

3.0

**PREFERRED SCENARIO  
AND RECOMMENDATIONS**

# 3.1 OVERVIEW

## WHAT IS THE PREFERRED SCENARIO?

**Section 3.2** and **3.3** recommend actions to increase resilience and improve quality of life in NENJ. These actions together form the “Preferred Scenario.” The Preferred Scenario came from technical evaluations and work with community members and others. See **Section 2.6** and later within this **Section 3.1** for more on development of the Preferred Scenario. The recommended actions fit the unique risk context, physical conditions, and community vision. Risk in the region is significant and widespread. As such, the recommendations address risk while prioritizing the most vulnerable people.

## WHAT DOES THE PREFERRED SCENARIO INCLUDE?

Resilient NENJ recommends actions across five categories. **Section 3.2** *Actions That Will Change Our Built And Natural Environment* includes physical and nature-based capital projects that involve construction. It also includes policy and governance actions that will create physical change, such as land use regulations. **Section 3.3** *Actions That Will Change The Way We Work Together* includes non-physical actions like other types of policy and governance; outreach, engagement, and capacity building; service and program development; and emergency response and preparedness. Some of the actions in **Section 3.3** may also involve capital projects.

**Section 3.2** and **3.3** provide “cut-sheets” on each recommended action. Each cut-sheet provides information about issues the actions will address, key considerations for implementation, evaluation criteria, expected outcomes or changes, roles by stakeholder (for non-capital actions – those that do not require construction – only), along with example community feedback that contributed to the recommendations. **Section 4.0** *Implementation Pathways* explains key questions and considerations that guide the development of an implementation and funding strategy. **Section 5.0** *The Roadmap* ties the actions together into a plan for implementation by providing sequencing and describing how the actions relate to each other.

**Appendix A** summarizes all of this information in a table.

### ENVIRONMENTAL



### ECONOMIC



### SOCIAL



### PHYSICAL



### GOVERNANCE



## THE STRATEGY



**EASE** the technical, financial, resource, and health burdens associated with climate hazards, and “take the edge off” the highest risks while improving quality of life.

**Lean into the PROTECT strategy for flood hazard due to the density of the region and the nature of the risk. This means keeping water out or removing it, rather than an approach like retreat, allowing communities to stay intact.**

**Focus on CONNECTivity – this includes walkability and access to the waterfront and green space, as well as improving collaboration, consistency, and access to information and resources.**

**By advancing these strategies, we will position ourselves to build trust and momentum, adapt, and build capacity to THRIVE in the coming century, in alignment with the identified community vision.**

**Thriving requires that we continue to adapt, to work away at the risk, and REGENERATE our communities, as well as advance the living plan as more information becomes available.**

### Examples of actions that will advance these strategies through changes to the built and natural environment



**Raising or developing elevated waterfront walkways** protects critical amenities and keeps water out of upland areas while improving waterfront access and mobility across the region, which are key components of the regional vision (see action **Coastal-03**).



**Integrating resilience into contaminated site transformation** can ease flooding through distributed stormwater management while minimizing exposure to toxic substances and regenerating areas with vacant and underutilized sites (see action **All Hazards-02**).



**Maximizing green infrastructure and green space** can have incremental benefits for flooding, heat, and air quality when implemented in a distributed manner and can connect people to nature (see action **All Hazards-01**).

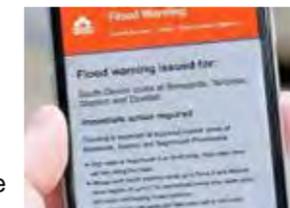
### Examples of actions that will advance these strategies through changes to the way that we work together



**A Regional Infrastructure Coordination Council** can ease coordination and connect infrastructure leaders to foster improved collaboration and greater consistency and efficiency in resilience projects (see action **Policy-02**).



**Resilience hubs** can ease flood hazards with green infrastructure, protect people from heat or flooding, and connect people to information and resources. As multi-purpose gathering spaces, they could be integral to thriving communities (see action **Service-01**).



**An outreach ambassador program that involves improving warning systems for high-risk residents** can ease access to information, connect people to their neighbors, and protect them during disasters (see actions **Outreach-05** and **EM-01**).

# HOW DO WE ENSURE THE ACTION PLAN ALIGNS WITH COMMUNITY VISION?

The community vision (see **Section 2.3** and the **Vision and Priorities Report**) includes goals that the Action Plan must align with and support. Resilient NENJ used evaluation criteria to compare the three scenarios (see **Section 2.6**) and create a preferred scenario that combines actions from each of the three. The team refined NJDEP’s initial evaluation criteria based on community feedback and best practices. The criteria answer questions such as: Will the benefits and impacts of this action or scenario occur equitably across the community? How effective is this action or scenario at reducing risk? **Appendix A** includes an evaluation of the Preferred Scenario and **Appendix D** evaluates the three preliminary scenarios, including both NJDEP’s initial evaluation criteria and Resilient NENJ’s refined criteria. Resilient NENJ also used the evaluation criteria with individual actions to ensure that they meet the vision and goals. **Section 3.2** and **3.3** show how each action scores using the evaluation criteria. Additionally, Resilient NENJ confirmed assumptions and recommendations at every decision milestone through engagement. Please see **Appendix I** for the engagement process and approach.



**EVALUATION CRITERIA CATEGORIES**  
Equity is integrated into each of these categories.

-  **Design Life and Adaptability**
-  **Cost and Feasibility**
-  **Risk Reduction and Effectiveness**
-  **Environmental Benefits and Impacts**
-  **Community and Health Benefits and Impacts**
-  **Partnership, Community Involvement, and Education**

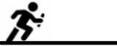
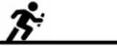
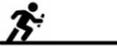
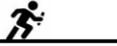
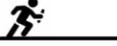
	<b>THRESHOLD CRITERIA</b> What a scenario <u>must</u> do	<b>ALTERNATIVES EVALUATION CRITERIA</b> How scenarios weigh against each other
<b>EQUITY</b>	<ul style="list-style-type: none"> <li>The project / scenario should have high probability of long-term effectiveness and be able to adapt to future conditions*</li> </ul>	<ul style="list-style-type: none"> <li>Phase-ability and time to implementation*</li> <li>Adaptability / flexibility*</li> <li>Design life / useful life</li> <li>Performance horizon</li> <li>Replicability</li> </ul>
	<ul style="list-style-type: none"> <li>Benefits outweigh costs</li> <li>Legal / permitting requirements considered and engagement has occurred</li> <li>Stakeholder support*</li> </ul>	<ul style="list-style-type: none"> <li>Cost: benefit / cost ratio*, overall cost*, maintenance cost*, equitable distribution of cost impacts, distribution of cost burdens to residents (limit impacts to taxes and service fees)*</li> <li>Existing implementation and maintenance capacity*</li> <li>Stakeholder preference*</li> <li>Funding strategy</li> <li>Constructability / how easy it is to complete</li> <li>Maintenance requirements</li> <li>Permitting and regulatory considerations</li> </ul>
	<ul style="list-style-type: none"> <li>Must reduce risk of current and future flooding*</li> <li>Must not increase flooding / risk in other parts of the community*</li> </ul>	<ul style="list-style-type: none"> <li>Risk reduction (avoided damage and loss) to: critical assets (including transportation systems and power continuity for facilities)*, community-based assets*, residential property*, human life*, socially vulnerable / low-income communities*, business and economic assets</li> <li>Project benefits primarily meet the existing needs of vulnerable groups* (benefits those harmed the most, maximize number of residents that benefit)</li> <li>Effectiveness: level of protection, reduction in flood extent, ease of implementation during an emergency</li> </ul>
	<ul style="list-style-type: none"> <li>Must not create a net reduction in environmental benefits</li> </ul>	<ul style="list-style-type: none"> <li>During and post-construction impacts / enhancements to*:                             <ul style="list-style-type: none"> <li>Open space / green space / natural feeling / tree canopy</li> <li>Habitat / ecology</li> <li>Water quality (e.g. by addressing combined sewer overflows)</li> <li>Air quality and urban heat island effect</li> </ul> </li> <li>Use of green infrastructure*</li> <li>Accomplishing remediation of soils, sediments, etc.</li> </ul>
	<ul style="list-style-type: none"> <li>Must account for existing resilience-building efforts in the community</li> <li>Must mitigate any anticipated health and social impacts</li> <li>Must help meet current needs of vulnerable groups</li> </ul>	<ul style="list-style-type: none"> <li>Impacts and benefits to communities during and after construction, including:                             <ul style="list-style-type: none"> <li>Livability and quality of life: community services, safety (of children, in particular)*, health*, happiness, recreational and cultural / historical spaces, aesthetics (preserve views of Manhattan), public access to the waterfront*</li> <li>Community and social fabric: keeping communities intact / potential for displacement*</li> <li>Economic: ratables, economic benefit and economic diversity / job creation / investment*, flood insurance rates, affordable housing</li> <li>Connectivity and mobility*</li> <li>Transportation systems / traffic / commutes*</li> <li>Individual resilience</li> <li>Parking</li> <li>Future construction</li> <li>Density / development trends</li> </ul> </li> <li>Equitable distribution of these impacts and benefits*</li> </ul>
	<ul style="list-style-type: none"> <li>Must be clearly aligned with the vision</li> <li>Local champion must be identified*</li> <li>Must clearly and directly respond to stakeholder input / community-driven plan</li> </ul>	<ul style="list-style-type: none"> <li>Community partnership*</li> <li>Youth engagement &amp; education*</li> <li>Adaptive capacity building and community value creation</li> <li>A champion and representative partner are identified for each neighborhood involved</li> </ul>

\* Priority criterion flagged by community members

# REFERENCE KEY FOR CONSIDERATIONS

Section 3.2 and 3.3 provide information about considerations for implementation for each action. This key summarizes the approach used for these considerations. **Since many of the actions include various components, these considerations are general. Actual conditions will vary depending on the specific project or program. Section 5.0 and Appendix A provide more information about individual projects, especially for capital projects.**

CONSIDERATION	POSSIBLE VALUES/RANGES				
<b>SCALE/LOCATION</b>	 REGION	 STATE	 CITY		
<b>ACTIONS TYPE</b>	 Physical and Nature Based Solutions	 Outreach, Education, and Capacity Building	 Policy and Governance	 Service and Program Development	 Emergency Response and Preparedness
<b>TIME REQUIRED TO IMPLEMENT</b> <small>A gradient implies range. More detail on timing is included in Section 5.0.</small>	 < 2 YEARS	 2-4 YEARS	 5-7 YEARS	 8-10 YEARS	 10+ YEARS
<b>PRIORITY FOR IMPLEMENTATION</b> <small>All the recommended actions are important to implement. These rankings help prioritize those that make sense to implement first due to time and resource limitations.</small>	1 FIRST PRIORITY	2 SECOND PRIORITY	3 THIRD PRIORITY		
<b>COSTS</b> <small>For capital projects involving construction, these are capital costs, excluding operations and maintenance costs. A gradient implies range.</small>	 < \$2M	 \$2-10M	 \$10-50M	 \$50-100M	 > \$100M

CONSIDERATION	POSSIBLE VALUES/RANGES		
<b>MAINTENANCE</b> <small>(used for capital actions, only)</small>	 LOW EFFORT Action can likely be operated/maintained within existing maintenance budget and governance strategy	 MODERATE EFFORT Action likely requires new budget or reallocation, but will not require significant adjustment or new funding streams	 HIGH EFFORT Action likely requires new management structure, department, or funding stream for maintenance
<b>OPERATIONS</b> <small>(used for non-capital actions, only)</small>	 LOW EFFORT Action involves few regulatory agencies and can be completed within existing regulatory framework.	 MODERATE EFFORT Action can be completed within existing framework but involves coordination across multiple agencies and priorities	 HIGH EFFORT Action does not fit into traditional regulatory framework and could require legal determination or an alternative approval pathway
<b>PERMITTING</b> <small>(used for capital projects, only)</small>	 LOW EFFORT Action involves few entities and can be completed within existing governance framework	 MODERATE EFFORT Action can be completed within existing framework but involves coordination across multiple agencies and priorities	 HIGH EFFORT Action does not fit into traditional governance framework and could require new pathways
<b>COORDINATION</b> <small>(used for non-capital actions, only)</small>	 LOW EFFORT All construction techniques are anticipated to be common industry standard practice. All solutions are "off the shelf"	 MODERATE EFFORT The majority of construction techniques are anticipated to be common industry standard practice	 HIGH EFFORT Implementation would require unconventional or innovative construction techniques and / or management
<b>CONSTRUCTABILITY</b> <small>(used for capital actions, only)</small>	 LOW EFFORT All techniques common industry standard practice. All solutions are "off the shelf." <i>Limited further engagement needed to advance to implementation</i>	 MODERATE EFFORT The majority of management techniques should be common industry standard practice. <i>Moderate further engagement needed to advance to implementation</i>	 HIGH EFFORT The action would require unconventional or innovative techniques and / or management (e.g., requires new kinds of coordination) <i>Significant further engagement and planning needed to advance to implementation</i>
<b>IMPLEMENTABILITY</b> <small>(used for non-capital actions, only)</small>			

3.2

ACTIONS THAT WILL CHANGE  
OUR BUILT AND NATURAL  
ENVIRONMENT

## 3.2 ACTIONS THAT WILL CHANGE OUR BUILT AND NATURAL ENVIRONMENT

The existing built and natural environments need changes to reduce risk from coastal flooding, stormwater flooding, and other climate related hazards, as well as to address existing social and environmental justice issues that compound this risk. Changes to the built and natural environment will not eliminate risk, only reduce it, and must be partnered with actions that change the way we work together (**Section 3.3**) to maximize their benefit.

Resilient NENJ developed “cut-sheets” on each recommended action that readers can extract and share as needed. Cut-sheets are organized by the type of issue they address (coastal flooding, stormwater flooding, other climate-related and environmental justice needs) and are structured a bit differently depending on whether the action requires some sort of construction (a capital project) or will change the built environment through policy and governance changes. Each “cut-sheet” includes:

### INFORMATION INCLUDED IN CAPITAL PROJECT CUT-SHEETS:

- Action type and description
- What the action could look like
- Proposed locations for the action
- Performance against evaluation criteria
- Key players (**Section 5.0** includes what they need to do)
- Key considerations for implementation\*

### INFORMATION INCLUDED IN POLICY AND GOVERNANCE CUT-SHEETS:

- Action type and description
- Issues the action could help address
- Expected outcomes
- Scale of action and benefit
- Performance against evaluation criteria
- Key players and the actions they need to take to implement the action, generally organized with the lead entity or entities first
- Key considerations for implementation\*

\*Key considerations for implementation include timeline, costs, and level of effort expected for operations, coordination, and implementability.

In the interest of space, this report uses abbreviations to title the actions, as follows:

<b>Coastal</b>	Actions that address coastal and tidal flooding ( <b>Section 3.2.1</b> )
<b>Stormwater</b>	Actions that address stormwater flooding ( <b>Section 3.2.2</b> )
<b>All Hazards</b>	Actions that address other climate-related and environmental justice needs ( <b>Section 3.2.3</b> )

#### Section 3.2.1: Actions that address coastal and tidal flooding

- Coastal-01:** Add physical flood barriers to ease flooding and protect communities
- Coastal-02:** Raise existing infrastructure to act as barriers and protect communities
- Coastal-03:** Integrate flood protection into parks, walkways & boardwalks
- Coastal-04:** Provide flood protection at the site and building scale
- Coastal-05:** Take action to restore the coastal environment
- Coastal-06:** Adopt additional land use policies to reduce flood risk
- Coastal-07:** Update flood damage prevention ordinances

#### Section 3.2.2: Actions that address stormwater flooding

- Stormwater-01:** Separate stormwater to safe, dedicated outfalls
- Stormwater-02:** Direct stormwater to deep storage and conveyance infrastructure
- Stormwater-03:** Improve natural drainage corridors
- Stormwater-04:** Reduce stormwater volume through stormwater management sites
- Stormwater-05:** Reduce impervious surface and improve conveyance through green infrastructure
- Stormwater-06:** Provide guidance to more quickly integrate stormwater management in open space
- Stormwater-07:** Update stormwater management ordinances

#### Section 3.2.3: Actions that address other climate-related and environmental justice needs

- All Hazards-01:** Provide green space and green infrastructure where it can have the most impact
- All Hazards-02:** Reduce risk from and incorporate resilience into contaminated sites
- All Hazards-03:** Incorporate resilience in new development, public space, and infrastructure



- LEGEND**
- Coastal Actions
- Road Raising
  - Flood Barrier
  - Bulkhead Barrier
  - Planned Land Raising
  - Areas for Adaptation
  - Green Street Corridor
  - Wetland/Living Shoreline
  - Greenways

# 3.2.1 ACTIONS THAT ADDRESS COASTAL FLOODING

# INTRODUCTION

This section details recommended actions to address coastal storm surge and tidal flooding. While impacts from coastal flooding are currently felt less frequently in NENJ than impacts from stormwater flooding and are therefore less erosive of communities, a single event can pack a powerful and devastating punch. Resilient NENJ, through the detailed **Flood Impact Assessment**, estimated that the modeled storm surge event could cause nearly five times more damage than the modeled stormwater flooding event in NENJ communities. Many ongoing or planned projects in the region, such as the Rebuild by Design-Hudson River project in Hoboken (see **Section 2.7**), are targeting coastal flood risk reduction in reaction to the devastation wrought by the storm surge during Hurricane Sandy. However, our communities are also at risk in the long term from regular tidal flooding in some areas.

**COASTAL STORM SURGE** occurs when tropical storms, hurricanes, and nor'easters temporarily raise water levels along the coast. To understand possible future flooding from extreme storm surge, NJDEP modeled a future extreme storm surge event by adding 2.4 feet of sea level rise onto Hurricane Sandy (year 2012) high-water marks. Hurricane Sandy caused extensive flooding to coastal areas in the region and across New Jersey in 2012. The Resilient NENJ team used the NJDEP models for the Flood Impact Assessment and estimates that \$17 billion of direct losses – including direct physical damage to buildings and contents, loss of function to certain public services, displacement and relocation, mental stress and anxiety, lost productivity, and direct economic impacts – could be expected in a present-day Sandy-like extreme storm surge event. The models predict \$30 billion in those same losses for a future extreme storm surge event in this region alone using the NJDEP model. That is almost double the expected impacts from a present-day Sandy-like event.

