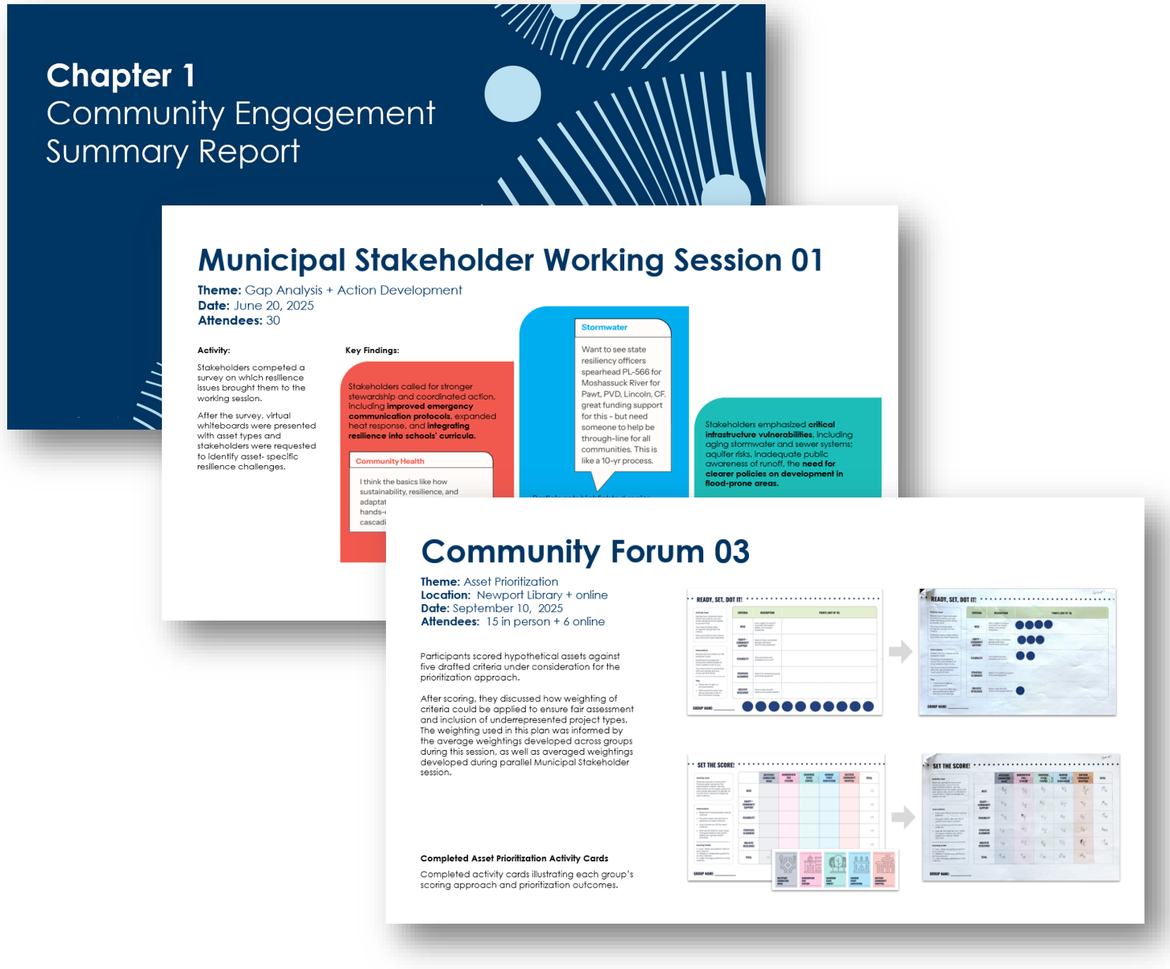
How to Read *Resilient Rhody 2025*

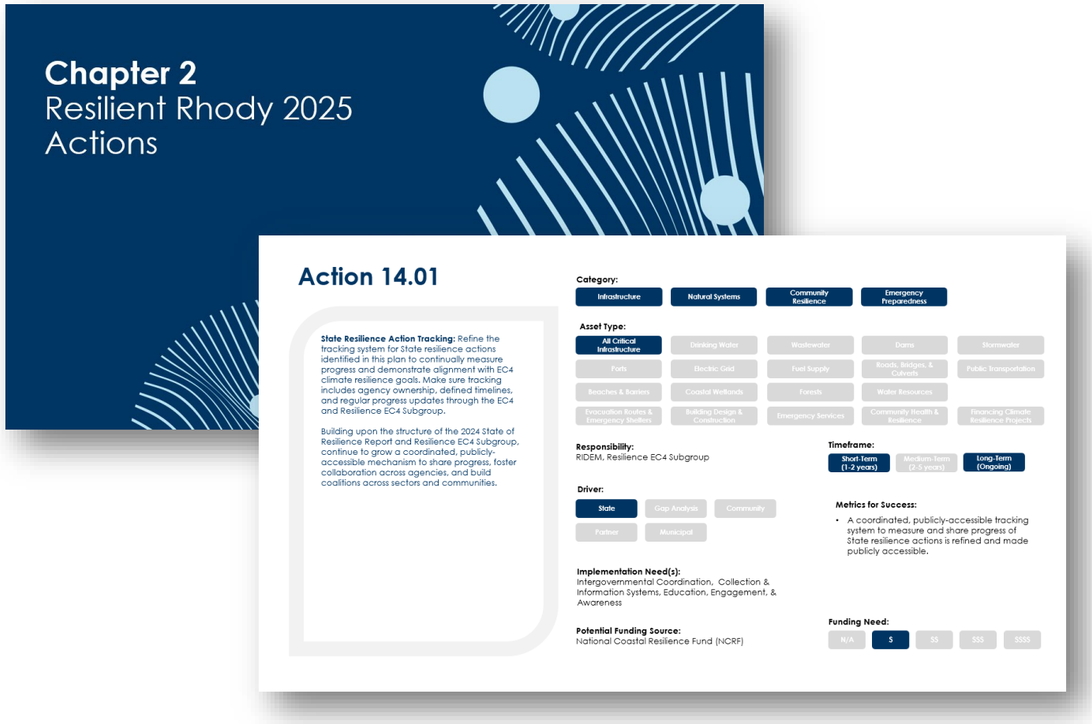
Resilient Rhody 2025 is organized into a Plan Summary and nine supporting chapters.

The Plan Summary provides an accessible overview of key takeaways, while each chapter offers a more detailed explanation of the methodology, engagement approach, and findings. These chapters also include practical resources for practitioners. The following pages present examples of the types of content featured in each chapter.

