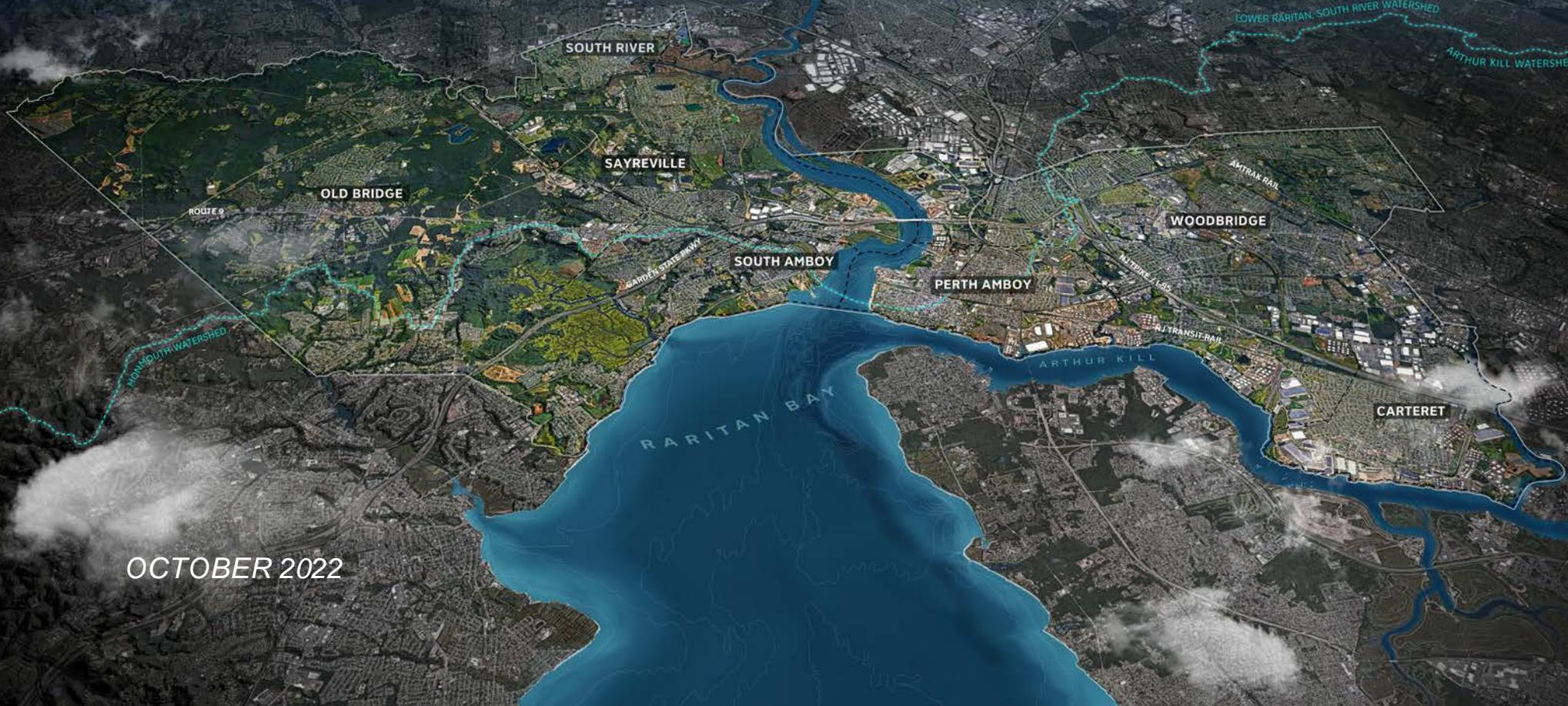


# RESILIENT NJ

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## PROTECT, RESTORE, TRANSITION

A Resilience Action Plan For The Raritan River And Bay Communities' Region



OCTOBER 2022

# SHARE YOUR FEEDBACK ON THIS REPORT



FEEDBACK FORM

PLEASE SHARE YOUR THOUGHTS USING THIS FORM:  
<https://forms.office.com/r/Df0dFcG0UU>

We continually share progress and ask for comments to make sure the project is on the right track. The *About Our Region* report (released spring of 2021) describes key features of the Raritan River and Bay Communities region and its municipalities that are important to understand when planning for higher resilience to flood risk and improved quality of life in the future. The *Vision and Priorities* report (released spring 2022) summarizes what we heard from the community and other stakeholders between December 2020 and January 2022. The *Flood Impact Assessment* (released summer 2022) details the expected impacts of flooding across the region.

