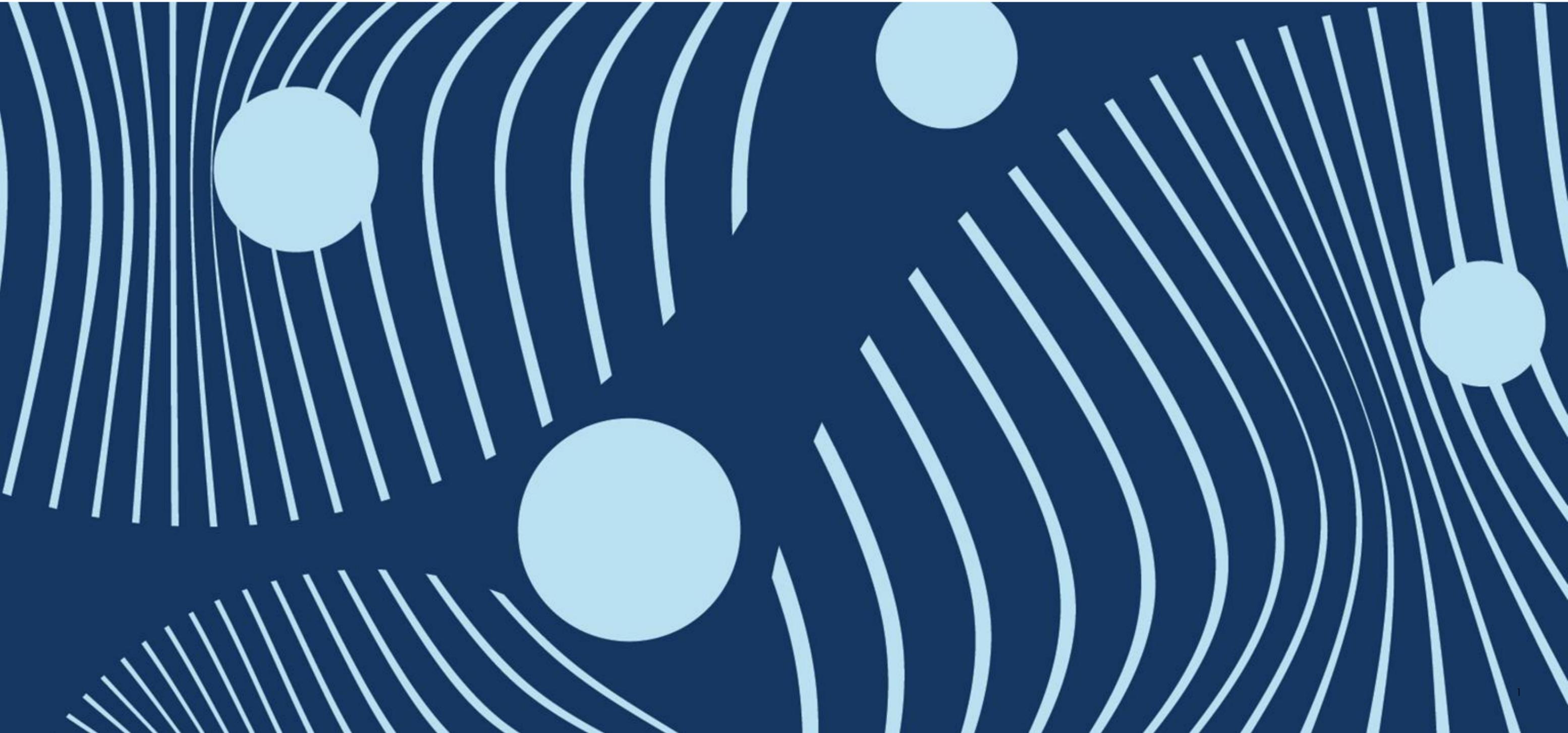




# Resilient Rhody 2025

## Plan Summary





## Foreword

# We are pleased to introduce *Resilient Rhody 2025*, a critical step forward in strengthening Rhode Island’s ability to adapt to the impacts of climate change.

As the Ocean State, with 400+ miles of shoreline, the topic of coastal resilience is of the utmost importance. Sea level rise and increased frequency & intensity of storms and precipitation have worsened the depth and extent of both our coastal and riverine flooding. Such storm events have driven need for extensive emergency management and repair measures, with significant financial impact. Between September 2023 and January 2024 alone, flood disasters resulted in more than \$22 million in FEMA Individual and Household Assistance for Rhode Island residents.

Rising air and water temperatures as well as changing biodiversity drive further social and economic impacts to our state, including hospitalization increases during heat waves and financial impacts to the marine trades.

In 2018, Rhode Island launched *Resilient Rhody*, our first comprehensive strategy to address the impacts of climate change and outline actions to strengthen our state’s resilience. This strategy outlined the climate impacts facing our state and identified 61 key resilience actions across areas such as Critical Infrastructure & Utilities, Natural Systems, Emergency Preparedness, Community Health & Resilience, and Financing Climate Resilience Projects.

Since then, state agencies, municipalities and partners have collaborated to implement innovative programs, funding mechanisms, and technical assistance. From green infrastructure projects to health equity initiatives and emergency preparedness improvements, our communities are better protected today than they were when *Resilient Rhody* began.

However, the work is far from finished. Climate impacts are accelerating—sea level rise, stronger storms, inland flooding, and rising temperatures continue to threaten our infrastructure, ecosystems, and public health. These challenges demand bold, coordinated action.

In response to these challenges, we are pleased to introduce *Resilient Rhody 2025*, Rhode Island’s statewide coastal resilience plan, which develops an actionable, implementable approach for Rhode Island’s climate resilience.

Herein you will find:

- A comprehensive vulnerability assessment of Rhode Island’s public built and natural assets
- Updated statewide resilience actions
- Priority solutions with accompanying cost estimates for critical resilience projects
- A funding and investment strategy to turn plans into action

Our goal remains clear: to ensure Rhode Island has the capacity to adapt and thrive no matter what chronic stresses and weather events we face. We also acknowledge that while the effects of climate change are felt across the state, these impacts are not equally distributed. Effective climate resilience requires a focus on environmental justice and equity—supporting local leadership and fostering sustained collaboration between communities, businesses, and governments.

With *Resilient Rhody 2025*, Rhode Island will be positioned to accelerate resilience efforts, leverage collaboration, and secure the resources needed to make adaptation possible on the ground. I am confident that this plan will put us on the path to build the capacity and develop the funding sources necessary to protect our most vulnerable assets and communities.

*Resilient Rhody* is intended to remain a dynamic plan that adapts to Rhode Island’s evolving needs. Accordingly, it will undergo a full review and update in two years.

We thank our partners for their continued commitment and collaboration. Together, we can advance resilience efforts to safeguard Rhode Island’s communities, economy, and natural systems for generations to come.



**Kimberly Koriath**  
Chief Resilience Officer,  
State of Rhode Island





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**Chapter 4: Priority Assets List**

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# Resilient Rhody 2025

## Purpose





# Resilient Rhody 2025 History and Purpose

As Rhode Island communities face growing risks from sea level rise, stronger storms, and other climate impacts, the State is taking decisive action with *Resilient Rhody 2025*, Rhode Island's first Statewide Coastal Resilience Plan.

## Resilient Rhody's Definition of Climate Resilience

"The capacity of individuals, institutions, businesses, and natural systems within Rhode Island to survive, adapt, and grow no matter what chronic stresses and weather events they experience. While the effects of climate change are felt across the state, these impacts are not equally distributed. Effective climate resilience requires a focus on environmental justice and equity to support local leadership for sustained interaction between community, business, and government."

## Six Statewide Manifestations of Climate Change

### Identified in Resilient Rhody 2018

- Sea level rise
- Warming air temperatures
- Warming water temperatures
- Storm frequency and intensity
- Changing biodiversity

### Resilient Rhody 2025 builds on more than a decade of coordinated efforts to advance climate mitigation and resilience goals.

In 2014, the General Assembly passed the "Resilient Rhode Island Act", which set the framework for addressing climate change and created the Executive Climate Change Coordinating Council (EC4) to guide statewide efforts. In 2015, EC4 defined six key climate change manifestations and began coordinating resilience planning across agencies.

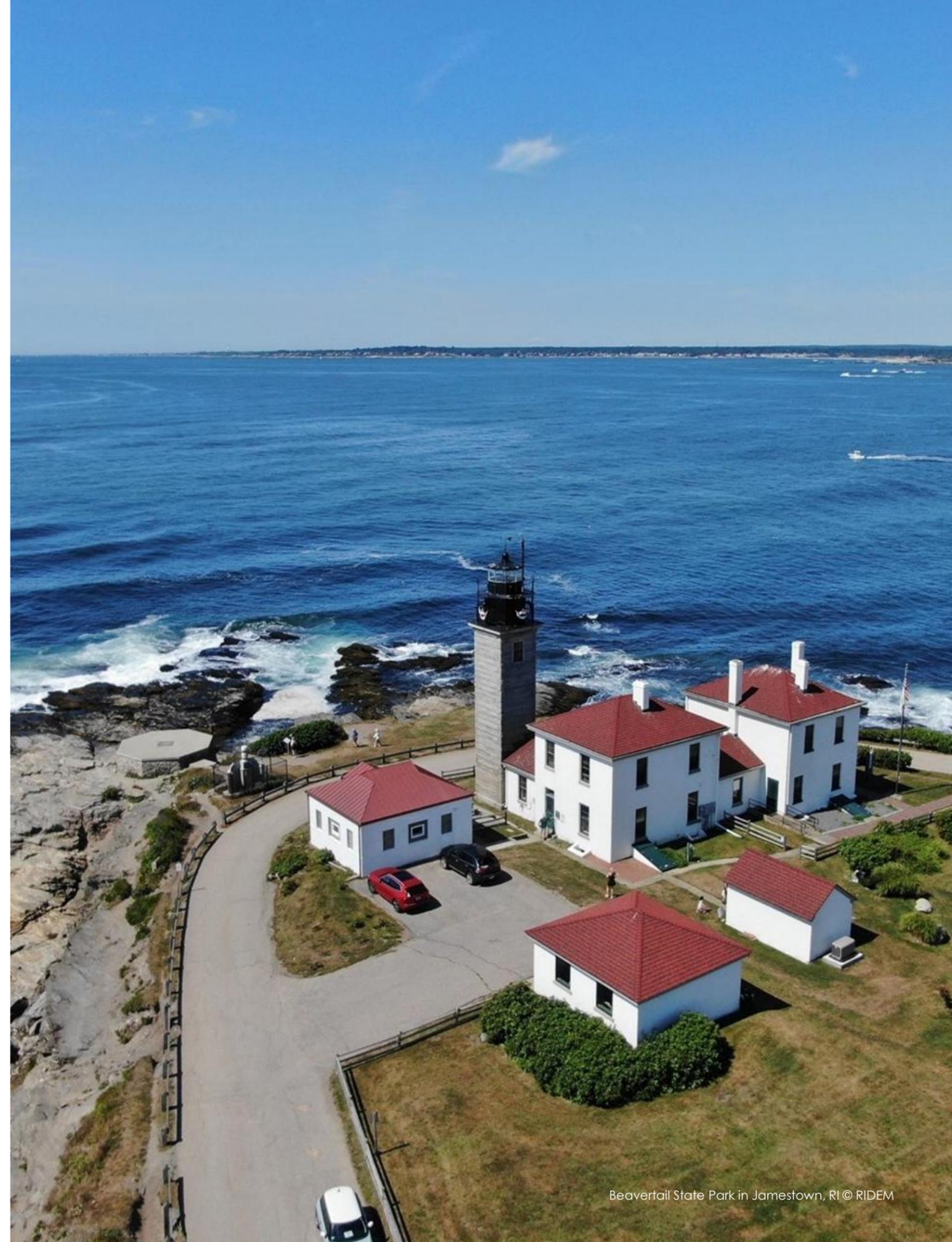
Building on this foundation, on September 15, 2017, Governor Gina M. Raimondo signed Executive Order 17-09: "Action Plan to Stand Up to Climate Change", establishing a Chief Resilience Officer to lead climate resilience efforts across the state in collaboration with business, academic, and non-profit partners. This culminated in *Resilient Rhody* in 2018, Rhode Island's first climate adaptation strategy.

*Resilient Rhody* outlined the impacts Rhode Island faces and identified 61 priority actions across critical areas such as infrastructure, natural systems, emergency preparedness, community health, and financing resilience projects.

Following the first *Resilient Rhody* plan, Governor Daniel McKee signed the "2021 Act on Climate" on April 14, 2021. This updated the 2014 "Resilient Rhode Island Act" to create enforceable emission reduction mandates.

In 2023, Governor Daniel McKee signed the Executive Order 23-07: "Rhode Island Resilience 2023" on May 22, 2023. This re-established the Chief Resilience Officer position and resulted in the *Resilient Rhody 2024 State of Resilience Report*. The 2024 report reviewed progress on the 2018 actions and highlighted new initiatives launched across Rhode Island.

With climate impacts accelerating, in 2024, the General Assembly passed the "Act on Coasts", which mandated the development of *Resilient Rhody 2025*. This 2025 plan takes the next step by updating resilience actions, assessing statewide vulnerabilities, prioritizing solutions, and developing a funding strategy to turn plans into action.





# Resilient Rhody 2025 Scope

Resilient Rhody 2025 is anchored by four core initiatives that collectively advance statewide climate resilience: *State Resilience Action Development*, a *Statewide Climate Vulnerability Assessment*, development of *Climate Resilience Solutions*, and a *Future Investment Strategy* that provides pathways for implementing both actions and solutions. Community engagement serves as the throughline across all components, ensuring local voices shape priorities and outcomes.

Resilient Rhody 2025 reflects work completed between April and December 2025, with iterative collaboration across tasks to refine findings and integrate stakeholder input.

## State Resilience Action Development

Resilient Rhody 2025 identifies 79 actions representing the most urgent and high-impact interventions to protect Rhode Island's residents, economy, and natural resources. These actions build on the original 61 actions from *Resilient Rhody 2018*, incorporating new objectives informed by stakeholder input and feedback, a statewide gap analysis, and an adaptative capacity survey. Each action specifies the responsible agency, implementation requirements, estimated funding needs and sources, and includes timelines and success metrics to track statewide implementation.

## Statewide Climate Vulnerability Assessment

This assessment provides Rhode Island's first comprehensive evaluation of climate risk across 21 asset types and five major hazards—coastal flooding, stormwater flooding, riverine flooding, extreme heat, and extreme wind—under four-time horizons (current, 2035, 2050, and 2100) and two emissions scenarios (intermediate and very high). The analysis identified more than 10,000 high-risk assets out of over 130,000 assessed statewide, creating a foundation for developing targeted resilience strate

## Climate Adaptation & Resilience Solutions

Building on vulnerability findings and a community-driven prioritization process, the plan introduces 10 climate resilience solutions tailored to critical assets. These solutions address infrastructure such as roads and bridges, ports, energy systems, stormwater and wastewater facilities, drinking water reservoirs and dams, beaches and wetlands, inland water areas, schools, public safety buildings, and hospitals. While their development was informed by specific assets, these solutions are intended to serve as a blueprint for similar assets across Rhode Island.

## Future Investment Strategy

The Future Investment Strategy outlines actionable steps to advance the 79 actions and 10 solutions, summarizing funding needs, legislative requirements, and implementation pathways. It provides a Funding Strategy Framework to help state and local partners identify and prioritize projects, navigate available funding opportunities, and coordinate effective implementation beyond the scope of this plan.

## Community Engagement

Community engagement was integral throughout the *Resilient Rhody* process. Through five Community Forums, six municipal stakeholder working sessions, and a targeted Frontline Community Forum with Health Equity Zone stakeholders, residents and partners provided input that shaped priorities and solutions reflected herein.

## Scope of Work

**State Resilience Action Development**  
Identifies and advances 79 high-impact actions to protect Rhode Island's residents, economy, and natural resources.

**Statewide Climate Vulnerability Assessment**  
Conducted the state's first comprehensive evaluation of climate risks across 21 asset types and five major hazards under multiple time horizons and greenhouse gas scenarios.

**Climate Adaptation & Resilience Solutions**  
Outlines and costs 10 priority solutions for critical assets, informed by vulnerability findings and community-driven prioritization.

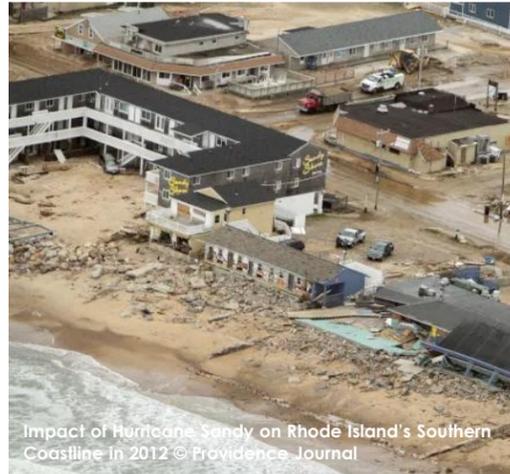
**Future Investment Analysis and Strategy**  
Outlines funding pathways, legislative needs, and strategies to implement actions and solutions effectively.

Community engagement serves as the throughline across all components, ensuring local voices shape priorities and outcomes.



# Resilient Rhody 2025 Executive Summary

## Key Take-Aways



Impact of Hurricane Sandy on Rhode Island's Southern Coastline in 2012 © Providence Journal

### Growing Climate Risks Will Require Proactive Solutions

Rhode Island faces increasing climate risks, with catastrophic flooding and extreme heat events projected to intensify throughout this century. These hazards threaten public health and infrastructure, underscoring the need for proactive strategies that move beyond reactive measures. Building statewide resilience will require long-term, sustainable solutions supported by programs and on-the-ground interventions that address highly vulnerable assets and strengthen system-wide resilience.

Today, 13% of all assessed assets are considered high or very high risk to coastal flooding. By late century, this could grow to 18% under the most extreme scenario. That is nearly one in five assets.

## How Resilient Rhody 2025 Responds

*Resilient Rhody 2025* introduces a bold set of actions designed to reduce risks from natural hazards across the state while providing detailed strategies and cost estimates to help communities advance toward implementation. Key actions emphasize proactive climate solutions, including:

### Action 14.05 State Resilience Standards

Develop strengthened resilience standards across agencies and programs that consider various assets, such as residential, commercial, roads, wastewater, stormwater, drinking water infrastructure, electrical infrastructure, and open space.

### Action 11.03 Develop Retreat & Voluntary Buyout Programming

Identify opportunities for retreat, infrastructure removal, and restoration on state-owned and municipally-owned properties, which can serve as demonstration sites for shoreline adaptation. Where possible, retreat rather than fortification should be considered as a coastal adaptation strategy.



Nag Marsh Sunset © Narragansett Bay National Estuarine Research Reserve (NBNERR)

### Need for Systems-Based Approaches that Prioritize Community and Natural Resource Health

Rhode Island communities emphasized the importance of strategies that focus on holistic community health and the protection of natural systems. While this assessment and Plan concentrated on identifying specific assets at risk from climate impacts, resilience efforts will require integrated solutions that address multiple asset types and operate across regional boundaries. Ensuring accessible and multilingual resilience resources for residents, mitigating stormwater flooding, and safeguarding beaches, wetlands, and forests were consistently identified as priorities throughout the development of this Plan.

