



Resilient Massachusetts Action Team

Climate Resilience Design Standards Tool

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MA Executive Office of Energy and Environmental Affairs



Executive Order 569 - 2016



- Comprehensive approach to reduce GHG emissions to combat climate change and prepare for the impacts of climate change
 - State Adaptation Plan
 - Climate Coordinators
 - Agency Vulnerability Assessments
 - Municipal Support

Environmental Bond - 2018

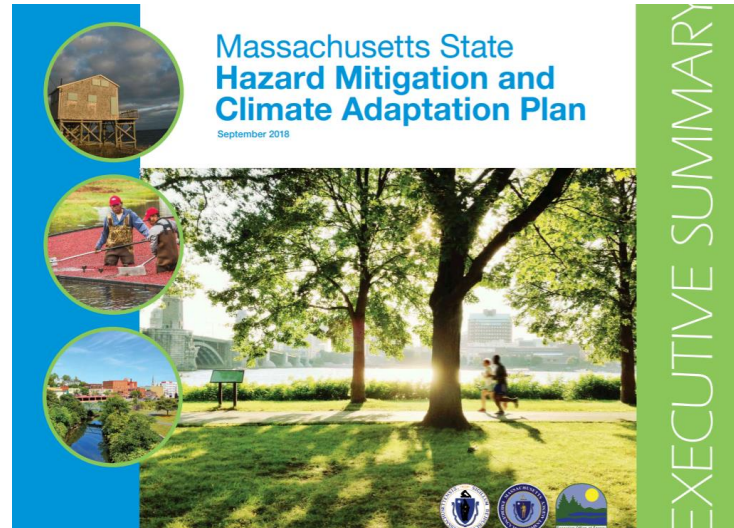


- \$2.4 billion bond bill with focus on climate change resiliency
- Over \$200 million authorized for climate change adaptation
- Codifies EO 569, including the Municipal Vulnerability Preparedness (MVP) Program

Resilient MA Action Team (RMAT)



Responsible for the State Hazard Mitigation and Climate Adaptation Plan (SHMCAP) implementation, monitoring, and maintenance, with representatives from each Secretariat and key state agencies



Resilient MA Action Team (RMAT)



Integration of climate resilience into capital planning is 2018 SHMCAP Priority Action

- Incorporating climate change vulnerability, resilience and adaptation standards into **budgeting, coordination, capital planning**
- **Review and update design standards** using MA climate change projections that will support best management and construction practices
- Incorporate climate vulnerability, resilience, and adaptation standards into **capital planning for new projects**

Hazard Mitigation and Climate Adaptation Actions

ACTION TITLE	ACTION DESCRIPTION	EXECUTIVE OFFICE / LEAD AGENCY	COMPLETION TIME FRAME
Budgeting, coordinating administrative functions, and planning.	Incorporate climate change vulnerability, resiliency, and adaptation standards into budgeting, coordination, and capital planning.	A&F	3–5 years
In consultation with DCAMM, MassDOT, and EOHEA, develop climate change design standards.	EOHEA will work with Climate Change Coordinators and agency staff across Secretariats to review and update design standards using Massachusetts climate change projections that will support best management and construction practices for new and improved agency structures, roads, parkways, parking lots, housing, and other facilities.	EOHEA	3–5 years
Incorporate hazard and climate change vulnerability into capital planning, master planning, and facilities management functions.	Incorporate climate change vulnerability, resilience, and adaptation standards into capital planning for new projects. Refer to agency climate change vulnerability assessments in master planning exercises. Integrate climate change vulnerability assessments into a facilities management system.	A&F / DCAMM	Greater than 5 years

Resilient MA Action Team

Beta Climate Resilience Design Standards Tool

An **interactive web-based tool** that **automates** the Commonwealth's available climate change data and provides a **preliminary climate risk screening and planning recommendations** for projects

Goals:

- **Makes preliminary climate resilience analysis** more broadly accessible
- **Inform “climate smart” capital planning** by providing recommendations for the consistent use of state’s climate data in the planning and designing of physical assets
- **Provides an easy to use planning and design support tool** for agencies and municipalities