This *Action Plan* is the culmination of the three preceding reports. It provides an actionable roadmap that includes clear next steps for the region to reduce risk and improve quality of life by means of thoughtful and targeted resilience actions.

To ensure the *Action Plan* is implementable, the project team welcomes your feedback on:

- The specific resilience actions recommended;
- The lead entities and next steps identified for each action; and
- Any additional information you feel is needed to make the plan actionable.

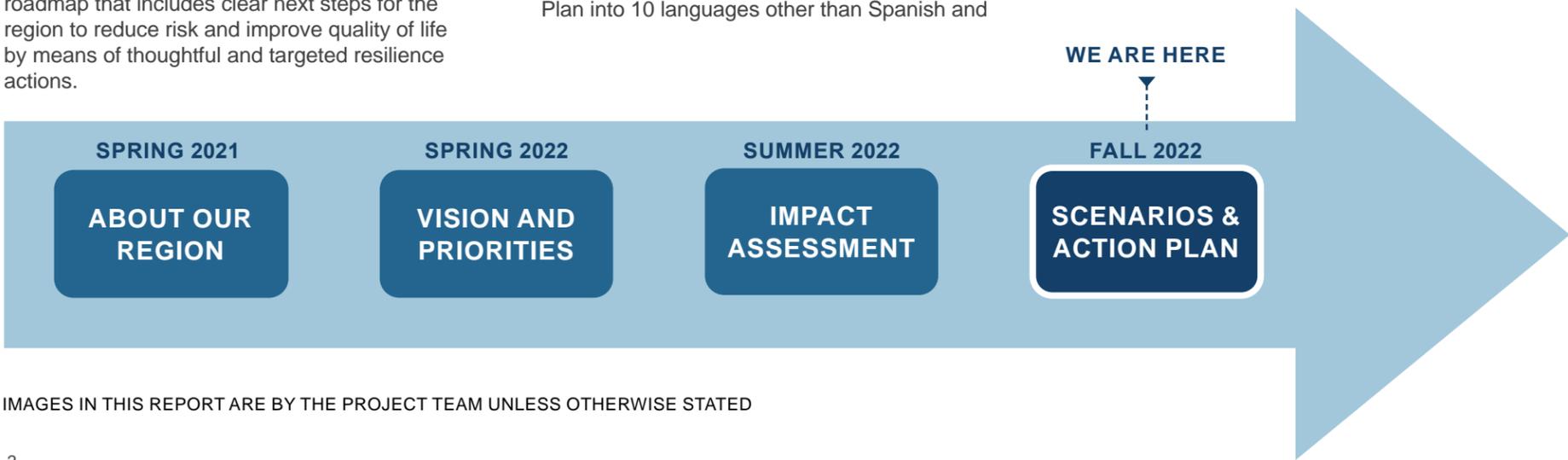
This version incorporates updates based on edits received by October 19th, 2022. Additional public comments are welcome to inform subsequent updates. Please submit comments by March 31, 2023.

The Action Plan will be available in Spanish. You can submit a request for translation of the Action Plan into 10 languages other than Spanish and

English. [Please follow the instructions in this form to submit a translation request.](#)

We also welcome you to share your thoughts on the broader project:

- By email: [ResilientRRBC@dep.nj.gov](mailto:ResilientRRBC@dep.nj.gov)
- By social media: Twitter and Facebook: @ResilientRRBC, Instagram: @Resilient\_RRBC
- Through our website: [www.resilient.nj.gov/rrbc](http://www.resilient.nj.gov/rrbc)
- Through the Irys app (download through Apple App Store or Google Play Store)



IMAGES IN THIS REPORT ARE BY THE PROJECT TEAM UNLESS OTHERWISE STATED

# RESILIENT NJ RARITAN RIVER AND BAY COMMUNITIES

PROTECT, RESTORE, TRANSITION:  
 A Resilience and Adaptation Action Plan For The Raritan River And Bay Communities' Region

OCTOBER 2022



# LETTER OF SUPPORT

## By New Jersey Department of Environmental Protection

Climate change is a global challenge, although its impacts—including flooding from sea-level rise, coastal storms, and extreme precipitation events—are experienced locally. Further, each community’s experience of these impacts is distinct and so requires a unique response consistent with, and driven by, the community members who are directly impacted. Integrating a proactive, climate-ready mindset into local and regional planning efforts is imperative to ensure that investments made today are designed to withstand the conditions of tomorrow.