**TIDAL FLOODING** is the inundation of low-lying areas with high tides, which occurs independently from storm surge events. Sea level rise will cause tides to be higher than they are today, and, although the models for high tides with 2.4 feet of sea level rise indicate less extensive single impacts than extreme storm surge, these tidal events occur with a high frequency – up to twice daily – and will likely affect groundwater in porous subsurface areas.

Depending on the area and uses, infrastructure and buildings may become unusable by the time they experience monthly, yearly, or even less frequent flooding, depending on water depths and how disruptive and damaging the flooding is. With 2.4 feet of sea level rise, NJDEP models predict that daily high tides will inundate 480 acres of land where 55 buildings currently reside. These buildings have \$2.0 billion in building and contents replacement value and house 420 people. The models predict that future high tides will flood places along the Hudson, Hackensack, and Passaic Rivers, as well as along Newark Bay and Upper New York Bay.

## 2.4 feet of sea level rise? When might that happen?

The rate and height of sea level rise are uncertain, but scientists have a general idea of what to expect. Rutgers' New Jersey Climate Change Resource Center projected in 2020 that if emissions continue at business as usual rates (the "High" scenario below), then there is a 50-percent chance that sea levels will rise by 2.4 feet over the average sea level observed from 1991 to 2009 by 2070.

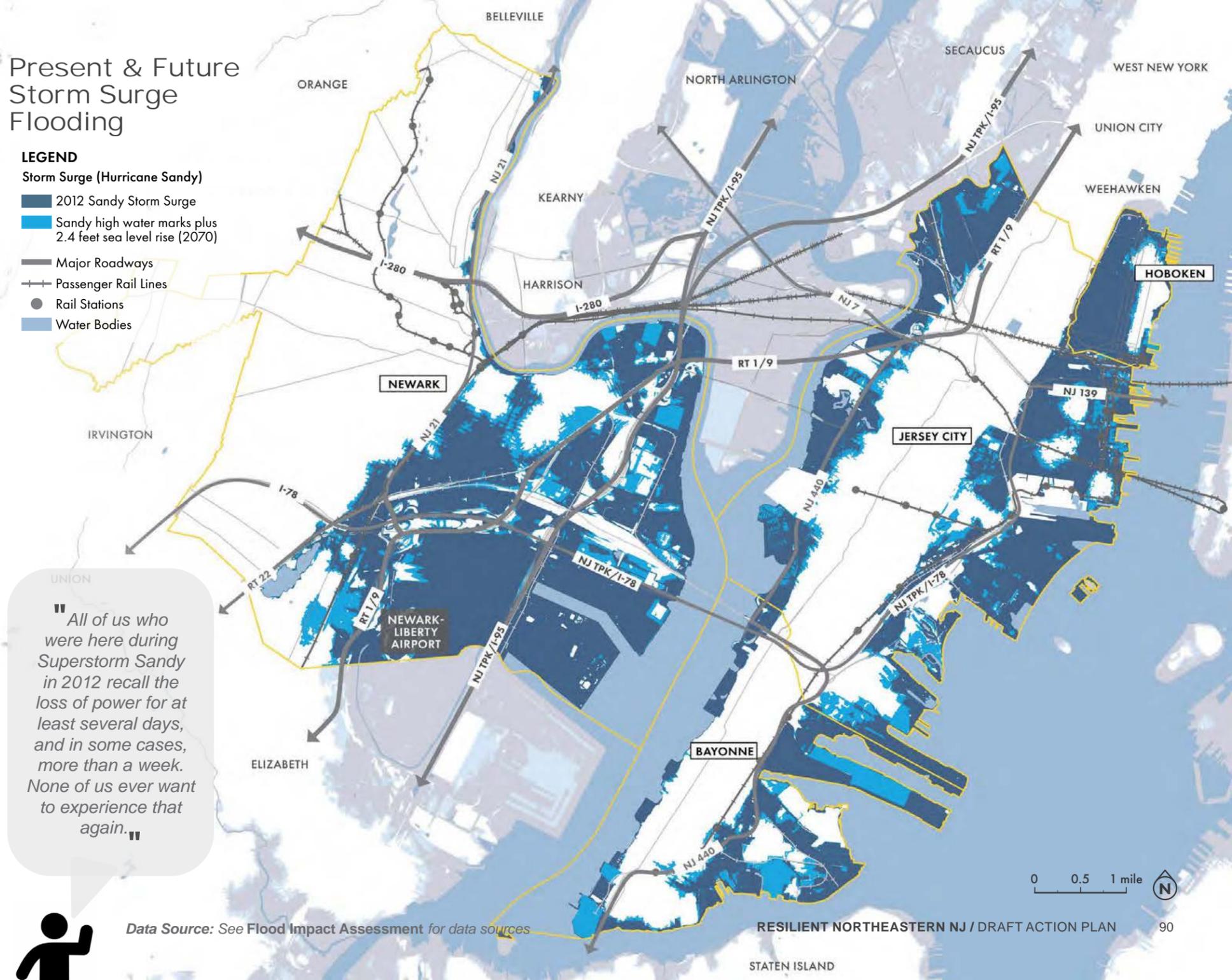
New Jersey sea level rise above the year 2000 (1991-2009 average) baseline (ft)\*

	Chance SLR Exceeds	Emissions											
		2030		2050		2070			2100			2150	
		Low	Mod.	High	Low	Mod.	High	Low	Mod.	High	Low	Mod.	High
Low End	> 95% chance	0.3	0.7	0.9	1	1.1	1.0	1.3	1.5	1.3	2.1	2.9	
Likely Range	> 83% chance	0.5	0.9	1.3	1.4	1.5	1.7	2.0	2.3	2.4	3.1	3.8	
	~50% chance	0.8	1.4	1.9	2.2	2.4	2.8	3.3	3.9	4.2	5.2	6.2	
High End	<17% chance	1.1	2.1	2.7	3.1	3.5	3.9	5.1	6.3	6.3	8.3	10.3	
	< 5% chance	1.3	2.6	3.2	3.8	4.4	5.0	6.9	8.8	8.0	13.8	19.6	

\*2010 (2001-2019 average) Observed = 0.2 ft  
Source: Rutgers' NJ Climate Change Resource Center (2020)

## Present & Future Storm Surge Flooding

**LEGEND**  
**Storm Surge (Hurricane Sandy)**  
 2012 Sandy Storm Surge  
 Sandy high water marks plus 2.4 feet sea level rise (2070)  
 Major Roadways  
 Passenger Rail Lines  
 Rail Stations  
 Water Bodies



"All of us who were here during Superstorm Sandy in 2012 recall the loss of power for at least several days, and in some cases, more than a week. None of us ever want to experience that again."

Data Source: See Flood Impact Assessment for data sources

# WHY DOES COASTAL FLOODING HAPPEN? THE CHALLENGE.

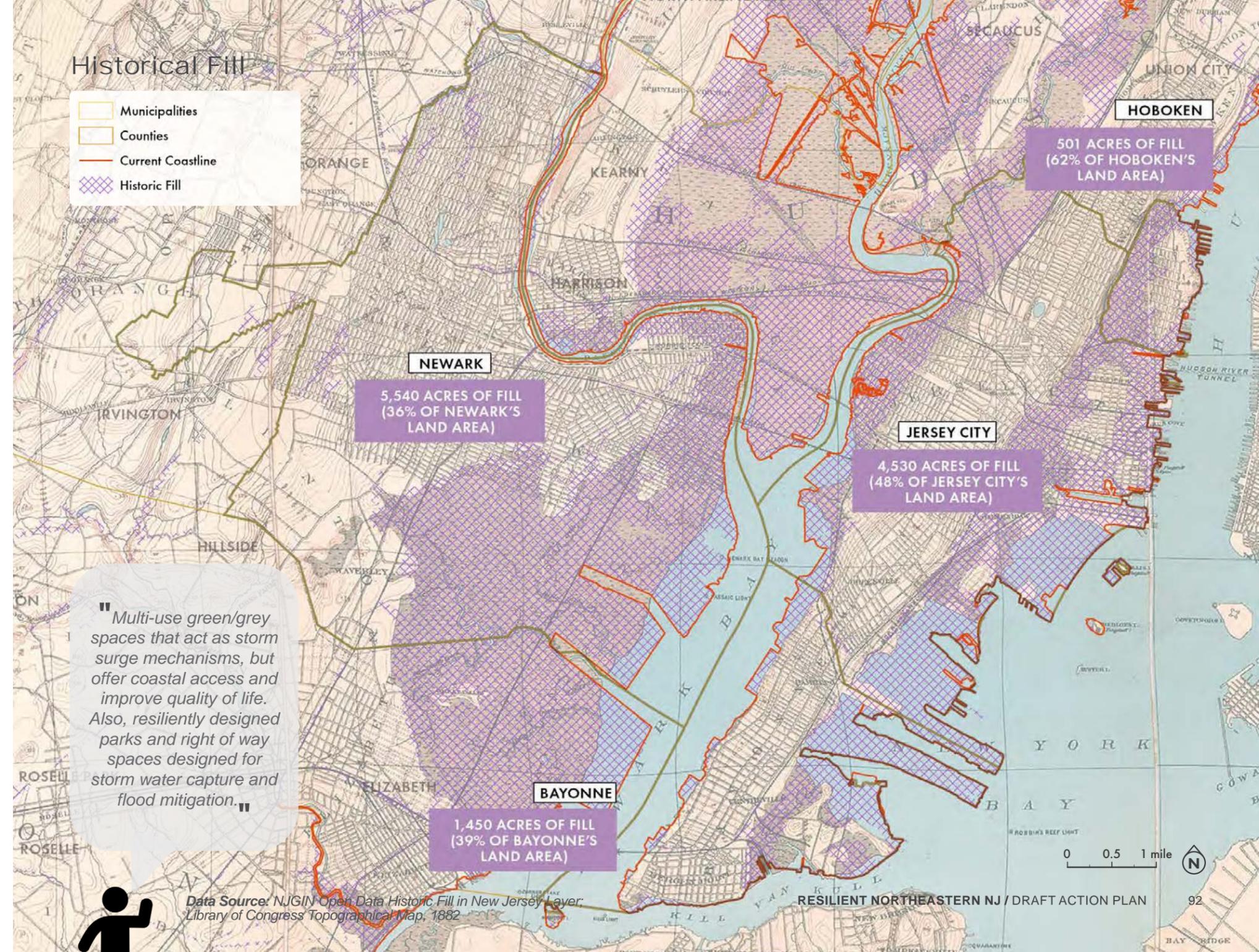
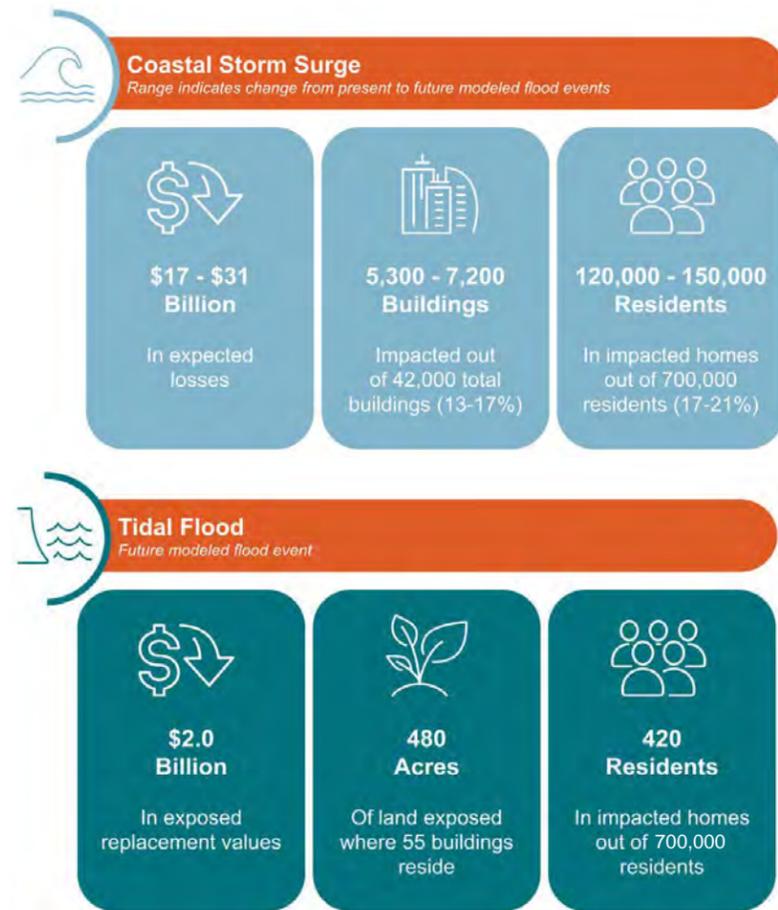
Coastal flooding, whether from storm surge or tidal flows, greatly affects the NENJ region, inundating coastal and low-lying interior areas. Most of these inundated areas are built on fill that has been added over the centuries to increase buildable land area by “reclaiming” wetlands and open water. Settlers often filled only to a few feet above sea level, so these areas are the first to flood during a coastal surge event. More recently, upkeep of shoreline edges has not been sufficient, leading to a patchwork of differing elevations, inconsistent protection elements, and crumbling infrastructure such as bulkheads and seawalls.

The last major storm surge event that affected NENJ was Hurricane Sandy in 2012. Some key areas saw extreme impacts from flooding, with loss of property, unsafe and unhealthy conditions, and in extreme cases, loss of life. With a changing climate and rising seas, Sandy-like events are expected to grow in both frequency and intensity.

Based on the Resilient NENJ **Flood Impact Assessment**, with no action, a future Sandy-like event could impact a sizable portion of Newark, including Newark Liberty International Airport, Port Newark, the Doremus Avenue area, and the Ironbound neighborhood (although the Ironbound is more inland, its lower elevation makes it vulnerable to inundation). Significant portions of Hoboken are also susceptible to storm surge, particularly its low-lying western areas, but Hoboken’s Rebuild by Design-Hudson River project will significantly reduce that risk moving forward (see **Section 2.7**). Central areas of Jersey City and Bayonne are more elevated, especially the Jersey City Heights area that sits on the Palisades outcrop (a geologic formation), so coastal storm surge is expected to be limited to waterfront areas in these cities. The areas at high risk from storm surge flooding include neighborhoods that house some of the most vulnerable populations in the nation according to the Centers for Disease Control Social Vulnerability Index (SVI). These areas include the Ironbound in Newark, Communipaw in Jersey City, western Bayonne, as well as public housing residents in southwest Hoboken. In Jersey City, at least eight public housing complexes are predicted to incur losses due to potential storm surge.

While storm surge is the more impactful form of coastal inundation, an increase in every-day tide levels will become more of an issue in the future. With sea level rise of about 2.4 feet, many low-lying areas along the coasts of NENJ could potentially see daily flooding from tides alone. These areas include eastern stretches of Newark’s coast, along the industrial Doremus Ave; some areas in southern and western Bayonne; and some isolated areas along both the east and west shorelines of Jersey City.

Coastal flooding from storm surge and high tides will impact homes, businesses, roadways, and lives. Vulnerable populations face additional challenges from coastal flooding, given that high water can restrict mobility and block evacuation routes for populations that do not have access to alternative means of transit. The combination of vulnerable populations and possibility of flooded transportation pathways creates a necessity to act on the coastal risks in the region.



# WHAT ARE WAYS WE CAN ADDRESS COASTAL FLOODING? THE TOOLBOX.

Resilient NENJ developed a toolbox to identify possible actions to reduce coastal inundation risk throughout the region. Several examples are shown on the opposite page, and the full Flood Resilience Toolbox is in the **Vision and Priorities Report**. Through our analysis and review of the NJDEP models of both present and future flood conditions as well as extensive stakeholder and resident engagement, the team selected several methods for addressing coastal flooding that are tailored to the conditions and needs of an area. These actions will block or address known flood pathways, protect residents and key assets, and lead to quicker recovery times from surge events.

Most of these tools are similar in their purpose to keep floodwaters out, but differ in their impact, execution, and design. In such a built-up and dense region, the tools implemented to protect from coastal flooding must be integrative and adaptable. Therefore, the tools selected range from fully freestanding barriers (gates, berms and bulkheads), to protections integrated with existing features (raised walkways and roads), to protections adapted to individual sites (perimeter flood barriers, site raising, and building adaptations), to coastal wetland restoration.

Recommendations also include policy and governance improvements to both make it easier to implement coastal flooding measures, as well as incentivize or require their construction, where appropriate, to protect properties and assets left outside of proposed lines of protection.

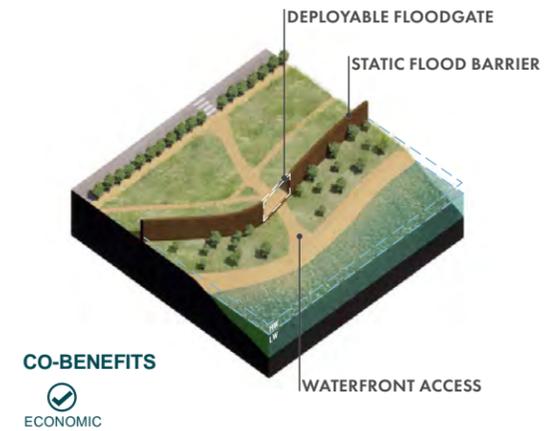
**TOOLBOX EXAMPLES >**

The Flood Resilience Toolbox (located in the Vision and Priorities Report) shares different tools that can help address coastal flood risk. These are some excerpts. The toolbox includes an image example, description, possible benefits, and key considerations (not shown here).

"The other key component that I would investigate is the use of environmental remediation to provide more natural barriers to storms (rain gardens across heavily paved areas) but also restoration of marsh lands to dampen storm surges."