**Stormwater flooding emerged as the top concern expressed by community members during the development of this Plan, largely due to its cascading effects on daily life and emergency response.**

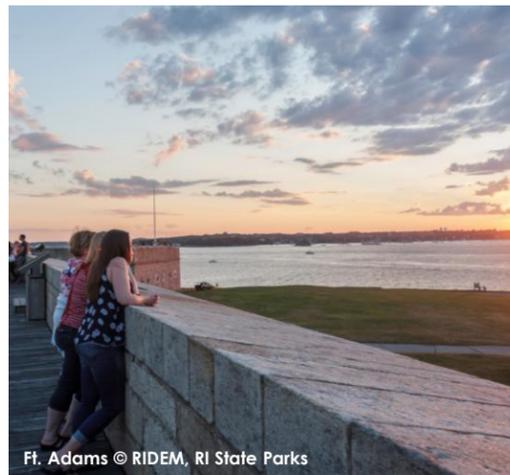
*Resilient Rhody 2025* outlines Actions that prioritize regional collaboration on resilience projects, particularly those involving natural systems that span jurisdictional boundaries. In addition, Actions aimed at strengthening local community resilience include:

### Action 18.03 Resilience Hubs

Develop a Resilience Hubs Program that provides technical support to create new Hubs, implement backup power systems, deploy mobile health units, and carry out necessary retrofits for shelters, community centers, and other critical infrastructure.

### Action 13.01 Water Resources Coordination & Monitoring

Strengthen coordination between freshwater and saltwater systems by advancing holistic watershed management across eco-geophysical boundaries and integrating this approach into existing regulatory and funding frameworks.



Ft. Adams © RIDEM, RI State Parks

### Evolving Risks Call for Flexible Funding and Technical Assistance

Expanded and flexible funding mechanisms, paired with technical assistance to support regional collaboration, were consistently identified as essential for advancing resilience. Legislative frameworks and policy reforms—focused on improved standards, ordinances, and strategies to manage ongoing development—will play a critical role in enabling these efforts and ensuring that initiatives move from planning to implementation. Municipalities emphasized that implementation will ultimately depend on financial resources and policy alignment, requiring new funding streams to support proactive, long-term projects.

**The estimated funding required to realize the *Resilient Rhody 2025* Actions ranges from \$119 million to \$298 million. This excludes implementation and construction costs.**

By leveraging both existing and new funding platforms, *Resilient Rhody 2025* outlines funding strategies for each Action and Solution identified herein. The Plan also includes multiple actions to expand available funding. Key actions related to technical assistance and funding include:

### Action 18.01 Resilience Technical Assistance

Establish support to help local governments—especially small, rural, and under-resourced communities—access climate resilience funding, with a focus on health, equity, and infrastructure needs.

### Action 19.03 Resilience Loans

Fund and launch the recently established *Resilient Rhody Infrastructure Fund*, which will serve as the State's resilience revolving loan fund.





# Engagement Process

The community engagement process for *Resilient Rhody 2025* was designed to ensure that local voices and lived experiences directly shaped the Plan.

Through a series of community forums, municipal stakeholder meetings, and a dedicated Health Equity Zone (HEZ) session, *Resilient Rhody 2025* worked to understand the diverse needs, challenges, and aspirations of residents and partners across the state. These conversations provided essential context and grounded the Plan's strategies in the realities of those most affected.

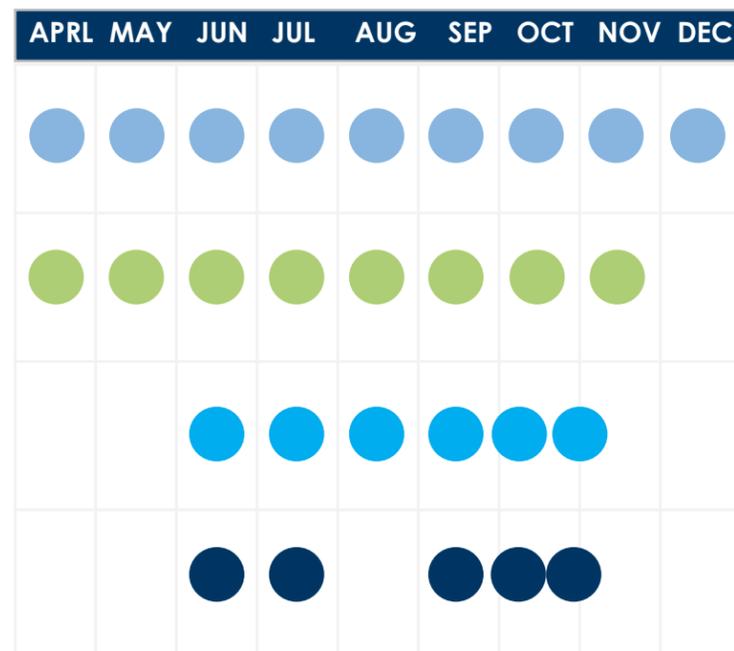
In total, **Resilient Rhody 2025 hosted 11 engagement sessions with more than 280 participants** representing municipalities and residents, complemented by 17 meetings with the Resilience EC4 Subgroup and Rhode Island Resilience Partner Group representatives. This approach ensured that the plan reflects both technical expertise and community priorities.

**Resilience EC4 Subgroup:** Monthly meetings with 14 State Agencies

**Rhode Island Resilience Partner Group:** Monthly meetings with over 40 entities including non-profit organizations, institutions, and subject matter experts

**Municipal Stakeholders:** Over 130 people in attendance at six working sessions

**Community Forums:** Over 150 attendees at five community forums



### Resilient Rhody 2025 Engagement Goals

- **Learn** about community priorities and concerns.
- **Gather** local knowledge and insights.
- **Grow** communities' awareness of the Plan.
- **Build** trust and interest.

Refer to Chapter 1: *Community Engagement Summary Report* for more information about *Community Forum and Municipal Stakeholder Working Session* activities and key findings.

Beginning in 2024, RIDEM convened the Resilience Executive Climate Change Coordinating Council (EC4) Subgroup and the Rhode Island Resilience Partner Group to provide ongoing forums for coordination, information-sharing, and collaboration on statewide resilience initiatives, including the development of *Resilient Rhody 2025*. Together, these groups represent more than fifty-five agencies and organizations and have met monthly throughout the plan's preparation to advise and guide the process.

#### Resilience EC4 Subgroup

The Resilience EC4 Subgroup facilitates ongoing coordination across state agencies engaged in climate resilience efforts. Comprised of representatives from each EC4 agency, the group meets monthly to discuss active resilience projects and needs, identify opportunities for interagency collaboration, and review statewide resilience standards, metrics, and priorities.

The subgroup played a central role in developing *Resilient Rhody 2025*, ensuring alignment across agencies and supporting consistent progress toward statewide resilience goals.

#### Rhode Island Resilience Partner Group

The Rhode Island Resilience Partner Group convenes resilience practitioners from nonprofits, universities, community-based organizations, and private partners. Meeting monthly, the group facilitates cross-sector collaboration and information sharing, helps identify opportunities for coordinated initiatives, provides technical and community-informed input on state resilience standards and metrics.

The Rhode Island Resilience Partner Group contributed critical expertise during the development of *Resilient Rhody 2025* and continues to help align statewide efforts with the diverse knowledge and experience of Rhode Island's resilience community.



# Community Forums

*Resilient Rhody 2025* hosted five community forums with more than 150 participants across in-person and virtual platforms.

*Resilient Rhody 2025* leveraged libraries and schools for all in-person sessions, complemented by a virtual option. Libraries serve as natural community resilience hubs, making them an ideal setting for engagement. The locations selected for this round of public engagement were chosen to maximize accessibility and participation. Sites with strong public transportation access, opportunities for hybrid (in-person and virtual) participation, and the ability to host large groups were prioritized.

Each session featured structured engagement activities designed to spark dialogue, surface priorities, and foster collaborative planning. Participants contributed through interactive Mentimeter surveys and hands-on exercises using table-based or Miro digital tools, sharing perspectives, identifying needs, and shaping the plan's development in real time. Portuguese and Spanish translation services were provided at each Forum.

Forums were strategically scheduled throughout the planning process, allowing feedback to inform every phase. After each session, input was consolidated into summary reports and integrated directly into interim deliverables, ensuring community voices were reflected in the evolving plan.

Future outreach will place greater emphasis on communities that were less represented in this engagement cycle—particularly inland municipalities and communities in the southwestern region of the state. At the same time, we recognize that some stakeholders were unable to participate due to competing priorities and commitments; their perspectives remain equally important. These communities and stakeholder groups will be prioritized in upcoming engagement rounds to ensure more comprehensive, equitable representation of Rhode Island's diverse resilience needs.

### Community Forum 1: Resilience Priorities & Actions

Providence, Providence Public Library  
June 18, 2025

Participants began in small groups, sharing the resilience issues that motivated their attendance. After these conversations, boards displaying gap analysis findings were placed around the room, and participants were invited to add their concerns and priorities. Key topics included community health, stormwater infrastructure, public transportation, and forest resources.

### Community Forum 2: Asset-Hazard Mapping

East Providence, Weaver Library  
July 17, 2025

Community members shared experiences with climate hazards such as flooding, extreme heat, and high winds, as well as community assets where they had experienced these impacts. Local experiences were then matched with previously drafted asset and hazard typologies, with the goal of identifying any assets or hazards that should be added to the Statewide Vulnerability Assessment. Stormwater and coastal flooding were the most frequently discussed hazards, while housing and schools were the most identified assets.



Community Forum 2: Asset-Hazard Mapping

### Community Forum 3: Asset Prioritization Framework

Newport, Newport Public Library  
September 10, 2025

Participants scored hypothetical assets against five drafted criteria under consideration for the prioritization approach. After scoring, they discussed how weighting of criteria could be applied to ensure fair assessment and inclusion of underrepresented project types. The weighting used in this plan was informed by the average weightings developed across groups during this session, as well as averaged weightings developed during parallel Municipal Stakeholder session.

### Community Forum 4: Climate Resilience Priority Assets & Investment Strategy

Bristol, Rogers Free Library  
October 22, 2025

A shortlist of identified priority assets and projects was shared with participants, followed by an anonymous survey to collect feedback. Participants then completed the "Build Your Own Project" activity, selecting hypothetical assets and choosing from a range of solution options for each asset. Popular strategies included rain gardens and bioswales, relocation, permeable pavements, and zoning regulation. Feedback from this session played a critical role in shaping the Climate Resilience and Adaptation Solutions.

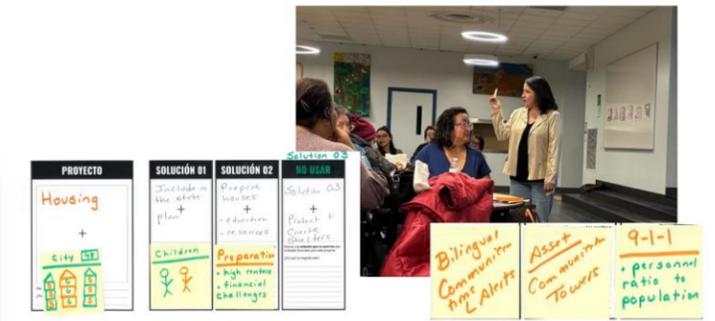


Locations of Community Engagement Forums

### Frontline Community Forum

Olneyville, William D'Abate Elementary School  
October 29th, 2025

This session focused on Rhode Island's Health Equity Zones (HEZs) and frontline community organizations. In an open discussion, participants identified housing, communication infrastructure, emergency response infrastructure, and local education on emergency preparedness as priority areas. They also completed the "Build Your Own Project" activity to explore potential solutions.



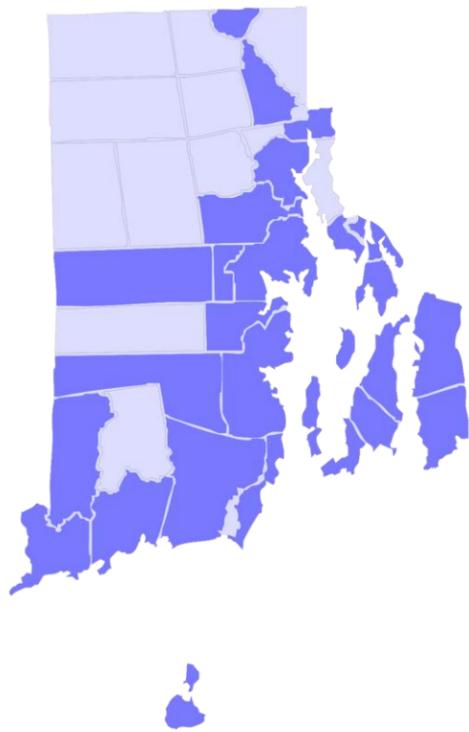
Community Forum 4 & Frontline Community Forum: Build Your Own Project



# Municipal Stakeholder Working Sessions

Resilient Rhody 2025 hosted six municipal stakeholder working sessions with more than 130 participants.

Represented Municipalities at Stakeholder Working Sessions



### Municipal Stakeholder Working Session #1

Theme: Gap Analysis + Action Development  
June 20, 2025

Stakeholders completed a survey on which resilience issues brought them to the working session. After the survey, virtual whiteboards were presented with asset types and stakeholders were requested to identify asset-specific resilience challenges. Key topics included critical infrastructure vulnerabilities, including aging stormwater and sewer systems; aquifer risks, inadequate public awareness of runoff, and the need for clearer policies on development in flood-prone areas. Stakeholders also highlighted major capacity and funding gaps and called for improved coordination. These priorities were incorporated into the Resilient Rhody 2025 Actions.

### Municipal Stakeholder Working Session #2

Theme: Asset + Hazard Mapping  
July 18, 2025

Stakeholders shared their experience with climate hazards as they pertained to different asset types. Stakeholders identified stormwater and coastal flooding as the most significant and widespread hazards, with roads and bridges, stormwater systems, wastewater facilities, and housing consistently cited as highly impacted and high-priority assets. These asset and hazard pairs were further studied in Chapter 3: Statewide Climate Vulnerability Assessment.



Municipal Stakeholder Working Session #2: Asset-Specific Whiteboards

### Municipal Stakeholder Working Session #3

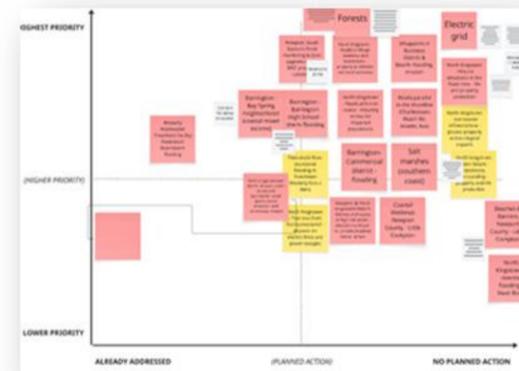
Theme: Vulnerability Assessment  
August 29, 2025

The results from the Statewide Climate Vulnerability Assessment were shared with stakeholders. Stakeholders broadly agreed with the vulnerability findings, emphasizing flooding-related damage and disruption as the most urgent risks across asset types. Stakeholders then prioritized assets based on need, equity, and service criticality, while stressing that short-term fixes must build toward long-term climate resilience.

### Municipal Stakeholder Working Session #4

Theme: Asset Prioritization  
September 12, 2025

Stakeholders ranked the importance of various criteria that were to be used for prioritizing assets, with Need and Feasibility emerging as the top priorities. Stakeholders then prioritized hypothetical assets against these criteria. Hospitals, substations, and major roads ranked highest. The weighting applied in this plan was based on the average values developed across groups during this session, as well as those derived from parallel Community Forum session.



Municipal Stakeholder Working Session #3: Asset Prioritization

### Municipal Stakeholder Working Session #5

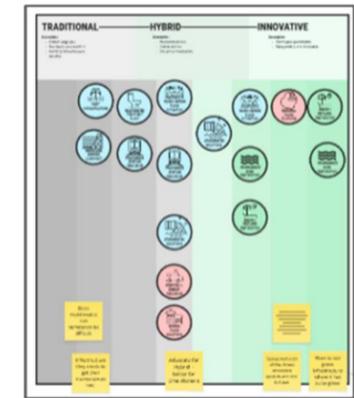
Theme: Priority Assets  
October 3, 2025

A draft shortlist of identified priority assets were shared with Municipal stakeholders, who provided feedback on the selections. Stakeholders then discussed the priority assets in small groups. Across both groups, critical infrastructure assets ranked as the highest priority, with wastewater facilities, major evacuation routes, hospitals, and energy transmissions lines most prioritized. These priority assets informed the Climate Adaptation & Resilience Solutions developed in this plan.

### Municipal Stakeholder Working Session #6

Theme: Climate Resilience Solutions  
October 24, 2025

An updated draft of the asset shortlist and Climate Resilience Solutions were shared with municipal stakeholders. Stakeholders were asked to review the proposed solutions and respond to questions about the level of innovation, the role of the State can take in implementation, and potential funding approaches. This session informed the strategies developed for Chapter 5: Climate Adaptation & Resilience Solutions.



Municipal Stakeholder Working Session #5 Solution Development

Refer to Chapter 1: Community Engagement Summary Report for more information about Community Forum and Municipal Stakeholder Working Session activities and key findings.

# Resilient Rhody 2025

## Statewide Climate Vulnerability Assessment

## Understanding Rhode Island's Climate Vulnerabilities

By analyzing current and projected climate risks, the Statewide Climate Vulnerability Assessment delivers data-driven insights to safeguard Rhode Island's most critical assets against future impacts.

With over 400 miles of coastline, approximately 400,000 acres of forest, and densely populated urban areas, Rhode Island faces significant climate challenges.

The assessment defines climate risk as the combination of climate hazards, asset exposure, and asset vulnerability, representing both the likelihood of climate-related impacts and the potential consequences for each asset.

**Five climate hazards were evaluated: coastal flooding, stormwater flooding, riverine flooding, extreme heat, and extreme wind.** These hazards were assessed across four time horizons (current, 2035, 2050, and 2100) to understand how risks will evolve over time, using two greenhouse gas emission scenarios—intermediate (SSP2-4.5) and very high (SSP5-8.5).

The analysis covered 21 asset types grouped into four categories:

- Critical infrastructure and Facilities
- Natural Systems
- Community Resilience structures
- Emergency Preparedness Structures

A total of over 130,000 assets were analyzed, including nearly 90,000 half-mile segments of roads and evacuation routes. Approximately 10,000 assets were classified as high or very high at risk (excluding roads and evacuation routes).

Refer to Chapter 3: *Statewide Climate Vulnerability Assessment* for a comprehensive overview of all climate hazard risk scores across asset types.

Rhode Island faces significant climate risks across critical systems, with flooding and extreme heat emerging as the most severe threats.\*

**Critical Infrastructure and Facilities:**

Flood hazards pose the greatest risk to these assets. Under the most extreme scenario, stormwater flooding impacts 100% of assets, coastal flooding threatens 12% of assets, while riverine flooding affects one in 10 assets, with those proportions rating high or very high at risk.

**Natural Systems:**

Extreme heat, stormwater flooding, and coastal flooding are the primary hazards of concern. Extreme heat and stormwater flooding threatens 100% of assessed assets, and coastal flooding impacts 57%, under the most extreme scenario.