To provide our communities with the assistance and resources to meet these challenges, the NJ Department of Environmental Protection (NJDEP) launched the Resilient NJ program, using funding from the U.S. Department of Housing and Urban Development’s National Disaster Resilience Competition. Resilient NJ is the preeminent planning program in the state to support local and regional climate resilience planning and serves as a model for other community resilience planning projects in New Jersey. Using the best available science on precipitation, sea-level rise, and coastal flooding, combined with a whole-community planning approach, Resilient NJ helps communities plan for how the changing climate may affect residents, businesses, and the natural and built environments.

The Resilient Raritan River and Bay Communities region is extremely diverse in both population and development patterns, with a mix of suburban and older urban centers. It is composed of several watersheds whose unique qualities require targeted management, as residents of the region

are regularly threatened by flood exposure. This Regional Resilience and Adaptation Action Plan is the result of a nearly two-year, whole community planning process. It presents a suite of innovative and implementable solutions that align with the community vision to increase climate resilience in both the short- and long-term.

New Jersey’s Statewide Climate Change Resilience Strategy defines “climate resilience” as the ability of social and ecological systems to absorb and adapt to shocks and stresses resulting from a changing climate, while becoming better positioned to respond in the future. Resilience is not an end-state, but a dynamic state-of-being that will grow more difficult to attain as the climate continues to change. Resilience is perseverance with grace, strength in the face of adversity and hardship, resourcefulness to leverage what is available, and faith in the road that lies ahead. The four initial Resilient NJ regional projects have met those high principles and have established a high bar by which all other resilience initiatives will be measured.

Sincerely,



Nicholas J. Angarone, PP/AICP

New Jersey Chief Climate Resilience Officer

# FOREWORD

## By the Steering Committee

Resilient NJ Raritan River and Bay Communities (RRBC) is one of four pilot regional planning projects funded through the New Jersey Department of Environmental Protection (NJDEP) that aims to build resilience while improving quality of life in the face of climate change. The program’s regional focus is on seven coastal municipalities within Middlesex County, and the program breaks traditional geographic and administrative boundaries to foster collaboration and yield productive change. The region is home to over 300,000 people today. Representatives of each participating municipalities, Middlesex County, and the YMCA sit on a Steering Committee that leads the project and works alongside resilience experts, infrastructure entities, community members and other local, county, and state leaders.

Resilient RRBC launched publicly in the Spring of 2021 with a mandate to develop a regional Resilience and Adaptation Action Plan (*Action Plan*) that outlines a roadmap for addressing current and future flooding. Through community feedback, the process that followed was expanded to consider other climate-related hazards, such as heat, poor air quality, and drought. These hazards interact with each other to create stressors on the region’s people, infrastructure, and environment. Stresses are already felt today, as we saw with recent storms such as the remnants of Hurricane Ida in September 2021, less recent storms such as Hurricane Sandy that catalyzed attention to resilience across much of the northeast, and the prevalence of health impacts due to polluted air and heat waves.

The science to understand the complex role that climate change plays in the future of these hazards is constantly evolving through studies led by federal agencies, NJDEP, and other academic and scientific entities. Nonetheless, the science shows that factors such as sea level rise, higher intensity precipitation, invasive species, air quality changes, and increasing temperatures will worsen quality of life in this region unless action is taken. The *Flood Impact Assessment* completed for this project estimates that, considering the effects of climate change, possible losses from severe rainfall and coastal storm surge events could be in the billions of dollars. These hazards compound other challenges faced by this region, including contamination and the legacy of the region’s industrial past, aging infrastructure, the need for additional housing, and lack of access to open space and natural areas in some areas within the region.