<https://resilientma.org>

A screenshot of the Resilient MA website. The top navigation bar includes "Tools & Data", "Learn", and "Take Action". The "Tools & Data" section is expanded, showing a list of resources. A yellow circle highlights the "Climate Resilience Design Standards & Guidelines" link. Below the navigation, there are sections for "Explore Sectors:" (listing Agriculture, Coastal Zones, Economy, Energy, Forestry, Infrastructure, and Local Communities) and "Identify Changes:" (listing Sea Level Rise, Extreme Weather, Changes in Precipitation, and Rising Temperatures). The "Take Action" section includes an "MVP Program:" link. A large blue banner in the center reads "Climate Resilience Design Standards Tool". Below this, a screenshot of the tool's user interface is shown, featuring a map and various data points. To the right of the UI screenshot, text reads: "This is the beta version of the Climate Resilience Design Standards Tool. Log in or register below to pilot the tool. Please submit feedback to support our piloting and improvements process by using this form." Below this text are two buttons: a blue "LOG-IN / REGISTER >" button and a grey "State Users Log-in >" button.

https://resilientma.org/rmat_home/designstandards/

RMAT Climate Resilience Design Standards Tool

Tool that will be enhanced over time with additional stakeholder feedback and updated climate change data

Fall 2019-Spring 2021

Stakeholder Engagement:

- Agency & Stakeholder Working Groups
- External Technical Advisory Group
- Summer 2020 Public Feedback Period

Note: This tool **does not** replace a thorough site-specific vulnerability analysis or provide site-specific design strategies, but is a useful cut to understanding underlying site risk factors and vulnerability.

Climate Resilience Design Standards Tool
Resilient MA Action Team (BETA)

Beta Tool 1
Project Number: 182
Project Status: Not Scored

Hello, RMATAdmin
Terms of Use
Delete Project

Date Project Created: 4/15/2021
Who Created This Project: RMATAdmin

Draw Project Area
You must draw a polygon on the map representing the project area.

1. Find the project location using the map zoom/pan and/or the address search bar in the upper right area of the map.
2. Draw the polygon using the drawing tools under the search bar.
3. Click the icon when you are satisfied with the polygon.

Find address or place 1

2

3

Show me how

Map View Additional Documents and Resources

Find address or place

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Getting Started: When to use the RMAT resilience tool

- **Improving state grant application**
 - Demonstrate awareness of a project's climate risks, and incorporation of climate data into design
- **Project siting**
 - If a potential site is at high risk of climate impacts, can support consideration of alternative locations
- **Project planning and design/ procurement**
 - Incorporate recommended design standards into early planning phases
 - Ask for proponents to meet recommended resilience standards as part of a response to a project RFP
- **Capital planning**
 - Identify whether investments are being made in a climate vulnerable location, and push those projects to conduct additional analysis and incorporate recommended standards

Climate Resilience Design Standards Tool



This is the beta version of the Climate Resilience Design Standards Tool. Log in or register below to pilot the tool. Please submit feedback to support our piloting and improvements process by [using this form](#).

LOG-IN / REGISTER >

State Users Log-In >

For state staff requesting first time access, please email rmat@mass.gov

[Tool User Guide](#)

https://resilientma.org/rmat_home/designstandards/

Getting Started: Review the tool user guide and training video

Resilient Massachusetts Action Team
Climate Resilience Design Standards and Guidelines
beta Tool, Version 1, April 2021

CLIMATE RESILIENCE DESIGN STANDARDS AND GUIDELINES TOOL (BETA) USER GUIDE

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RMAT Beta Tool Overview and Training

https://resilientma.org/rmat_home/designstandards/

Drawing a Project Polygon



Climate Resilience Design Standards Tools
Resilient MA Action Team (BETA)




Pioneer Terrace

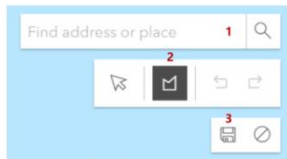
Project Number: 193
Project Status: Not Scored