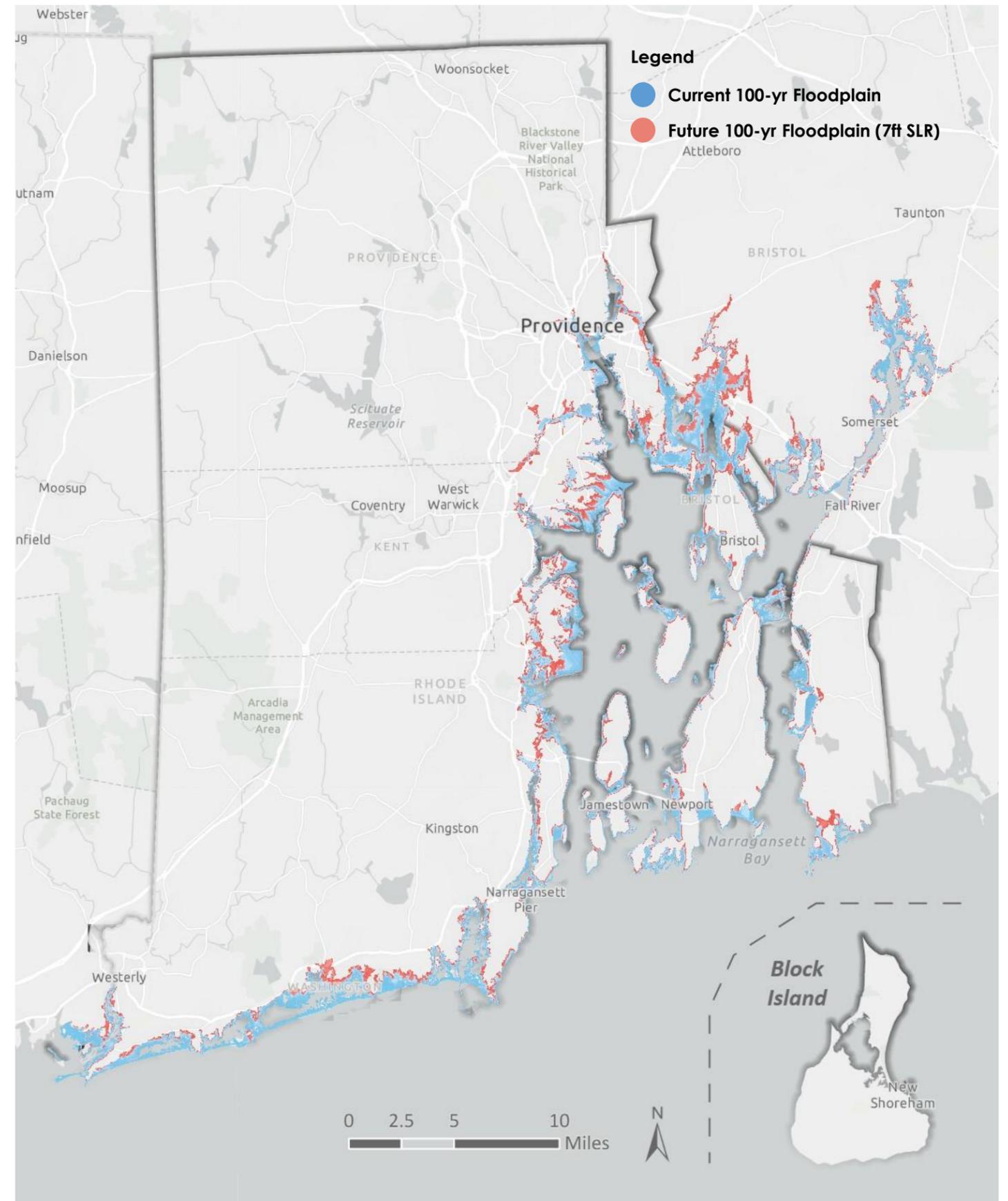
**Community Resilience Structures:**

Stormwater flooding and heat dominate risks for more than 1,200 high-risk assets. Extreme heat and stormwater flooding affects 100% of assessed assets. In addition, extreme wind impacts all public housing, with those proportions rating high or very high at risk.

**Emergency Preparedness Structures:**

Stormwater flooding and heat pose the greatest challenges, projected to impact over 230 high-risk assets. Extreme heat and stormwater flooding threatens 100% (not including evac routes), coastal flooding 17%, and riverine flooding 15%.

\*Summary results are taken for the most extreme scenario, which is SSP5-8.5 in 2100 for coastal flooding, stormwater flooding, extreme heat, and extreme wind, and present day for riverine flooding.



Current and Future Coastal Flooding (Assessed Using University of Rhode Island STORMTOOLS Data)

# Methodology

Resilient Rhody 2025 assessed current and future climate hazard risks across Rhode Island's infrastructure, natural, community, and emergency preparedness systems.

- 1 Hazard**

**Definition:** Occurrence of climate-related events.

**Process:** Collected climate hazard data.
- 2 Exposure**

**Definition:** The likelihood, extent, and intensity of a hazard occurrence in relation to the asset.

**Process:** Combined statewide asset location data with hazard data to determine exposure.
- 3 Vulnerability**

**Definition:** How susceptible to damage an exposed asset is to a hazard.

**Process:** Used asset characteristics to determine its vulnerability to the hazard(s) to which it is exposed.
- 4 Risk**

**Definition:** The impacts of a hazard to an asset based on the asset's exposure and vulnerability to the hazard.

**Process:** Combined the asset's hazard exposure and vulnerability characteristics to produce a qualitative evaluation of asset risk.

### Hazards Assessed

Five climate hazards were assessed based on the six manifestations of climate change outlined in *Resilient Rhody 2018*.

**Five Hazards**

- Coastal Flooding
- Stormwater Flooding
- Riverine Flooding
- Extreme Heat
- Extreme Wind

**Four Time Horizons**

- **Present:** Current Conditions
- **Future:** 2035, 2050, 2100

**Two Climate Scenarios**

- **SSP2-4.5:** Intermediate emissions scenario
- **SSP5-8.5:** Very High emissions scenario

### Assets Assessed

Climate hazards were mapped against 21 asset-types to determine exposure. To assess vulnerability, additional criteria were applied, including asset characteristics (such as age of asset), physical state (such as condition), and socioeconomic indicators (such as the Social Vulnerability Index).

**Critical Infrastructure and Facilities**  
 Drinking Water Systems, Wastewater Treatment Facilities, Dams, Seawalls and Tidal Gates, Stormwater Infrastructure, Ports, Electric Grid, Fuel Supply, Roads, Bridges, and Culverts, Historic Resources, and Public Transportation

**Natural Systems**  
 Coastal Wetlands, Beaches and Barriers, Forests, and Water Resources

**Community Resilience Structures**  
 Public Housing, Municipal Buildings, Schools, and Food Markets

**Emergency Preparedness Structures**  
 Evacuation Routes & Emergency Shelters and Emergency Services

### Consequences Assessed

**Risk metrics were developed to evaluate susceptibility and measure potential consequences across three dimensions: damage, disruption, and life safety.**

**Damage**  
 Physical damage experienced by an asset resulting in financial loss and/or inability to function as required. (example: \$)

**Disruption**  
 Disruption of critical functionality resulting from hazard impact on infrastructure systems exceeding their capacity (example: downtime of roadways).

**Life Safety**  
 Negative human health outcomes that are not attached to physical damage of other assets but pose a direct risk to life safety of asset occupants. (example: hospitalization)



Refer to Chapter 3: *Statewide Climate Vulnerability Assessment* to learn about the Risk Rating Methodology & Results for each asset type.

### Example: Risk Rating Development

**Hazard**  
 Nor'easter storms commonly occur in Rhode Island from September through April and have been increasing in intensity.

**Exposure**  
 Two assets share the same probability of experiencing a Nor'easter, resulting in a High exposure rating. Exposure reflects the likelihood and extent to which an asset may experience a hazard.

**Vulnerability**  
 One asset is newer, elevated, and constructed with resilient materials. It also has backup power. The other is older, low-lying, in poor condition, and built with less flood-resistant materials. These characteristics determine how susceptible each asset is to experience hazard consequences.

**Risk**  
 Although both assets are exposed to the same hazard, the one with lower vulnerability is expected to experience fewer consequences; resulting in reduced overall risk. In contrast, the asset with higher vulnerability faces a significantly greater risk due to its increased susceptibility to impacts.

## Coastal Flooding Summary

This assessment found that approximately 18% of the assets assessed for coastal flooding will have high or very high risk by 2100.

This includes more than half of the ports, wastewater treatment facilities, natural systems, and colleges identified as being at high or very high risk of coastal flooding. Damage and downtime to critical assets can disrupt essential transportation routes, degrade natural systems, and delay emergency response times. Debris and contaminants carried by flood waters can further threaten life safety.

### Coastal Flooding is a Disruptive Community Concern

Feedback from Municipal Stakeholder Working Session 3 emphasized that flood-related damage and disruption was the **most urgent risk** across all asset types.

#### Key Takeaways:

- The percentage of assets at high or very high risk to coastal flooding is projected to increase by 5% between present day and 2100.
- In instances where the proportion of at-risk assets remains constant over time and emissions scenarios, some assets may still experience greater flood depths.



Flooding in Westerly during Tropical Storm Henri © Scott Eisen, Getty Images

## Coastal Flooding Risk Critical Infrastructure

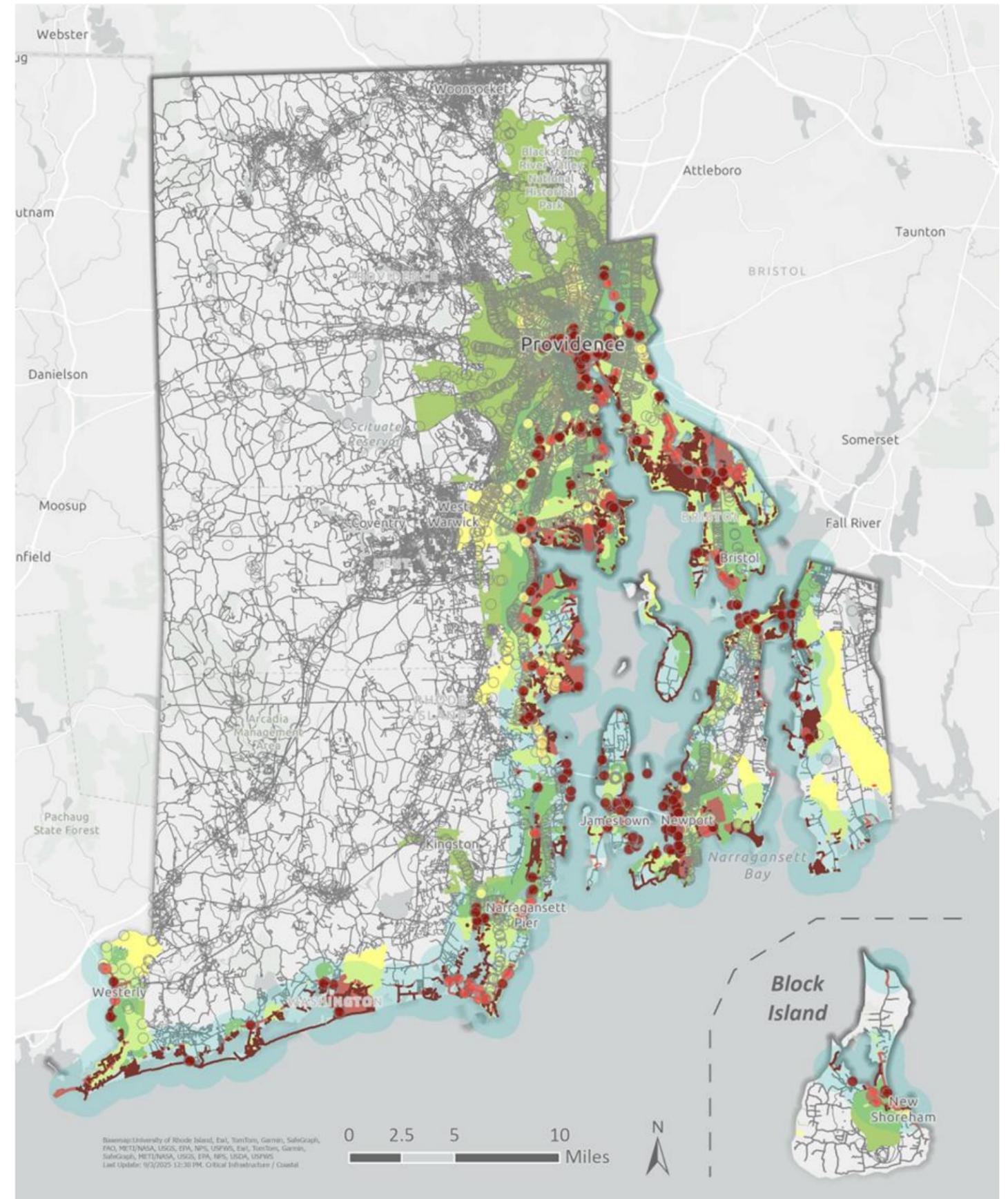
Coastal flood hazards pose a risk to Critical Infrastructure and Facilities with over 2,500 assets receiving a high or very high-risk rating (not including roads).

Approximately 18,500 critical infrastructure and facilities, and an additional 84,000 half-mile segments of roads were assessed. Approximately 12% of these assets are at high or very high risk to coastal flooding, which could lead to statewide impacts.

Damage and downtime to critical assets can disrupt the functionality of essential transportation routes and options, limiting access across the state. Life safety impacts may be heightened due to increased runoff carrying contaminants.

Asset	Risk Results (High or Very High Rating, 2100, High SLR*)
Drinking Water Systems	<b>4 / 111 drinking water systems</b>
Electric Grid	<b>11 / 165 electric grid assets</b>
Fuel Supply	<b>29 / 317 underground storage tanks</b>
Ports	<b>813 / 1568 ports</b>
Public Transportation	<b>883 / 8722 public transportation assets</b>
Roads, Bridges, and Culverts	<b>9844 / 85848 road and bridges (1/2-mile segments)</b>
Seawalls and Tidal Gates	<b>70 / 1098 hardened shorelines</b>
Stormwater Infrastructure	<b>374 / 2887 stormwater infrastructure</b>
Wastewater Treatment Facilities	<b>13 / 19 wastewater treatment facilities</b>

\*University of Rhode Island's (URI) Coastal STORMTOOLS data was used to map coastal flooding through the State.



# Coastal Flooding Risk

## Natural Systems

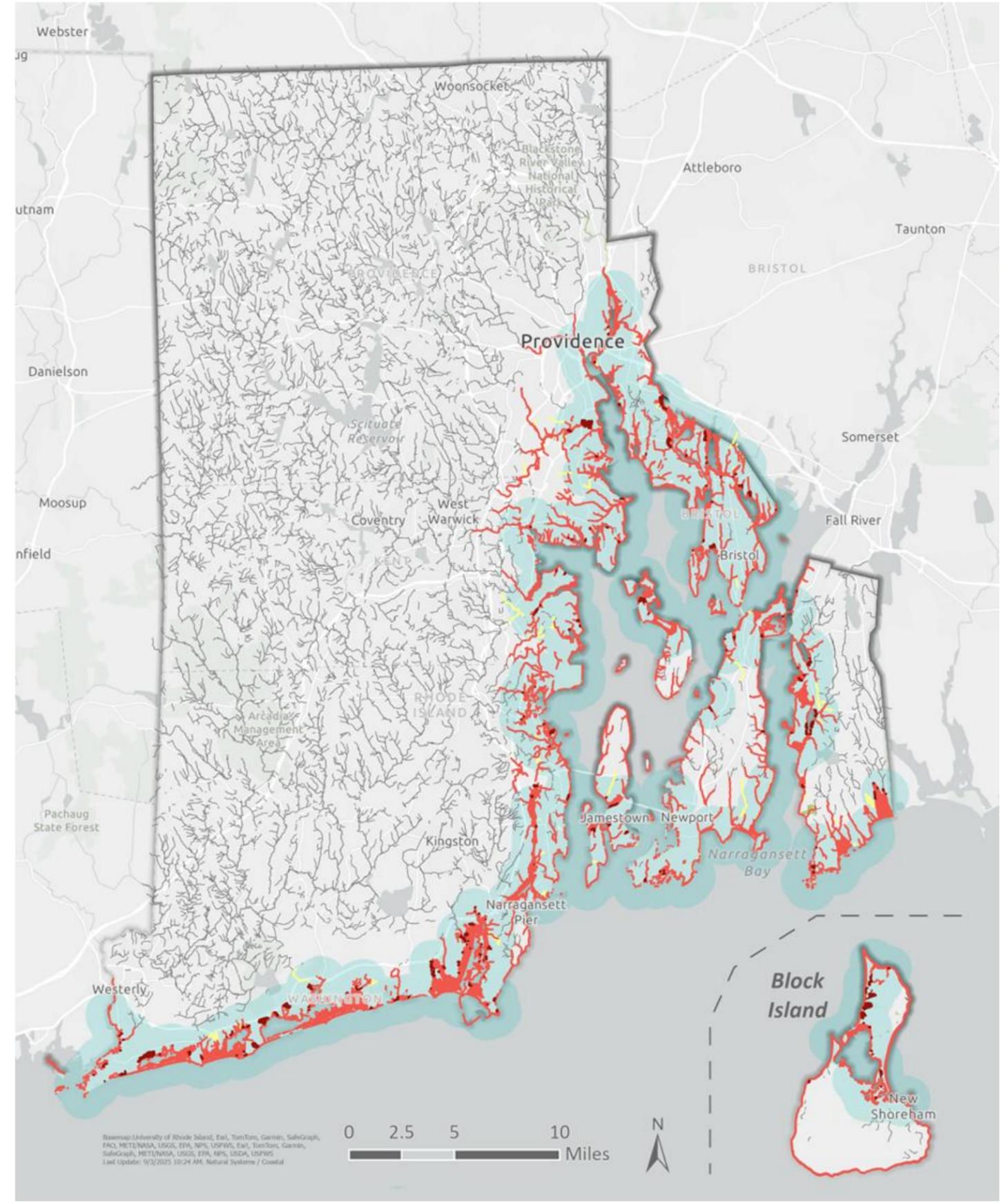
Along with extreme heat, coastal flooding poses one of the greatest risks to natural systems, with more than 10,000 assets classified as high or very high risk.

The assessment evaluated nearly 19,000 natural system assets across Rhode Island. Results indicate that 57% of these assets are at high or very high risk from coastal flooding, which could create cascading impacts on ecosystems.

Coastal flooding damages natural buffers such as wetlands and dunes, leaving adjacent development more exposed to future storms. Saltwater intrusion and rising flood levels further disrupt habitats, degrade soil quality, and reduce biodiversity.

Asset	Risk Results (High or Very High Rating, 2100, High SLR*)
Beaches and Barriers	37/134 beaches and barriers
Coastal Wetlands	9821/9966 coastal wetlands
Water Resources	904/8788 rivers and streams

\*University of Rhode Island's (URI) Coastal STORMTOOLS data was used to map coastal flooding through the State.