The Steering Committee is committed to facing these challenges by advancing the recommendations of the *Resilient RRBC Action Plan* and continuing to lead, collaborate, and innovate on these issues. The *Action Plan* outlines clear actions such as policy changes, programs, and capital projects that can be implemented to reduce risk by protecting critical assets and population centers, restoring natural systems, and transitioning to more resilient and sustainable land use patterns. Together, Resilient RRBC partners are already working to advance these recommendations, as shown in the following pages.

The actions aim to advance ongoing efforts in the region and to work alongside the New Jersey Statewide Climate Change Resilience Strategy and other statewide initiatives. As reflected in the *Action Plan*, we can all play a role in increasing resilience, and the plan describes responsibilities at several scales. Community engagement was crucial to the development of the plan to ensure that it aligns with community vision and priorities. Involvement from everyone in our region, especially those who could face the most significant impacts from climate change, will continue to be critical for successful implementation of the plan’s recommendations.

This *Action Plan* is not the final step in the process towards achieving increased resilience. By taking the next steps as charted in the roadmap and working iteratively to improve and complete projects, we can collectively build thriving communities.

# PROJECT TEAM

## ELECTED OFFICIALS

### MIDDLESEX COUNTY

**Mayor:** Fred Henry  
**Council:** Brian McLaughlin (Ward 1), Thomas B. Reilly (Ward 2), Zusetta Dato (Ward 3), Christine Noble (at-large), Michael Gross (President)

### CARTERET

**Mayor:** Daniel J. Reiman  
**Council:** Jorge Diaz (President), Vincent Bellion, Susan Naples, Ajmar Johal, and Dennis DiMascio

### OLD BRIDGE

**Mayor:** Owen Henry  
**Council:** Mary Sohor (President), Debbie Walker (VP), Dr. Anita Greenberg-Belli (at-Large), Kevin Garcia (Ward 1), Erik DePalma (Ward 2), Kiran Desai (Ward 3), Jill DeCaro (Ward 4), Tony Paskitti (Ward 5), and John E Murphy III (Ward 6)

### PERTH AMBOY

**Mayor:** Helmin Caba  
**Council:** William A. Petrick (President), Joel Pabon, Sr., Milady Tejeda, Rose B. Morales, and Bienvenido “BJ” Torres

### SOUTH AMBOY

**Mayor:** John L. Madden  
**Council:** James Eodice (President), Jack Mikolajczyk, Douglas Rex, Jeremiah Carnes, Martin Quinn, Michael Conahan

### SAYREVILLE

**Mayor:** Victoria Kilpatrick  
**Council:** Vincent Conti, Eunice K. Dwumfour, Michele Maher, Mary J,Novak, Christian Onuoha, and Donna Roberts

### SOUTH RIVER

**Mayor:** John M. Krenzel  
**Council:** Tony Ciulla (President), Donna Balazs, Jason Oliveira, Peter Guindi, James Gurchensky, and Julie Meira

### WOODBIDGE

**Mayor:** John E. McCormac  
**Council:** Howie Bauer (President/Ward 2), Gregg M. Ficarra (VP/at-Large), Sharon McAuliffe (Ward 1), Cory Spillar (Ward 3), Virbhadra N. Patel (Ward 4) Debbie Meehan (Ward 5), Kyle Anderson (at-Large), Lizbeth DeJesus (at-Large), and Brian Small (at-Large)

## STEERING COMMITTEE MEMBERS

### MIDDLESEX COUNTY

Doug Greenfeld, Mirah Becker, Laurie Sobel, John Ferguson, Lakeasha Carter, Brady Smith