Date Project Created: 4/20/2021
Who Created This Project: RMATAdmin

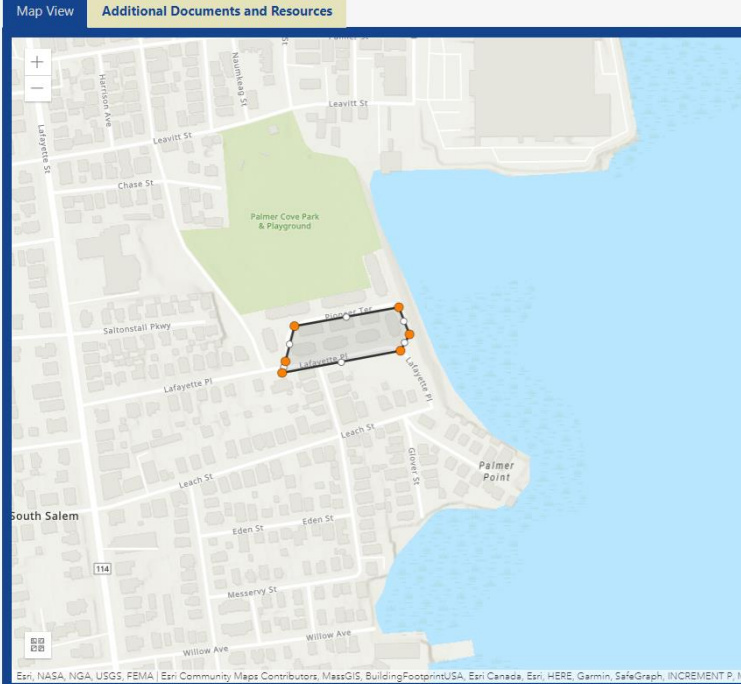
Draw Project Area

You must draw a polygon on the map representing the project area.

1. Find the project location using the map zoom/pan and/or the address search bar in the upper right area of the map.
2. Draw the polygon using the drawing tools under the search bar.
3. Click the  icon when you are satisfied with the polygon.



[Show me how](#)




PIONEER TERRACE

Location: Corner of Salem St. & Lafayette Pl.


Units: 104 garden-style 1 BR apts.

Tool Inputs







**Beta Tool 1**

Project Number: 182
Project Status: Not Scored

Date Project Created: 4/15/2021
Who Created This Project: RMATAdmin

Hello, RMATAdmin 
[Terms of Use](#)
[Delete Project](#)

Map View | **Project Inputs** | **Project Outputs** | **Additional Documents and Resources**

- Step 1** Core Project Information *(Click each question to answer and save. All questions in red are required)* 
- Step 2** **Project Ecosystem Services Benefit** *(Please identify whether the project provides the following ecosystem services benefits to the project site or surrounding area)* 
- Step 3** Project Climate Exposure *(Click each question to answer and save. All questions in red are required)* 
- Step 4** **Project Assets** 
- Step 5** Review Project Outputs 
- Step 6** Submit Project 

Tool **Inputs**: Core Project Information

Map View | **Project Inputs** | Project Outputs | Report Preview | Additional Documents and Resources

Step 1 Core Project Information

Name: UserGuide PioneerTerrace

i Given the expected useful life of the project, through what year do you estimate the project to last (i.e. before a major reconstruction/renovation)? 2030 - 2039

Location of Project: Salem

Estimated Capital Cost: \$4,444,444

Entity Submitting Project: Executive Office of Housing and Economic Development / Department of Housing and Community Development

Is this project being submitted as part of a state grant application? No

Is climate resiliency a core objective of this project? No

Is this project being submitted as part of the state capital planning process? No

Is this project being submitted as part of a regulatory review process? No

Brief Project Description: Enter Project Description here.