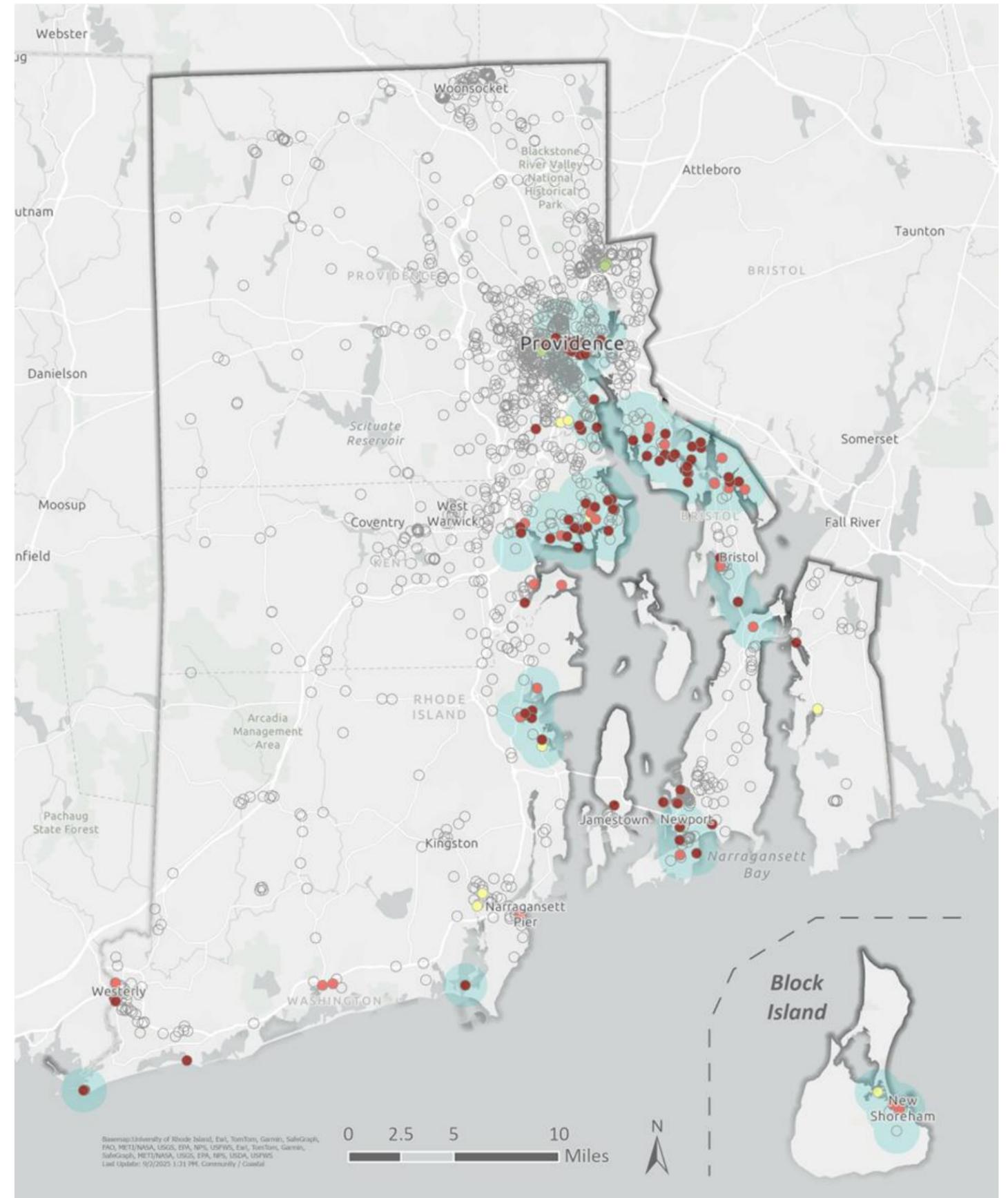
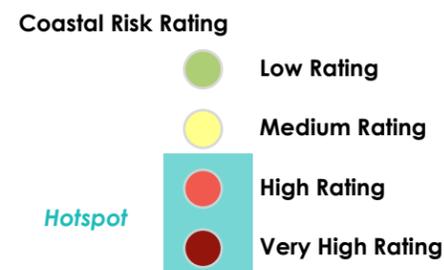
## Coastal Flooding Risk Community Resilience Structures

Nearly 2,000 community resilience structures were assessed, and approximately 130 assets face high or very high risk from coastal flooding.

This represents about 7% of all community resilience structures, including half of the State's universities. These structures include schools, libraries, food distribution centers, and other facilities that serve as critical hubs for community well-being. Flooding can cause costly property damage and disrupt essential services such as education, emergency shelter, and food access. Loss of functionality in these facilities during extreme events can leave communities without safe gathering spaces or access to vital resources, amplifying the impacts of climate hazards.

Asset	Risk Results (High or Very High Rating, 2100, High SLR*)
Public Housing	<b>26 / 799 housing assets</b>
Municipal Buildings (Libraries and Town Halls)	<b>9 / 110 buildings</b>
Schools (Pre K-12 Schools and Colleges and Universities)	<b>54 / 568 schools</b>
Food Markets	<b>41 / 470 food markets</b>

\*University of Rhode Island's (URI) Coastal STORMTOOLS data was used to map coastal flooding through the State.



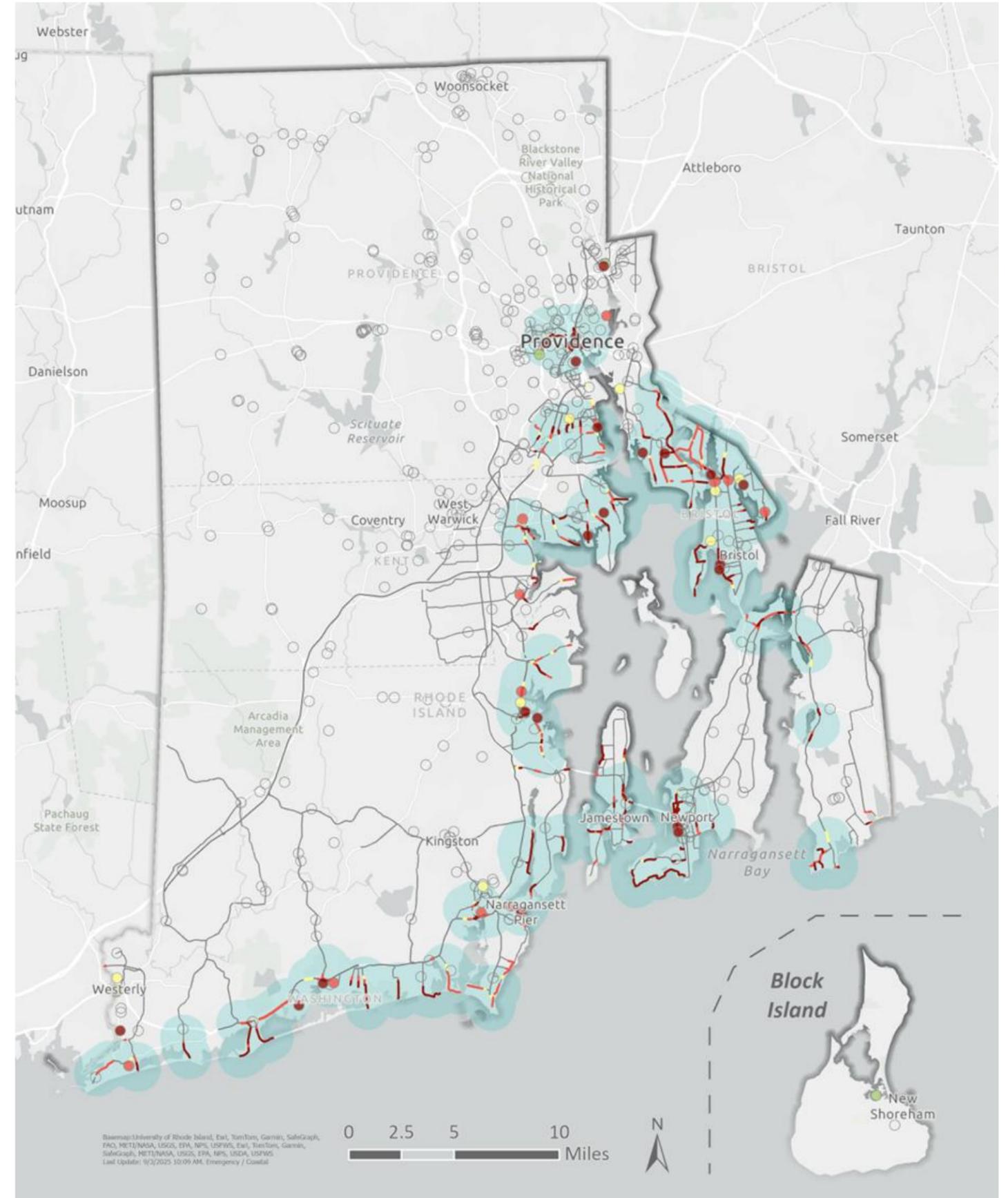
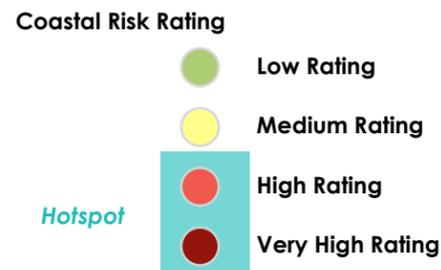
## Coastal Flooding Risk Emergency Preparedness Structures

Results show that 17% of the 450 assessed assets and 4,000 half-mile segments of evacuation routes face high or very high risk from coastal flooding.

Assets at high or very high risk to coastal risk include almost one-fifth of the State's hospitals and key evacuation routes, which are essential for life safety during extreme climate events. Flooding can disrupt emergency operations, delay response times, and compromise access to medical care and shelter. These disruptions are especially dangerous during severe storms or heat waves when emergency services are most needed.

Asset	Risk Results (High or Very High Rating, 2100, High SLR*)
Hospitals	<b>3/17 hospitals</b>
Fire Stations	<b>15/173 fire stations</b>
Police Facilities	<b>6/68 police facilities</b>
Evacuation Routes	<b>18% evacuation routes</b>
Emergency Shelters	<b>14/192 emergency shelters</b>

\*University of Rhode Island's (URI) Coastal STORMTOOLS data was used to map coastal flooding through the State.



# Stormwater Flooding

## Summary

Nearly all of the assets assessed for stormwater flooding are projected to face high or very high risk by 2100, underscoring the severity of projected impacts.

These results highlight the severity of projected stormwater impacts by late century, with the potential to damage every major infrastructure type, disrupt critical transportation routes, spread contaminants, and reduce overall quality of life.

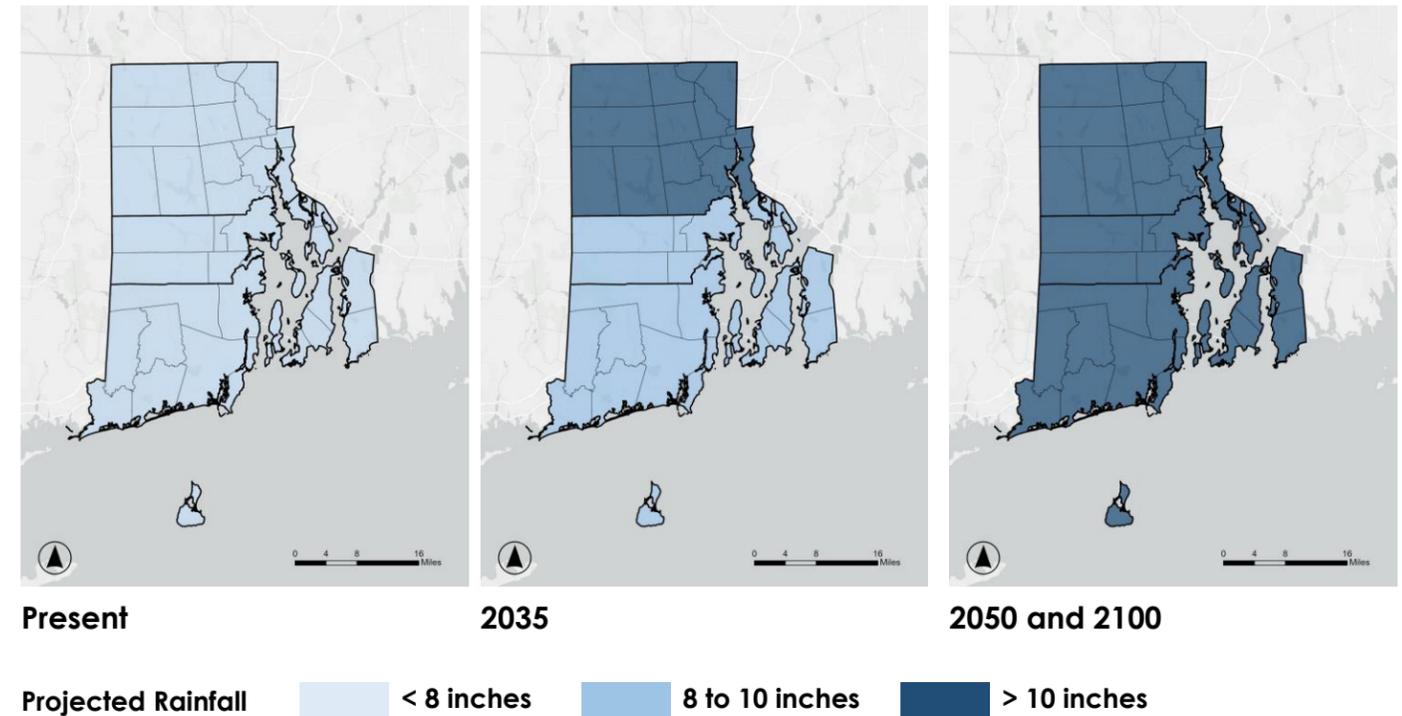
Stormwater flooding also threatens homes and essential community facilities, such as schools, leading to significant disruptions to daily life and creating costly, long-term recovery needs.



**Stormwater Flooding is a Community Priority**

During the second Community Forum, community members highlighted **stormwater infrastructure, emergency services, and roads, bridges, and culverts** as the assets most impacted by stormwater flooding and of highest concern.

Projected Rainfall During a 24-hr 100-yr storm based on SSP5-8.5



### Key Takeaways:

- Rainfall is anticipated to increase by approximately 2 inches during a 24-hr 100-year storm event by 2030 across all counties, with an additional inch by 2100.
- By 2100 all counties could experience over 10 inches of rainfall during a 24-hr 100-yr storm.
- Providence County currently has the highest rainfall totals among Rhode Island counties and is projected to continue experiencing the greatest rainfall through 2100.

## Riverine Flooding

### Summary

This assessment found that approximately 10% of the assets assessed for riverine flooding currently face high or very high risk.

Cascading consequences from riverine flooding events may include increased pollutants in water supplies and streets, transportation disruption, and costly repairs.

### Riverine Flooding is an Environmental and Public Health Challenge

Community feedback identified **public health** impacts as a priority concern. Stormwater flooding can trigger sewage overflows, while riverine flooding can spread that contamination more widely.

### Key Takeaways:

Assets such as the Electrical Grid, Commuter Rail Line and Stations, Bridges, Wastewater Treatment Facilities, Hospitals, and Evacuation Routes demonstrate a notable portion of total high-risk assets.



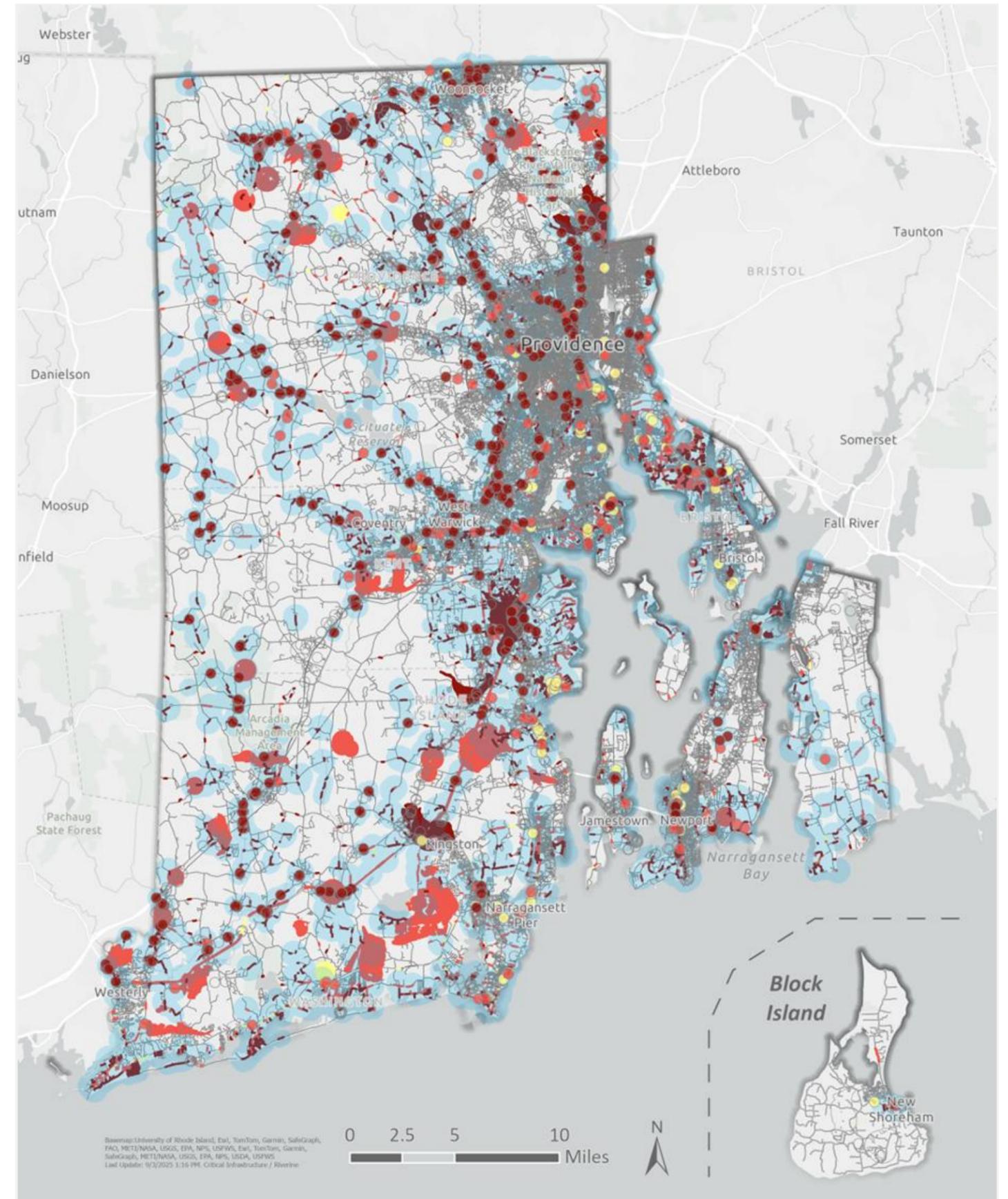
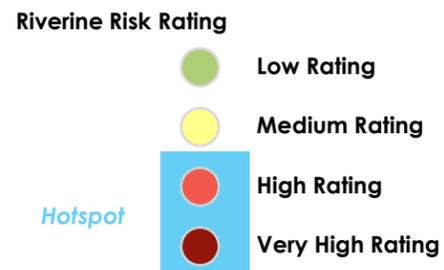
## Riverine Flooding Risk Critical Infrastructure

Results indicate that 10% of the 95,000 assessed Critical Infrastructure assets are at high or very high risk to riverine flooding.