### CARTERET

Mike Sica

### OLD BRIDGE

Veena Sawant, Damian Gil

### PERTH AMBOY

Tashi Vazquez, Larry Cattano, Joel Rosa

### SOUTH AMBOY

Glenn Skarzynski

### SAYREVILLE

Kirk Miick

### SOUTH RIVER

Art Londensky

### WOODBIDGE

Tom Flynn, Mike Gelin, Marta Darden

### RARITAN BAY AREA YMCA

Steve Jobin, Lauren Capaci, Brenda Crespo

### RARITAN VALLEY YMCA

Gina Stravic

### GATEWAY FAMILY YMCA RAHWAY BRANCH

Rodger Koerber

### OLD BRIDGE FAMILY YMCA

Christopher Nasta, Jennifer Dunn

### YMCA OF METUCHEN EDISON, WOODBRIDGE AND SOUTH AMBOY

Gerry Gessie

## CONSULTANTS

### ARCADIS

### INGROUP, INC.

### SCAPE LANDSCAPE ARCHITECTURE

### ONE ARCHITECTURE & URBANISM

### IRYS

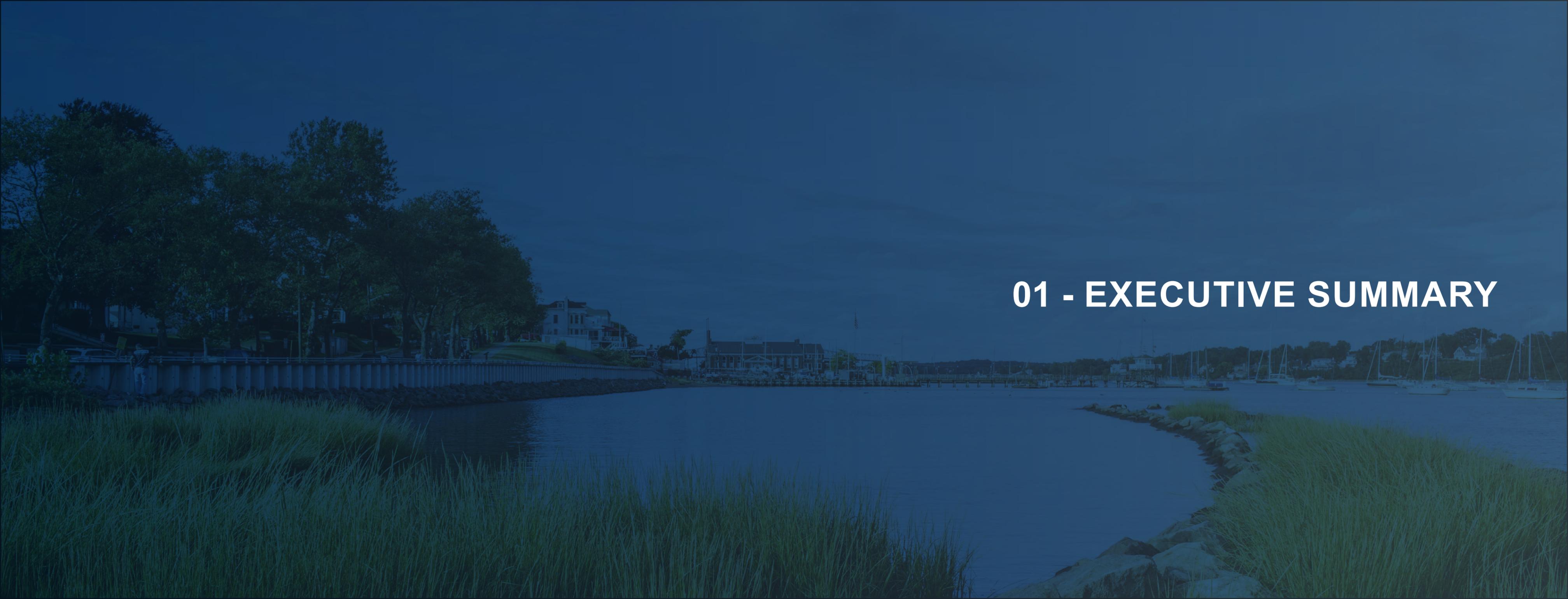
### SAM SCHWARTZ ENGINEERING

### HEYER, GRUEL & ASSOCIATES



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A dark blue-tinted photograph of a waterfront scene. In the foreground, there is a body of water with tall grasses on the left and right banks. A stone breakwater or pier extends into the water. In the background, there are several buildings, including a large multi-story building, and a marina with many sailboats. The sky is overcast.