Resilient Rhody 2025 Table of Contents

Chapter Summaries





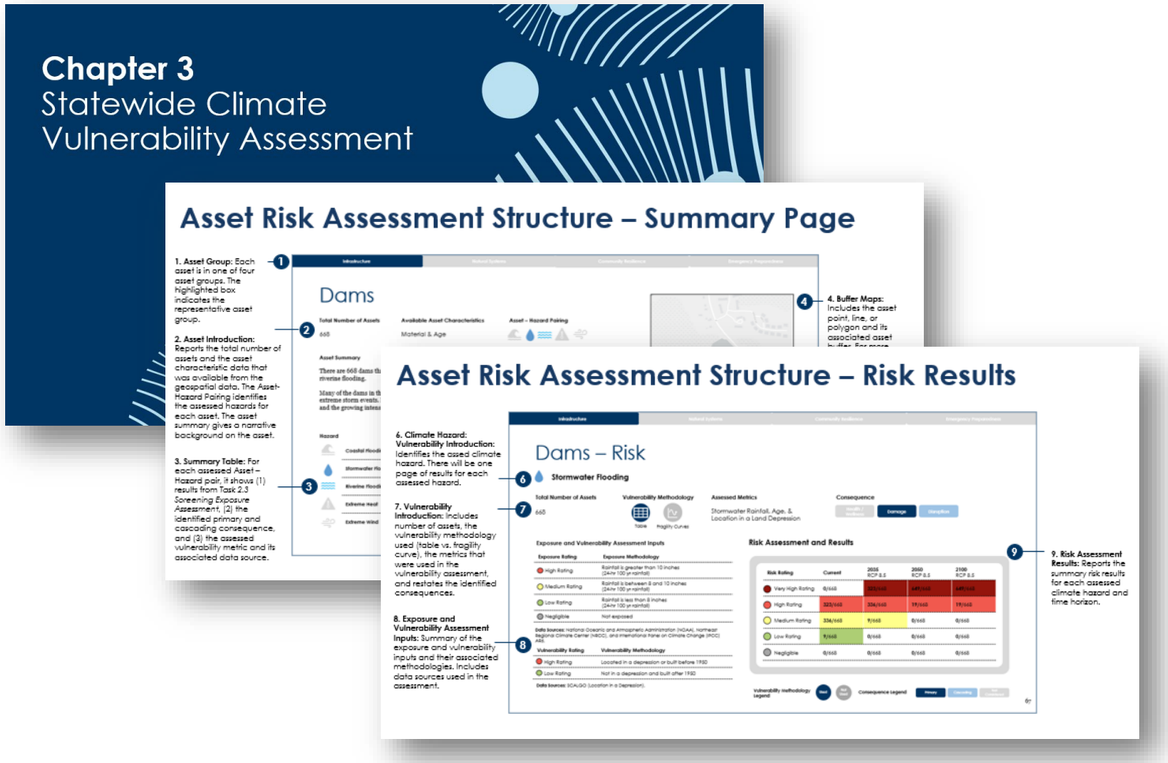
Chapter 1: Community Engagement Summary Report

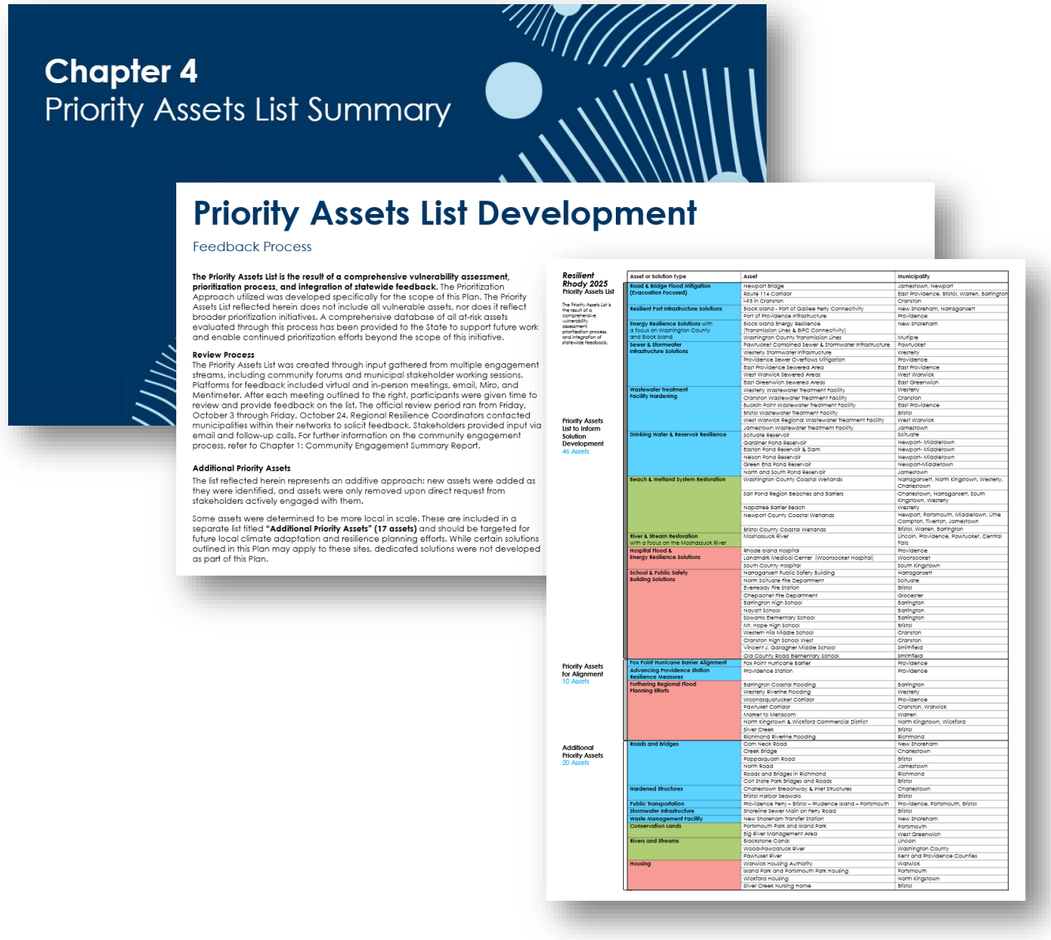
Chapter 1 provides an overview of the four community forums, six municipal stakeholder meetings, and the Health Equity Zone Frontline Community Forum conducted throughout the Plan's development. The chapter details the theme, location, date, number of attendees, and activities for each session along with key takeaways and explanation of how those insights were incorporated into the Plan.

