



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

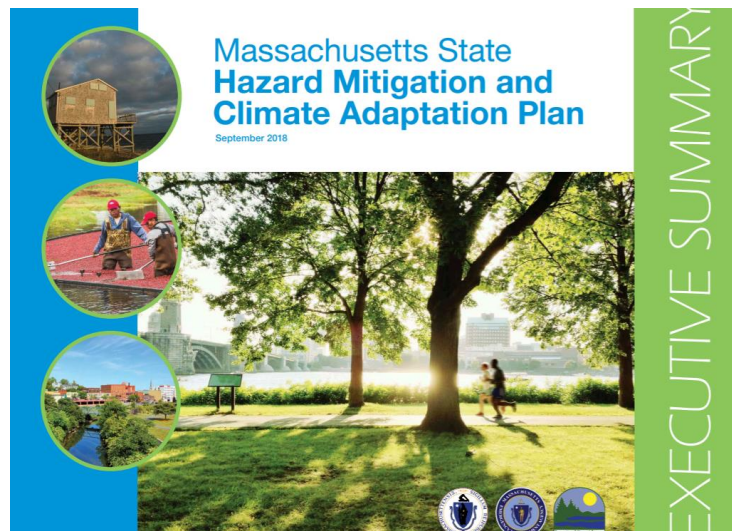


- \$2.4 billion bond bill with focus on climate change resiliency
- Over \$200 million authorized for climate change adaptation
- Codifies EO 569, including the Municipal Vulnerability Preparedness (MVP) Program

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.	EOEEA 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.	EOEEA	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



Resilient MA

Climate Change Clearinghouse for the Commonwealth

<https://resilientma.org>

Supporting the Commonwealth through up-to-date climate change science:

Tools & Data

Resource Clearinghouse

- Documents
- Data
- Maps

Climate Resilience Design Standards & Guidelines

Learn

Explore Sectors:

- Agriculture
- Coastal Zones
- Economy
- Energy
- Forestry
- Infrastructure
- Land Use
- Natural Resources / Habitats
- Public Health
- Public Safety / Emergency Response
- Recreation

Identify Changes:

- Sea Level Rise
- Extreme Weather
- Changes in Precipitation
- Rising Temperatures

Take Action

MVP Program:

- MVP Program Information

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 >](#)

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

RMAT Climate Resilience Design Standards Tool

Beta 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.

The screenshot displays the 'Beta Tool 1' interface for the 'Climate Resilience Design Standards Tool'. The header includes the tool's name, 'Resilient MA Action Team (BETA)', and the user 'Hello, RMATAdmin'. It shows project details: 'Project Number: 182', 'Project Status: Not Scored', 'Date Project Created: 4/15/2021', and 'Who Created This Project: RMATAdmin'. A 'Delete Project' button is visible. The main area is divided into two panels. The left panel, titled 'Draw Project Area', provides instructions: 1. Find the project location using the map zoom/pan and/or the address search bar. 2. Draw the polygon using the drawing tools under the search bar. 3. Click the 'Save' icon when satisfied. It includes a search bar with 'Find address or place' and a '1' next to it, and drawing tools with a '2' next to the polygon tool and a '3' next to the 'Save' icon. A 'Show me how' link is at the bottom. The right panel, titled 'Map View', shows a map of Massachusetts with a red polygon drawn around a region. A search bar with 'Find address or place' and a '3' next to it is at the top right. The map is powered by Esri.

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



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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/