# 01 - EXECUTIVE SUMMARY

# EXECUTIVE SUMMARY

Resilient NJ is a planning program, administered by the New Jersey Department of Environmental Protection (NJDEP), that supports regional climate resilience planning. Resilient NJ has brought together planners, engineers, designers, and other experts to address flood-related and other hazards at a regional scale in order to develop a targeted set of strategies and actions with clear pathways to implementation, a process fundamentally guided and driven by local community input, particularly from underserved and under-resourced populations.

The mission of Resilient NJ: Raritan River and Bay Communities (RRBC) is to **create a watershed-based plan with a clear vision and roadmap for reducing flood risk, increasing resilience, and achieving environmental restoration to help the multi-municipal region survive and thrive.**

The RRBC region includes seven municipalities in Middlesex County that were impacted by Hurricane Sandy: Carteret, Old Bridge, Perth Amboy, South Amboy, Sayreville, South River, and Woodbridge. The region is home to approximately 310,000 residents of diverse backgrounds, 76,000 jobs, and numerous transportation and environmental assets of regional importance. The region has been shaped geographically and culturally by the Raritan Bay, which serves as an entrance point to the rest of Middlesex County as well as a connection point with

New York City and New England. RRBC is heavily interconnected along major transportation networks and waterbodies, home to a wide variety of cultures and industries.

Thousands of residents of RRBC live in areas vulnerable to flooding. These hazards include coastal storms and storm surge, coastal erosion, high tide flooding exacerbated by sea level rise, riverine flooding, flooding from heavy rainfall, and in some areas, combined sewer overflows. In 2012, the region experienced severe flooding during and after Hurricane Sandy. The hurricane caused power outages, damaged businesses and homes, and forced the evacuation of thousands of people. Since then, the region has experienced flooding from other storms, including nor'easters and Hurricanes Irene and Isaias. Many neighborhoods in the region also experience flooding due to heavy rainfall events overwhelming the stormwater system, as seen during Tropical Storm Ida. Climate change will increase these risks as sea levels rise and extreme events become more common.

## What is the purpose of this plan?

Through the Resilient NJ program, the Raritan River and Bay Communities region has engaged in a stakeholder-guided process to become more resilient and improve quality of life for its more than 300,000 residents. This action plan is a culmination of these efforts. The plan:

- Summarizes the Resilient NJ program and resilience planning process undertaken in RRBC;
- Shares the outcomes and results of the program and process; and
- Provides a roadmap for reducing flood and other climate risks, and addressing critical issues in the region through identified resilience strategies and actions.

## Some Key Terms

The terms introduced here are used throughout the *Action Plan* to define flood risk and resilience in RRBC.

Resilience means the ability to adapt to changing conditions, such as those driven by climate change, and transform in the face of disruption or challenges. Resilience is about creating physical change to prevent flood damage as well as strong civic and governance systems that support inclusive decision-making.

Flooding can be caused by rainfall, overwhelmed sewer systems, overflowing rivers, coastal storms, or high tides. Flooding is more significant at lower elevations (ground levels) and can be exacerbated when drainage systems lack necessary capacity or paved surfaces prevent rainfall from being absorbed. Coastal storms can cause a temporary rise in ocean levels (or storm surge) and strong winds can lead to large waves that overtop bulkheads or coastal barriers. Climate change is causing sea levels to rise and is producing more severe rain events, which will increase flood risk in some areas.

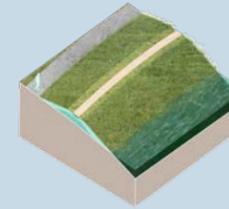
Flood Risk Reduction refers to strategies and actions that reduce the likelihood of flooding and/or build capacity to minimize the consequences of flooding when it occurs. Planning to reduce flood risk helps decrease the number of people and buildings at risk from flood impacts.

Nature-based Solutions refers to sustainable planning, design, environmental management, and engineering practices that weave natural features or processes into the built environment to promote adaptation and resilience. These solutions use natural approaches to reduce flood risk, combat climate change, and realize a variety of co-benefits.

A watershed is an area of land that drains into a body of water such as a river, lake, stream, or bay.