Chapter 2: Resilient Rhody 2025 Actions

Chapter 2 includes all 79 Resilient Rhody 2025 actions and establishes cross-agency goals for each asset type. Each action page summarizes the action, identifies the responsible agency(ies) or lead party(ies), outlines the primary driver(s), details implementation needs, lists potential funding sources and estimated amounts, and provides timeline and success metrics to move towards implementation.

Chapter Summaries





Chapter 3: Statewide Climate Vulnerability Assessment

Chapter 3 outlines the methodology and results for the Statewide Climate Vulnerability Assessment. The result pages identify asset-hazard risks across all assessed asset types and five hazards: coastal flooding, stormwater flooding, riverine flooding, extreme heat, and extreme wind. Asset-hazard pairs were assessed under current and future time horizons and two emissions scenarios, data permitting. The findings illustrate how risk is projected to change over time for each assessed pair.

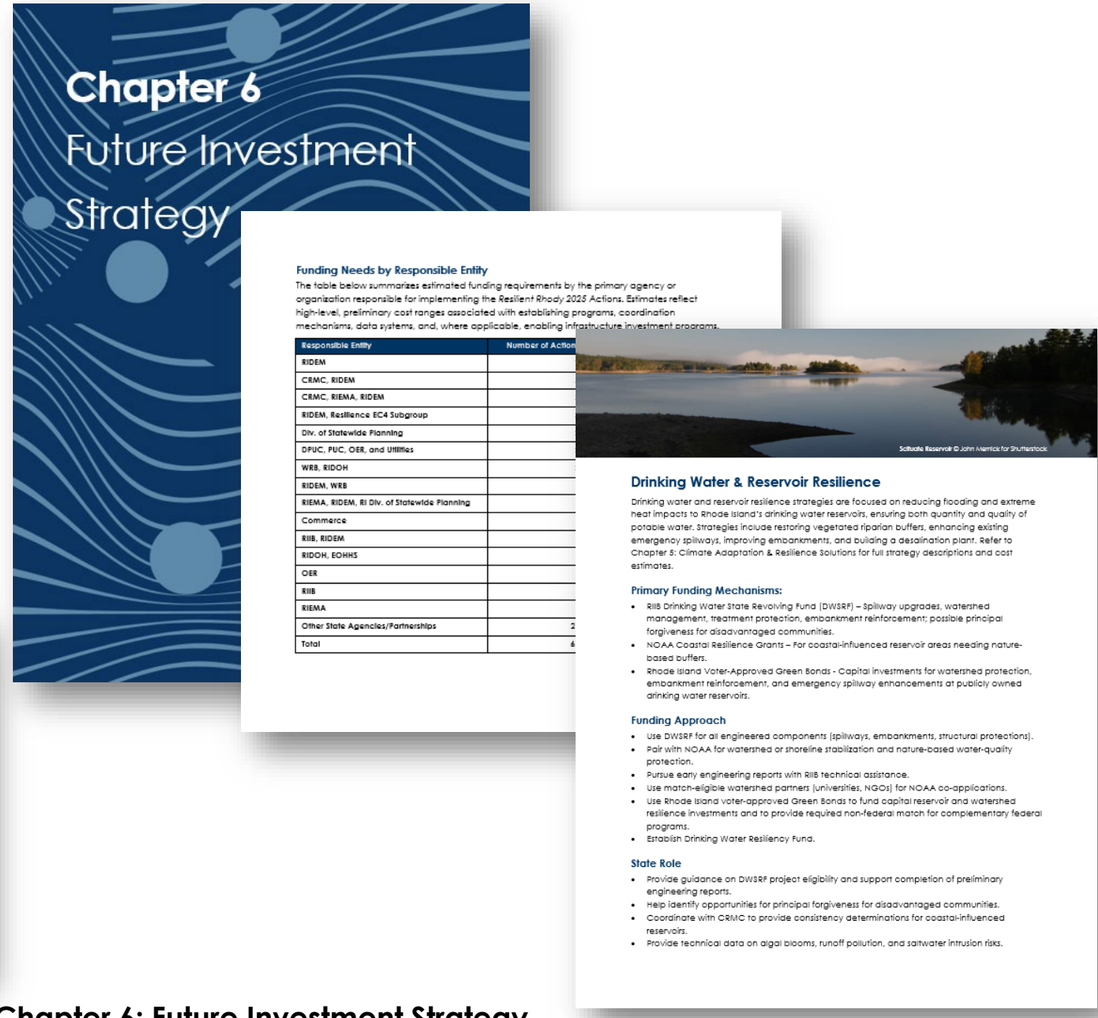
Chapter 4: Priority Assets List Summary & List

Chapter 4 includes all the priority assets that were identified through *Resilient Rhody 2025*'s prioritization process. The chapter provides more detail on the prioritization approach, which incorporated results from the statewide climate vulnerability assessment, development of weighted prioritization criteria, and integration of statewide feedback.

Chapter Summaries

Chapter 5: Climate Adaptation & Resilience Solutions

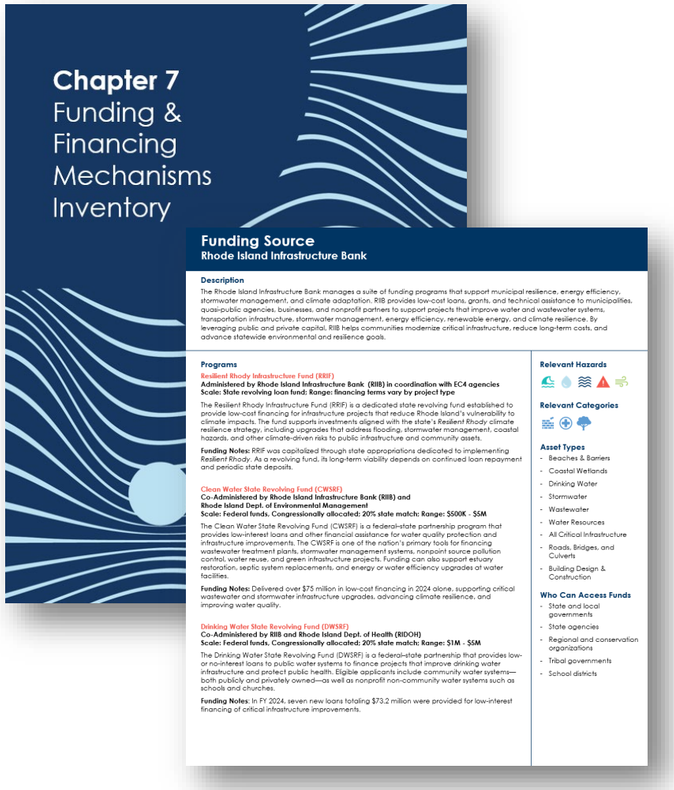
Chapter 5 presents climate adaptation and resilience solutions organized into ten asset-based solution typologies aligned with the State's priority assets. Each solution outlines the key strategies, implementation steps, cost estimates, and a funding approach to guide successful implementation.