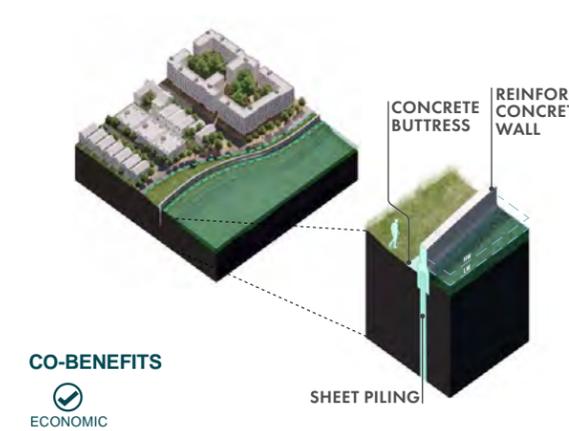
## DEPLOYABLE FLOODGATES

Deployable floodgates are mobile elements, integrated into static flood barriers, that are closed during flood events to fill gaps in protective barriers and prevent floodwater intrusion.



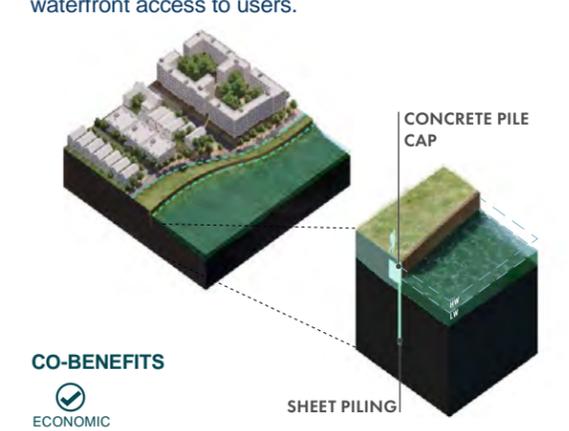
## FLOOD BARRIERS

Flood barriers are concrete structures designed to keep water out by physically blocking storm surges and floodwaters. Various types of flood barriers may be applicable to different areas and regions.



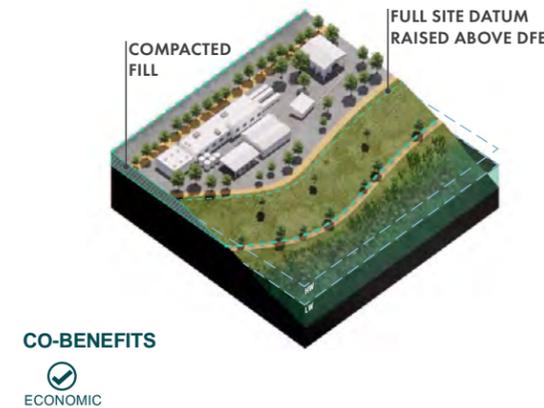
## BULKHEADS

Bulkheads are structures along bodies of water that protect from flooding, wave action, and erosion. For these purposes they are typically concrete, but can be other materials such as timber or plastic. They can be integrated into recreational greenways and provide waterfront access to users.



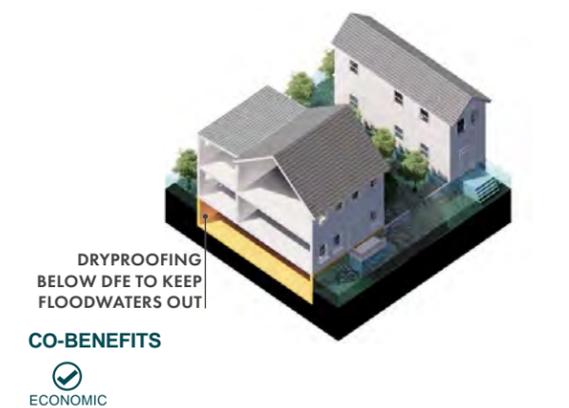
## RAISE LAND

By physically raising land above flood levels a whole site can be protected from regular flooding. Raising land protects the full footprint of important sites like utilities and other public assets. This tool does displace risk to surrounding areas and is susceptible to subsidence. This should be applied only when there is enough space and risks to surrounding areas are considered.



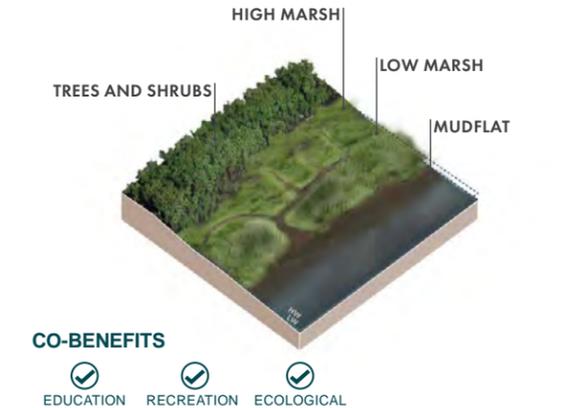
## DRYPROOF LEVELS BELOW FLOOD LEVEL

Dryproofing below flood levels involves fully blocking out floodwaters with both permanent and deployable structures. This tool retains usability of floors below grade for permanent and temporary uses. Allows for assets and utilities to remain below DFE with a lessened chance of flooding.



## COASTAL WETLAND RESTORATION & EXPANSION

Low-lying tidal wetland ecosystems are among the most vulnerable environments to sea level rise. The resilience of tidal wetlands to sea level rise depends on the potential for horizontal migration to upland areas and the vertical accretion rate of the wetland, which can be supported through restoration and expansion.



# WHAT IS ALREADY BEING DONE? SCENARIO 0.

As a result of the devastation seen following Hurricane Sandy in 2012, the region initiated many projects and processes to deal with the extreme exposure the event revealed. Many utilities and private businesses conducted studies and projects to protect and harden their own assets. For example, Passaic Valley Sewerage Commission (PVSC) constructed a flood barrier to surround their wastewater treatment plant in Newark, the Port Authority of New York and New Jersey (PANYNJ) began developing plans for the airport and port district, and NJ TRANSIT developed plans for a microgrid system to increase their rail system resilience.

City, state and federal entities also jumped into action, leading studies and projects, many of which are still ongoing, to investigate options for coastal resilience. Two of these projects, initiated by federal agencies, are in progress and are expected to protect two of the most vulnerable areas of our region. These are the Rebuild by Design Hudson River Project (RBD Hudson), expected to protect much of Hoboken's vulnerable area, and the USACE Newark Flanking Plan, which will cut off main flood pathways into Newark's Ironbound neighborhood. Each of the four cities has completed vulnerability studies and developed resiliency plans. Many of these have already led to resilience projects such as Newark Riverfront Park's series of raised berms and bulkhead reinforcement, while some have put out proposals that were integrated into this Action Plan such as Jersey City's walkway and roadway raising proposed under the Jersey City Adaptation Master Plan. The municipalities also took action through redevelopment plans, such as those underway in Bayonne. These projects have been woven into this Action Plan.

"During Hurricane Sandy, homes lost power but stores stayed online with back-up generators and supported residents."

"Hurricanes Irene and Sandy devastated my home and the whole neighborhood. I have flood insurance and it barely covered anything. It cost me tens of thousands of dollars to rebuild."



## WHAT ARE OTHER KEY CONSIDERATIONS? DECISION DRIVERS.

### Most parts of the region are not appropriate for the “living with water” model for managing coastal flood risk, or for moving away from the water.

In lesser populated areas, where zoning and buy-outs could have a major impact on future risk, it might be appropriate to proactively limit development and relocate existing neighborhoods to safer locations and let the water come. Northeastern NJ, however, is densely populated with a history of environmental justice and equity concerns, and with little space available for relocation. This would require significant community upheaval and could lead to further inequities, at least in the near-term. Further, community members asked that the program protect communities and keep them intact and help to limit gentrification.

### But it may not be possible to keep the water out everywhere.

The region is rich with working ports and industry that require ship-to-shore connections for their operations. In such areas, protections to keep the water out could be extremely disruptive. There are also areas where such solutions would require unanimous agreement among private property owners, which may take considerable effort and time. In areas where keeping the water out may not be possible, the severity of impacts could be reduced through raising and reinforcement of bulkheads and site-specific flood protections. These alternate approaches can be back up plans in areas contingent on agreement from many different people, or the primary approach due to technical, economic, and other considerations.

### Keeping the water out will require significant intervention in some areas, which can also be disruptive to communities.

In several areas across the region, flood actions may need to be 9 to 11 feet tall or higher above the current ground to provide the level of protection that may be required to meet FEMA's base flood elevation plus sea level rise. These height needs, regardless of the tools used, can have a transformative effect on the built and natural environment at the same time that they help protect life, property, critical infrastructure, and livelihoods.

### But mitigating risk to major events must enhance and not detract from the urban fabric.

Community members identified many things they love about their communities in coastal areas (such as views and access to the waterfront, walkability), but also things they would like to change (such as increasing access to the waterfront and walkability). Coastal solutions, particularly those meant to keep the water out, can often be designed to include many amenities to help enhance the urban environment. Such improvements can include integration with new and existing walkways, green infrastructure, and art wherever possible.

### A layered approach can help ease severity of interventions, navigate our complicated and dense urban region, and reduce impacts to properties outside of coastal barrier solutions.

All of these factors together – the dense urban factor, complex industrial environment, severity of coastal flooding and flood depths, and need for improvements that enhance quality of life - converge toward a layered approach that uses both physical and policy mechanisms to reduce risk. This layered approach can also be referred to as a strategy of multiple lines of defense. Multiple lines of defense can mean two things: 1) building in redundancy of solutions to increase resilience in the case any particular measure fails (either during implementation or when it is needed during a storm), and 2) building in layers of protection that can vary in their impacts and work together to provide a single solution. Policy solutions are needed to reduce risk inland as properties change hands and are improved and developed, as well as mitigate creation of possible future risk. Layered physical solutions can help break waves and reduce flood heights and severity of interventions that may be required on land, and provide a more gradual and positive transformation to the urban environment when partnered with solutions that address other risks (see other actions in **Section 3.2**). Additionally, having multiple options in a given area can provide a path forward even in the case that the preferred option becomes unavailable.

## WHAT IS THE BASE FLOOD ELEVATION?

FEMA provides maps of areas that have a 1 in 100 chance of flooding each year based on historical data, called the special flood hazard area. The base flood elevation is the flood height that must be considered and used in new developments and major improvements to existing properties. FEMA's definition of the base flood correlates to the flood height that has a 1 in 100 chance of being met or exceeded in any given year. The design elevation is the base flood elevation plus a certain amount of freeboard, or additional height as a safety factor, and is the elevation at which buildings must be constructed or floodproofed. The design elevation is required to be a minimum of 1 foot above base flood elevation in New Jersey.

### HOBOKEN FLOODING

An ambulance sits stranded at a flooded intersection in Hoboken following Hurricane Sandy.

*Image Source: accarrino*

# WHAT SHOULD WE DO ABOUT IT? THE STRATEGY.

- EASE burden and intensity of interventions through multiple lines of defense
- PROTECT densely populated communities and infrastructure by keeping the water out
- CONNECT people to the water and each other through raised walkways and mobility points wherever feasible

## To do this, the Action Plan proposes to:

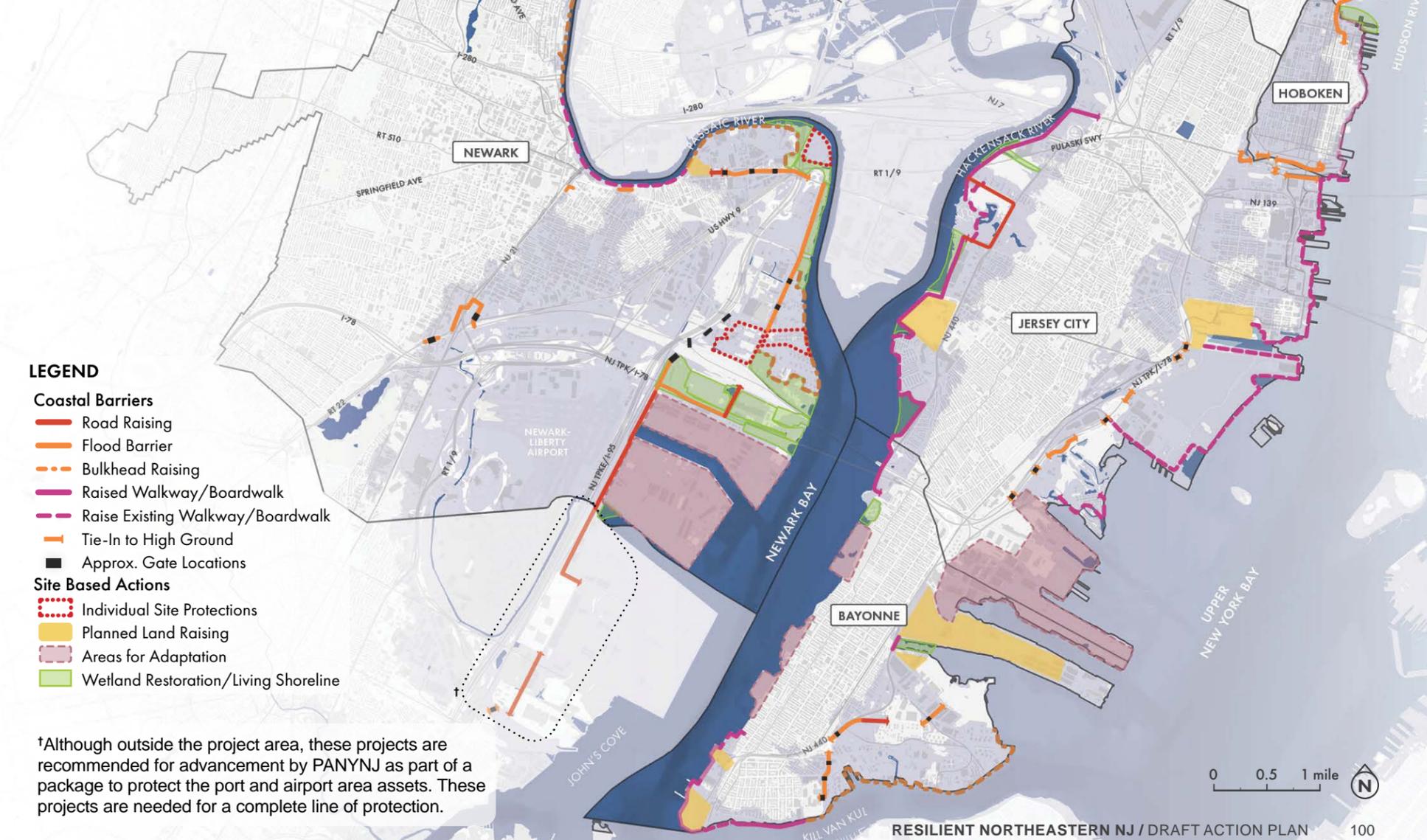
- 01 Add physical flood barriers to ease flooding and protect communities
- 02 Raise existing infrastructure to act as barriers and protect communities
- 03 Integrate flood protection into parks, walkways & boardwalks
- 04 Provide flood protection at the site and building scale
- 05 Take action to restore the coastal environment
- 06 Adopt additional land use policies to reduce flood risk
- 07 Update Flood Damage Prevention ordinances

### NY & NJ HARBOR AND TRIBUTARIES STUDY (HATS)

At the time of the writing of this report, the USACE is conducting the NY and NJ Harbor and Tributaries Focus Area Feasibility Study (HATS). This study will identify regional strategies to address coastal flooding, and the outcomes will affect Northeastern NJ and surrounding areas.<sup>1</sup> It will be important for Resilient NENJ and interested stakeholders to review and submit comments on this study when it is released in late September 2022. Resilient NENJ recommends that HATS integrate recommendations from this Action Plan, as well as community feedback that contributed to this plan.

<sup>1</sup> For more on this study: [NY & NJ Harbor & Tributaries Focus Area Feasibility Study \(HATS\) \(army.mil\)](#)

# RECOMMENDED CAPITAL PROJECTS TO ADDRESS COASTAL FLOODING



\*Although outside the project area, these projects are recommended for advancement by PANYNJ as part of a package to protect the port and airport area assets. These projects are needed for a complete line of protection.

# 01. ADD PHYSICAL FLOOD BARRIERS TO EASE FLOODING AND PROTECT COMMUNITIES

Physical

EASE  
PROTECT  
CONNECT

Physical flood barriers are generally single-purpose structures meant to keep floodwaters out of a protected area. These barriers can take several forms, including walls, gates, berms, and bulkheads, which have different spatial constraints and construction methods, and should be selected based on site-specific opportunities and needs.

Physical flood barriers are needed in many areas of our region to cut off known critical flow paths of coastal storm surge. Cutting off flow paths is a PROTECT strategy, best in areas of dense population and infrastructure. It is not realistic or desirable to relocate communities in NENJ in the near-term. The ability for these defenses to negotiate heavily urbanized, densely populated areas, which make up the vast majority of our region, makes them key components in our coastal protection system. Barriers are mostly proposed in areas where there may be usage or space constraints, and where flood depths and life safety concerns might preclude "living with water."

These physical barriers can be intrusive, block pedestrian access and reduce view corridors depending on their necessary design height, so use of these techniques is focused on areas where the barriers could be designed to reduce impact on communities and might also be partnered with opportunities to increase waterfront access. Depending on design, these structures can integrate walkways, plantings, and murals, but their main purpose is protecting the communities behind them.

## EVALUATION CRITERIA

These structures can be designed to integrate walkways, plantings, green infrastructure, and murals, but their main purpose is protecting the communities behind them. Barriers must be designed carefully to ensure they contribute to and do not disrupt a community and the environment, though there will be some level of disruption, particularly during construction.