This preferred scenario will achieve the region's vision by:

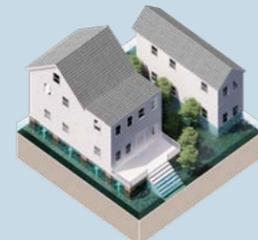
### PROTECTING Critical Assets & Economic Centers through



- **Adaptation or protection of critical facilities**
- **Coastal flood barrier systems** to protect from storm surge
- **Adaptation of bulkheads** to protect from sea level rise



- **Expanding stormwater storage** to reduce risks from heavy rainfall



- Increasing **awareness of flood risk and mitigation options** and **increased funding for flood mitigation**

### RESTORING Natural Systems & Minimize Exposure through



- **Protecting and managing tidal wetlands** for sea level rise
- **Protecting and preserving open space**



- Improving stormwater management by **restoring riparian corridors** and **eliminating barriers to natural drainage flows**



- Implementing **beach and dune restoration** and building **living breakwaters**

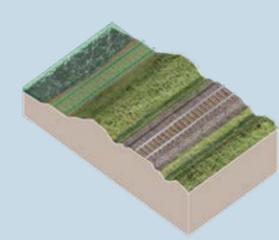
### TRANSITIONING to Smart Growth for a New Economy through



- Limiting development and **reducing density in higher-risk areas** and **creating development opportunities in low-risk areas**



- Incorporating resilience into **redevelopment plans** and **local codes and standards**
- Improving **regional coordination and governance**



- Improving resilience of **mobility systems**

## Why this this plan needed?

Flooding is not the only climate hazard this region must worry about, however. Increasing global temperatures, radical shifts in precipitation and weather patterns, sea level rise, and correlated groundwater table rise will interact in complex ways to threaten the region with various additional hazards, including other (non-flooding) types of severe weather, various direct and indirect hazards posed by groundwater rise, increased drought and threats to water supply, extreme heat, worsening air quality, invasive species and vector-borne illnesses, increased risk of wildfire, and ocean acidification. These hazards will increasingly threaten public health, provision of critical services, and the health and integrity of existing ecosystems and habitats the region’s population depends on.

While flooding and additional climate hazards will impact people across the region, those with fewer resources or additional vulnerabilities face additional hardships. Indeed, some of the most socially vulnerable communities in the state—and in some cases, the country—reside in Perth Amboy and Carteret. Lower income households with less savings are more vulnerable when faced with losing income. A history of exclusionary policy has inequitably distributed resources so that Black and Latinx communities are disproportionately vulnerable to flooding, high urban heat, air pollution, and proximity to hazardous waste. There are also specific communities such as the elderly and those with disabilities that are at higher risk.

## What does this plan recommend?

A broad range of resilience strategies and actions can be leveraged to realize the Raritan River and Bay Communities’ vision for the future of: “A thriving region of interconnected watersheds, with complementary environmental, social, economic, and governance systems working together to

reduce flood risk of communities and infrastructure, restore natural systems, and adapt to a changing climate.” In the process of collaborating with RRBC communities and evaluating three preliminary scenarios, it became clear to the Resilient NJ team that achieving the community vision will require a hybrid strategy that includes a careful balance between the three scenarios.

## What will the benefit of this plan be?

This *Action Plan* seeks to reduce current and future risks due to flooding and Additional Climate Hazards, now and into the future. The strategies and actions it proposes are intended to increase adaptive capacity, enable positive transformation, and improve quality of life for the communities who live and depend on the region, even as the impacts of climate change loom larger—especially for the region’s most under-resourced communities. Thoughtful implementation of the strategies and actions contained herein could yield a wide variety of benefits for the entire region, including:

- Avoided loss of life, injuries, illnesses, mental stress and anxiety, in addition to other public health benefits
- Protection of structures, contents, and inventories
- A more sustainable economy and avoided impacts to local and regional businesses
- Protection of critical assets and avoided loss of public and essential services
- Multiple ecological benefits, including restoration and expansion of existing open spaces, wetlands, streams, and various habitats
- Expanded access to green space and improved connectivity/mobility

## What happens next?

This plan is intended to be an actionable roadmap, providing clear next steps that should be taken to implement the identified resilience actions. It builds off ongoing resilience planning within the region and incorporates the voices and needs of all members of the region, including the most vulnerable, to provide innovative and implementable actions that increase long- and short-term resilience and enhance the value and integrity of the ecological, recreational, and economics resources of the region.