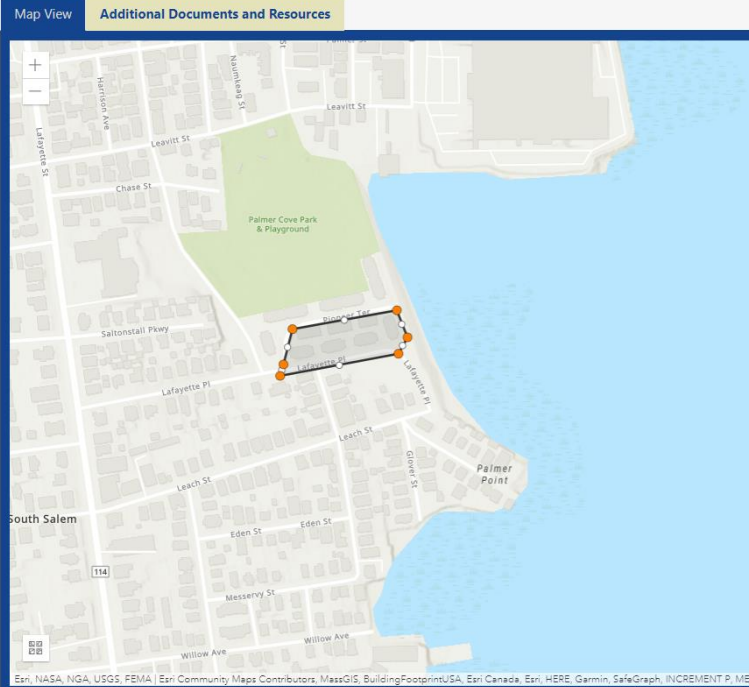


Project Number: 193
Project Status: Not Scored

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


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](#)


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

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

- Does the project site have a history of coastal flooding? Yes
- Does the project site have a history of flooding during extreme precipitation events (unrelated to water/sewer damages)? No
- Does the project result in a net increase in impervious area of the site? No
 - Does the project site have a history of riverine flooding? No
- Are existing trees being removed as part of the proposed project? No

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

Identify the length of time the asset can be inaccessible/inoperable without significant consequences.

Building must be accessible/operable at all times, even during natural hazard event

Identify the geographic area directly affected by permanent loss or significant inoperability of the building/facility.

Impacts would be limited to local area and/or municipality

Identify the population directly served that would be affected by the permanent loss of use or inoperability of the building/facility

Less than 1,000 people

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?

Inoperability of the building/facility would result in moderate or severe injuries or moderate or severe impacts to chronic illnesses

What are the environmental impacts related to spills/releases of hazardous materials as a result of loss of the building/facility functionality?

There are no hazardous materials in the building/facility

What are the impacts on other facilities, assets, and/or infrastructure as a result of loss of the building/facility functionality?

Minor – Inoperability will not likely affect other facilities, assets, or buildings

What are the direct costs to replace the loss of the building/facility?

Between \$30 million and \$100 million

Is this a recreational facility which can be vacated during a natural hazard event?

No

If the building/facility became inoperable for longer than

Few alternative programs and/or services are available to support the community

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

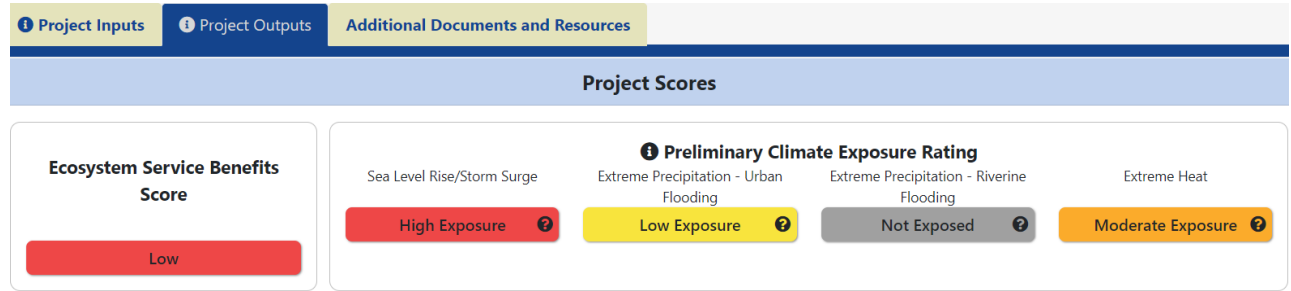
1. Ecosystem Services Benefits Score

- 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)

Preliminary Climate Risk Rating for this Project Asset

Sea Level Rise/Storm Surge

High Risk



Extreme Precipitation - Urban
Flooding

Moderate Risk



Extreme Precipitation - Riverine
Flooding

Low Risk



Extreme Heat

High Risk



Climate Risk Rating Details

Primary project exposure factors influencing
risk ratings for Test Building

Exposed to the 1% annual coastal flood event as early as 2030

Historic coastal flooding at project site

Located within the 0.1% annual coastal flood event within the project's useful life