## CONSIDERATIONS FOR IMPLEMENTATION

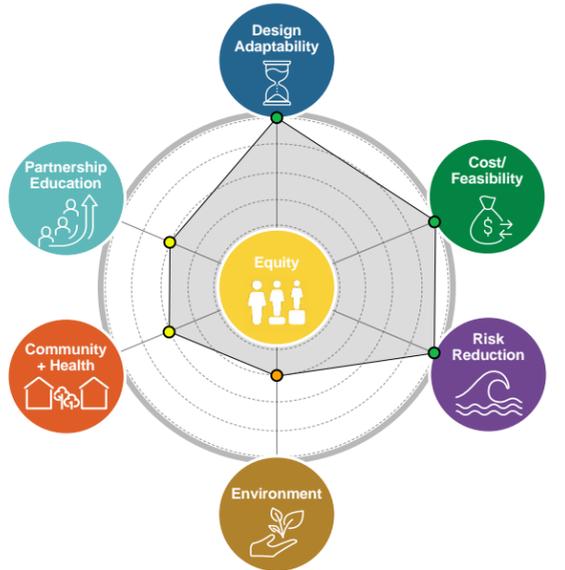
**PROJECT TIMELINE**  
Once the concept is complete and funding identified, expect at least 2 years for design and permitting and 2 to 3 years for construction, although engagement may need more time.

**CAPITAL COSTS**  
Expect significant range in costs depending on the length, environment, technical considerations, and design of any barrier project.

**MAINTENANCE**  
Barriers with deployable components (like gates to leave openings for entry and exit) will require new management structures for staff, storage of components, and regular exercises to ensure features perform during a flood event.

**PERMITTING**  
Barriers can be completed within the existing permitting framework, but require coordination across multiple agencies. Hoboken's Rebuild by Design project provides precedent for how agencies can work together on these systems.

**CONSTRUCTABILITY**  
While barriers are common flood mitigation solutions, their application in any given area will require significant design and feasibility work, as well as further engagement in neighborhoods affected by the recommendation. Funding needs can complicate larger projects.



## WHAT THIS COULD LOOK LIKE



Sunbury Flood Barrier  
Susquehanna River, PA



Flood Gates  
Metairie/New Orleans, LA



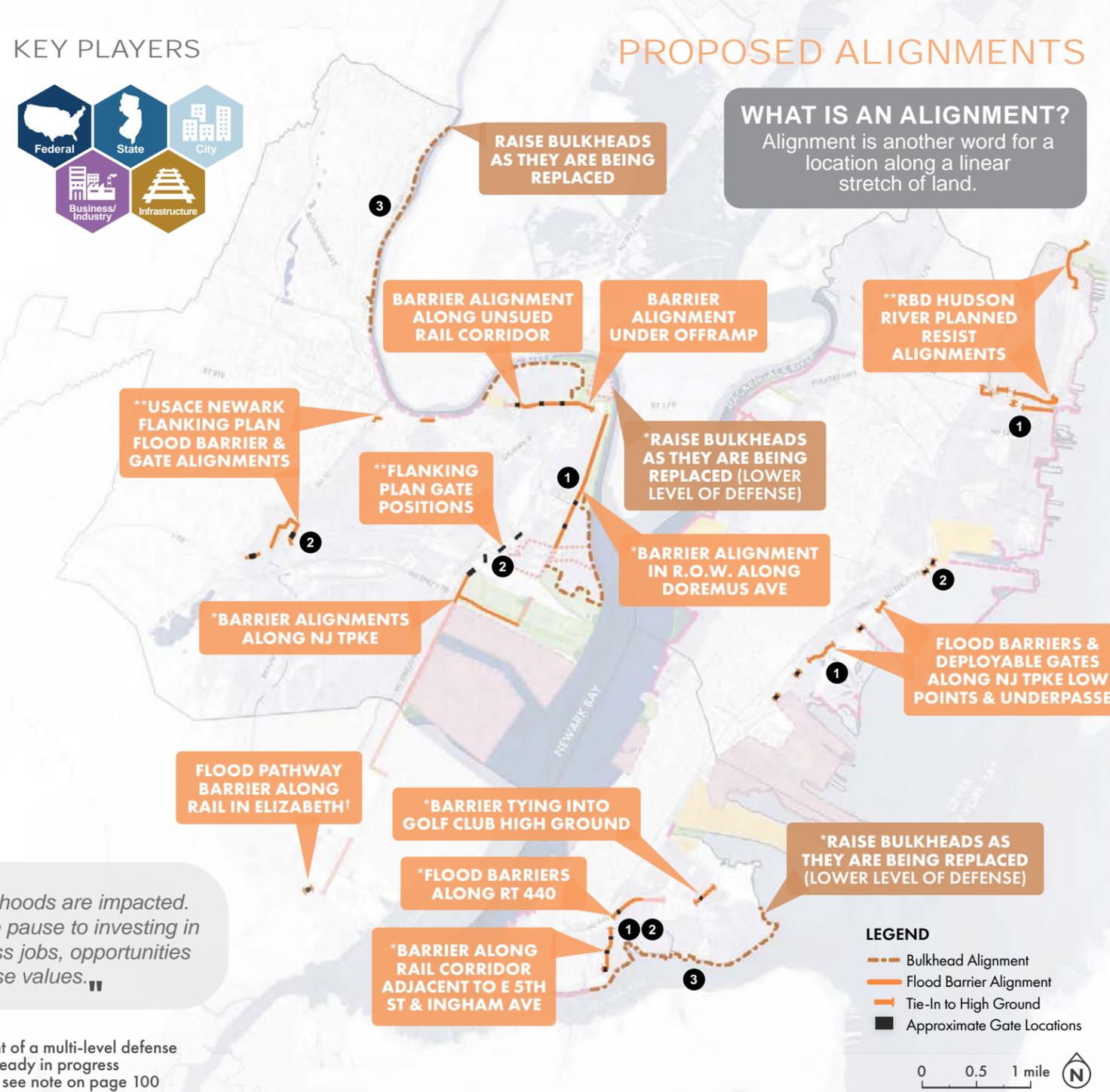
Bulkhead Replacement + Raising  
Monmouth County, NJ

## KEY PLAYERS



## PROPOSED ALIGNMENTS

**WHAT IS AN ALIGNMENT?**  
Alignment is another word for a location along a linear stretch of land.



"People's homes and livelihoods are impacted. The flood zones give people pause to investing in those areas, that means less jobs, opportunities and stagnant house values."

\*indicates a component of a multi-level defense  
\*\*indicates projects already in progress  
†outside of study area, see note on page 100

# 02. RAISE EXISTING INFRASTRUCTURE TO ACT AS BARRIERS AND PROTECT COMMUNITIES

Physical

EASE  
PROTECT  
CONNECT

Raising the elevation of existing infrastructure can be a solution where roads, rail, park land or other infrastructure is close to the coast or within an ideal alignment for flood protection. The action involves removing the existing infrastructure component, raising and strengthening the land below, and reconstructing the infrastructural element on top; both removing it from the floodplain and acting as a barrier to storm surge.

Raising roadways provides protection for inland areas while retaining access and minimizing the need for additional barrier construction. Raising existing infrastructure leads to less change to flow patterns and the urban fabric, and can also mitigate stormwater flooding. Though construction is intensive, these actions can integrate with streetscape and stormwater improvements making it a multi-purpose solution. Where appropriate, this could be partnered with other improvements to the area and infrastructure.

These projects would notably need to be coordinated with stakeholders such as the New Jersey Department of Transportation (NJDOT), the New Jersey Turnpike Authority (NJTA), the Port Authority of New York and New Jersey (PANYNJ), and local and county departments responsible for roadways.

## EVALUATION CRITERIA

Raising infrastructure has many of the same considerations as a barrier solution. Where raising infrastructure is inland, it will need to be reviewed for potential impacts on stormwater flooding in other areas, and any issues mitigated. There are fewer long-term environmental impacts expected compared to flood barriers as actions would affect existing above grade infrastructure.

## CONSIDERATIONS FOR IMPLEMENTATION

### PROJECT TIMELINE



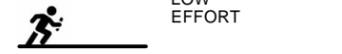
Once initial concept is complete and funding is identified, it is reasonable to expect at least 2 years for design and permitting and 2 years for construction for such projects.

### CAPITAL COSTS



While the design and length of the action will affect costs, these types of actions can be expected to cost tens of millions of dollars each.

### MAINTENANCE



Once the project is complete, it can usually be maintained as it was prior to the improvement.

### PERMITTING

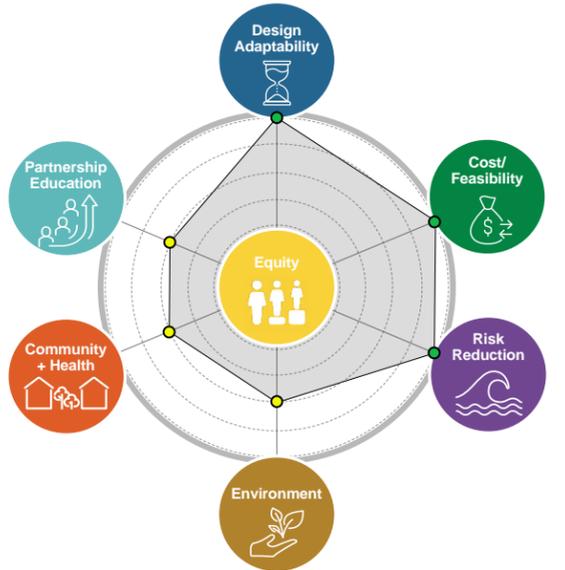


This work can be completed within the existing permitting framework, but requires coordination across multiple agencies and priorities.

### CONSTRUCTABILITY



Raising existing infrastructure is very disruptive during the construction period. Funding can be a significant barrier to projects moving forward.



## WHAT THIS COULD LOOK LIKE



Highway Raising  
Washougal, WA

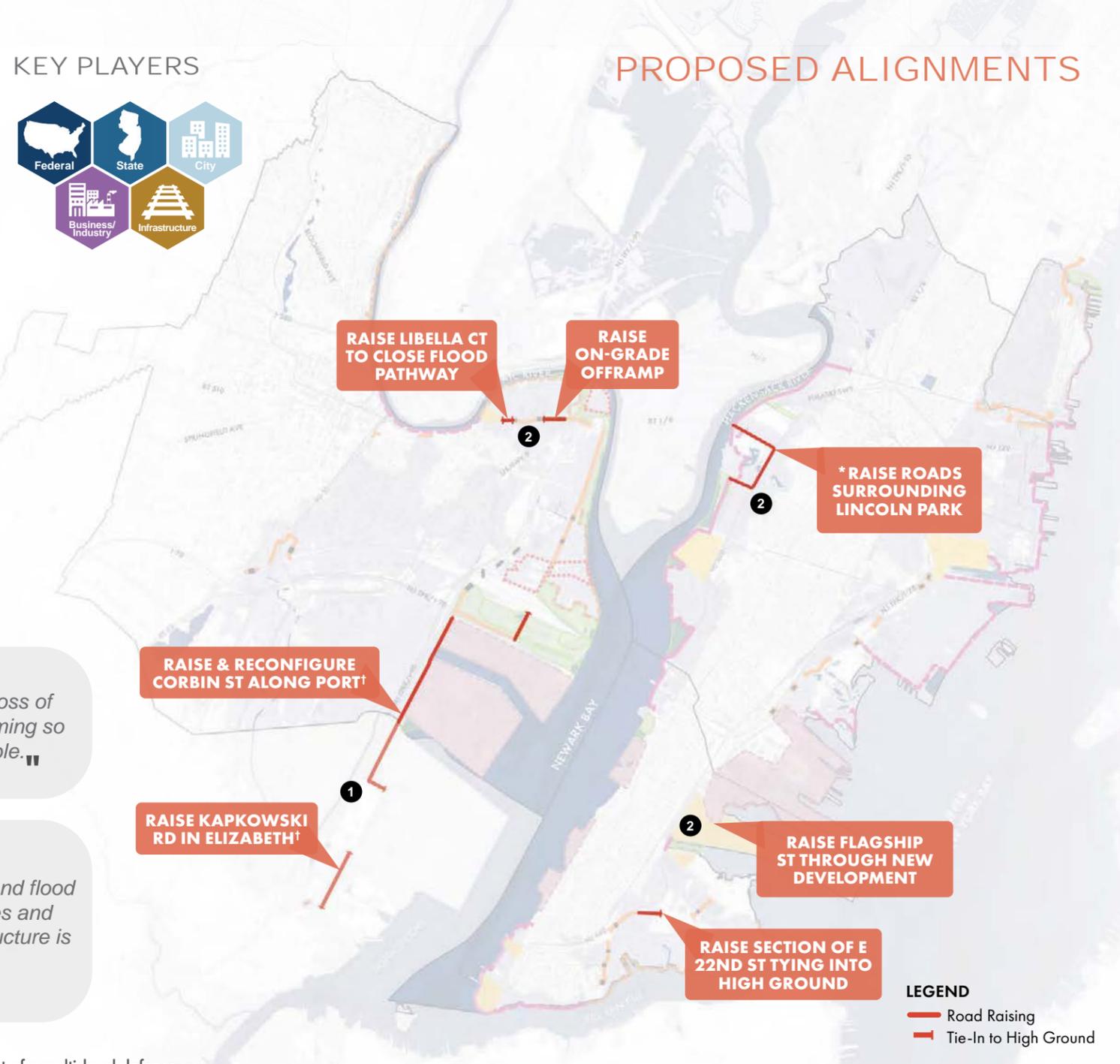


Inland Road Raising  
Miami, FL

## KEY PLAYERS



## PROPOSED ALIGNMENTS



"(I am worried about) the loss of my home or my home becoming so damaged in is uninhabitable."

"Incorporation of resilience and flood mitigation into public spaces and infrastructure so that infrastructure is multi-functional."

\*indicates a component of a multi-level defense  
†outside of study area, see note on page 100

# 03. INTEGRATE FLOOD PROTECTION INTO PARKS, WALKWAYS & BOARDWALKS

Physical

EASE  
PROTECT  
CONNECT

Flood protection along the waterfront can mitigate risk in densely populated urban areas. By combining these barriers with walkways, parks, and boardwalks, projects can provide protection while maintaining—and in some cases increasing—waterfront access and regional connectivity. In appropriate areas, physical barriers can be installed beneath walkway infrastructure as well as creatively integrated into landscape, seating, and other park features, resulting in a multi-purpose, resilient public amenity.

In other areas, waterfront parks and walkways may be raised together to elevate these amenities while also protecting areas further inland. The Hudson River Waterfront Walkway is a regional waterfront walkway that runs from Fort Lee, NJ to Bayonne. Most sections of the walkway are complete, but some portions are not yet constructed. A Hackensack Riverwalk also exists in portions of Bayonne and Jersey City along the west coasts, and Newark has a segment of waterfront walkway in Newark Riverfront Park. By raising existing stretches of walkway and waterfront parks, the impact on the built environment will be less noticeable, and the design, access, and benefits improved, while ensuring that these important amenities are not inundated in the future. New sections of raised walkway alignments provide opportunities to better connect and integrate the region's vast network of greenways, walkways, bike paths, and parks.

*Raising walkways and waterfront areas will require involvement and input from many sectors, including city and state agencies, and local residents and business owners will have large roles to play in shaping the project outcomes.*

## EVALUATION CRITERIA

This action is expected to increase pedestrian access and mobility, but is expected to have balanced impacts on the environment. For example, construction will have a temporary impact on the environment, but walkways may stabilize erosion, limit pedestrian foot traffic on sensitive eco-systems, and increase awareness and desire to conserve habitat by increasing it.

## CONSIDERATIONS FOR IMPLEMENTATION

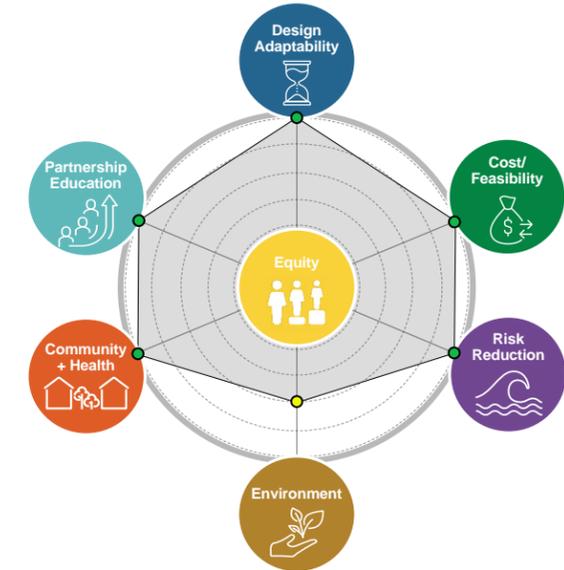
**PROJECT TIMELINE**  
Once initial concept is complete and funding is identified, it is reasonable to expect 1-2 years for design and permitting and 1-2 years for construction for such projects, depending on the scale of the project and construction phasing requirements.

**CAPITAL COSTS**  
While the design and scale of the action will affect costs, these types of actions can be implemented in smaller segments.

**MAINTENANCE**  
LOW EFFORT  
Once the project is complete, it can usually be maintained as it was prior to the improvement.

**PERMITTING**  
MODERATE EFFORT  
This work can be completed within the existing permitting framework, but requires coordination across multiple agencies and priorities.

**CONSTRUCTABILITY**  
MODERATE EFFORT  
Raising existing walkways and parks is disruptive during the construction period.



