, and more. In FY 2021, the FHMP sent out 80 such messages across the Commonwealth. As of February 2, 2023, 349 communities have participated in the MVP Program, as identified earlier in this chapter, and 60 communities were awarded MassWorks support in 2022 alone.

Many communities in Massachusetts have Community Emergency Response Teams (CERTs). The CERT program "educates volunteers about disaster preparedness for the hazards that may impact their area and trains them in basic disaster response skills, such as fire safety, light search and rescue, team organization, and disaster medical operations. CERT offers a consistent, nationwide approach to volunteer training and organization that professional responders can rely on during disaster situations, which allows them to focus on more complex tasks. Through CERT, the capabilities to prepare for, respond to, and recover from disasters is built and enhanced."

Two national programs that offer local communities the opportunity to prepare for and mitigate risk are the StormReady program and the Firewise USA program. The StormReady program operates as part of the Weather-Ready Nation program of NOAA's National Weather Service (NWS). The program prepares communities for increased exposure to extreme weather and water events. To date, 21 cities and towns in Massachusetts have the StormReady designation. In addition, six universities have this designation: Boston College, Boston University, Harvard University, Milton Academy, Tufts University, and the University of Massachusetts Amherst.

Firewise USA is a program of the National Fire Protection Association that teaches communities how to adapt to living with wildfires and encourages neighbors to work together and take mitigation actions to prevent losses. As of October 2022, two communities in Massachusetts have received the Firewise USA designation: Six Ponds Improvement Association in 2021 and Hopps Farm Road Association in 2010.

StormReady Communities: Spotlight on Town of Hanover

In September 2022, the town of Hanover received the StormReady Community designation from NWS. To become StormReady, a community must meet or exceed established criteria in six areas:

1. Communications
2. NWS information reception
3. Weather and water monitoring systems
4. Local warning dissemination (including NOAA Weather Radios in local city- or government-owned buildings with public access)
5. Community preparedness (safety/spotter talks and public education).
6. Administrative tools/ recordkeeping

4.1.3.4.1 Current Challenges and Opportunities

There is an opportunity for the Commonwealth to support and increase the availability of outreach and education programs by building upon those that have been successful in the past or are currently successful. Current programs such as the MVP Program, MAPC's technical assistance programs, and CZM's Coastal Resilience Grant Program provide funding, technical support, educational materials, supplemental webinars, outreach, and education, and are good examples of programs led by state agencies that go beyond grant funding alone to boost overall municipal capacity.

In addition, the Commonwealth or other neighboring local communities could provide training and guidance to local communities on best practices to engage, educate, and provide outreach to environmental justice and other priority populations. Conducting community outreach and education can be complex and local communities need support on how to design an equitable and justice-informed approach, which includes working with community-based organizations that have existing relationships within their communities. It is important to build participation into the process—such as by inviting input on prioritizing actions that can be driven by community members, partners, and other stakeholders, not just municipal staff—to ensure diverse perspectives and community needs are being met.

People-Focused Design: City of Springfield

In 2022, the city of Springfield, an MVP grantee, presented its project on building trust in community partnerships, called People-Focused Resilient Redesign and Retrofits for Community and Civic Infrastructure. The main project objectives included improving (1) trust between community members and local agencies, (2) knowledge and understanding of city resilience initiatives, and (3) city communications and outreach. The city worked with a Resident Advisor Board, which consisted of paying stipends to resident advisors who brought their input on various issues aimed at improving communication with residents, particularly the city's most vulnerable residents.

4.1.4 Conclusions

The Commonwealth has a long history of demonstrating its commitment to advancing risk reduction and climate and hazard resilience through a variety of policies, programs, and other capabilities. In recent years, it has advanced that commitment through innovative programs, coordination, and actions that have advanced the understanding of risks from hazards and climate change.

Massachusetts continues to be a leader in the nation on its commitments to climate mitigation and adaptation, including the first-in-nation Clean Peak Standard (established by DOER and designed to provide incentives to clean energy technologies that can supply electricity or reduce demand during seasonal peak demand), the MVP Program, the 2022 MA Climate Assessment, the updated SMART solar program (DOER's incentive program established to support the development of solar energy in Massachusetts), participation in

the Regional Greenhouse Gas Initiative, nation-leading energy efficiency programs, and its Clean Energy Standard. Since 2018, the Commonwealth continues to conduct studies or develop plans and programs on hazard mitigation and climate adaptation, which generate data, information, and findings that are useful to other local and state agencies, as well as nonprofits, academia, and community-based organizations.

The Commonwealth also maintains a strong institutional capacity to reduce hazard and climate risks, especially resources directed towards emergency preparedness and response. Most agencies surveyed in Massachusetts have adequate infrastructure and hardware (e.g., backup generators, software) as well as authority (e.g., policies, laws) to deliver their services or programs in the face of increasing threats from hazards and climate change. For some state agencies, these threats are significant, but for others, they do not pose any major risks or vulnerabilities of concern. Regardless, the MA SHMCAP provides a framework for state and local governments to continue to evaluate risk, assess vulnerability, and work across all agencies to adapt, maintain, and increase their resilience to changing hazards and the impacts of climate change.

To ensure it addresses the top challenges surrounding the capacity and capability of funding, staffing, skills/expertise, and data and information, the Commonwealth will continue to invest in and advance the key opportunity areas highlighted in Section 4.1.2.2 and Table 4-4.

By being proactive in building the Commonwealth's resilience and adapting to hazard and climate vulnerabilities and consequences, in addition to being prepared for emergency response, Massachusetts can be more innovative and strategic when it comes to coordination and implementation across sectors, agencies, and jurisdictions. It will take collaborative planning and teamwork to build capacity and effectiveness across the Commonwealth and across sectors. This extraordinary commitment promotes hazard mitigation, climate adaptation, and overall resilience and recognizes the importance of investing now for the future resilience of the Commonwealth.