More than half of dams, drinking water systems, and commuter rail lines face high or very high riverine flood risk. These events can contaminate drinking water, interrupt essential transportation services, and result in extensive and costly infrastructure damage.

Asset	Risk Results (High or Very High Rating, Present*)
Dams	<b>391 / 669 dams</b>
Drinking Water Systems	<b>75 / 111 drinking water systems</b>
Electric Grid	<b>9 / 218 electric grid assets</b>
Fuel Supply	<b>39 / 317 underground storage tanks</b>
Public Transportation	<b>791 / 8722 public transportation assets</b>
Roads, Bridges, and Culverts	<b>8643 / 85848 roads and bridges</b>
Wastewater Treatment Facilities	<b>5 / 19 wastewater treatment facilities</b>

\*FEMA FIRM data was used to map riverine flooding throughout the State.



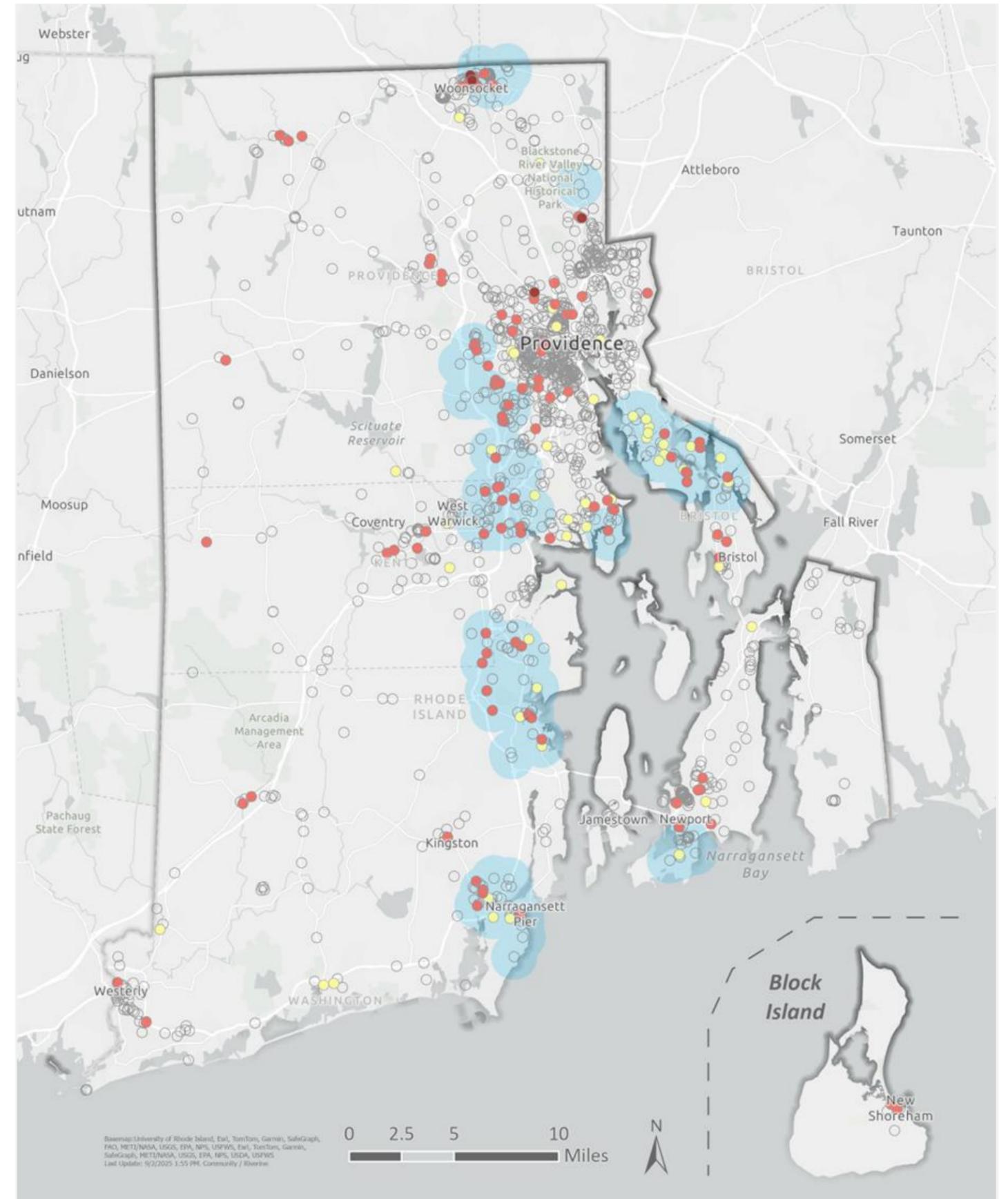
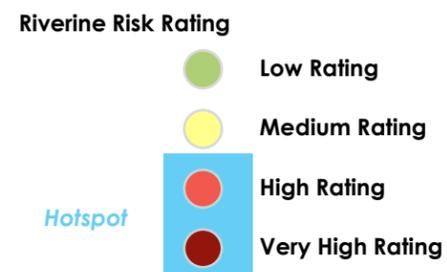
## Riverine Flooding Risk Community Resilience Structures

Approximately 17% of the nearly 2,000 assessed Community Resilience assets face high or very high risk to riverine flooding, totaling 128 at-risk assets.

More than one out of every ten PreK-12 school or college and university are at high or very high risk to riverine flooding. Riverine flooding can threaten the safety of students and faculty.

Asset	Risk Results (High or Very High Rating, Present*)
Public Housing	21 / 799 housing assets
Municipal Buildings (Libraries and Town Halls)	5 / 110 buildings
Schools (Pre K-12 Schools and Colleges and Universities)	61 / 568 schools
Food Markets	41 / 470 service providers

\* FEMA FIRM data was used to map riverine flooding throughout the State.



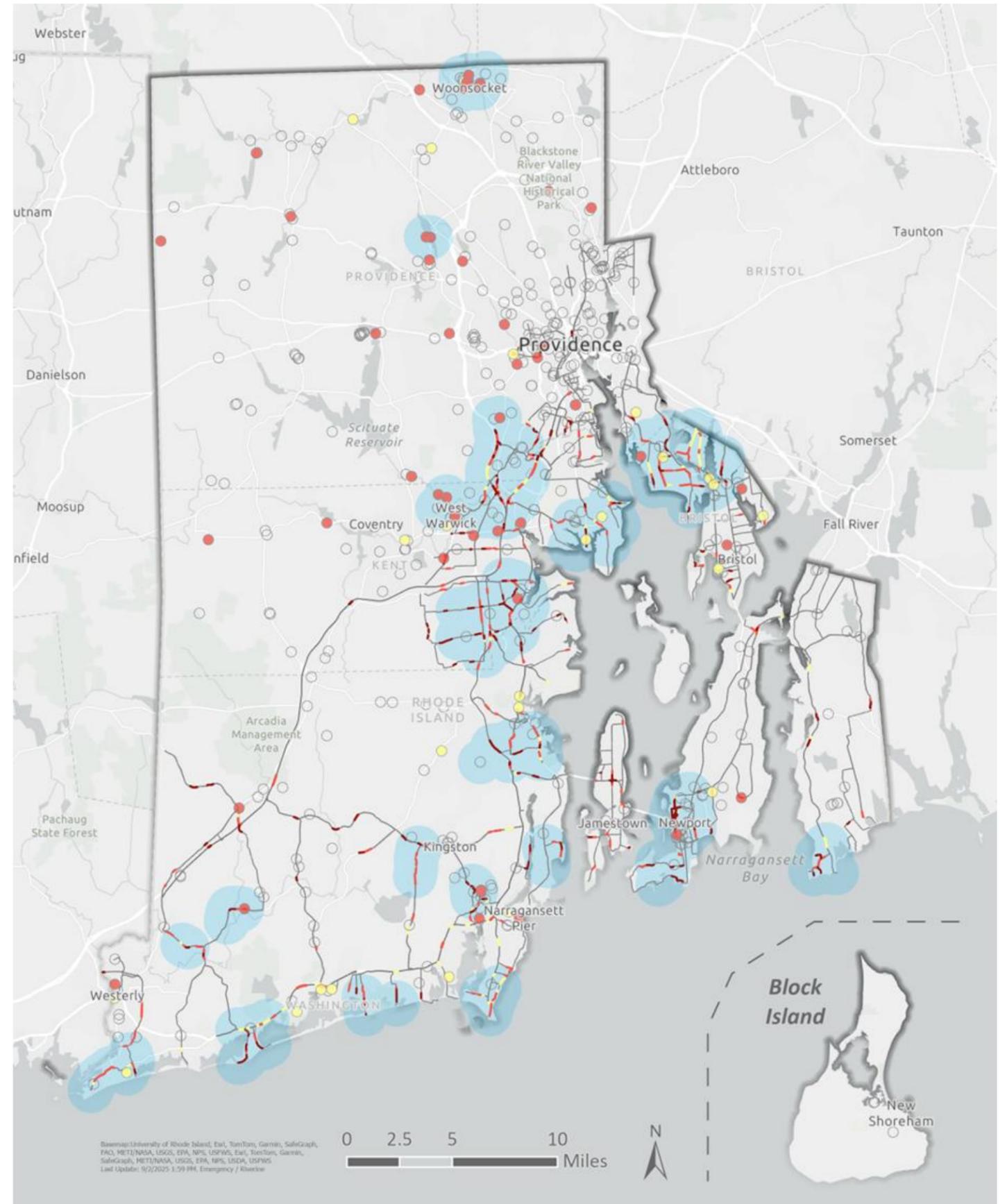
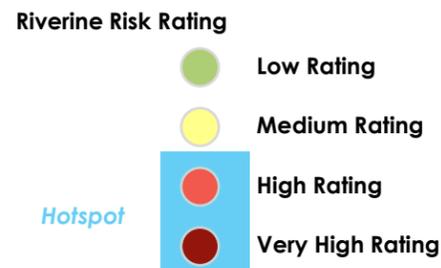
## Riverine Flooding Risk Emergency Preparedness Structures

Results show that approximately 15% of the 450 assessed emergency preparedness assets and 4,000 half-mile segments of evacuation routes face high or very high risk to riverine flooding.

Hospitals, police stations, and emergency shelters each had more than 10% of their assessed assets receive a high or very high risk score. These facilities provide essential care and safety to the community, and any operational disruption or loss due to flooding could result in widespread impacts.

Asset	Risk Results (High or Very High Rating, Present*)
Hospitals	<b>3/17 hospitals</b>
Fire Stations	<b>15/173 fire stations</b>
Police Facilities	<b>9/68 police facilities</b>
Evacuation Routes	<b>15% of half- mile evacuation route segments</b>
Emergency Shelters	<b>23/192 emergency shelters</b>

\* FEMA FIRM data was used to map riverine flooding throughout the State.



# Extreme Heat

## Summary

All of the assets assessed for extreme heat are anticipated to face high or very high risk by late century, with all counties expected to experience over 30 days per year above 90°F by 2100.

These findings illustrate the pervasive nature of extreme heat risk and its potential for wide-ranging consequences.

Extreme heat directly threatens public health and increases the risk of power outages by placing significant strain on the electric grid. This combination is particularly concerning because critical services are most needed during heat events.

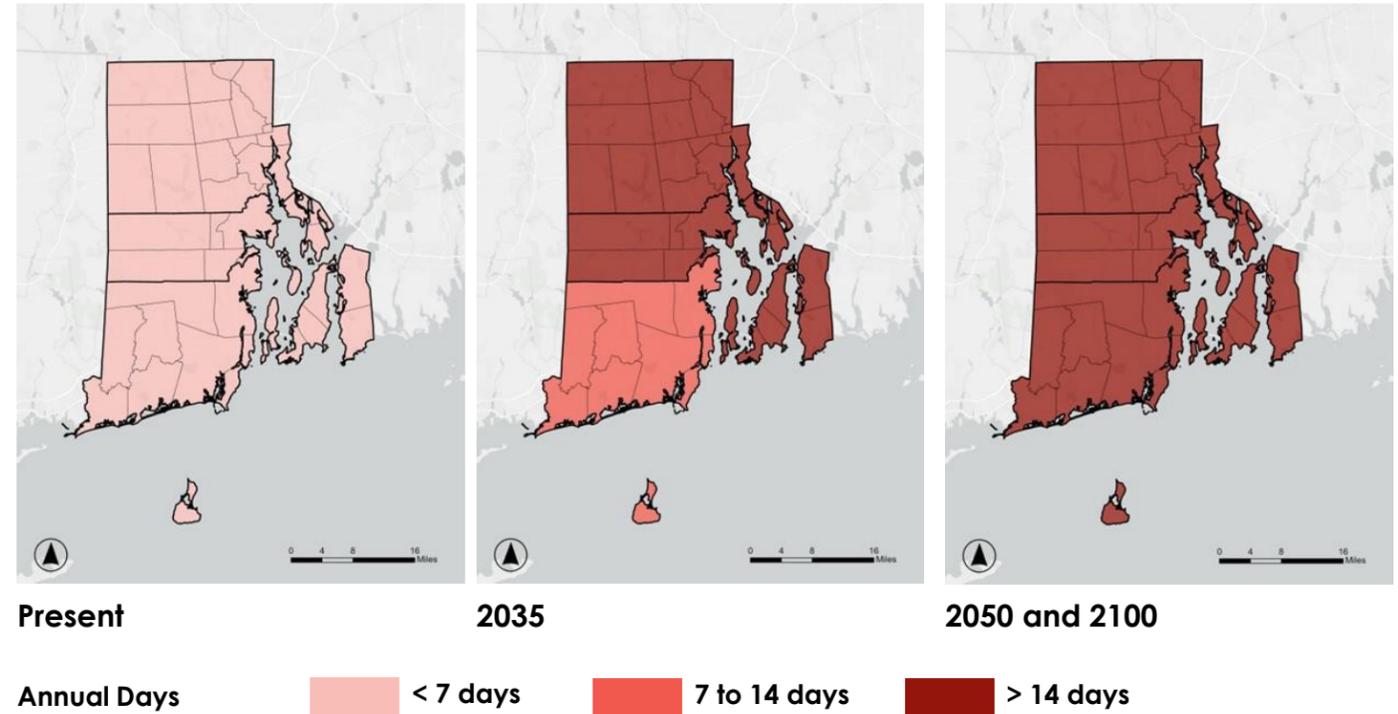
High temperatures can also accelerate bacterial growth in drinking-water systems and threaten our natural systems, compounding public health risks and stressing already-vulnerable ecosystems.



**Extreme Heat is a Public Health Threat**

During the second Community Forum, community members highlighted **housing, public transportation, and schools** as the assets most impacted by extreme heat and of highest concern.

Number of Annual Days Above 90 °F based on SSP5-8.5



### Key Takeaways:

- Extreme heat is projected to become an increasingly significant hazard across all assets, with the number of days exceeding 90°F rising significantly through 2100.
- By 2100 under the SSP5-8.5 scenario, all counties are projected to experience over 30 days per year above 90°F.
- Providence County is projected to consistently experience the highest number of extreme heat days, followed by Kent and Bristol Counties.

## Extreme Wind Summary

This assessment found that approximately 50% of the assets assessed for extreme wind face high or very high risk by 2100.

All electrical transmission lines and public housing assets were identified to be at high or very high risk from extreme wind. Extreme wind can bring down overhead power lines and trees and cause significant damage to buildings. Cascading consequences from extreme wind events may include power outages, transportation disruption, costly repairs, and serious safety concerns.

### Extreme wind can cause cascading impacts across Rhode Island's roads and electrical grid.

Community feedback highlighted tree health, power loss, and emergency access as concerns related to extreme wind, underscoring how wind-driven disruptions can quickly spread across multiple systems.

### Key Takeaways:

- Present-day extreme wind speeds are relatively consistent across counties, ranging from approximately 130 to 140 mph.
- By 2100, wind speeds are projected to rise sharply, with Newport and Washington counties projected to reach 150 mph.
- Newport and Washington Counties show the highest projected wind speeds across scenarios.





# Resilient Rhody 2025

## Resilient Rhody 2025 Actions



## Introduction & Summary

The *Resilient Rhody 2025* Actions set bold, cross-agency goals to strengthen resilience across Rhode Island's systems and communities.

Building on the foundation of the original 61 actions from *Resilient Rhody 2018*, these actions aim to reduce climate-related risks, such as flooding, heat, and severe storms, while protecting critical infrastructure and essential services. They prioritize safeguarding natural resources, advancing equity, and enhancing community resilience, all while creating a framework for long-term investment and integrating climate considerations into state and local decision-making.

The 2025 Actions were developed through a multi-step process from January to November 2025.

The process commenced with a series of consultations involving state agencies and statewide partner organizations to review the existing *Resilient Rhody 2018* actions and to propose revisions and additions. Subsequently, current state resilience initiatives were consolidated into a structured database. This was followed by a comprehensive gap analysis to identify underrepresented assets and an assessment of adaptive capacity across agencies and municipalities.

Based on these findings, draft actions were developed incorporating new objectives. Upon iterative review by stakeholders, this effort culminated in the formulation of 79 finalized actions intended for statewide implementation.

### This Plan outlines 79 Actions

**38** actions focus on infrastructure asset types, addressing climate risks to critical systems.

**18** actions strengthen community resilience, including new measures to address health impacts of climate hazards and expand financing for resilience solutions.

**14** actions target natural systems, emphasizing preservation and restoration of vulnerable habitats.

**9** actions enhance emergency preparedness, streamlining response procedures and improving coordination.

Asset Type	Number of Actions
<b>Critical Infrastructure</b>	<b>38</b>
Statewide Resilience: All Critical Systems	14
Drinking Water	4
Wastewater	3
Dams	1
Stormwater Infrastructure	3
Ports	2
Electric Grid	4
Fuel Supply	2
Roads, Bridges, and Culverts	3
Public Transportation	2
<b>Natural Systems</b>	<b>14</b>
Beaches and Barriers	5
Coastal Wetlands	3
Forests	4
Water Resources	2
<b>Community Resilience</b>	<b>18</b>
Community Health & Resilience	10
Resilience Funding	5
Cross Sector Resilience	3
<b>Emergency Preparedness</b>	<b>9</b>
Building Design and Construction	3
Evacuation Routes & Emergency Shelters	2
Emergency Services	4

Refer to Chapter 2: *Resilient Rhody 2025* Actions for all 79 Actions.



# Contents

The *Resilient Rhody 2025* Actions articulate statewide programmatic priorities, outline funding needs, and designate responsible entities, while establishing metrics to evaluate success.

The *Resilient Rhody 2025* Actions use a numbering system as shown below. Each Action ID corresponds to the focus area based on the five thematic groups and asset categories established in the *Resilient Rhody 2018* framework. Each action is presented on its own page within the Plan, detailing the action ID, action, category, and asset type, along with the information outlined on the right.