## WHAT THIS COULD LOOK LIKE



Raised Riverwalk  
Queens, NY

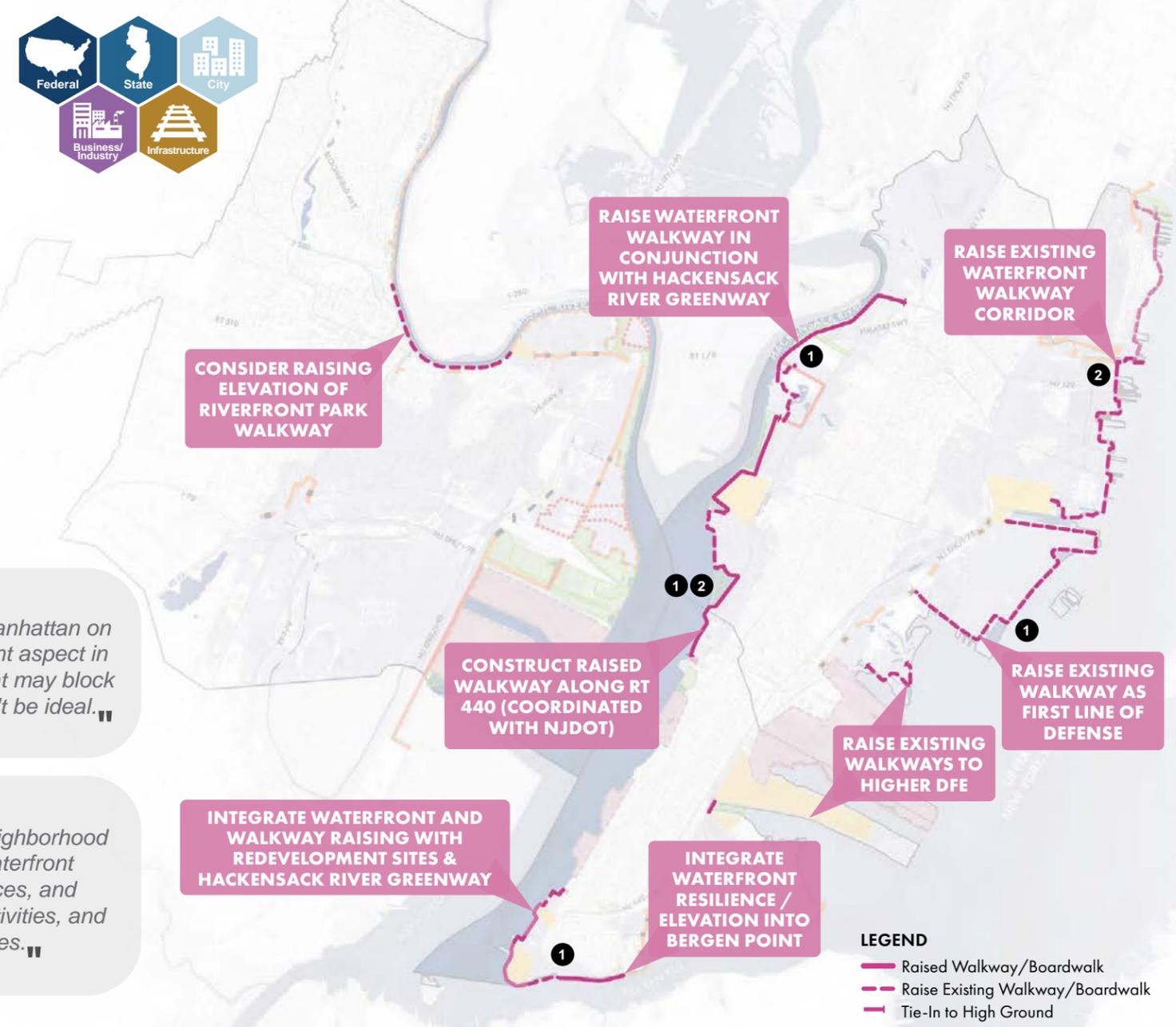


Raised Boardwalk  
New York, NY

## KEY PLAYERS



## PROPOSED ALIGNMENTS



"Additionally, the view of Manhattan on the waterfront is an important aspect in Jersey City, so a solution that may block the view (floodwall?) wouldn't be ideal."

"Preserve and enhance neighborhood and waterfront parks, waterfront walkways, gathering places, and recreational and cultural activities, and access to these spaces."

\*indicates a component of a multi-level defense  
\*\*indicates projects already in progress

# 04. PROVIDE FLOOD MITIGATION AT THE SITE AND BUILDING SCALE

Physical

EASE  
PROTECT  
CONNECT

In order to strike a balance between the costs and impacts of coastal protection, the recommendations include several alignment segments located inland from the coast. In some cases, this means properties and infrastructure may be left outside of the barriers, and these areas would need to be adapted using site and building scale flood protections.

These may include site-scale perimeter barriers or individual site raising but could also include hardening of structures and/or relocation or protection of key utilities and assets. In almost all cases, sites identified for site and building scale action are in industrial areas where alignments and coordination are harder to navigate, and where some individual initiatives are already underway. In areas that are susceptible to stormwater flooding in addition to coastal flooding, the protections can be designed to protect against that hazard as well.

*This recommendation necessitates deep engagement with industrial, utility, and transportation properties along the waterfront as part of next steps, as well as policy changes that incentivize or require adaptation. NENJ's recommendations also include options and resources available for individual adaptation and protection.*

## EVALUATION CRITERIA

Individual site solutions may need to give way to more areawide solutions over time, depending on sea level rise. Individual site protections and retrofits can burden property owners without financial or technical support, but resilient redevelopment can lower financial impact due to economies of scale.

## CONSIDERATIONS FOR IMPLEMENTATION

### PROJECT TIMELINE



Once the concept is complete, expect 1-2 years for design and permitting and 1-2 years for construction for such projects, depending on physical length.

### CAPITAL COSTS



Capital costs for flood mitigation actions at the site and building scale vary widely based on context. Costs to elevate target equipment might be thousands of dollars for smaller assets, but a site-wide flood barrier, such like Passaic Valley Sewerage Commission, plus hardening of critical assets could be hundreds of millions of dollars.

### MAINTENANCE



Generally, site specific actions easily integrate into existing maintenance budgets and governance strategies. Flood barriers and berms are an exception, as they require training, exercising, and storage for any deployable elements.

### PERMITTING

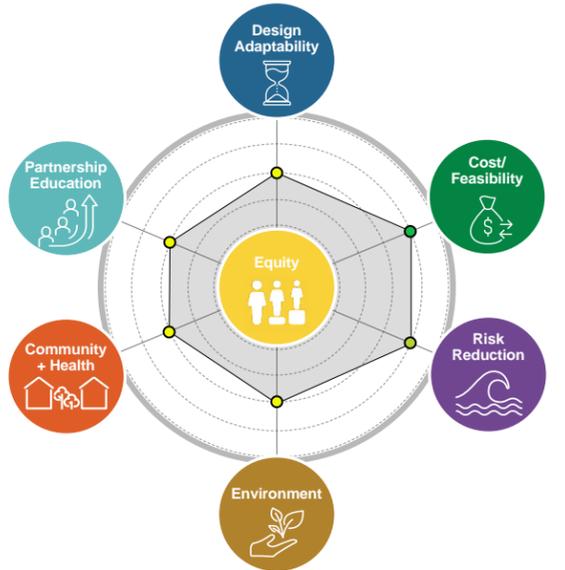


Permitting may be easier for modifications within an existing building footprint or on previously disturbed property. Flood barriers, berms, and site raising with fill are an exception due to their technical and environmental complexity.

### CONSTRUCTABILITY



Most of the time, such actions must be implemented on an active site. Phasing to limit operational impacts is important. Actions may also trigger code improvements that could alter project design, schedule, and cost.



## WHAT THIS COULD LOOK LIKE



Flip-Up Flood Barrier  
Susquehanna River, PA



Deployable Flood Barriers  
New York, NY

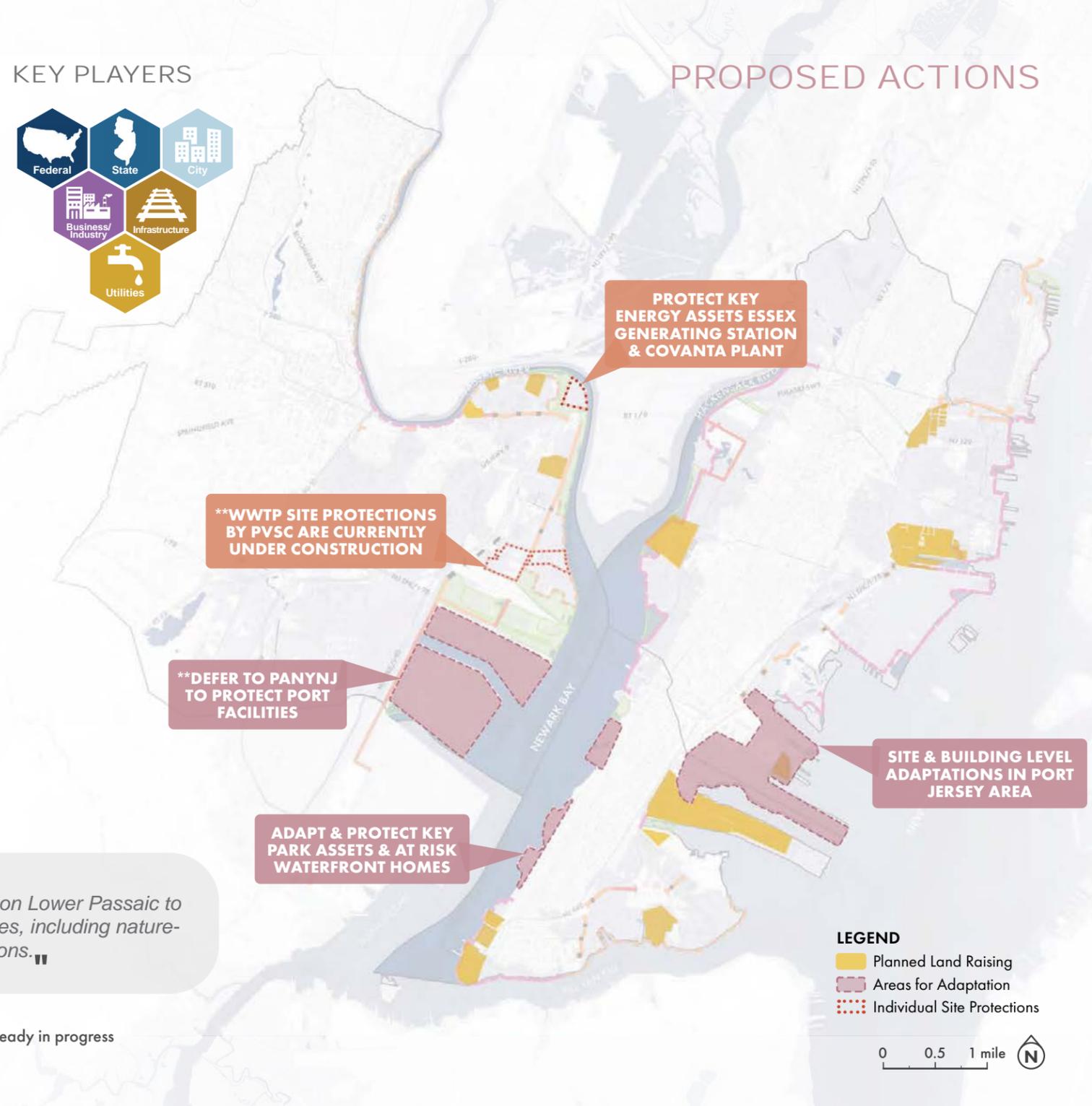


Automatic Flood Gate  
Houston, TX

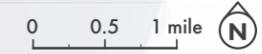
## KEY PLAYERS



## PROPOSED ACTIONS



**LEGEND**  
 [Yellow Box] Planned Land Raising  
 [Pink Box] Areas for Adaptation  
 [Dotted Box] Individual Site Protections



\*\*indicates projects already in progress

# 05. TAKE ACTION TO RESTORE THE COASTAL ENVIRONMENT

Physical

EASE  
PROTECT  
CONNECT

Improvements to coastal environments can have multiple benefits to our region. On the resilience side, coastal wetlands, shellfish reefs, and dunescapes can all help mitigate wave action (natural, ship-generated, and storm related) and can assist coastal communities in adapting to sea level rise. Environmentally, these coastal environments are key components of local ecologies, helping to naturally filter runoff and clean waterways, as well as providing habitats for local flora and fauna.

NENJ, a region once dominated by coastal wetland environments, has coastal areas likely suitable for wetland restoration and living shorelines, notably at the convergence of the Passaic and Hackensack Rivers and surrounding Newark Bay, as well as within NJDEP's ongoing Liberty State Park wetland restoration project. These restored environments, when paired with flood barriers and stormwater improvements, can build on these actions and create co-benefits. They can also be integrated with parks, greenways, nature walks and local educational initiatives.

A concerted effort is needed to restore coastal environments at a regional scale, what we're calling "Newark Bay Living Shorelines." We have already identified several sites for restoration, including some wetlands needing improvements to restore natural functions, some to be newly constructed in key spots, and some restoration and remediation in incentivized industrial retreat areas.

## EVALUATION CRITERIA

Restoration of natural systems to help address coastal flooding are a necessary component of the plan and are well-aligned with the vision, as well as environmental and public health needs. Careful planning will be needed to ensure survival and effectiveness of these systems as sea levels rise.

## CONSIDERATIONS FOR IMPLEMENTATION

**PROJECT TIMELINE**  
⌚ ⌚ ⌚ ⌚ ⌚

Once initial concept is complete and funding is identified, it is reasonable to expect at least 2 years for design and permitting and 2 to 3 years for construction for such projects. Depending on the level of change that an action may cause in a community, necessary engagement with those who could be affected could add additional months or years to the process.

**CAPITAL COSTS**  
\$ \$ \$ \$ \$

Coastal restoration efforts can be significant undertakings, depending on the approach and materials used.

**MAINTENANCE**  
MODERATE EFFORT

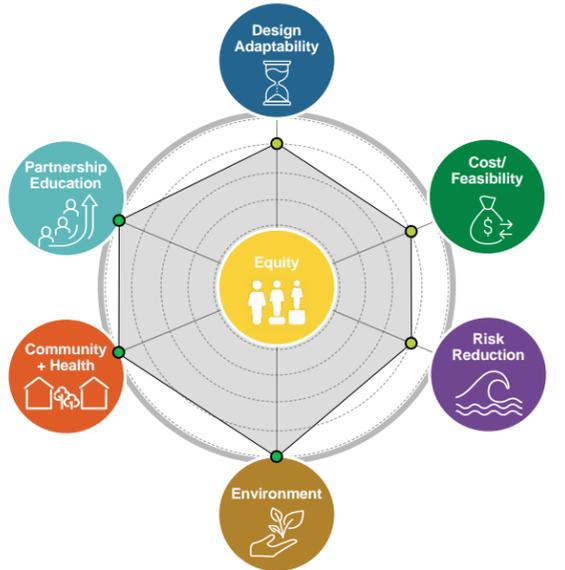
Maintenance needs will depend on the designs and solutions selected. If designed correctly, solutions should self-maintain. The Stone Living Lab in Massachusetts is actively testing effectiveness and maintenance of such solutions.

**PERMITTING**  
MODERATE EFFORT

Coastal restoration in urban areas is novel and complex. Nevertheless, there appears to be momentum and will to advance such solutions, where feasible.

**CONSTRUCTABILITY**  
HIGH EFFORT

Significant coordination will be needed to advance these recommendations.



## WHAT THIS COULD LOOK LIKE



Hunters Point Wetlands  
Queens, NY



Wetland & Habitat Restoration  
Wolf Lake, IN

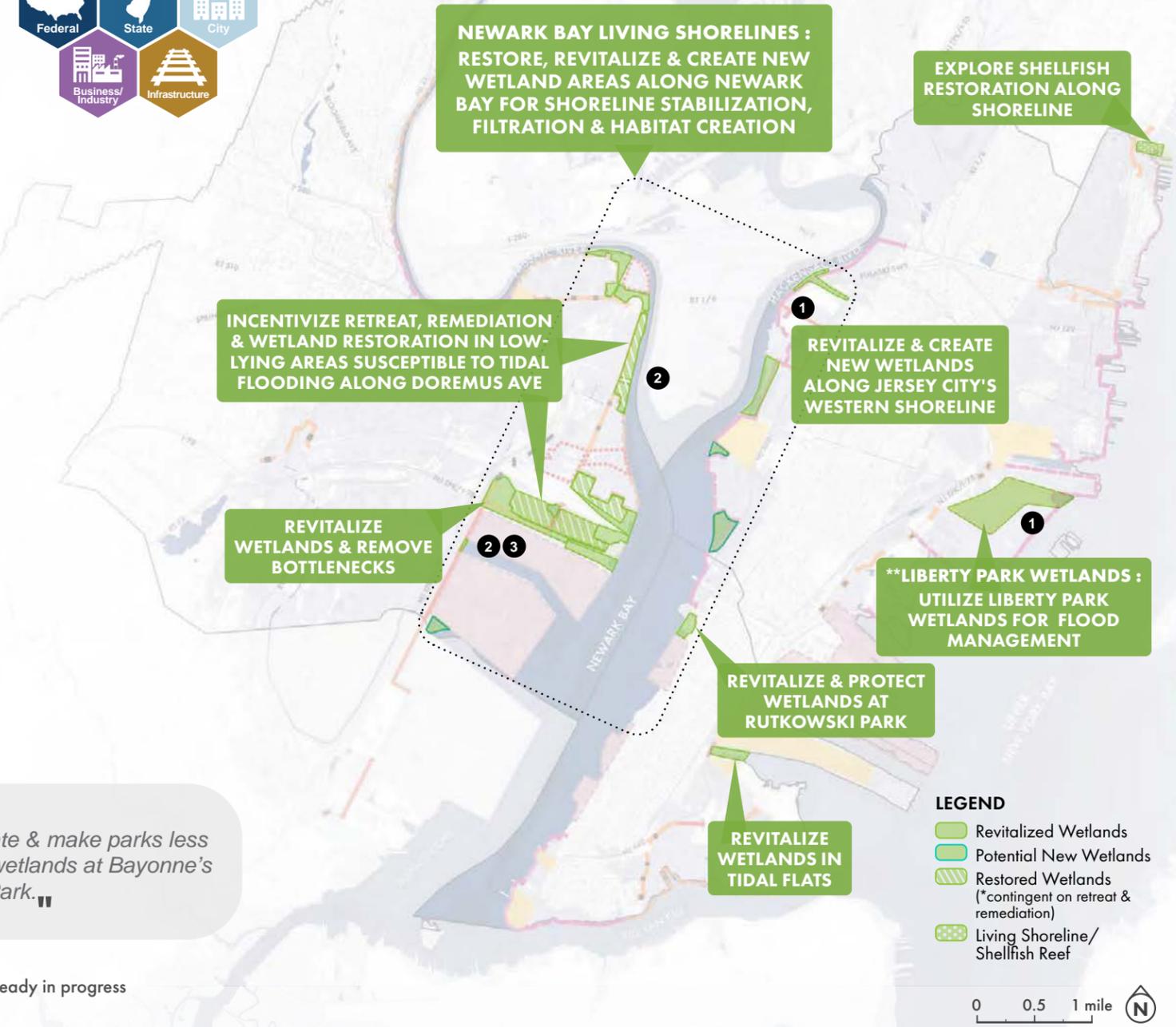


Living Shoreline  
Stump Sound, NC

## KEY PLAYERS



## PROPOSED ACTIONS



"Water quality will deteriorate & make parks less appealing - particularly the wetlands at Bayonne's Rutkowski Park."