Step 2 Project Ecosystem Services Benefit

Step 3 Project Climate Exposure

Step 4 Project Assets

Step 5 Review Project Outputs

Step 6 Submit Project

Tool **Inputs:** Project Environmental Benefits and Climate Exposure

Map View | Project Inputs | Project Outputs | Additional Documents and Resources

Step 2 | **Project Ecosystem Services Benefit**

- Provides flood protection through green infrastructure or nature-based solutions No
 - Provides storm damage mitigation No
 - Provides groundwater recharge No
 - Protects public water supply No
 - Filters stormwater No
 - Improves water quality No
 - Promotes decarbonization Yes
 - Enables carbon sequestration Yes
 - Provides oxygen production No
 - Improves air quality No
 - Prevents pollution Yes
 - Remediates existing sources of pollution No

- Protects fisheries, wildlife, and plant habitat No
- Protects land containing shellfish No
 - Provides pollination No
 - Provides recreation No
Step 3 | **Project Climate Exposure**

Tool **Inputs:** Project Assets and Impacts

Step 4 Project Assets

Building/Facility Add

UserGuide Building

Infrastructure Add

N/A

Natural Resources Add

N/A

Selected Asset: UserGuide Building

Asset Type: Typically Occupied

Asset Sub-Type: Residential building - Public Housing

Construction Type: Maintenance (critical repair)

Construction Year: 2025

Useful Life: 15

| | |
|--|--|
| <p>Identify the length of time the asset can be inaccessible/inoperable without significant consequences.</p> | <p>Building must be accessible/operable at all times, even during natural hazard event</p> |
| <p>Identify the geographic area directly affected by permanent loss or significant inoperability of the building/facility.</p> | <p>Impacts would be limited to local area and/or municipality</p> |
| <p>Identify the population directly served that would be affected by the permanent loss of use or inoperability of the building/facility</p> <p>If the building/facility became inoperable for longer than acceptable in Question 1, how, if at all, would it be expected to impact people's health and safety?</p> | <p>Less than 1,000 people</p> <p>Inoperability of the building/facility would result in moderate or severe injuries or moderate or severe impacts to chronic illnesses</p> |
| <p>What are the environmental impacts related to spills/releases of hazardous materials as a result of loss of the building/facility functionality?</p> | <p>There are no hazardous materials in the building/facility</p> |
| <p>What are the impacts on other facilities, assets, and/or infrastructure as a result of loss of the building/facility functionality?</p> | <p>Minor – Inoperability will not likely affect other facilities, assets, or buildings</p> |
| <p>What are the direct costs to replace the loss of the building/facility?</p> | <p>Between \$30 million and \$100 million</p> |
| <p>Is this a recreational facility which can be vacated during a natural hazard event?</p> | <p>No</p> |
| <p>If the building/facility became inoperable for longer than</p> | <p>Few alternative programs and/or services are available to support the community</p> |

Tool Inputs

Map View **Project Inputs** Project Outputs Report Preview Additional Documents and Resources

Step 1 Core Project Information

Step 2 Project Ecosystem Services Benefit

Step 3 Project Climate Exposure

Step 4 Project Assets

Step 5 Review Project Outputs

You have completed all required Project Inputs. Go to the [Project Outputs](#) tab to review project ratings and recommended standards.

Step 6 Submit Project

You have completed all required Project Inputs. Once submitted, you cannot edit project information. Please go to the [Report Preview](#) tab to download your project report, which can be used as an attachment for project applications, as needed.