## Asset Types & IDs

- 1 - Drinking Water Systems
- 2 - Wastewater Treatment Facilities
- 3 - Dams
- 4 - Stormwater Infrastructure
- 5 - Ports
- 6 - Electric Grid
- 7 - Fuel Supply
- 8 - Roads, Bridges, and Culverts
- 9 - Public Transportation
- 10 - Beaches and Barriers
- 11 - Coastal Wetlands
- 12 - Forests
- 13 - Water Resources
- 14 - Statewide Resilience: All Critical Systems
- 15 - Building Design & Construction
- 16 - Evacuation Routes and Emergency Shelters
- 17 - Emergency Services
- 18 - Community Health & Resilience
- 19 - Financing Climate Resilience Projects
- 20 - Cross-Sector Coordination

### Action 14.02

**Category:**  
 Infrastructure  Natural Systems  Community Resilience  Emergency Preparedness

**Asset Type:**  
 All Critical Infrastructure  Drinking Water  Wastewater  Dams  Stormwater  
 Ports  Electric Grid  Fuel Supply  Roads, Bridges, & Culverts  Public Transportation  
 Beaches & Barriers  Coastal Wetlands  Forests  Water Resources  
 Evacuation Routes & Emergency Shelters  Building Design & Construction  Emergency Services  Community Health & Resilience  Financing Climate Resilience Projects

**1 Responsibility:**  
RIDEM, Resilience EC4 Subgroup

**2 Driver:**  
 State  Gap Analysis  Community  
 Partner  Municipal

**3 Implementation Need(s):**  
Intergovernmental Coordination, Technical Assistance & Capacity Building

**4 Potential Funding Source:**  
NOAA's Rhode Island Sea Grant

**5 Timeframe:**  
 Short-Term (1-2 years)  Medium-Term (2-5 years)  Long-Term (Ongoing)

**6 Metrics for Success:**

- Partnerships between Rhode Island and neighboring states, national resilience organizations, and professional organizations are strengthened.
- RI Resilience Partner Group is actively and regularly convened.

**7 Funding Need:**  
 N/A  \$  \$\$  \$\$\$  \$\$\$\$

**State Resilience Partnerships:** Continue to research, learn from, and establish collaborative and supportive partnerships with neighboring states, national resilience organizations, and outside professional organizations to inform Rhode Island's resilience efforts.

In particular, Rhode Island should continue to look to successful regional examples, such as Massachusetts' Municipal Vulnerability Preparedness program and New Jersey's Blue Acres program, to continue to model municipal and non-profit partnerships that move from planning to project assistance and funding.

Continue to host the RI Resilience Partner Group, as a point of collaboration between statewide non-profits, universities, and resilience subject matter experts.

- 1 Responsibility**  
Indicates the lead or partner entities responsible for the action.
- 2 Action Driver**  
Identifies the stakeholder group(s) that initiated, influenced, or recommended the action.
- 3 Implementation Need(s)**  
Indicates policy or legislative needs necessary to implement the action. These are categorized into four groups: Funding, Policy & Compliance, Tools & Training, & Coordination needs.
- 4 Potential Funding Source**  
Indicates potential funding sources ranging from federal, state, local, and innovative mechanisms.

- 5 Timeframe**  
Indicates short-term, medium-term, or long-term/ongoing actions.
- 6 Metrics for Success**  
Indicators of success to measure progress towards the action against.
- 7 Funding Need**  
Indicates the relative funding amounts necessary to carry forward the action. N/A indicates actions focused on advocacy, efficiency, or priority setting.

\*All funding sources should be verified for current availability and applicability before pursuing them.



# Resilient Rhody 2025

## Climate Adaptation & Resilience Solutions

## Asset Prioritization Approach

Ten climate adaptation and resilience solutions were developed and costed based on assets identified as priorities within this Plan.

The Priority Assets List represented the outcome of a comprehensive vulnerability assessment, a structured prioritization process, and the integration of stakeholder feedback. The objective of this effort was to identify priority, high-risk assets across Rhode Island's infrastructure, natural systems, and community resilience networks.

The prioritization approach was designed specifically for the scope of this Plan. The applied criteria and methodology provided a consistent and structured process for identifying critical assets, while also incorporating community input. The Priority Assets List reflected herein therefore includes assets identified through engagement alongside those surfaced through the criteria-based process.

This list does not encompass all vulnerable assets within the state, nor did it reflect broader prioritization initiatives. A comprehensive database of all assets evaluated during this process has been provided to the State to support future planning and enable continued prioritization efforts beyond the scope of this initiative.

A three-step scoring framework was applied to narrow a broad list of high-risk assets into a shortlist of priority assets. This structured approach ensured consistency given the diversity and complexity of asset types. Assets identified through engagement were integrated into the shortlist to reflect community priorities.

### Step 1: Statewide Climate Vulnerability Assessment

Assets determined to be at high or very high risk in the Statewide Climate Vulnerability Assessment were considered for inclusion in the prioritization process. This initial screening encompassed approximately 10,000 assets.

### Step 2: Intra-Asset Comparison

Assets were evaluated within their respective categories using criteria tailored to each asset type, such as role in emergency response, service capacity, and redundancy. This process reduced the list to approximately 200 assets.

### Step 3: Cross-Type Comparison

From an initial screening of approximately 200 assets, assets were compared across categories using a weighted scoring system. Weightings for criteria were developed based on aggregated feedback from stakeholder working sessions and community forums. This approach ensured alignment with the Plan's objectives and strategic priorities.

#### Qualification

Prioritization within complex, interdependent systems is inherently challenging. There is no single definitive method for ranking assets, as infrastructure, communities, and ecological systems function as an interconnected network. No asset operates in isolation, and any prioritization approach necessarily simplifies the dynamic relationships that influence statewide resilience. This complexity is most evident in the State's natural systems, which underpin the State's built, community, and cultural infrastructure. Accordingly, this Plan affirms that protecting, managing, and restoring natural systems is not ancillary to resilience efforts but central to them, even if not explicitly highlighted among priority assets.

Category	Percentage of Total Points	Criteria
Need	35%	Life Safety (Health + Wellness Consequences)
		Urgency
		Criticality (Cross-Sector Interdependency)
		Redundancy
		Number of People Impacted
Equity and Community Support	20%	Supports Vulnerable Populations
		Community Supported
		Advances Environmental Justice
		Protects Economic Resources
Strategic Alignment	25%	Alignment with Local and Regional Planning Goals
		Identified in Multiple Resilience Planning Initiatives (HMPs, etc.)
Holistic Resilience	20%	Advances or Protects Biodiversity
		Provides Ecosystems Services or Co-benefits
		Supports Sustainability Goals or Initiatives
		Carries Cultural or Historical Value

### Review Process & Engagement Process

The Priority Assets List was developed through input gathered from multiple engagement streams, including community forums and municipal stakeholder sessions. Feedback was collected through virtual and in-person meetings utilizing interactive platforms such as Miro and Mentimeter.

After the list was narrowed to approximately 40 assets, sites identified during community forums, municipal stakeholder sessions, technical assistance meetings, and annual resilience updates were reviewed and added. Assets were then added or removed as appropriate, ensuring that the final list reflected both technical criteria and community priorities.

### Regional Resilience Coordinators & Technical Assistance Packages

In June of 2025, Rhode Island Department of Environmental Management hired three Regional Resilience Coordinators to support the Chief Resilience Officer and local resilience efforts statewide as part of the agency's growing resilience team. These coordinators, covering three distinct regions (Coastal, Inland, and Urban), provide technical assistance to municipalities and communities for advancing their resilience priorities. To define local resilience needs and establish workplans, coordinators held introductory meetings with municipalities in their regions to establish Resilience Technical Assistance Packages (RTAPs) with cities and towns. To support the *Resilient Rhody 2025* priority asset identification process, coordinators compiled all 2026 priority resilience actions named by municipalities in their RTAPs for inclusion within this process.

Refer to Chapter 4: [Priority Assets List](#) for more information.

## Priority Asset List

The adjacent map shows how the identified priority assets are distributed across the state.

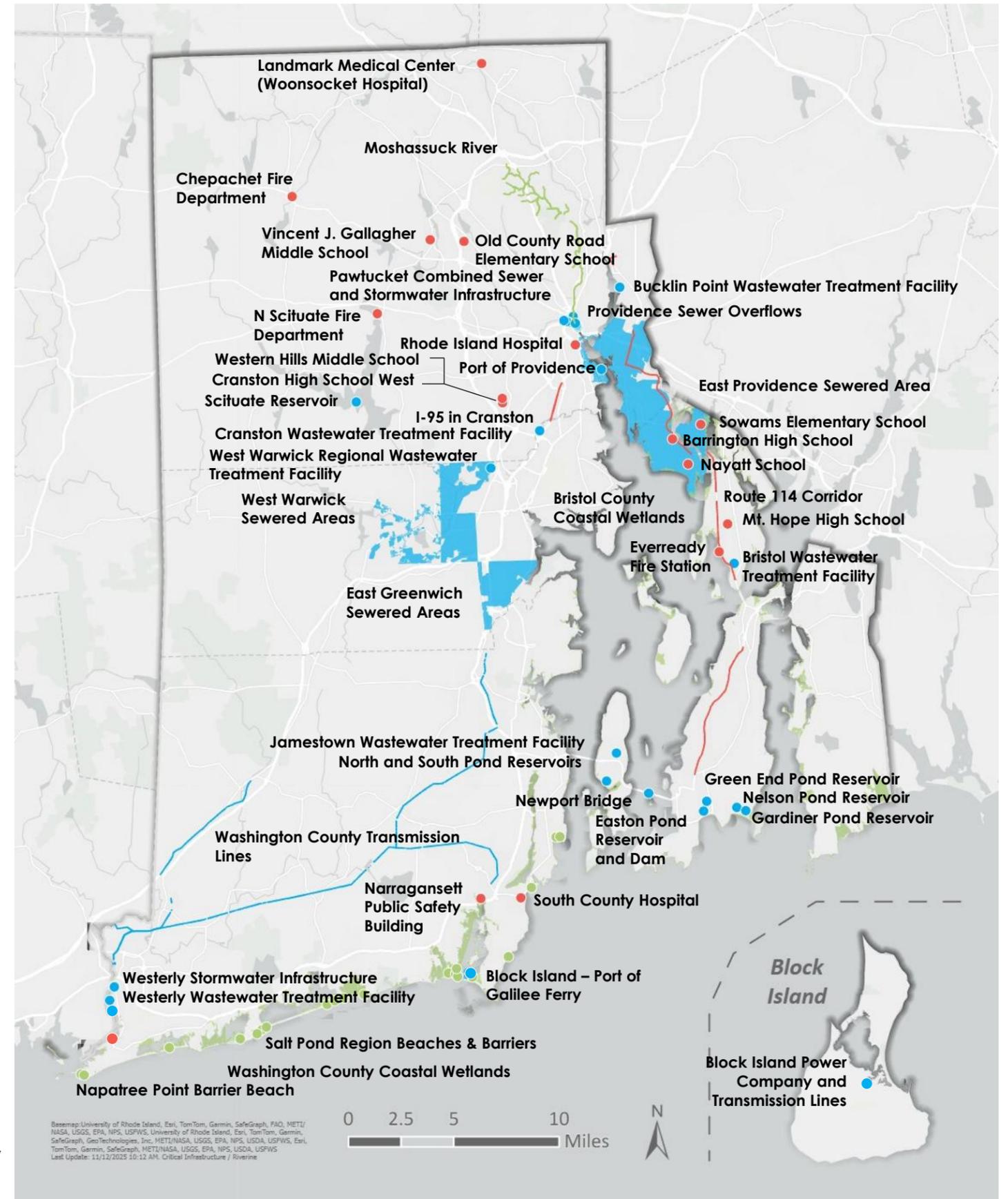
These assets were identified as high-risk to one or more assessed hazards, aligned with prioritization criteria, and confirmed through the engagement process. These assets informed the ten developed and costed strategies described in Chapter 5: Climate Adaptation & Resilience Solutions.

Asset Category	Number of Priority Assets
Critical Infrastructure and Facilities	25
Natural Systems	6
Community Resilience and Emergency Preparedness Structures	15

Additional assets were identified through this planning process as critical to Rhode Island communities, particularly the **Fox Point Hurricane Barrier** and **Providence Station**. This Plan recognizes that ongoing initiatives are already addressing these locations. To prevent duplication of efforts, this Plan did not develop solutions for these assets. However, they remain priority areas, and this Plan supports projects at these locations through strategic alignment and recommends continued, dedicated efforts moving forward.

Refer to Chapter 4: *Priority Assets List* for the comprehensive list of assets identified within the scope of this Plan.

- Assets**
- Critical Infrastructure & Facilities
  - Natural Systems
  - Community Resilience & Emergency Preparedness Structures



# Introduction

Building resilience against climate hazards demands strategic physical infrastructure improvements.

Therefore, to supplement the *Resilient Rhody 2025* Actions, the Plan presents ten targeted solutions designed to strengthen Rhode Island's resilience.

The solutions are tailored to priority assets identified through a statewide vulnerability assessment and stakeholder input. While grounded in these known priority assets, the guidance is designed to remain flexible and adaptable to additional assets as needs evolve.

These strategies serve as both a reference for viable alternatives to address relevant climate risks and a practical guide for municipal planners, state agencies, utilities, and partners to help move projects from risk identification to implementation.

## Organization

Solutions are organized into three categories based on asset type:

- Critical Infrastructure,
- Natural Systems,
- Community Resilience and Emergency Preparedness

## Contents

Each solution described includes:

- Strategy guidance
- Cost estimates
- Funding approaches

Refer to Chapter 5: *Climate Adaptation & Resilience Solutions* for more information.

**Road & Bridge Flood Mitigation Solutions**  
with a focus on evacuation routes

This chapter outlines adaptation solutions for bridges and roads, focusing on evacuation routes. Road and bridge flood mitigation strategies are focused on reducing flood damages to roads that cause transportation disruption throughout the state.

The strategies presented were developed based on assets identified as having high climate risks and aligning with the prioritization criteria established for this plan. The adjacent map illustrates how priority assets identified for solution development within this plan are distributed statewide. While these assets informed the strategy development, they are not exhaustive across the State. The prioritized assets are shown in the map. For instance, I-95 in Providence remains an essential transportation corridor. The Verrazano Bridge serves as vital infrastructure.

**Assets Identified for Road & Bridge**

Asset
I-95 in Cranston
Route 114 Corridor
Newport Bridge

*\*The priority assets listed herein were identified through a statewide vulnerability assessment. Details of this process and the complete list of vulnerable assets, nor does it reflect broader assets that have been provided to the State for this initiative.*

**Road & Bridge Flood Mitigation Solutions Summary**

**Flooding from heavy rain, rivers, and coastal storms increasingly threatens low lying roads and bridges throughout the state.** Flooding can wash out roads, weaken bridges, and cut off safe routes, including emergency evacuation routes. Strategies like road raising, flood barriers, nature-based solutions (NBS), and strategic relocation help keep evacuation routes accessible.

More frequent and intense storm events are increasing the risk of flooding on roads and bridges, especially along critical evacuation routes like Route 114, which spans from East Providence to Bristol, and I-95 in Cranston and Providence. Flooding in these areas has caused repeated closures, erosion of embankments, and damage to bridge foundations, limiting safe access for residents and emergency responders. These routes are also vital evacuation routes. Flooding events cause damage leading to isolation, safety hazards, and costly repairs.

Communities can adopt a mix of strategies tailored to local conditions. Including elevating roads, implementing NBS, improving stormwater system capacities, constructing flood barrier, upgrading culverts at road and stream crossings. In certain cases, voluntary retreat can represent the most sustainable long-term approach. Physical interventions, developing a climate platform is essential to help municipalities take effective flood mitigation measures and address the RIDOT Resilience Improvement Plan.

**Ongoing Actions**

In 2024, RIDOT published their Resilience Improvement Plan, which identified vulnerabilities and potential adaptation strategies to reduce risk to the State's transportation infrastructure. Communities across the State are also working to address their vulnerable roadways and bridges. For example, Barrington, Warren, and Bristol evaluated flood-vulnerable areas along the Route 114 corridor.

**Resources**

- RIDOT Resilience Improvement Plan (2024)

**Steps for Implementation**

- 1 Stakeholder Engagement**  
Identify key stakeholders early and maintain engagement throughout the project planning process to build project support.
- 2 Data Collection and Existing Conditions Analysis**  
Review existing conditions to understand limitations to potential alternatives, such as as-built and local flood models. Collect data such as critical elevations, utility information, and natural resource delineations. Identify potential technical assistance programs to support implementation.
- 3 Vulnerability Assessment**  
Conduct a vulnerability assessment to identify flood pathways and better define the flood risk impacting assets and populations. Utilize climate data from STORMTOOLS and RIDOT.
- 4 Hydrologic and Hydraulic (H&H) Modeling and Analysis**  
Perform H&H modeling to simulate flood conditions, identify elevations that provide effective flood protection, and develop approaches to avoid downstream impacts.
- 5 Optioneering Analysis**  
Identify and assess multiple strategies to improve flood mitigation, including NBS, gray infrastructure, hybrid, and retreat approaches. Assessing site-specific conditions, such as available space, natural resources (e.g., wetlands), land use, etc., will dictate which alternatives may be feasible for further analysis and design.
- 6 Conceptual Designs, Design Developments, and Construction Documents**  
Develop concept-level designs of the identified alternatives. Selected concepts will move forward.

**Road & Bridge Flood Mitigation Strategies**

Depending on site-specific conditions, communities may identify and implement a range of options for a particular project area. Raising roads maintains access above designated flood levels. Flood barriers protect critical sections of road from storm surge and heavy rain. Nature-based solutions, such as restored wetlands and vegetated slopes, can absorb runoff, store floodwaters, and break down wave energy before reaching coastal roadways. In some areas, choosing to retreat and buyout at-risk property can expand floodplain storage and permanently remove vulnerable built infrastructure from risk.

**Implement Nature-Based Solutions and Stormwater Infrastructure in Right-of-Ways**

Nature-based solutions (NBS) use natural processes and materials to prevent erosion, slow water flow, reduce flood impacts, and create added flood storage. Along low-lying coastal stretches of Route 114 and in open flood-prone areas near I-95, measures such as restoring the natural link between water bodies, salt marsh restoration, and vegetated buffers can reduce roadway erosion and flooding by storing and attenuating runoff. When paired with strategic land acquisition, these practices lower flood volumes and lessen impacts to nearby infrastructure while providing ecological co-benefits. Stormwater infrastructure capacity improvements may be necessary to reduce flooding where site conditions limit the functionality of NBS.

**Solution Mechanism**  
Protect: ●  
Accommodate: ●  
Restore: ●  
Rethink: ●

**Scale of Innovation**  
Innovative: ●  
Hybrid: ●  
Traditional: ●

**Relevant Hazards**  
Coastal Flooding  
Stormwater Flooding  
Riverine Flooding

**Cost**  
\$\$\$  
\$3.5M - \$15M  
Assumption: storm movement, planting of trees and native species along 1 mile of roadway.  
Cost Benchmark: Ninigret Pond Restoration, Charlestown, RI

**Raise Emergency Access Roads**

Elevating roads and bridges above flood levels helps maintain access during flood events for residents and emergency services. In less developed, low-lying segments of Route 114 and along vulnerable open areas of I-95 in Cranston, careful pre-planning and analysis must address potential unintended consequences, such as damming, reduced access to adjacent properties, or altered drainage patterns. Elevated roadways should be designed to match the expected useful life and maintenance needs of adjacent roads.