Primary asset criticality factors influencing
risk ratings for Test Building

Asset must be operable at all times, even during natural hazard event

Loss/inoperability of the asset would have impacts limited to local area and/or municipality

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

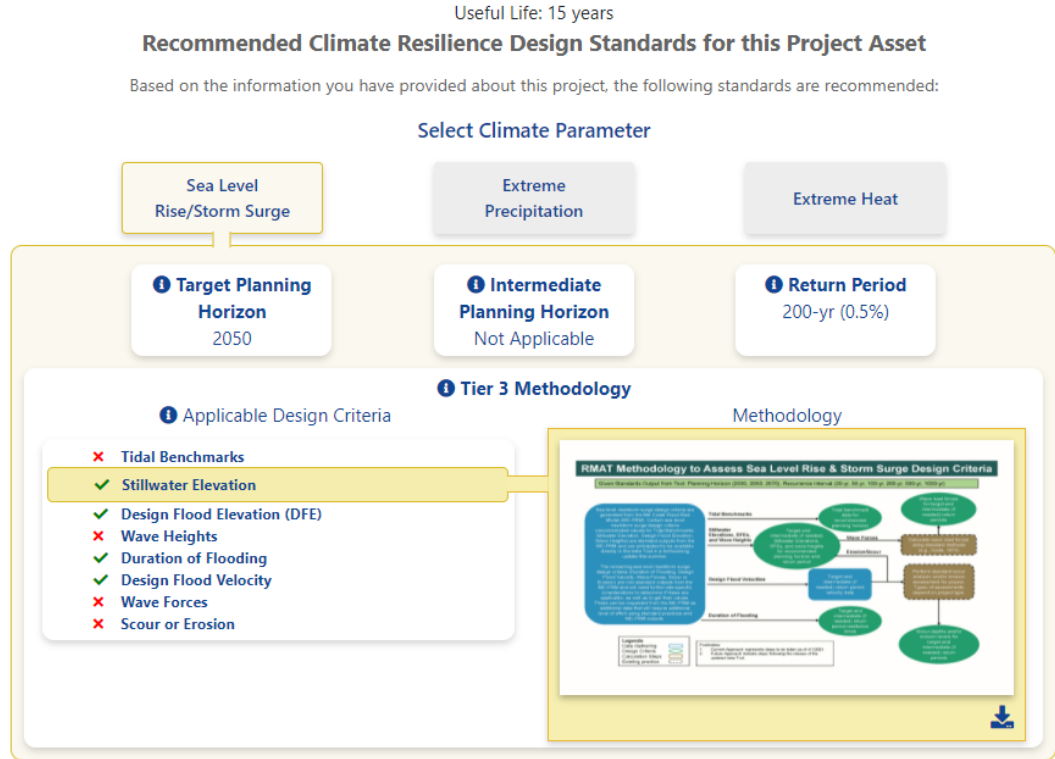
Cost to replace is between \$10 million and \$30 million

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

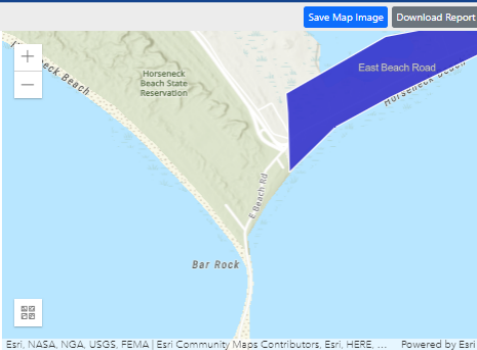
Project Summary

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

Asset Risk	Sea Level Rise/Storm Surge	Extreme Precipitation - Urban Flooding	Extreme Precipitation - Riverine Flooding	Extreme Heat	Number of Assets: 3
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 recieved 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 recieved 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 recieved 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 recieved 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 and NGOs
 - Engineering and Design Associations

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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 June 11, 2021 using this form.

Name •

First Name Last 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>