\*\*indicates projects already in progress

**LEGEND**  
 Revitalized Wetlands  
 Potential New Wetlands  
 Restored Wetlands (\*contingent on retreat & remediation)  
 Living Shoreline/Shellfish Reef

0 0.5 1 mile N

# 06. ADOPT ADDITIONAL LAND USE POLICIES TO REDUCE FLOOD RISK

Policy

This action involves updates to municipal land use and zoning ordinances to promote resilient development, redevelopment, and substantial improvements. The Resilient NENJ process determined that retreat is not a preferred strategy for most parts of the region at this time. Nevertheless, there are opportunities to regulate redevelopment in flood prone areas to promote lower risk uses and ensure that infrastructure is designed for future conditions.

Updates may include rezoning parcels within the mapped special flood hazard area or areas modeled as being at flood risk and could be combined with other environmental constraints to reduce the potential for development to increase risk (either on or off-site from the development). For example, the Jersey City Flood Overlay Zone requires green infrastructure during redevelopment within special flood hazard areas. The Jersey City Flood Overlay Zone could be replicated in other cities or expanded to areas of high stormwater flood risk that are outside of FEMA's mapped special flood hazard area. Other updates may include modifications to permitted impervious coverage standards, enhanced setback requirements from critical environmental areas, developable area definitions that exclude floodplains and other environmentally sensitive areas, resilient redevelopment requirements, and other similar modifications to the scope and footprint of development in areas subject to hazards.

Resilient NENJ took initial steps to create a Land Use Working Group to collaborate on land use policy changes across the region. This is area key area for continued regional coordination as recommended in **Section 3.3.1**. Despite the density of the region, there is a lot of development and redevelopment activity. The Newark Waterfront along Newark Bay and Constable Hook in Bayonne may be key opportunities for resilient transformation through policy.

EASE  
PROTECT  
CONNECT

## WHAT ISSUES DOES THE ACTION HELP ADDRESS?

The action reduces possible risk from development, redevelopment, and substantial improvements within flood prone areas. While construction and substantial rehabilitations that bring living space and finished elevations above base flood elevations can provide near-term protection for individual properties, there may be other hazards associated with access, provision of services, and broader infrastructure impacts in the most vulnerable areas. Regulating redevelopment, in areas where this is appropriate, can also provide space for natural systems restoration and reduce future losses and negative impacts.

## WHAT ARE THE EXPECTED OUTCOMES?

Development and redevelopment in flood prone areas considers flood risks (and other resilience-related needs, see later in **Section 3.0**). In some areas, such policies can reduce density in high risk areas over time and may be coupled with a medium-to long-term program of buyouts and amortization. If coupled with increased density and development opportunities elsewhere – in lower risk areas - the municipality may be able to realize a break-even, or net positive to the future tax ratable base, and may also experience operational efficiencies by reducing the need for hazard response and provision of services in vulnerable areas.

"Create processes to ensure that new construction does not adversely impact existing systems."

## KEY PLAYERS



### CITY

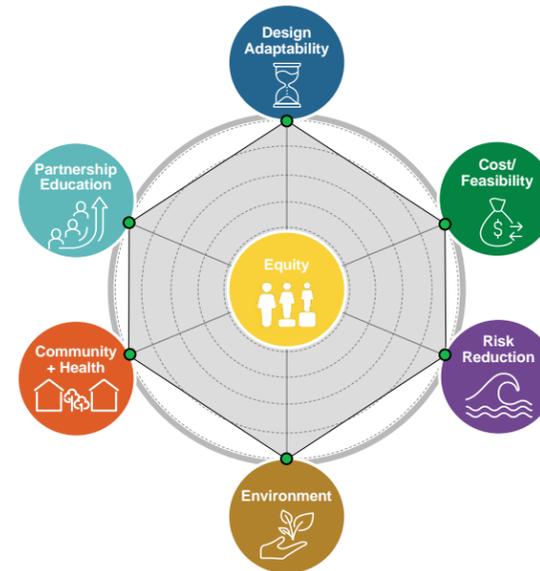
- Prepare ordinance amendments and/or rezoning ordinances. Adopt them through the governing body process with planning board advisory review
- Continue to incorporate higher standards related to resilience in redevelopment plans (e.g. setback requirements, waterfront access requirements, freeboard requirements)
- Consider land use policies that help incentivize growth where it can be accommodated without increasing risk to the development or other properties, such as in lower coastal risk, higher stormwater capacity areas



### INDIVIDUALS

- Participate in planning board and governing body review processes to ensure consistency with the Master Plan and best practices

## EVALUATION CRITERIA



By their nature, land use policies mitigate risk before it occurs. Land use policies can be designed to accomplish mobility and community health goals simultaneous with reducing risk. Community engagement through policy development can help maximize benefit and limit negative impacts.

## CONSIDERATIONS FOR IMPLEMENTATION

### SCALE



CITY

### ACTION TYPE



Policy and Governance

### PRIORITY FOR IMPLEMENTATION

1

### PROJECT TIMELINE



The ordinance adoption process typically takes 2 to 3 months from start to finish. Developing the desired standards and rezoning recommendations may take 6 months or more.

### COSTS



The range of costs depends on the level of study and analysis needed to identify appropriate locations for rezoning. A master plan reexamination report may be necessary to provide foundation for the recommendations.

### MAINTENANCE



LOW EFFORT

These updates are part of typical planning and land use practices by municipalities.

### PERMITTING



MODERATE EFFORT

The municipalities should coordinate across the region for consistency. Engagement will be needed to communicate the benefits and implications of the standards, similar to other land use changes.

### IMPLEMENTABILITY



MODERATE EFFORT

This action involves requirements that are standard industry practice but involves a developing a comprehensive, forward-thinking strategy.



# 07. UPDATE FLOOD DAMAGE PREVENTION ORDINANCES

Policy

EASE  
PROTECT  
CONNECT

This action involves reviewing and updating municipal flood damage prevention ordinances to be consistent with current best practices and the most recent New Jersey model code-coordinated ordinance. Optional higher standards can be incorporated that may increase freeboard requirements (offset between design flood elevation and base flood elevation), expand regulatory provisions to areas with a 0.2% chance of annual flooding, and include other enhancements.

Regional coordination among the Resilient NENJ municipalities can support consistency in policy. As of September 2022, each of the Resilient NENJ cities is required by the State to update this ordinance, and some of this work is being completed as a coordinated effort through Resilient NENJ. Future updates may be needed to align with new NJ Protecting Against Climate Threats (NJ PACT) statewide regulations.

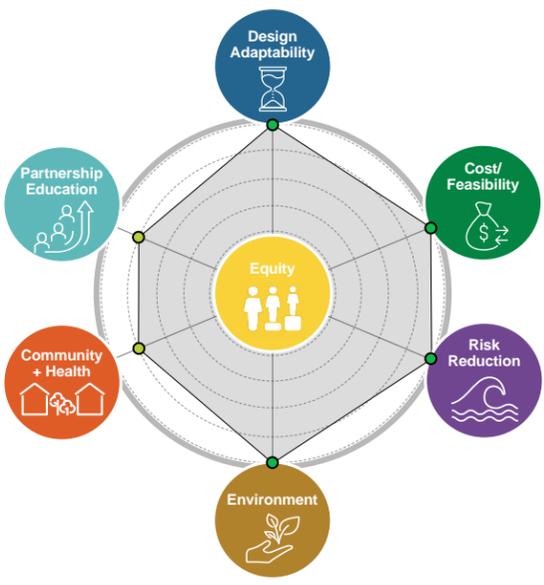
## KEY PLAYERS

- CITY**
  - Update ordinances and adopt them through the governing body process with planning board review, and coordinate across Resilient NENJ for consistency
- INDIVIDUALS**
  - Participate in planning board and governing body review processes to ensure consistency with the Master Plan and best practices

## CONSIDERATIONS FOR IMPLEMENTATION

SCALE	ACTION TYPE	PRIORITY FOR IMPLEMENTATION
 <b>CITY</b>	 Policy and Governance	<b>1</b>
<b>PROJECT TIMELINE</b>  The ordinance adoption process typically takes 2 to 3 months from start to finish.	<b>MAINTENANCE</b>  LOW EFFORT	The Ordinance adoption process typically takes 2 to 3 months from start to finish.
<b>COSTS</b>  The model ordinance should provide a framework, which limits the costs associated with local modification. Nominal professional fees / staff time will be required.	<b>PERMITTING</b>  LOW EFFORT	Updates will require typical coordination for ordinance amendment process as well as coordination across the region for consistency.
	<b>IMPLEMENTABILITY</b>  MODERATE EFFORT	Many of the higher standards for consideration are common measures to promote resilience.

## EVALUATION CRITERIA



Similar to land use policies, the flood damage prevention ordinance can help limit the creation of new risk. Nevertheless, these policies are currently tied to FEMA flood insurance studies, which look backward. Expansion of the policies to consider future expected risk could increase their long-term value.

**WHAT ISSUES DOES THE ACTION HELP ADDRESS?**  
 Developments in flood hazard areas will be held to a higher standard of elevation, flood proofing, and other measures of resilience.

**WHAT ARE THE EXPECTED OUTCOMES?**  
 Any activity in the flood hazard area that is subject to local review will be held to higher standards, which should improve the resiliency of buildings and developments, and reduce negative impacts associated with flooding events.

"(I am concerned about) building in flood prone areas and areas that will exacerbate flooding in other areas without adequate plans to address flooding risks."

**COASTAL ZONES**  
 As development pressures continue to grow, ordinances for coastal zones must be strengthened.

Image Source: Resilient NENJ



LEGEND

- Drainage Solutions
- Deep Tunnel
- New Parallel Interceptor
- New Main
- New Drainage Line
- Sewer Separation
- Ditch Drainage
- Retention Sites
- Detention Sites
- New Outfalls
- Pump Stations

3.2.2

ACTIONS THAT ADDRESS  
STORMWATER FLOODING

# INTRODUCTION

Stormwater flooding from heavy rainfall is already impacting homes, businesses, roads, and lives in Resilient NENJ communities. Many community members reported having anxiety every time it rains because of the possibility of flooding in their homes and streets. Impacts to public services and daily life include power and water outages, mobility disruptions, and street closures. Neighborhoods, such as southwest Hoboken and the Ironbound in Newark, have had longstanding repeat flooding issues, but there are other areas previously not prone to flooding that flooded in 2021, such as the Heights in Jersey City.

Today, stormwater flooding events have the potential to cause billions of dollars in losses in the form of direct physical damage, disruption, and stress. Resilient NENJ modeled two distinct types of rainfall-based flood events to help clarify areas and depths of flooding during different types of major rainstorms: Flash Flooding and Areal Flooding. NJDEP modeled these types of rainstorms with and without 2.4 feet of sea level rise to better understand potential long-term impacts of high tides on drainage during major rainstorms. NJDEP also modeled these rainstorms with and without a 10-percent increase in rainfall amount due to projections that rainfall amounts are increasing over time. With a 10-percent increase in rainfall, flood depths and extents increase, though not significantly. New data from NJDEP as part of the NJ PACT initiative predict that rainfall amounts could increase even more in the coming decades.

There are few areas in the region unlikely to be exposed to some level of stormwater flooding. Even places not directly exposed are surrounded by places that are, meaning that power and other utilities, transportation, services, and the ability to evacuate could all be affected. In other words, all people who live, work, and play in the region face some level of stormwater flood risk today.

This includes some of the most socially vulnerable populations in the nation, according to the Center for Disease Control Social Vulnerability Index (SVI). Overall, 430,000 residents in the region (65 percent) live in areas designated with an SVI over 0.75, indicating very high social vulnerability. For more on SVI, see **Section 2.2**.

While social vulnerability exists throughout the region, some neighborhoods see both high concentrations of vulnerable populations and a high risk of stormwater flooding. In Ironbound, for example, many residents are low income and large portions of the neighborhood are paved over, which can contribute to flooding as water cannot be absorbed into the ground. Other areas with high vulnerability and high flood risk include Vailsburg in Newark, southwest Hoboken, Bayonne, and central Jersey City.

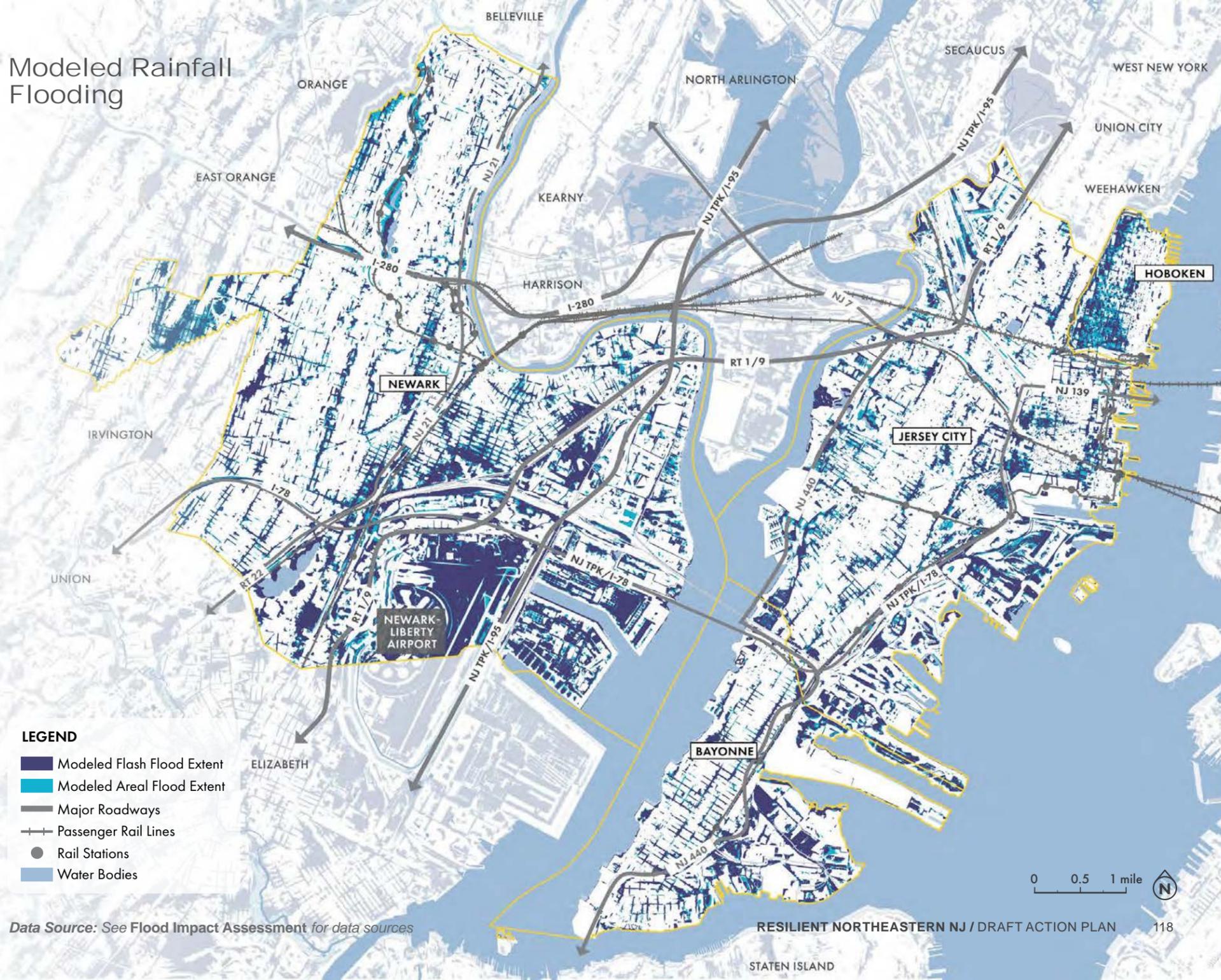
Flooding that impacts roads and public transit restricts mobility, preventing residents from traveling to important activities such as work, school, or medical appointments. Stormwater flooding may also lead to health hazards due to the presence of contaminated sites in these regions. These effects are likely to impact vulnerable populations more acutely, as they have access to fewer transportation alternatives and, due to historic exclusion and under-resourcing, are more likely to live in areas close to contaminated sites.

**FLASH FLOODS** occur when there is a significant amount of rainfall over a short period of time. The NJDEP models use around 3.5 inches over two hours, which is a little worse than Floyd (1999), Irene (2011), and Henri (2021) in most places and not nearly as heavy as the worst of Ida in 2021.<sup>1</sup> Flash flooding modeled for the region has the potential to cause up to \$3.1 billion in expected losses and impact 160,000 residents.

**AREAL FLOODS** occur when flooding develops more gradually and comes from sustained rainfall over a longer period. The NJDEP models use around 8 to 9 inches of rainfall over 24 hours, which is similar to Ida or Irene, depending on the area.<sup>1</sup> Areal flooding modeled for the region has the potential to cause up to \$5.9 billion in expected losses and impact 220,000 residents, with the greatest impacts in Jersey City and the Ironbound and Branch Brook Park neighborhoods of Newark.