**Solution Mechanism**  
Protect: ●  
Accommodate: ●  
Restore: ●  
Rethink: ●

**Scale of Innovation**  
Innovative: ●  
Hybrid: ●  
Traditional: ●

**Relevant Hazards**  
Coastal Flooding  
Stormwater Flooding  
Riverine Flooding

**Cost**  
\$\$\$  
\$6M - \$25M  
Assumption: demolish 1 mile of existing 2-lane roadway, clear for 4' height increase, and reconstruct roadway in-kind in a different location.

**Create Flood Barriers**

Barriers that physically block or divert flood water from reaching a roadway can be nature-based (e.g., a landscape berm) or gray infrastructure (e.g., a sheetpile or reinforced concrete wall). Along low-lying, less developed sections of Route 114 and in open areas of I-95, key considerations include anticipated flood elevations (to determine the necessary height of protection) and space constraints. Landscaped berms can provide multiple co-benefits but require more horizontal space than flood protection walls. Flood barriers must be strategically planned, selectively implemented, and rigorously maintained to prevent false sense of security and mitigate the severe consequences of potential failure.

**Solution Mechanism**  
Protect: ●  
Accommodate: ●  
Restore: ●  
Rethink: ●

**Scale of Innovation**  
Innovative: ●  
Hybrid: ●  
Traditional: ●

**Relevant Hazards**  
Coastal Flooding  
Stormwater Flooding  
Riverine Flooding

**Cost**  
\$\$\$  
\$6M - \$25M  
Assumption: 1 mile landscaped berm adjacent to roadway with height of 2' and 2' slope.  
Landscape Berm, Janet Drive, West Warwick, RI © PWS & O'Neill, Inc.

**Consider Roadway Rerouting and Retreat**

In some locations, rerouting and retreat may be the most cost-effective and sustainable option, particularly where flooding is chronic, space for other adaptations is limited, or protection costs exceed roadway value. Along repeatedly inundated, low-lying segments of Route 114 or contained flood-prone areas near I-95, acquiring and abandoning the road may be more feasible than elevation or a causeway. This strategy can eliminate long-term risk and liability and create community benefits, such as a floodable public park.

**Solution Mechanism**  
Protect: ●  
Accommodate: ●  
Restore: ●  
Rethink: ●

**Scale of Innovation**  
Innovative: ●  
Hybrid: ●  
Traditional: ●

**Relevant Hazards**  
Coastal Flooding  
Stormwater Flooding  
Riverine Flooding

**Cost**  
\$\$\$  
\$6M - \$25M  
Assumption: demolish 1 mile of existing 2-lane roadway and reconstruct in-kind in a different location.  
Building Demolition, Scholze, RI © PWS & O'Neill, Inc.

## Strategy Mechanisms

This Plan identifies four key mechanisms that explain how resilience strategies strengthen assets and communities.

These mechanisms—Protect, Accommodate, Restore, and Rethink—serve as a framework for understanding the different ways solutions function and interact to build resilience. Strategies may apply one or more of these mechanisms, working independently or in combination to address climate risks.

**Protect** strategies focus on defending vulnerable areas through physical or engineered measures, using approaches like landscape berms and shoreline protection that stabilize coasts.

**Accommodate** strategies emphasize adapting buildings, systems, and infrastructure to withstand changing conditions, such as building and infrastructure retrofits that elevate structures and reduce exposure to hazards.

**Restore** strategies prioritize rehabilitating natural systems to buffer against hazards, including nature-based solutions like green infrastructure that improves biodiversity and hydrologic function.

**Rethink** strategies involve reevaluating how Rhode Island plans its communities to steer growth away from high-risk areas, using tools such as zoning and regulatory updates to reduce long-term vulnerability.

Solution mechanisms are identified within each strategy description in Chapter 5: Climate Adaptation & Resilience Solutions to illustrate how the approach enhances resilience for the asset. For example, the Beach and Wetland System Restoration strategy, “Restore Wetlands and Buffer Zones,” provides guidance on improving the health of wetlands and buffer zones through techniques that strengthen biodiversity and restore the hydrologic function of these critical areas. These solutions focus on restoring ecosystem health, which in turn enables these areas to better accommodate future conditions. Therefore, this strategy is marked with both relevant solution mechanisms.

### Restore Wetlands and Buffer Zones

Restoring tidal wetlands and buffer zones helps absorb floodwaters, filter pollutants, and provide critical habitat. This strategy focuses on improving hydrologic connectivity, maintaining tidal exchange, and planting vegetation of native species to stabilize soils and support biodiversity. Techniques such as sediment placement raise marsh elevation to keep pace with sea-level rise, while hydrological restoration corrects drainage issues. When combined with land acquisition, marsh migration corridors can also be preserved to provide continued ecological and resilience wetland benefits. Long term success requires ongoing adaptive management of salt marsh restoration areas and marsh migration corridors as sea levels rise.



Sediment Replacement Project at Quonochontaug Pond © NOAA

Solution Mechanism	Scale of Innovation	Relevant Hazards	Cost
Protect	Innovative	Coastal Flooding	<b>\$\$\$</b> \$6M - \$20M <i>Assumption: earth moving, thin layer soil placement, trees and in-water plantings for 1 mile (50' width)</i> Cost Benchmark: Ninigret Pond Restoration, Charleston, RI
Accommodate	Hybrid	Stormwater Flooding	
Restore	Traditional	Riverine Flooding	
Rethink			

Refer to Chapter 5: Climate Adaptation & Resilience Solutions for additional strategy descriptions.

### Protect

Defend vulnerable areas using physical or engineered measures

#### Ex: Shoreline Protection

Engineered and natural barriers can stabilize coasts



Napatree Point © Yankee Magazine

### Accommodate

Adapt buildings and infrastructure to withstand changing conditions

#### Ex: Building & Infrastructure Retrofits

Elevating and reinforcing structures can prevent hazards from impacting operations and occupants



Oineyville Resilience Hub © City of Providence

### Restore

Rehabilitate natural systems to buffer against hazards

#### Ex: Green Infrastructure

Nature-based solutions like rain gardens can capture and filter stormwater while supporting biodiversity



Stormwater Infrastructure at Roger Williams Park © Providence Stormwater Innovation Center

### Rethink

Reevaluate planning strategies and support people, infrastructure, and critical assets relocate away from high-risk areas

#### Ex: Zoning and Regulation

Implementing land-use policies and development standards can help prevent growth in high-risk areas



Trustom Pond National Wildlife Refuge © U.S. Fish and Wildlife Service

# Strategies



## Road & Bridge Flood Mitigation Solutions

- Implement Nature-Based Solutions and Stormwater Infrastructure in Right-of-Ways
- Raise Emergency Access Roads
- Create Flood Barriers
- Consider Roadway Rerouting and Retreat

## Resilient Port Infrastructure Solutions

- Integrate Dock and Pier System Improvements for Accessibility
- Elevate Bulkheads and Flood Barriers
- Design Hybrid Nature Based Solutions
- Install Energy and Backup Power Systems

## Energy Resilience Solutions

- Expand Right-Of-Way (ROW) Area and Vegetation Management
- Create Alternative Transmission Routes
- Increase the Number of Interconnection Points
- Underground Transmission Lines in High-Risk Areas

## Sewer & Stormwater Solutions

- Disconnect Infiltration/Inflow (I/I) Sources
- Increase Storm Drain Capacity
- Replace Undersized Culverts
- Harden Infrastructure in Floodplain
- Develop Nature-based Flood Storage
- Develop Green Stormwater Infrastructure
- Remove & Disconnect Impervious Coverage
- Stormwater Mitigation Funding Mechanisms



## Wastewater Treatment Facilities

- Protect or Relocate Facilities and Equipment
- Install Submersible Pumps and Ensure Access to Backup Pumps
- Provide Storage and Emergency Disinfection
- Redirect Sewage Flows, Where Possible

## Drinking Water & Reservoir Resilience

- Implement Watershed Management and Heat Reduction Measures
- Enhance Existing Emergency Spillway
- Improve Embankment
- Build a Desalination Plant

## Beach & Wetland System Restoration

- Enhance Dynamic Dunes and Barriers
- Restore Wetlands and Buffer Zones
- Implement Voluntary Buyout Program

## River and Stream Restoration

- Improve Water Quality with Green Infrastructure
- Reconnect Floodplains and Increase Riparian Buffer Capacity
- Restore Wetland Function
- Improve Watershed Hydraulics



## School & Public Safety Building Solutions

- Relocate Programming Out of Flood Zones
- Elevate Critical Infrastructure
- Retrofit and Reinforce
- Create a Resilience Hub and Microgrid

## Hospital Flood & Energy Resilience Solutions

- Conduct Multi Hazard Mitigation Planning
- Comprehensive Floodproofing & Façade Enhancements
- Emergency Access Protective Measures
- Create Microgrids

This page presents the ten climate adaptation and resilience solutions and supporting strategies, designed and costed to strengthen the resilience of priority assets and communities across Rhode Island. Each solution provides strategic guidance, cost estimates, and funding approaches to assist municipal planners, state agencies, utilities, and partnerships in advancing projects.

Refer to Chapter 5: *Climate Adaptation & Resilience Solutions* for the full guidance.

# Resilient Rhody 2025

## Future Investment Strategy





## Summary

This Plan provides a statewide strategy to advance the *Resilient Rhody 2025* Actions and Solutions by summarizing funding needs, implementation requirements, and specific funding pathways for each of the 79 Actions and the ten solutions.

### Resilient Rhody 2025 Actions

Understanding funding and implementation requirements is critical to advancing the *Resilient Rhody 2025* actions. Each action includes an estimated funding need, developed through targeted research using cost ranges derived from prior state capital plans, comparable adaptation initiatives, and national benchmarks.

### The total estimated funding needed to achieve the Resilient Rhody 2025 Actions is \$119M-\$298M, not including construction costs.

The funding requirements span multiple categories, including supporting funding mechanisms, resilient infrastructure programs and initiatives\*, planning and coordination activities, data and mapping, workforce development and capacity building, and updating standards and codes.

**Rhode Island Department of Environmental Management (RIDEM) is associated with the greatest number of actions (eight)** and the widest estimated funding needs range to achieve the *Resilient Rhody 2025* Actions.

**Funding, Technical Assistance & Capacity Building** are the most cited implementation needs to achieve the *Resilient Rhody 2025* Actions.

### Climate Adaptation & Resilience Solutions

This Plan provides a recommended funding approach for the ten priority Climate Adaptation & Resilience Solutions, specifying primary funding mechanisms and the State's responsibilities in advancing these projects. By combining cost projections with targeted funding sources and governance requirements, the Plan equips state and local partners with practical tools to move projects from concept to implementation.

To implement the Actions and Solutions outlined in this Plan, significant funding will be essential for design and construction of physical projects. Two assessments, State Benchmarking and Solution Benchmarking, have been completed to establish a baseline for scaling this need.

The State Benchmarking analysis incorporates budget allocation trends from neighboring and peer states, contextualizing the scale and structure of resilience investments across the region. These insights are intended to support future funding decisions.

Massachusetts has adopted a structured approach to resilience funding by establishing a statutory framework that sets a goal of allocating one percent of its state budget to environmental and climate-related initiatives, including resilience. If Rhode Island adopted a similar allocation model, **the State could advance adaptation and resilience solutions across its highest risk assets.**



### Drinking Water & Reservoir Resilience

Drinking water and reservoir resilience strategies are focused on reducing flooding and extreme heat impacts to Rhode Island's drinking water reservoirs, ensuring both quantity and quality of potable water. Strategies include restoring vegetated riparian buffers, enhancing existing emergency spillways, improving embankments, and building a desalination plant. Refer to Chapter 5: Climate Adaptation & Resilience Solutions for full strategy descriptions and cost estimates.

#### Primary Funding Mechanisms:

- RIBB Drinking Water State Revolving Fund (DWSRF) – Spillway upgrades, watershed management, treatment protection, embankment reinforcement; possible principal forgiveness for disadvantaged communities.
- NOAA Coastal Resilience Grants – For coastal-influenced reservoir areas needing nature-based buffers.
- Rhode Island Voter-Approved Green Bonds - Capital investments for watershed protection, embankment reinforcement, and emergency spillway enhancements at publicly owned drinking water reservoirs.

#### Funding Approach

- Use DWSRF for all engineered components (spillways, embankments, structural protections).
- Pair with NOAA for watershed or shoreline stabilization and nature-based water-quality protection.
- Pursue early engineering reports with RIBB technical assistance.
- Use match-eligible watershed partners (universities, NGOs) for NOAA co-applications.
- Use Rhode Island voter-approved Green Bonds to fund capital reservoir and watershed resilience investments and to provide required non-federal match for complementary federal programs.
- Establish Drinking Water Resiliency Fund.

#### State Role

- Provide guidance on DWSRF project eligibility and support completion of preliminary engineering reports.
- Help identify opportunities for principal forgiveness for disadvantaged communities.
- Coordinate with CRMG to provide consistency determinations for coastal-influenced reservoirs.
- Provide technical data on algal blooms, runoff pollution, and saltwater intrusion risks.

Sample Page of the Future Investment Strategy

### Solution-Specific Funding Strategies

These solutions will require complex coordination, substantial capital investment, and consistent state leadership to advance. Therefore, each solution demands a tailored, actionable funding strategy rather than a one-size-fits-all approach.

Each strategy outlines viable funding or financing tools that can strengthen competitiveness or meet match requirements, and the optimal sequencing of activities. In addition, each solution defines the State's role in providing data, technical assistance, permitting support, and cross-agency coordination to accelerate implementation.

**Refer to Chapter 6: Future Investment Strategy for further information on solution-specific funding strategies.**

\*Costs associated with the design and construction of resilient infrastructure projects are not included in this estimate. This will require project-specific construction cost analysis which will significantly influence the Action's total funding needs depending on the scope and number of projects pursued. These actions include qualifications on their respective pages in Chapter 2: *Resilient Rhody 2025* Actions to acknowledge the significant investment required for large-scale implementation.



# A Framework for Prioritizing & Funding Resilience Solutions

Rhode Island’s climate resilience priorities extend beyond the Priority Asset List and ten representative solutions described herein.

This Plan therefore includes Chapter 8: Prioritization Framework to provide an effective, transparent, and equitable roadmap to support state and local climate leaders systematically evaluate other candidate assets and projects.

The process below outlines how the State and local leaders can employ the Prioritization Framework to continue planning for and beyond the ten priority solutions and priority assets.

**Step 1:** Apply the **Asset Prioritization Framework** Criteria to Vulnerable Assets

**Step 2:** Apply the **Project Prioritization Framework** to Priority Assets

**Step 3:** Match High-Priority Projects to Available **Funding Mechanisms**

**Step 4:** Define the State’s Specific **Support Role** for Each Project

## Step 1: Apply the **Asset Prioritization Framework** Criteria to Vulnerable Assets

Criteria		
<b>Need:</b> How vital an asset is to the safety, stability, and functioning of interconnected systems or sectors.	N1	Life Safety
	N2	Urgency
	N3	Criticality
	N4	Redundancy
	N5	Number of People Impacted
<b>Equity and Community Support:</b> Whether an asset serves or protects vulnerable populations, aligns with community priorities, promotes environmental justice, and protects economic opportunities.	E1	Supports Vulnerable Populations
	E2	Community Supported
	E3	Advances Environmental Justice
	E4	Protects Economic Resources
<b>Strategic Alignment:</b> How well an asset aligns with broader municipal, regional, or resilience planning goals, including comprehensive and hazard mitigation planning efforts.	S1	Alignment with Local/Municipal Goals
	S2	Identified in Multiple Planning Initiatives
<b>Holistic Resilience:</b> Whether an asset contributes to long-term environmental, cultural, and social well-being beyond its primary function.	H1	Advances or Protects Biodiversity
	H2	Provides Ecosystems Services or Co-Benefits
	H3	Supports Sustainability Goals or Initiatives
	H4	Carries Cultural or Historical Value

## Step 2: Apply the **Project Prioritization Framework** to Priority Assets

Criteria		
<b>Cost Factors:</b> Captures the overall financial commitment required to implement and sustain the project.	C1	Initial Capital Costs
	C2	Ongoing Costs
	C3	Cost of Doing Nothing
	C4	Potential Economy of Scale
<b>Impact:</b> Reflects the extent to which the project benefits people and businesses in the broader community.	I1	Impacted Populations
	I2	Economic Resilience and Business Impact
	I3	Number of Assets and Services Impacted
	I4	Ecosystem Health and Environmental Resilience
<b>Lifespan:</b> Indicates how long the investment will deliver value and remain functional without major reinvestment or degradation in performance.	S1	Longevity of Investment
<b>Implementation and Maintenance Feasibility:</b> Measures the ease of successful implementation based on funding availability, organizational capacity, and project complexity.	F1	Funding Source
	F2	Leading Entity
	F3	Complexity
	F4	Adaptability

Refer to Chapter 4: *Priority Assets Lists* for more information on the prioritization process used to identify priority assets for solution development included in this Plan.



## A Framework for Prioritizing & Funding Resilience Solutions, Cont.

### Step 3: Match High-Priority Projects to Available Funding Mechanisms

To support the implementation of *Resilient Rhody 2025*, a comprehensive inventory of funding mechanisms was developed and mapped to each Action and the ten solutions outlined in Chapter 7: Funding & Financing Mechanism Inventory.

Potential funding sources are organized into three categories: federal funding, state funding, and non-traditional funding.\* The list on the right provides a summary of state and non-traditional funding sources available.

### Step 4: Define the State's Specific Support Role for Each Project

This Plan outlines the role the State can play in advancing the diverse resilience solutions identified herein. It defines how the State can provide critical support—such as technical assistance, funding guidance, regulatory coordination, and equity integration—to ensure projects move from planning to implementation and deliver long-term benefits for Rhode Island's communities and natural resources.

#### Rhode Island's Evolving Funding Approach\*\*

Initially, Rhode Island supported resilience projects through solely grant funding. Rhode Island's Municipal Resilience Fund is the capital deployment arm of the state's broader Municipal Resilience Program. The program begins with a structured, collaborative risk assessment and planning process in which municipalities receive support to identify and prioritize locally relevant resilience projects. This is an essential first step for smaller or under-resourced jurisdictions, as they may not have in-house climate planning capacity. Thus, the program is designed for more equitable delivery, not just scaled delivery, of vital capital.

This approach succeeded at promoting resilience planning on a small scale, however as demand grew and project size increased, it became clear that a more durable, sustainable financing method was needed. In response, the Rhode Island Infrastructure Bank shifted toward a has leveraged a loan model through the Resilient Rhody Infrastructure Fund (RRIF), using its experience managing state revolving funds to offer long-term, low-cost capital. On a conservative basis, every \$1 in public resources can now support \$3 in project costs. This turns a finite pool of funds into a self-renewing and significantly more powerful platform to meet mounting demand.

Once projects are ready for implementation, the Rhode Island Infrastructure Bank can now provide funding through a mix of revolving loan capital, state bond proceeds, green bonds, and federal infrastructure funding. The result is a layered sustainable financing model that does not rely on a single funding source. Among other strengths, this model enables small cities and towns to punch above their fiscal weight, accessing both capital and expertise without needing to master the complex mechanics of resilience finance.