Submit Project

Tool Outputs

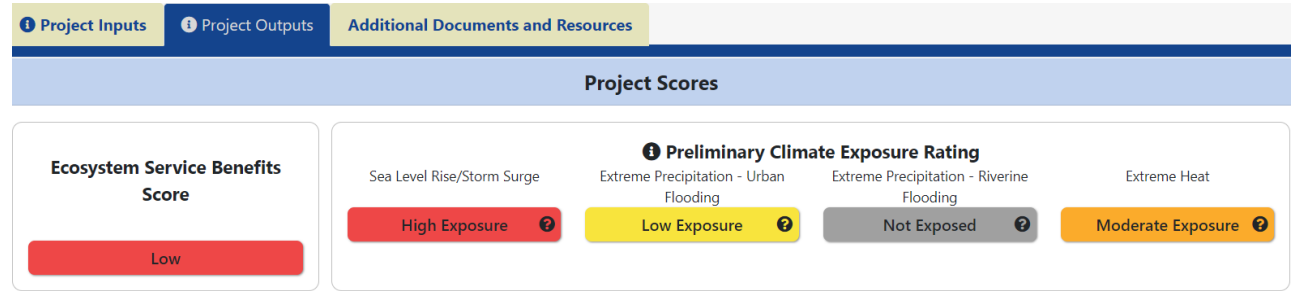
1. Ecosystem Services Benefits Score

- E.g. Improves air or water quality; Pollution prevention or remediation; Decarbonization or carbon sequestration

2. Preliminary Climate Exposure Rating

- Based on project location and user responses
- **Plus “Exposure Details”** on why the project received this rating

Project Exposure (Project Location + User Responses)



Project Exposure Details



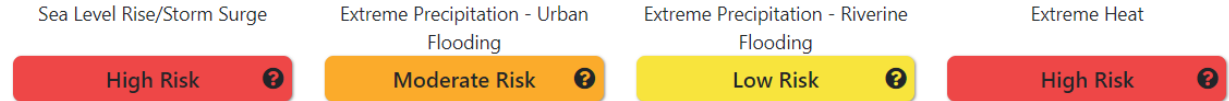
Tool Outputs

3. Preliminary Climate Risk Rating

- Determined by:
 - **Project Exposure + Project Impact**
 - User responses on the social, economic, and environmental impacts of project inoperability
 - **Can help identify** climate vulnerable projects that may require additional analysis

Project Climate Risk Rating (Exposure + Impact)