The plan is organized into the following chapters:

- **Project Background & Objectives** – Provides an overview of the Resilient NJ program, our understanding of the RRBC region and its history, and a summary of the planning process undertaken to complete this plan
- **Summary of Climate Impacts in the Region** – Summarizes key findings of the flood impact and other climate hazard assessments which provided the basis of our understanding of current and future risks in the region
- **Three Pathways to a More Resilient Region: Scenario Development and Evaluation** – Details the scenario development and evaluation process undertaken to weigh the pros and cons of three potential approaches and develop the preferred scenario
- **Resilience Action Plan Implementation Framework** – Provides an overview of the preferred scenario, details recommended strategies and actions at the regional, sub-watershed, and resilience opportunity area scales, and outlines a roadmap to implement the identified actions

The release of this *Action Plan* is an important step in addressing the flood risks this region faces, but what comes next is even more important.

# EVERYONE HAS A ROLE TO PLAY

Everyone has a role to play in reducing flood risk and increasing resilience in the Raritan River and Bay Communities region. The information in the chart below provides additional guidance on next steps for different groups of stakeholders.

IF YOU ARE	WHAT YOU NEED TO KNOW	WHAT YOU CAN DO NEXT
<b>A RESIDENT, BUSINESS OWNER, OR PROPERTY OWNER IN THE REGION</b>	<p>Building resilience in the region depends on you and the actions you take to reduce flood risk to your home, business or property</p> <p>This <i>Action Plan</i> includes a variety of actions that may affect the places you care about so review the plan and stay involved in the process as actions are implemented</p>	<ul style="list-style-type: none"> <li>• Know your risk today and in the future</li> <li>• Purchase and maintain flood insurance and prepare when a flood is in the forecast</li> <li>• Share this plan with your friends, family, and neighbors</li> </ul>
<b>A REPRESENTATIVE OF A COMMUNITY-BASED ORGANIZATION</b>	<p>This <i>Action Plan</i> recommends a variety of actions that will require partnership and coordination with organizations like yours</p> <p>Implementation of this plan provides an opportunity for actions to realize a number of co-benefits including those that may benefit your organization</p> <p>Effective implementation of this plan will require ongoing conversations with the public</p>	<ul style="list-style-type: none"> <li>• Carefully review this plan and stay informed about and involved in the implementation process by coordinating with municipal and county staff</li> <li>• Work with municipal and county staff to identify partnership opportunities that further identified resilience actions</li> <li>• Help raise public awareness of flood and Additional Climate Hazards risks and the <i>Action Plan</i> through your networks</li> </ul>
<b>A MEMBER OF MUNICIPAL STAFF</b>	<p>This plan recommends actions that affect property, infrastructure and services owned and managed by municipalities in the region</p> <p>Municipal staff will lead implementation of some of the actions recommended in this plan</p> <p>Effective implementation of the plan will require active coordination and involvement of staff across municipal departments and functions</p>	<ul style="list-style-type: none"> <li>• Carefully review this plan and stay informed about and involved in the implementation process</li> <li>• Lead advocating for implementation of priority actions</li> <li>• Lead finding, developing, and overseeing funding opportunities from various sources</li> <li>• Share the <i>Action Plan</i> with colleagues</li> </ul>
<b>A MEMBER OF COUNTY STAFF</b>	<p>This plan recommends strategies actions that affect property, infrastructure and services owned and managed by Middlesex County</p> <p>County staff will lead implementation of some of the actions recommended in this plan</p> <p>Effective implementation of the plan will require active coordination and involvement of staff across County departments and functions</p>	<ul style="list-style-type: none"> <li>• Carefully review this plan and stay informed about and involved in the implementation process</li> <li>• Share the <i>Action Plan</i> with colleagues</li> </ul>
<b>A MEMBER OF STATE STAFF</b>	<p>This plan recommends strategies actions that affect property, infrastructure and services owned and managed by various NJ State Agencies</p> <p>State agency staff will lead implementation of some of the actions recommended in this plan</p> <p>Effective implementation of the plan will require active coordination and involvement of staff across State departments and functions</p>	<ul style="list-style-type: none"> <li>• Carefully review this plan and stay informed about and involved in the implementation process</li> </ul>