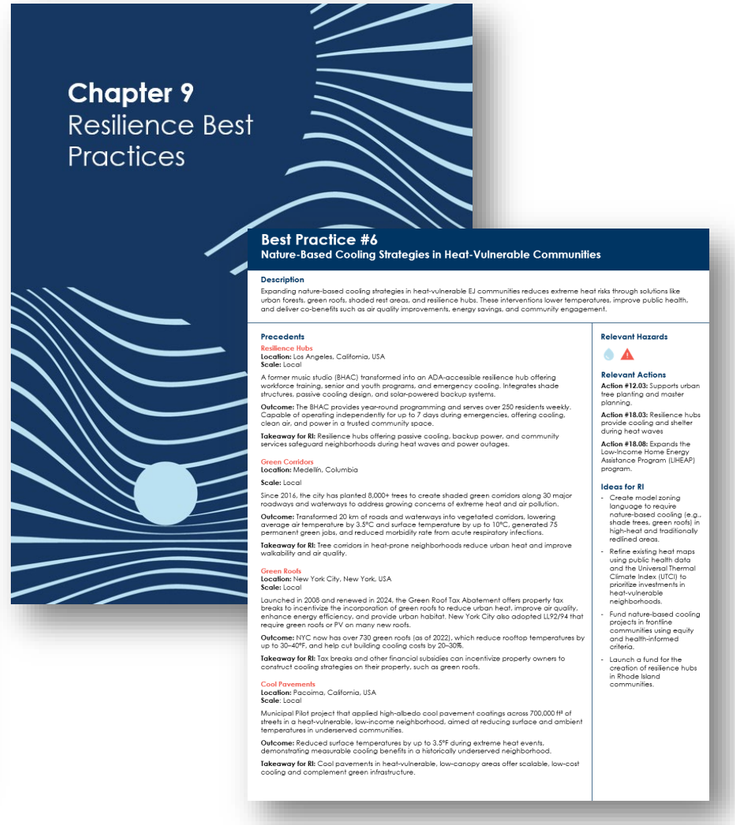


Chapter 6: Future Investment Strategy

Chapter 6 provides a framework for identifying and securing funding to implement both the *Resilient Rhody 2025* Actions outlined in Chapter 2 and the Climate Adaptation & Resilience solutions detailed in Chapter 5. For the Actions, the chapter summarizes funding and implementation needs by responsible entity and asset type. For the Solutions, each includes potential funding mechanisms, the recommended funding approach, and the role the State should play in supporting implementation.

Chapter Summaries





Chapter 7: Funding & Financing Mechanisms Inventory

Chapter 7 provides an inventory of resilience funding and financing sources and mechanisms. Each funding source includes details on program administration, scale, and eligible activities. A side panel identifies relevant hazards, asset types, and eligible applicants.

Chapter 8: Prioritization Framework

Chapter 8 outlines both the Asset and Project Prioritization Frameworks. The Asset Prioritization Framework was used to identify and prioritize the assets included in this Plan and is intended to be replicated when assessing additional assets in the future. The Project Prioritization Framework is designed to guide the prioritization of projects once they have been identified.

Chapter 9: Resilience Best Practices

Chapter 9 presents 12 best practices for advancing climate resilience. Each best practice is supported by case studies demonstrating how it has been implemented. Relevant hazards, corresponding *Resilient Rhody 2025* Actions, and key takeaways for Rhode Island are highlighted for each best practice.

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.

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

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
IIJA: 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

RIDLT: 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
- **WWTFRF:** 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
NEIWPCC: 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.