\*\*Muro, M., & Kammen, D. (2024, October 31). *Rethinking our assumptions and financing tools for community resilience in the face of growing climate loss and risk*. Brookings. <https://www.brookings.edu/articles/rethinking-our-assumptions-and-financing-tools-for-community-resilience-in-the-face-of-growing-climate-loss-and-risk/>

#### State Funding Mechanisms\*

##### Rhode Island Infrastructure Bank (RIIB)

- Resilient Rhody Infrastructure Fund
- Municipal Resilience Program (MRP)
- Municipal Infrastructure Grant Program (MIGP)
- Clean Water State Revolving Fund (CWSRF)
- Drinking Water State Revolving Fund (DWSRF)
- Stormwater Project Accelerator (SPA)
- Municipal Road & Bridge Revolving Loan Fund (MRBRF)

##### Rhode Island Department of Environmental Management (RIDEM)

- RI Climate Resilience Fund (CRF)
- Bay and Watershed Restoration Fund
- State Land Conservation Program
- Local Open Space Grants
- Wastewater Treatment Facility Resilience Fund (RIDEM & RI Infrastructure Bank – RIIB)
- Ocean State Climate Adaptation & Resilience Fund (OSCAR) (RIDEM & RI Coastal Resources Management Council – CRMC)

##### Additional State Programs

- RI Green Economy and Clean Water Bonds (State of RI)
- RI Department of Transportation Capital Improvement Program (RIDOT)
- Energy Resilience & Emergency Planning (RI Office of Energy Resources – OER)

#### Non-Traditional Funding Mechanisms

- Tax Increment Financing (TIF)
- Special Assessment Districts
- Developer Impact Fees / Resilience Exactions
- Transfer of Development Rights (TDR)
- Catastrophe / Resilience Bonds
- Blue Bonds
- Environmental Impact Bonds
- Dedicated Utility Fees
- Community-Based Public-Private Partnerships (CBP3)
- Parametric Insurance
- Insurance Premium Discounts

Refer to Chapter 2: *Resilient Rhody 2025 Actions* and Chapter 5: *Climate Adaptation & Resilience Solutions* for a detailed overview of the recommended funding mechanisms mapped to each priority. Refer to Chapter 6: *Future Investment Strategy* for additional funding guidance by solution type.

\*All funding sources should be verified for current availability and applicability before pursuing them.



# Assumptions and Qualifications

## Data & Information

This report relies on information provided by others to determine current and future climate conditions for hazard and risk assessment and to develop resilience solutions. Arup does not accept responsibility for the content, including the accuracy and completeness, of such information. Arup emphasizes that the forward-looking projections, forecasts, or estimates, are based upon interpretations or assessments of available information at the time of this project.

## Priority Assets, Resilience Strategies & Jurisdiction

The current and future natural hazard exposure and risk of any site is dependent on many factors beyond Arup's control, including uncertainties around existing project sites and their construction details, natural hazards, and climate change.

Any climate resilience strategy includes potential residual risks. The resilience solutions described in this report are not guaranteed nor intended to eliminate all climate risk but are intended to be a tool to reduce climate-related damage and/or disruption. Arup shall not be responsible for damages or impacts associated with the performance of the climate resilience systems.

The realization of the prospective risks is dependent upon the continued validity of the assumptions on which it is based. Actual events frequently do not occur as expected, and the differences may be material. For this reason, Arup bears no responsibility for the realization of any projection, forecast, opinion or estimate. Findings are time-sensitive and relevant only to current conditions at the time of writing.

This plan does not confirm the feasibility or effectiveness of the strategies outlined as they relate to the designated Priority Assets. It provides a framework of specific steps to advance the proposed solutions from initial identification through to potential implementation. All proposed strategies require comprehensive due diligence, stakeholder engagement, detailed planning, design, and costing for each strategy and location identified.

Actions and strategies outlined in this plan may fall under municipal rather than state jurisdiction. Therefore, successful implementation of these actions may require local participation and coordination.

## Costing

Cost estimates for each solution type are categorized as Class 5 based on the Association for the Advancement of Cost Engineering International (AACEi) cost estimate classification matrix based on indicative scope and benchmark projects.

The accuracy range for these class 5 cost estimates are assumed to be +100% / -50%.

Benchmark projects are sourced from desktop research and Arup's internal database. Benchmark costs are normalized to Rhode Island cost basis using location factors from RS Means. Benchmark costs are escalated to 2025 cost basis using the Construction Cost Index (CCI) from Engineering News Record (ENR).

Scope assumptions are made based on benchmark projects, proposed scope to be included, and sized relative to other strategies considering possible size of potential future projects. Parametric costing (utilizing a defined quantity and unit rate) is employed where possible. Allowances are estimated to account for scope intended to be included in the project when sufficient detail or context for parametric costing was not available.

Costs for actual projects will vary based on a variety of factors including but not limited to defined extent of scope, project-specific risks, site constraints, environmental scope, construction delivery method, stakeholder engagement, funding mechanisms, existing asset operations and potential downtime, and/or market factors.

## Funding

Funding sources were identified in Summer 2025 and represent a point in time assessment. This plan does not guarantee the availability, continuation, or applicability of these sources.

All funding sources should be verified for current availability and applicability before pursuing them.

Due to changing federal priorities in both policy and funding, agencies across state government have been facing challenges in program implementation. As these changes impact agency resources including the state budget, timelines and commitments will shift, as necessary.





# Glossary of Acronyms

## Federal Agencies and Programs

- CDC:** Centers for Disease Control
- DOD:** Department of Defense
  - DCIP: Defense Community Infrastructure Program
  - OLDCC: Office of Local Defense Community Cooperation
- DOE:** Department of Energy
  - SEP: State Energy Program
- DOT:** Department of Transportation
  - FHWA: Federal Highway Administration
  - MARAD: Maritime Administration
- EPA:** Environmental Protection Agency
  - SNEP: Southeast New England Program
- FEMA:** Federal Emergency Management Agency
  - NFIP: National Flood Insurance Program
  - FIRM: Flood Insurance Rate Map
  - PAPPG: Public Assistance Program and Policy Guide
- NOAA:** National Oceanic & Atmospheric Administration
  - CELCP: Coastal & Estuarine Land Conservation Plan
- NPS:** National Park Service
- USACE:** United States Army Corps of Engineers
- USDA:** United States Department of Agriculture
- USFS:** United States Forest Service
  - NRCS: Natural Resources Conservation Service
- USFWS:** United States Fish & Wildlife Service
- USGS:** United States Geological Survey
  - 3DEP: 3D Elevation Program

## Federal Funding Sources

- BRACE:** Building Resilience Against Climate Effects
- BRIC:** Building Resilience in Communities Grant Program
- CAP:** Continuing Authorities Program
- CDBG:** Community Development Block Grant
- CMAQ:** Congestion Mitigation & Air Quality Improvement Program
- CRSCI:** Climate-Ready States & Cities Initiative
- CSP:** Conservation Stewardship Program
- CZM:** Coastal Zone Management Program & Grants
- ELP:** Environmental Literacy Program
- EPMG:** Emergency Management Performance Grant
- EPSCoR:** Established Program to Stimulate Competitive Research
- EQIP:** Environmental Quality Incentives Program
- EWP:** Emergency Watershed Protection Program
- FMA:** Flood Mitigation Assistance Grant Program
- HPF:** Historic Preservation Fund
- IJJA:** Bipartisan Infrastructure Law
- IRA:** Inflation Reduction Act
- LIHEAP:** US Department of Health and Human Services Low Income Energy Assistance Program
- NBEP:** Narragansett Bay Estuary Program

- NCRF:** National Coastal Resilience Fund
- NCWCG:** National Coastal Wetlands Conservation Grants
- NDSP:** National Dam Safety Program
- NEP:** National Estuary Program
- NRCS:** Natural Resources Conservation Service Incentives
- PRO Housing Grant Program:** Pathways to Removing Obstacles to Housing Grant Program
- PROTECT:** Promoting Resilient Operations for Transformative, Efficient, & Cost-saving Transportation Program
- REAP:** Rural Energy for America Program
- REPI:** Readiness & Environmental Protection Integration Program
- RISG:** Rhode Island Sea Grant Program
- SOAR:** SNEP Opportunity to Advance Resilience
- SWIG:** SNEP Watershed Implementation Grants
- WFIA:** Water Infrastructure Finance & Innovation Act
- WCPP:** Wildlife Crossings Pilot Program
- WPDG:** Wetland Program Development Grants

## State Agencies and Programs

- CRMC:** Rhode Island Coastal Resources Management Council
  - CEHRTF:** Coastal & Estuarine Habitat Restoration Trust Fund
- DBR:** Rhode Island Department of Business Regulation
- DHS:** Rhode Island Department of Human Services
- EC4:** Rhode Island Executive Climate Change Coordinating Program
- EOHHS:** Rhode Island Executive Office of Health & Human Services
- HEZ:** Health Equity Zones
- OER:** Rhode Island Office of Energy Resources
  - SESP:** State Energy Security Plan
- RIDE:** Rhode Island Department of Education
  - CTE:** Career and Technical Education
- IDEM:** Rhode Island Department of Environmental Management
  - CRO:** Chief Resilience Officer
  - RISDISM:** Stormwater Management, Design, & Installation Rules
- RIDLTL:** Rhode Island Department of Labor & Training
- RIEMA:** Rhode Island Emergency Management Agency
- RIGIS:** Rhode Island Geographic Information Systems
- RIIB:** Rhode Island Infrastructure Bank
  - SPA:** Stormwater Project Accelerator
- RIDOH:** Rhode Island Department of Health
  - RIWARN:** Rhode Island Water/Wastewater Agency Response Network
- RIDOT:** Rhode Island Department of Health
  - CIP:** RIDOT Capital Improvement Program

## State Agencies and Programs

- RIPDES:** Rhode Island Pollution Discharge Elimination System
- STIP:** Statewide Transportation Improvement Program
- IRA:** Inflation Reduction Act
- WRB:** Water Resources Board

## State Funding Sources

- OER:** Rhode Island Office of Energy Resources
  - REF:** Renewable Energy Fund
  - RGGI:** Regional Greenhouse Gas Initiative
- RIDEM:** Rhode Island Department of Environmental Management
  - CRF:** Rhode Island Climate Resilience Fund
  - OSCAR:** Ocean State Adaptation and Resilience
  - WWTRF:** Wastewater Treatment Facility Resilience Fund
- RIIB:** Rhode Island Infrastructure Bank
  - C-PACE:** Commercial Property Assessed Clean Energy
  - CPAF:** Community Project Assistance Fund
  - CSSLP:** Community Septic System Loan Program
  - CWSRF:** Clean Water State Revolving Fund
  - DWSRF:** Drinking Water State Revolving Fund
  - EBF:** Efficient Building Fund
  - MIGP:** Municipal Infrastructure Grant Program
  - MRP:** Municipal Resilience Program
  - MRBRF:** Municipal Road & Bridge Revolving Loan Fund
  - RRIF:** Resilient Rhody Infrastructure Fund

## Schools

- CCRI:** Community College of Rhode Island
- RIC:** Rhode Island College
- RISD:** Rhode Island School of Design
- URI:** University of Rhode Island

## Data and Modeling Sources

- ASCE:** American Society of Civil Engineers
- GDDP:** NASA Earth Exchange Global Daily Downscaled Projections
- HAZUS:** Hazards United States
- HEC-RAS:** Hydrologic Engineering Center–River Analysis System
- IPCC AR6:** Intergovernmental Panel on Climate Change Sixth Assessment Report
- MarshRAM:** Statewide Coastal Rapid Assessment Method
- NRCC:** Northeast Regional Climate Center
- RI-CHAMP:** Rhode Island Coastal Hazards Modeling and Prediction
- SVI:** Social Vulnerability Index
- SWMM:** EPA Stormwater Management Model
- UTCI:** Universal Thermal Climate Index

## Data and Modeling Sources (cont.)

- URI EDC:** University of Rhode Island Environmental Data Center
- SewerGEMS:** Sewer Geospatial Engineering Modeling System
- SLAMM:** Sea Level Affecting Marshes Model Maps

## Other

- AACEI:** Association for the Advancement of Cost Engineering International
- APA:** American Planning Association
- ARCCA:** California Alliance of Regional Collaboratives for Climate Adaptation
- BIPC:** Block Island Power Center
- CCO:** University of Oregon Climate Change in Oregon Data Portal
- CFROD:** Boston Coastal Flood Resilience Overlay District
- CIG:** University of Washington Climate Impacts Group Data Hub
- CRO:** Norfolk Coastal Resilience Overlay Zone Update
- CRRA:** New York Community Risk and Resiliency Act
- CSCI:** The Climate Smart Communities Initiative
- DEEP:** Connecticut Department of Energy & Environmental Protection Climate Resilience Fund
- DEP:** New Jersey Department of Environmental Protection Blue Acres
- EAP:** Emergency Action Plan
- ETAA:** Illinois Energy Transition Assistance Act
- FMPRA:** California Floodplain Management, Protection, & Risk Awareness Grant Program
- FTE:** Full-Time Equivalent
- GLISA:** University of Michigan Great Lakes Integrated Sciences & Assessments
- HEZ:** Health Equity Zone
- IBC:** International Building Code
- IBHS:** Insurance Institute for Business & Home Safety
- ISR:** Infrastructure, Safety, and Reliability Filings
- MVP:** Massachusetts Municipal Vulnerability Preparedness Program
- NCCF:** North Carolina Coastal Federation
- NCRF:** National Coastal Resilience Fund
- NEIWPC:** New England Interstate Water Pollution Control Commission\*
- NFWF:** National Fish and Wildlife Foundation
- NBC:** Narragansett Bay Commission
- NRDC:** Natural Resources Defense Council
- NYSARP:** New York State Adaptation & Resilience Plan
- PPL:** Project Priority List
- RIE:** Rhode Island Energy
- RMAT:** Resilient Massachusetts Action Team Climate Resilience Design Standards Tool
- SCV:** Statewide Climate Vulnerability Assessment
- SEA Streets:** Street Edge Alternatives



# Glossary of Technical Terms

## Key Terms

**Climate Resilience** The capacity of individuals, institutions, businesses, and natural systems within Rhode Island to survive, adapt, and grow no matter what chronic stresses and weather events they experience. While the effects of climate change are felt across the state, these impacts are not equally distributed. Effective climate resilience requires a focus on environmental justice and equity to support local leadership for sustained interaction between community, business, and government.

**Adaptive Capacity** The ability of a community, agency, or system to adjust its practices and use its resources, including redundancies, to respond effectively to change.

**Climate Mitigation** Reducing emissions of heat-trapping greenhouse gases into the atmosphere.

## Engineering Terms

**BFE: Base Flood Elevation** Water surface elevation resulting from the flood having a 1-percent chance of being equaled or exceeded in any given year.

**CSO: Combined Sewer Overflows** A sewer system that collects rainwater runoff, domestic sewage, and industrial wastewater into one pipe.

**EUL: End of Useful Life** The point at which an asset can no longer safely, effectively, or economically perform its intended function.

**GSI: Green Stormwater Infrastructure** Infrastructure that uses natural processes such as filtration, infiltration, and evapotranspiration to treat stormwater where it falls.

**HRU: Hydrologic Response Unit** Areas of common physical characteristics that are expected to respond to precipitation and weather events in a similar way.

**I/I: Infiltration/Inflow Sources** Sources of water other than domestic wastewater that enters sanitary sewer systems.

**LIDAR: Light Detection and Ranging** A remote sensing method that uses light in the form of a pulsed laser to measure ranges to the Earth and generate information about the Earth's shape and surface.

**MHHW: Mean Higher High Water** The average of the higher of the two daily tides observed over a 19-year period.

**Nbs: Nature-based Solutions** Infrastructure projects that intentionally use natural and nature-based habitats and processes to reduce risks and deliver multiple benefits.

**PER: Preliminary Engineering Report** A technical planning document that assesses the viability, cost, and environmental impact of a proposed project before final design.

**ROW: Right-of-Way** A legal right granted to pass through or use another person's land for a specific purpose, such as transportation, utilities, or access to support essential infrastructure.

**SCP: Stormwater Control Plan** A regulated document outlining site-specific strategies and best management practices to control, treat, and minimize pollutants in stormwater runoff.

**SLR: Sea Level Rise** An increase in the total volume of ocean water over time, driven in part by melting glaciers and polar ice sheets.

**SSO: Sanitary Sewer Overflow** A release of untreated or partially treated sewage from a municipal sanitary sewer.

**STU: Stormwater Treatment Unit** Infrastructure that improves stormwater runoff quality, reduces runoff volume, and/or reduces runoff peak flow.

**TMDL: Total Maximum Daily Load** The maximum amount of a pollutant a waterbody can receive while still meeting water quality standards, along with the pollutant reduction targets assigned to its sources.

**WWTF: Wastewater Treatment Facility** Facilities that remove contaminants from sewage and wastewater.

## Planning & Policy Terms

**ADA: Americans with Disabilities Act** A federal civil rights law that prohibits discrimination against people with disabilities.

**CBO: Community-Based Organization** A nonprofit that represents its community and provides educational or related services.

**CBP3: Community-Based Public-Private Partnership** A partnership between a local government and a private entity with the goal of providing cost-effective, high-quality services.

**CCMP: Comprehensive Conservation and Management Plans** Document that establishes priorities for activities, research, and funding for the Narragansett Bay Estuary.

**EJ: Environmental Justice** The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.

**GJZ: Green Justice Zone** Areas that face a legacy of public health burdens, environmental degradation, and socioeconomic stressors, but are prioritized for resources and support at a variety of levels to implement community-based solutions to achieve change.

**MPO: Metropolitan Planning Organization** An agency created by federal law to provide local elected officials input into the planning and implementation of federal transportation funds to metropolitan areas with populations of greater than 50,000.

**NOFO: Notice of Funding Opportunity** A publicly available document by which a Federal Agency makes known its intentions to award discretionary grants or cooperative agreements.

**RCP: Representative Concentration Pathways** Plausible future scenarios of carbon dioxide emissions and possible reductions in atmospheric concentration.

**RFP: Request for Proposals** A solicitation method which communicates the government's requirements and requests proposals.

**RLF: Resilience Loan Fund** A specialized financing mechanism designed to provide loans and capital to fund projects that build resilience to natural hazards.

**SAMP: Special Area Management Plan** A plan used to collect and examine data, identify potential development trends and anticipates conflicts between different uses. In coastal areas.

**SSP: Shared Socioeconomic Pathways** A set of narratives describing possible future development pathways in relation to its use of fossil fuels and the social and economic factors which drive fossil fuel use.

**SSP2-4.5:** Intermediate Emissions Scenario where carbon dioxide emissions continue around current levels until 2050, then decrease but do not reach net zero by 2100.

**SSP5-8.5:** Very High Emissions Scenario characterized by continued growth in carbon dioxide emissions throughout the 21st century, driven by heavy reliance on fossil fuels, with emissions increasing substantially by 2100.

**TAP: Technical Assistance Package** A support mechanism funded by potentially responsible parties that enables community groups to retain the services of an independent technical advisor.

**TDR: Transfer of Development Rights** The transfer of development rights from land in a sending area to land in designated receiving areas.

**TIF: Tax Increment Financing** A value capture tool that uses taxes on future gains in real estate values to pay for new infrastructure.

**WUI: Wildland-Urban Interface:** The zone of transition between unoccupied land and human development.