<sup>1</sup> In actuality, rainfall does not fall evenly over a large area. Localized rainfall amounts may have been higher away from the official observation sites. Further, the amount of flooding from an actual rainfall event will differ based on the conditions of an area (e.g., how much concrete there is or whether storm drains are clogged by leaves that day) and atmospheric conditions leading into the event. For example, Ida and Henri in 2021 were on the heels of a very moisture rich summer

## Modeled Rainfall Flooding



**LEGEND**

- Modeled Flash Flood Extent
- Modeled Areal Flood Extent
- Major Roadways
- Passenger Rail Lines
- Rail Stations
- Water Bodies

Data Source: See Flood Impact Assessment for data sources

# WHY DOES STORMWATER FLOODING HAPPEN? THE CHALLENGE.

Northeastern New Jersey's geologic conditions and history of development make the region particularly susceptible to stormwater flooding. As the metropolitan area grew, settlers added fill to wetlands and open water to provide more developable land, but the elevations of these new areas were often not much higher than high tides. The region has since heavily urbanized and become primarily impervious. This low-lying, impervious land generates more stormwater runoff that moves more quickly.

In addition, a band of bedrock rock formation produced the higher ground in the region. This bedrock is also impenetrable to water and is often close to the ground surface. This bedrock reduces the ability for higher ground (called upland areas) to absorb stormwater. This adds even more runoff to low-lying areas.

All these factors together result in widespread stormwater flooding throughout the region. Nevertheless, the Ironbound neighborhood in Newark, Southwest Hoboken, and the eastern coasts of Jersey City and Bayonne flood the most severely. These are areas where dense urbanization has been built along historical fill and where other critical infrastructure has created barriers to more effective stormwater drainage.

These issues are compounded by climate change. Sea level rise raises high tides and average water levels of water bodies that receive drainage, which means that surrounding water bodies can block drainage outfalls and cause flooding to back up. More frequent, high intensity storms further stress the aging combined sewer system. The combined sewer system in parts of the region is one of the oldest in the country and has helped support the dense development in the area. This also means that the system is largely undersized based on current design standards, even more so when considering potential future conditions. The majority of the region is reliant on rigid, undersized infrastructure with few options for alternative drainage pathways, leading to widespread flooding during intense rain events.

## Rainfall Areal Flood

*Range indicates change from present to future modeled flood events*

 <b>\$5.2 - \$5.9 Billion</b> In expected losses	 <b>11,000 - 12,000 Buildings</b> Impacted out of 42,000 total buildings (29%)	 <b>210,000 - 220,000 Residents</b> In impacted homes out of 700,000 residents (31%)
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## Rainfall Flash Flood

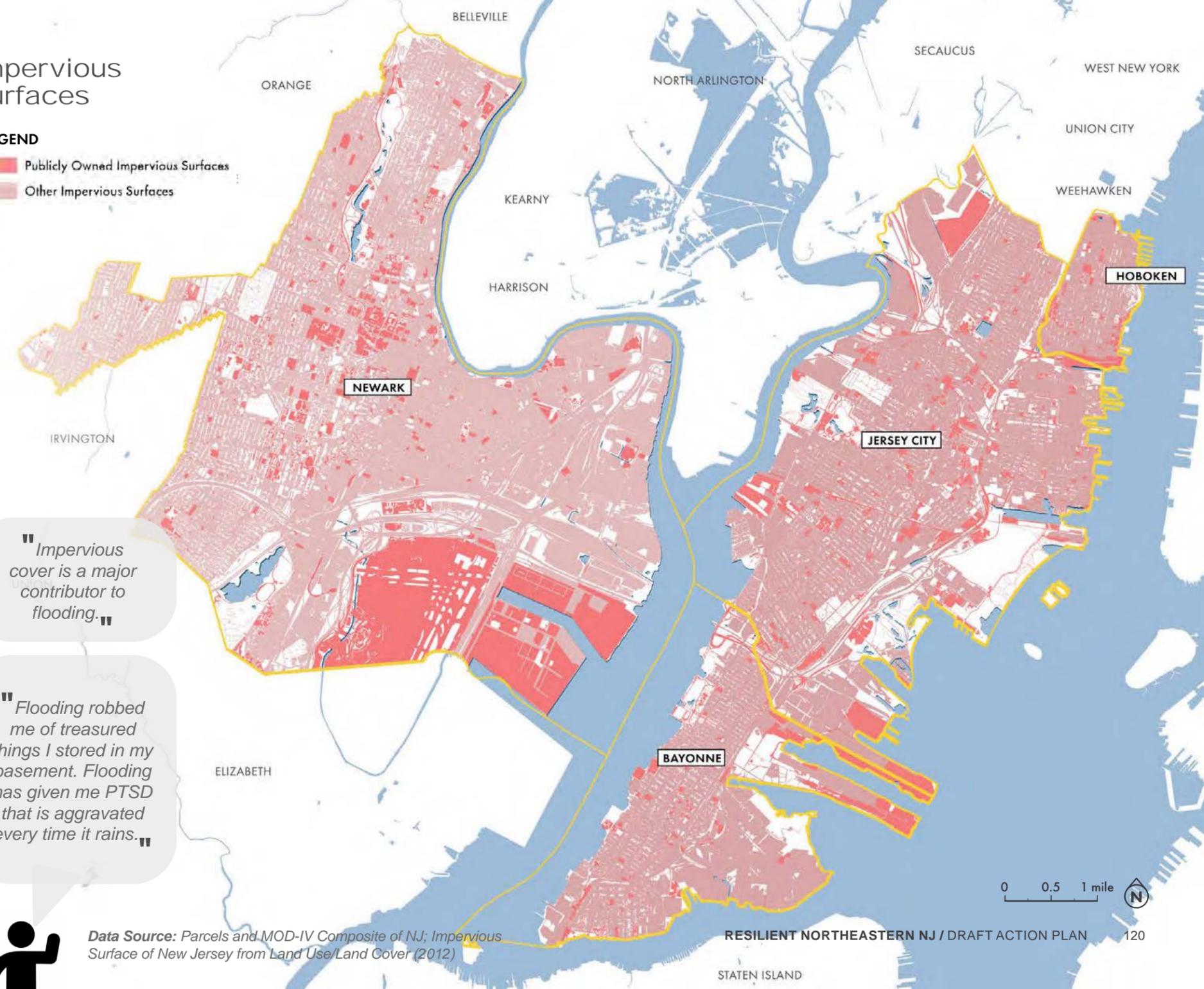
*Range indicates change from present to future modeled flood events*

 <b>\$2.7 - \$3.1 Billion</b> In expected losses	 <b>7,100 - 7,900 Buildings</b> Impacted out of 42,000 total buildings (17-19%)	 <b>150,000 - 160,000 Residents</b> In impacted homes out of 700,000 residents (21-23%)
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## Impervious Surfaces

**LEGEND**

- Publicly Owned Impervious Surfaces
- Other Impervious Surfaces



"Impervious cover is a major contributor to flooding."

"Flooding robbed me of treasured things I stored in my basement. Flooding has given me PTSD that is aggravated every time it rains."

Data Source: Parcels and MOD-IV Composite of NJ; Impervious Surface of New Jersey from Land Use/Land Cover (2012)

# WHAT ARE WAYS WE CAN ADDRESS STORMWATER FLOODING? THE TOOLBOX.

Resilient NENJ developed a toolbox to identify possible actions to reduce stormwater flood risk throughout the region. Several examples are shown on the next page, and the full Flood Resilience Toolbox is in the **Vision and Priorities Report**. This Action Plan leverages tools that support both storage and conveyance of stormwater to improve stormwater management throughout the region. The proposed solutions will reduce the amount and speed (referred to as flow rate) of stormwater runoff, re-direct stormwater to safe places, and increase stormwater capacity.

Throughout the visioning process, the regional community continually brought up an interest in more green spaces and the many co-benefits associated with these techniques. The toolbox responds to this feedback and includes practices such as rain gardens, bioswales, and green roofs. Although much of the region is fully developed, the Resilient NENJ team included green infrastructure approaches for riparian corridors, where possible, including stream daylighting and stream restoration.

Green infrastructure cannot manage flood water from large events alone. In fact, while it can help ease flood risk from smaller rain events, there are a lot of factors that will limit green infrastructure's ability to address big storms in Northeastern NJ:

- The heavily urbanized nature of the region restricts space needed for large scale green infrastructure that could significantly reduce flooding
- High water tables below ground in some areas leave little capacity to add more water
- The presence of bedrock in other areas make it difficult for water to absorb below grade
- The volume of water that must be managed is significant. The combination of the factors above plus the amount of rainfall coupled with so much concrete mean that green infrastructure could not be developed in a way to store and convey the total amount of water needed to significantly reduce flooding from larger rain events.

As such, green infrastructure must be paired with what we often call "grey" stormwater infrastructure practices (think pipes, pumps, and structures). Improvements to the sewer system, for example, is a key tool examined throughout the region. Much of the region is managed by combined sewer systems, so separating stormwater or implementing high-level storm sewers can provide additional capacity and help move water away from areas it could flood. Underground storage, deep tunnels, and pump stations also help address multiple stormwater challenges from the headwaters to the outfalls throughout the region.

The Northeastern New Jersey region is not only a dense urban, vibrant area where people live and work, it is also a key transportation corridor for people and goods for the greater New York City metropolitan area and the northeastern United States. This infrastructure – highways, railways, ports, and airports – includes critical assets that need to be prioritized for resiliency but that can also increase flood risk for neighborhoods throughout the region. Resilient NENJ therefore worked to align the toolbox with transportation infrastructure and corridors.

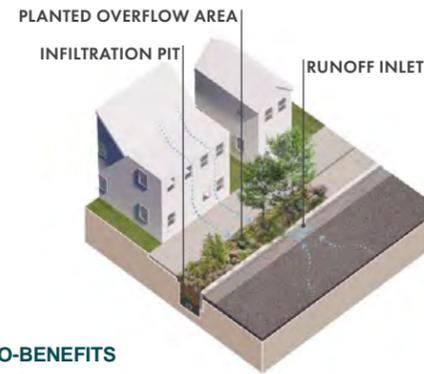
Recommendations also include policy and governance improvements to both make it easier to implement green infrastructure and stormwater improvements, and incentivize or require their inclusion, where appropriate, to avoid adding more flood risk due to new development.

**TOOLBOX EXAMPLES >**  
 The Flood Resilience Toolbox (located in the Vision and Priorities Report) shares different tools that can help address coastal flood risk. These are some excerpts that address stormwater flooding.

"During intense/heavy rain events, the Newark Police Department issues a flood advisory for specific areas that are prone to flooding. I hit at least one of these (McCarter highway, at ramp onto 280) on my way home from work."

## PLANTED BIOSWALES (URBAN)

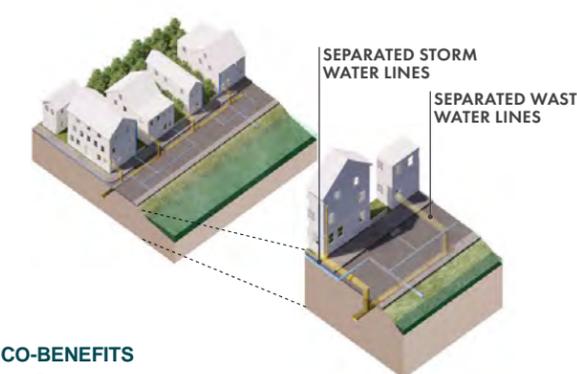
Right-of-way bioswales are vegetated drainage courses located in sidewalks to capture, detain, and infiltrate runoff from streets, allowing any excess rain water to enter the piped stormwater system.



**CO-BENEFITS**  
 ECONOMIC ECOLOGICAL

## IMPROVE & EXPAND DRAINAGE SYSTEM

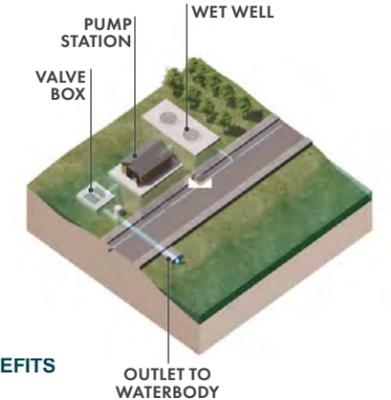
Overwhelmed drainage systems are frequently the root cause of rainfall flooding. By separating and expanding the drainage capacity of these systems we can mitigate both stormwater flooding and CSO pollution.



**CO-BENEFITS**  
 ECONOMIC

## CONSTRUCT PUMPING STATIONS

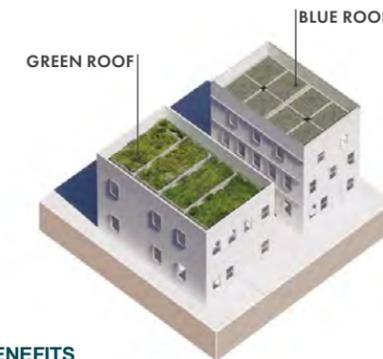
Pumping is a crucial method to convey water out of areas vulnerable to inundation, where natural and gravity fed drainage is insufficient or not possible.



**CO-BENEFITS**  
 ECONOMIC

## GREEN & BLUE ROOFS

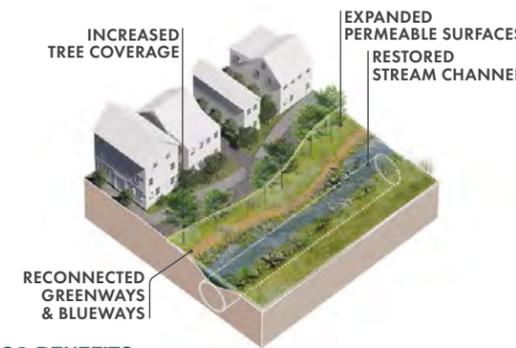
Green and blue roofs can slow down, absorb and retain rainwater, this temporary water storage then allows for the gradual release or evaporation of stored water.



**CO-BENEFITS**  
 ECONOMIC EDUCATION RECREATION ECOLOGICAL

## STREAM DAYLIGHTING & RESTORATION

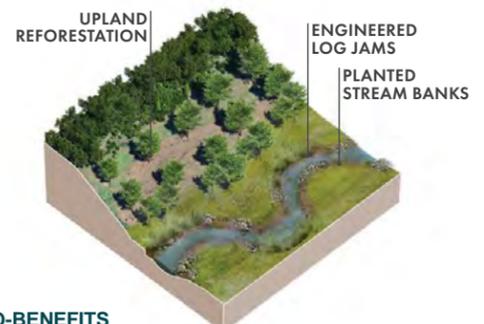
Stream daylighting is the exposure of some or all of the flow of waterways from pipes or culverts. This can help eliminate flooding issues by reconnecting piped stream channels with the floodplain and recreating a functioning floodplain and riparian area.



**CO-BENEFITS**  
 ECONOMIC EDUCATION RECREATION ECOLOGICAL

## NATURAL CHANNEL DESIGN/ STREAM RESTORATION

Streams that are artificially modified through straightened channels or altered stream banks result in instability where bed and bank erosion is a common consequence. Natural streams and floodplains provide stability to manage floodwaters safely, minimizing impacts to infrastructure.



**CO-BENEFITS**  
 ECONOMIC EDUCATION RECREATION ECOLOGICAL



# WHAT IS ALREADY BEING DONE? SCENARIO 0.

The Action Plan will build on the significant momentum already in progress throughout the region, and many actions in this section draw inspiration from work already underway or completed. For example, action **Stormwater-04** models Hoboken's resiliency park projects that manage large stormwater volumes.

Several completed or ongoing projects to address stormwater flooding in the region include Newark's South Street Area Drainage System Improvements (increased pipe capacity and installed new pump station, combined with green infrastructure installation), Newark's Queens Ditch Restoration Project (improved capacity of the overland ditch system), Hoboken's 9th and Madison Infrastructure Improvements (being designed to include sewer replacement and road elevation, along with other components), and various other sewer separation and pump station upgrade projects.

All four municipalities within the region have advanced their green infrastructure programs and projects, supported by state, academic institutions, and local environmental groups. Municipalities have worked to secure grants and develop design standards and protocols for green infrastructure projects to be incorporated and implemented more widely throughout the region.

Green infrastructure is a key element in the combined sewer overflow long term control plans. These long term control plans will impact all four municipalities. Projects include efforts to store and treat more stormwater through storage, sewer separation, interceptor expansion, and other techniques in addition to green infrastructure.

"Impossible to get home from the PATH station due to extreme flooding."

"It is impossible to cross the street without getting your shoes wet during times of flooding."

"Yesterday it took me 40 minutes to drive less than a mile because so many streets were flooded. I have to park 2 or more blocks from my home so my vehicle doesn't end up under water."



## WHAT ARE OTHER KEY CONSIDERATIONS? DECISION DRIVERS.

### Stormwater flooding is happening so frequently in some areas that it is eroding quality of life.

The Northeastern New Jersey region experienced historic coastal flooding because of Hurricane Sandy. In the ten years since, stormwater flooding has caused significant additional impacts at an accelerating pace to the point where certain neighborhoods experience chronic problems.

Throughout the Resilient NJ process, community members from across the region shared stories of repetitive, damaging stormwater flooding. Several neighborhoods flooded multiple times during the project, from massive storms such as the remnants of Hurricane Ida but also through unnamed rainstorms with little advanced warning. There is an urgency to finding and implementing more resilient solutions to this problem, both to alleviate the trauma experienced by residents and property owners in these areas and to provide protection for some of the most socially vulnerable communities within the region.

### This creates a need for urgent visible action in the near-term, in addition to long-term major infrastructure improvements.

It is important for community members to see progress in the short term – to help build trust in the process, empower the community to create change, and create further momentum. As such, the Action Plan includes several small-scale projects that require smaller budgets and shorter schedules, will have visible impact, and can be repeated widely as part of a distributed approach. Targeted green solutions will maximize co-benefits and demonstrate responsiveness to community needs expressed throughout the Resilient NJ process. Green infrastructure can be prioritized in these early action items to begin progress towards a resilient future, while capturing additional benefits by providing access to green space, improving water and environmental quality, and reducing heat island impacts.

### And a need to avoid worsening risk through development.

At the same time as climate change is increasing the risk of stormwater flooding, development has the potential to put more people in harm's way. Community members have expressed concerns about the strain that development places on already overburdened infrastructure. Resilient NENJ prioritizes solutions that can support safe, resilient development, recognizing that continued growth within the region can be an effective strategy to distribute responsibility to a broader coalition.