i Preliminary Climate Risk Rating for this Project Asset



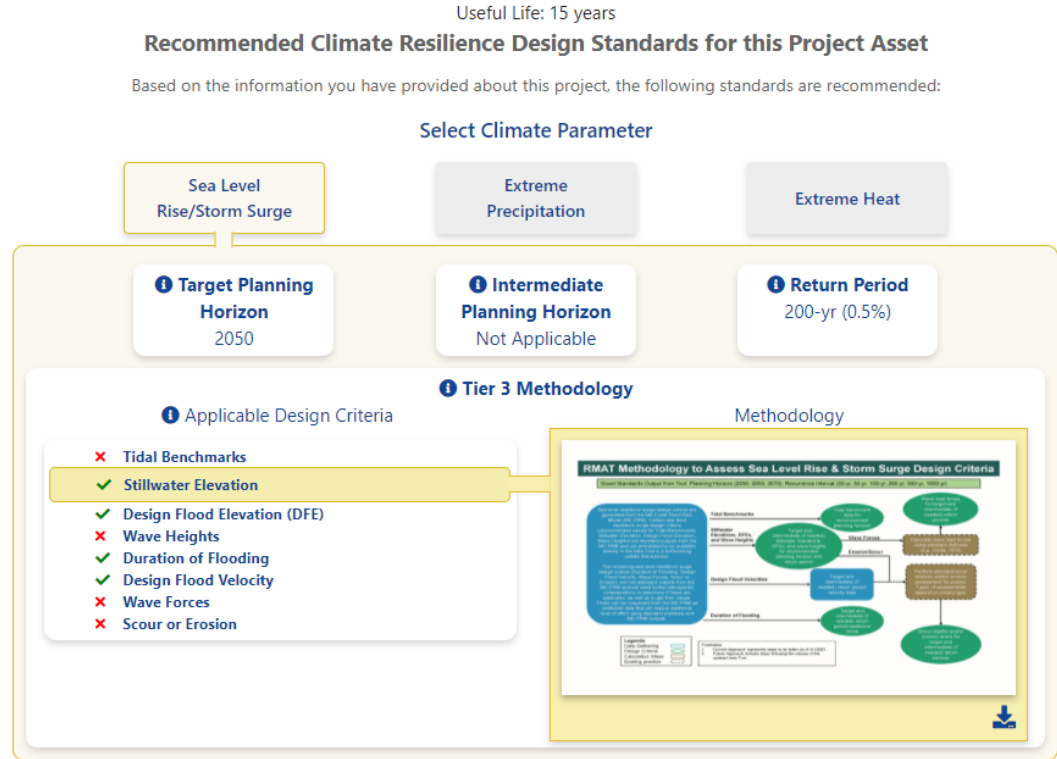
Climate Risk Rating Details

| Primary project exposure factors influencing risk ratings for Test Building | Primary asset criticality factors influencing risk ratings for Test Building |
|---|---|
| Exposed to the 1% annual coastal flood event as early as 2030 | Asset must be operable at all times, even during natural hazard event |
| Historic coastal flooding at project site | Loss/inoperability of the asset would have impacts limited to local area and/or municipality |
| Located within the 0.1% annual coastal flood event within the project's useful life | The building is located in an environmental justice community, and/or does provide services to vulnerable populations |
| | Inoperability of the asset would result in moderate or severe injuries or moderate or severe impacts to chronic illnesses |
| | Cost to replace is between \$10 million and \$30 million |
| | Impact on natural resources can be mitigated naturally with the inoperability of the asset |

Tool Outputs

4. Recommended resilience design parameters to guide project planning, design, and review

- Design standards include recommended:
 - **Planning Horizon**
 - **Return Period**
 - **Applicable Design Criteria**
 - **Tiered Methodology**
 - E.g. Higher Criticality/ Longer Useful Life projects are recommended a higher level of effort to identify design criteria



Project Report

Project Outputs | Report Preview | Additional Documents and Resources

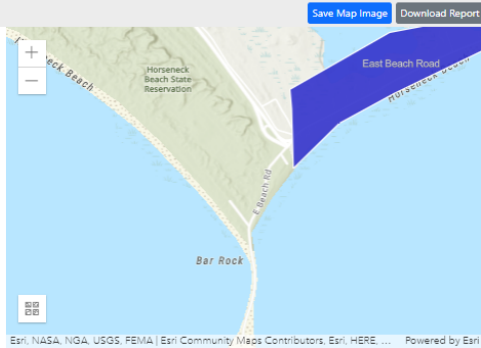
Project Summary

East Beach Road

Estimated Construction Cost: \$4500000.00

Useful Life: 2070 - 2079

| Ecosystem Benefits | Scores |
|---|---------------|
| Project Score | Low |
| Exposure | Low |
| Sea Level Rise/Storm Surge | High Exposure |
| Extreme Precipitation - Urban Flooding | High Exposure |
| Extreme Precipitation - Riverine Flooding | Not Exposed |
| Extreme Heat | High Exposure |



Asset Summary

Number of Assets: 3

| Asset Risk | Sea Level Rise/Storm Surge | Extreme Precipitation - Urban Flooding | Extreme Precipitation - Riverine Flooding | Extreme Heat |
|-------------------------|---|--|---|--------------|
| East Beach Road | High Risk | High Risk | Low Risk | High Risk |
| East Road Barrier Beach | Natural Resource project assets do not receive a preliminary climate risk rating. | | | |
| East Road Barrier Beach | Natural Resource project assets do not receive a preliminary climate risk rating. | | | |

Project Outputs

| | Target Planning Horizon | Intermediate Planning Horizon | Percentile | Return Period | Tier |
|-----------------------------------|-------------------------|-------------------------------|------------|---------------|--------|
| Sea Level Rise/Storm Surge | | | | | |
| East Beach Road | 2070 | 2050 | | 500-yr (0.2%) | Tier 3 |
| East Road Barrier Beach | 2050 | | | | Tier 2 |
| East Road Barrier Beach | 2050 | | | | Tier 2 |
| Extreme Precipitation | | | | | |
| East Beach Road | 2070 | | | 50-yr (2%) | Tier 3 |
| East Road Barrier Beach | 2050 | | | | Tier 2 |
| East Road Barrier Beach | 2050 | | | | Tier 2 |

Scoring Rationale - Exposure

Sea Level Rise/Storm Surge

This project received a "High Exposure" because of the following:

- Located within the predicted mean high water shoreline by 2030
- Exposed to the 1% annual coastal flood event as early as 2030
- Historic coastal flooding at project site

Extreme Precipitation - Urban Flooding

This project received a "High Exposure" because of the following:

- Historic flooding at the project site
- Increased impervious area
- Projected increase in rainfall within project's useful life

Extreme Precipitation - Riverine Flooding

This project received a "Not Exposed" because of the following:

- No historic riverine flooding at project site
- Not exposed to riverine flooding within the project's useful life

Extreme Heat

This project received a "High Exposure" because of the following:

- 30+ days increase in days over 90 deg. F within project's useful life
- Increased impervious area
- Located within 100 ft of existing water body

Scoring Rationale - Asset Risk Scoring

Asset - East Beach Road

Primary asset criticality factors influencing risk ratings for this asset:

Additional Documents and Resources

Map View

Project Inputs

Project Outputs

Report Preview

Additional Documents and Resources

Documents

Guidelines and Forms



[Climate Resilience Design Guidelines](#)

The Guidelines are supplemental resources that provide useful instructions and best practices for implementing the Standards. The Guidelines constitute design principles related to site suitability, flexible adaptation strategies and regional coordination that are illustrated through forms and specific "best practices," which may include case studies and/or existing published resources that exemplify the Guidelines.



[Site Suitability Form](#)

Optional form aimed at evaluating how geographic location, existing conditions, and asset placement impact the sites' ability to serve its intended function, before, during, and after climate impacts.



[Regional Coordination Form](#)

Optional form aimed at understanding how coordination and collaboration across regions, as well as State Agencies and jurisdictions, can help strengthen resilient designs and implementation.



[Flexible Adaptation Pathways Form](#)

Optional form aimed at evaluating project design strategies that are able to adapt over time and respond to changing climate conditions, while encouraging climate mitigation, prioritizing nature-based solutions, and preparing for current and future operations and maintenance needs.

Other Documents



[Section 1: Project Overview](#)

This section describes the project's overall goals, approach, and limitations, including stakeholder engagement history.



[Section 2: Project Inputs and Climate Risk Screening Output](#)

This section details the Project Inputs to the beta tool in addition to the Climate Risk Screening Output, which includes a preliminary exposure rating, risk rating, and ecosystem services benefits score.



[Section 3: Climate Resilience Design Standards Overview](#)

This section details the Climate Resilience Design Standards outputs provided by the beta tool, and the relationships that inform those outputs.



[Glossary of Terminology](#)




[Responses to Questions Received During Stakeholder Outreach](#)

Next Steps

Stakeholder feedback being collected via survey at [mass.gov/rmat](https://www.mass.gov/rmat) by 7/31

Planned stakeholder testing and feedback

- Spring 2021 Pilots:
 - State infrastructure grant program pilots
 - MVP
 - Massworks through the Community One Stop for Growth
 - State capital projects piloting
 - Public feedback period open on www.mass.gov/rmat
- Summer 2021 Stakeholder Focus Groups, targeting:
 - State Agencies
 - Municipalities
 - Regional Planning Agencies
 - Engineering and Design Associations
 - Utilities and Infrastructure
- **Updated tool anticipated to be released in early 2022**



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LOG-IN / REGISTER >

State Users Log-in >

Mass.gov

OFFERED BY: Executive Office of Energy and Environmental Affairs

RMAT beta Climate Resilience Design Standards Tool Feedback Form

Please fill out the form below

You will need:

The beta Climate Resilience Design Standards Tool is now open for stakeholder feedback. You are invited to submit your feedback on the beta tool through 5 pm on July 11, 2021 using this form.

Name *

Email *

Affiliation (town or organization) *

1. Please provide feedback on the beta Climate Resilience Design Standards Tool user interface and map view. (required)



Mia.mansfield@mass.gov
<https://www.mass.gov/mvp>
<https://www.mass.gov/rmat>