### While limiting disruption and maximizing co-benefits to the greatest extent possible.

As key agencies and stakeholders take on large capital projects focused on maintaining their missions, resilience must be incorporated into these projects to expand the benefits of these investments, limit potential external impacts, and limit disruption by taking a “dig once” approach. There is an opportunity to build upon the momentum created by the municipal coalition formed as part of the Resilient NJ program to find more effective ways to work across municipalities and other large agencies and utilities to integrate resilience projects into other capital investments.

### While limiting disruption and maximizing co-benefits to the greatest extent possible.

Providing long-term solutions to stormwater flooding in Northeastern New Jersey will include several large infrastructure projects that require significant resources and coordination to complete and maintain. Due to technical complexity and the number of agencies that will need to be involved, it could potentially be decades before certain projects are finished and able to provide risk reduction benefits. This reality conflicts with the urgency to address stormwater flood risk. As larger projects move through their longer processes and schedules, other “no regrets” solutions can be implemented in the near term to adapt local areas to a changing climate.



#### STREET FLOODING

A vehicle drives through a flooded intersection in Hoboken, July 2021.

*Image Source: Carter Craft / Outside New York™*

# WHAT SHOULD WE DO ABOUT IT? THE STRATEGY.

- EASE combined sewer overflows (CSOs) and loads on the system through increased storage and sewer separations
- EASE the burden today through widespread implementation of lower cost “no regrets” green infrastructure projects that could also improve daily quality of life
- PROTECT densely populated communities and infrastructure by moving the water away through major conveyance and storage infrastructure projects
- CONNECT people to the environment and water by strengthening natural drainage corridors

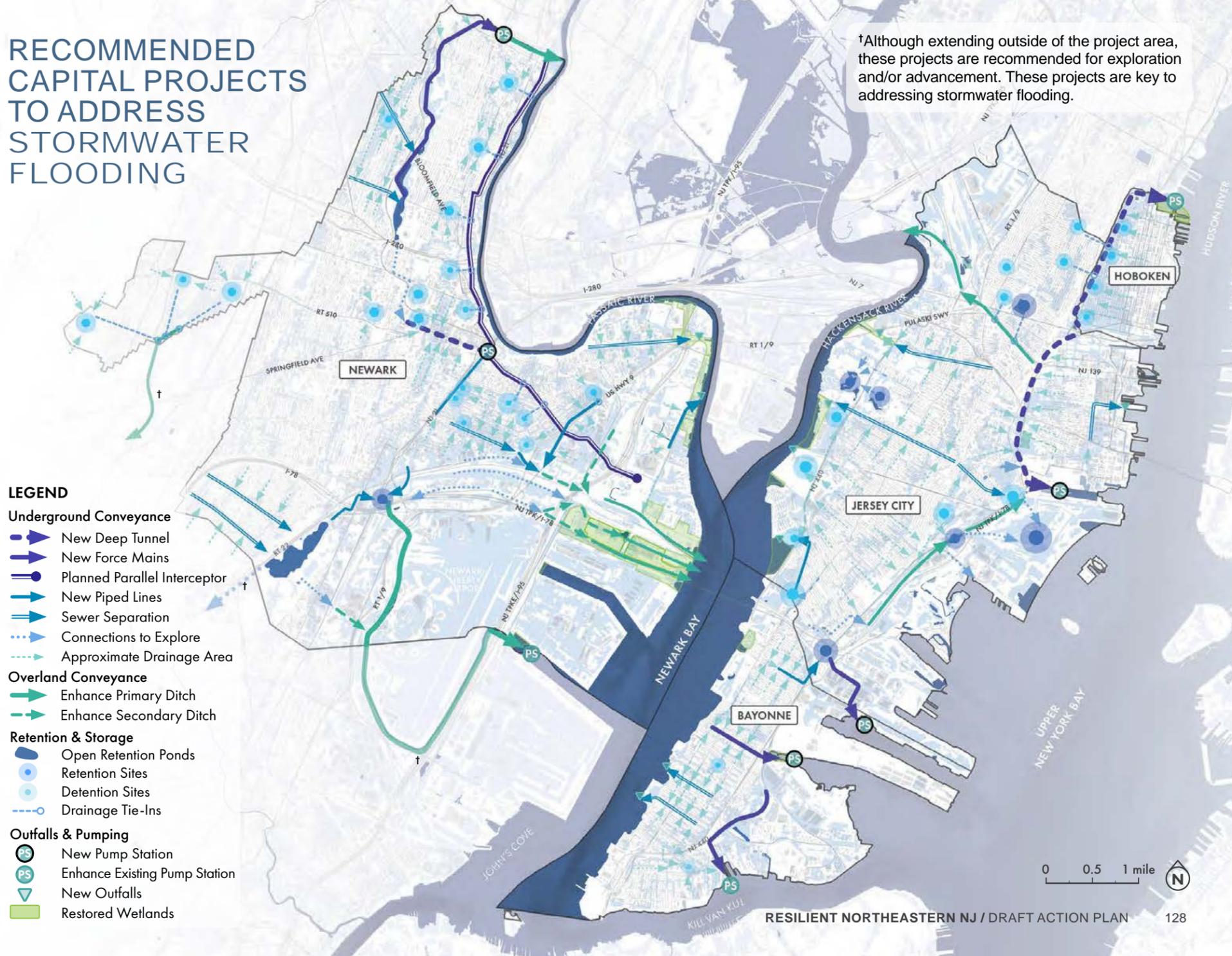
## To do this, the Action Plan proposes to:

- 01 Separate stormwater to safe, dedicated outfalls
- 02 Direct stormwater to deep storage and conveyance infrastructure
- 03 Improve and restore natural drainage corridors
- 04 Reduce stormwater volume through stormwater management sites
- 05 Reduce impervious surface and improve conveyance through green infrastructure
- 06 Provide guidance to more quickly integrate stormwater management in open space
- 07 Update stormwater management ordinances

"If nature-based solutions are used, additional risks like public health risk and respiratory risk would be addressed."

"I want to see greater investment in green infrastructure (bioswales, rain gardens, retention tanks, more tree-lined streets), a new sewer system that separates rain runoff from solid waste water."

# RECOMMENDED CAPITAL PROJECTS TO ADDRESS STORMWATER FLOODING



# 01. SEPARATE STORMWATER TO SAFE, DEDICATED OUTFALLS

Physical

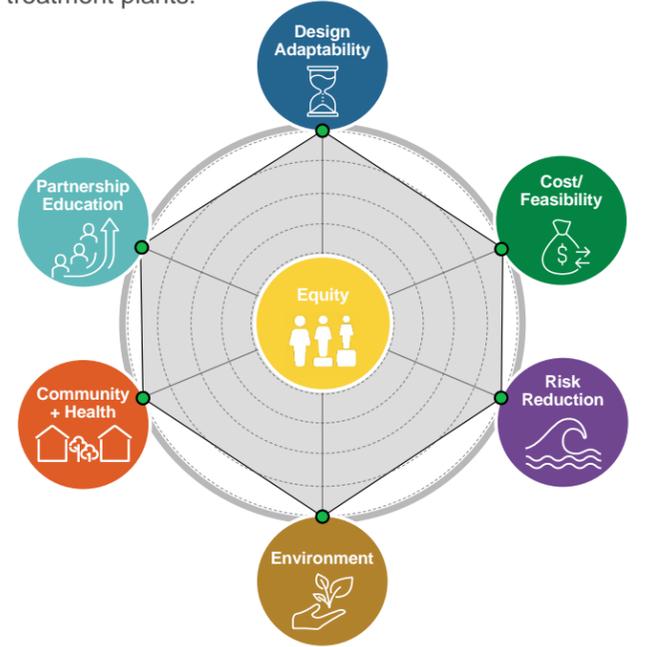
EASE  
PROTECT  
CONNECT

Separating stormwater from the existing combined sewer system in some areas would increase drainage capacity within the watershed, reduce the amount of water treated at the wastewater resource recovery facility, and reduce the number of combined sewer overflows during smaller storm events. This action is preferable to expanding the capacity of the existing system in areas where the downstream treatment capacity would also need to expand to prevent discharge of combined sewage and stormwater. Such discharges impact water quality and public health.

Separating stormwater, whether through separating combined sewers into stormwater and sanitary sewers or building high level storm sewers outside of the combined sewer system is highly beneficial to the environment and public health. This action would significantly reduce the risk of stormwater flooding but must be implemented strategically in areas where they can drain by gravity. This is a particular concern due to climate change, where sea level rise will further reduce outfall capacities by making it harder to discharge stormwater as the waterbody level increases. Areas with significant elevation changes, such as the western coast of Bayonne and Jersey City, or areas where outfalls can effectively drain into a natural waterbody, such as Weequahic Lake in Newark, are good candidates for this action as they would not require the addition of expensive stormwater pumps. Other key considerations in the placement of this action are its need for space in the public right of way and potential to disrupt local roadways.

## EVALUATION CRITERIA

This action scores highly across the evaluation criteria where proposed because it reduces flood risk and combined sewer overflows by separating and routing stormwater runoff away from the sewer and reduces the pressure on wastewater treatment plants.



## CONSIDERATIONS FOR IMPLEMENTATION

- PROJECT TIMELINE**: 5 clock icons (all active)
- CAPITAL COSTS**: 5 dollar sign icons (all active)
- MAINTENANCE**: 1 person icon, LOW EFFORT. Text: Maintenance responsibility and approach is consistent with current conditions.
- PERMITTING**: 1 person icon, LOW EFFORT. Text: Sewer infrastructure already has a defined implementation process.
- CONSTRUCTABILITY**: 1 person icon, MODERATE EFFORT. Text: New sewer infrastructure would need to be located within the road right-of-way, competing with other infrastructure for space. It would also require significant disruption to local roadways.

## WHAT THIS COULD LOOK LIKE



Stormwater Median Paso Robles, CA



Sewer Separation Cambridge, MA

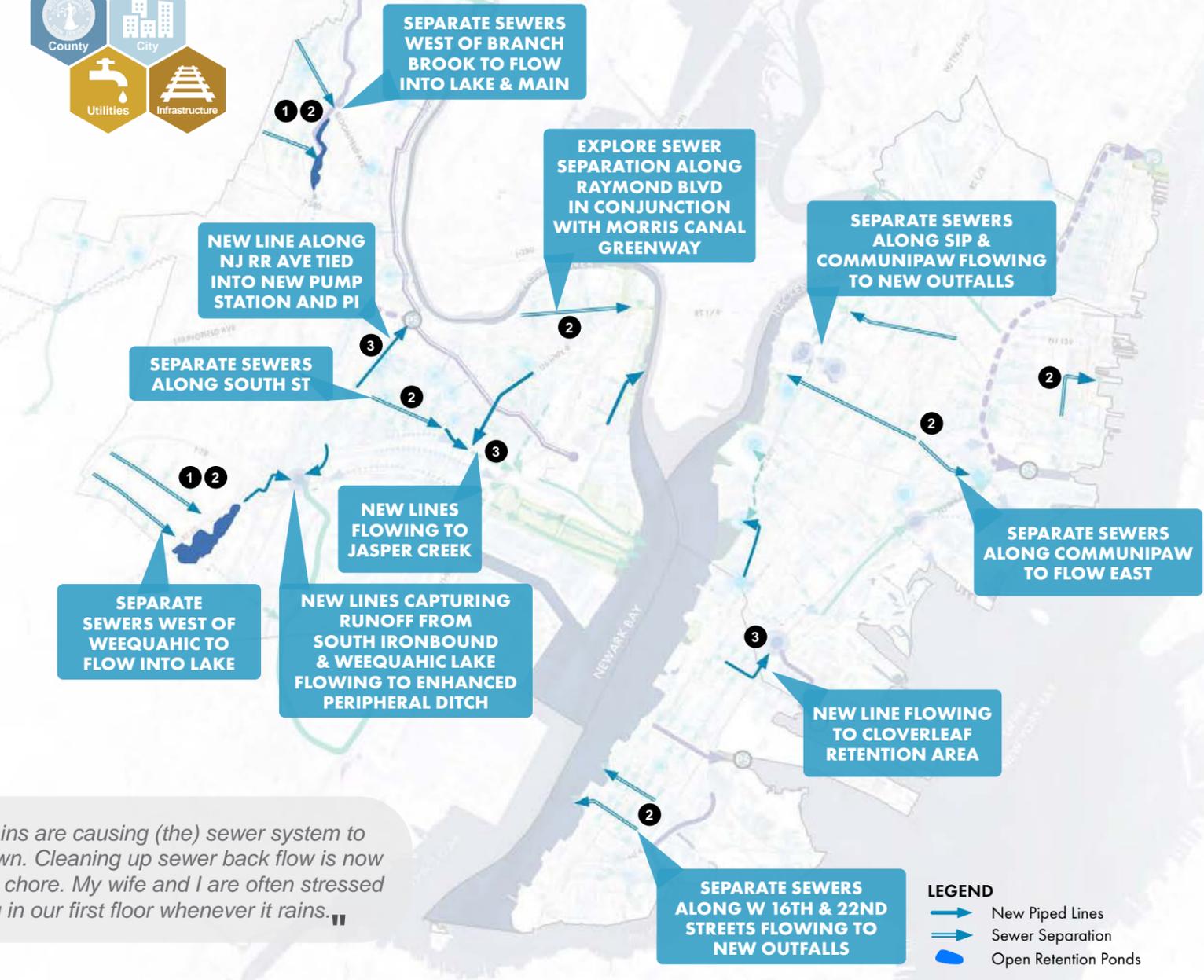


New Piped Drainage Line Hartford, CT

## KEY PLAYERS



## PROPOSED ACTIONS



"More frequent heavy rains are causing (the) sewer system to back up all across downtown. Cleaning up sewer back flow is now a routine - and disgusting - chore. My wife and I are often stressed about potential flooding in our first floor whenever it rains."



# 02. DIRECT STORMWATER TO DEEP STORAGE AND CONVEYANCE INFRASTRUCTURE

Physical

EASE  
PROTECT  
CONNECT

Deep tunnel storage presents an opportunity to provide significant stormwater storage while avoiding the challenges of traditional stormwater infrastructure that uses gravity to convey water, which can be hindered by surface elevations that are flat. Though interceptors in combined sewer systems can be set lower and pumped to wastewater treatment plants, they typically require large-scale changes to the network that cause construction feasibility issues and high costs which limit the use of this strategy to increase the capacity of the system.

Alternatively, deep tunnel storage can be a useful technique to provide significant storage at a lower depth. Deep tunnels manage stormwater or combined sewage, are 10-foot diameter or larger, and are located far below the ground surface. Deep tunnels involve different construction methods than traditional sewers, often requiring boring equipment specialized to the local conditions. Though the cost can be high, this technique avoids infrastructure conflicts and more significant surface disruptions. Deep tunnels are also relatively low maintenance and have a service life of 100 years or more.

Since costs can be limiting, these practices are best suited in areas where it is difficult to implement other flood risk reduction measures or where there are significant benefits to limiting surface disruptions, such as downtown Newark.

## EVALUATION CRITERIA

This action scores lower in environmental benefits because it involves heavy construction by means of deep excavation, which potentially would displace people, existing infrastructure, and natural systems or areas.

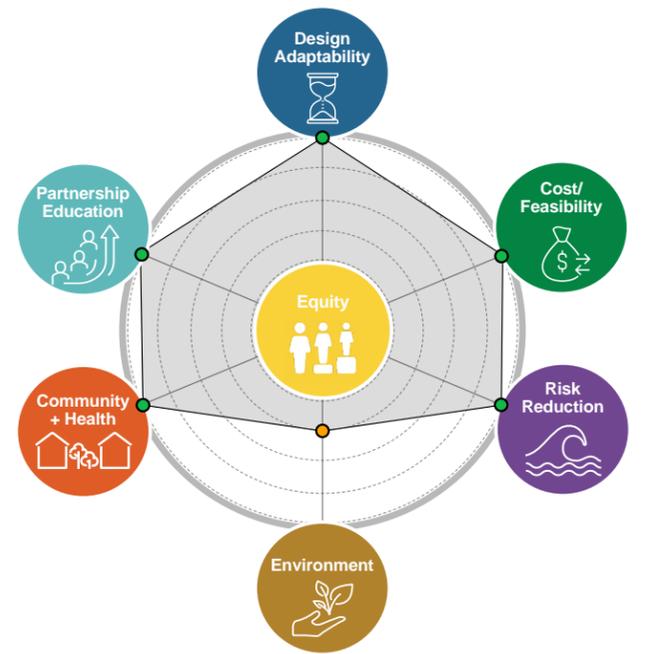
## CONSIDERATIONS FOR IMPLEMENTATION

PROJECT TIMELINE	🕒🕒🕒🕒🕒
CAPITAL COSTS	💰💰💰💰💰
MAINTENANCE	🏃 LOW EFFORT
PERMITTING	🏃 LOW EFFORT
CONSTRUCTABILITY	🏃 HIGH EFFORT

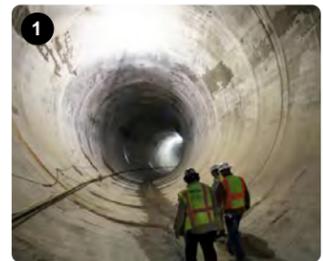
Deep tunnels generally include screening facilities and other practices to minimize maintenance.

The depth of these practices helps to avoid impacts with other infrastructure or environmental areas that would require more complicated permitting.

Large areas need to be identified to stage equipment and access the tunnel. Large, custom-built boring equipment is often required for construction.



## WHAT THIS COULD LOOK LIKE



Deep Tunnel Chicago, IL

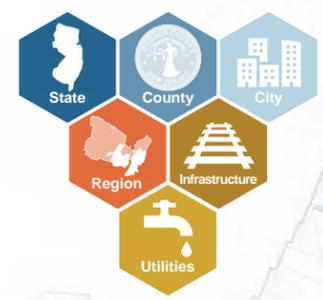


Storage & Conveyance Tunnel South Boston, MA

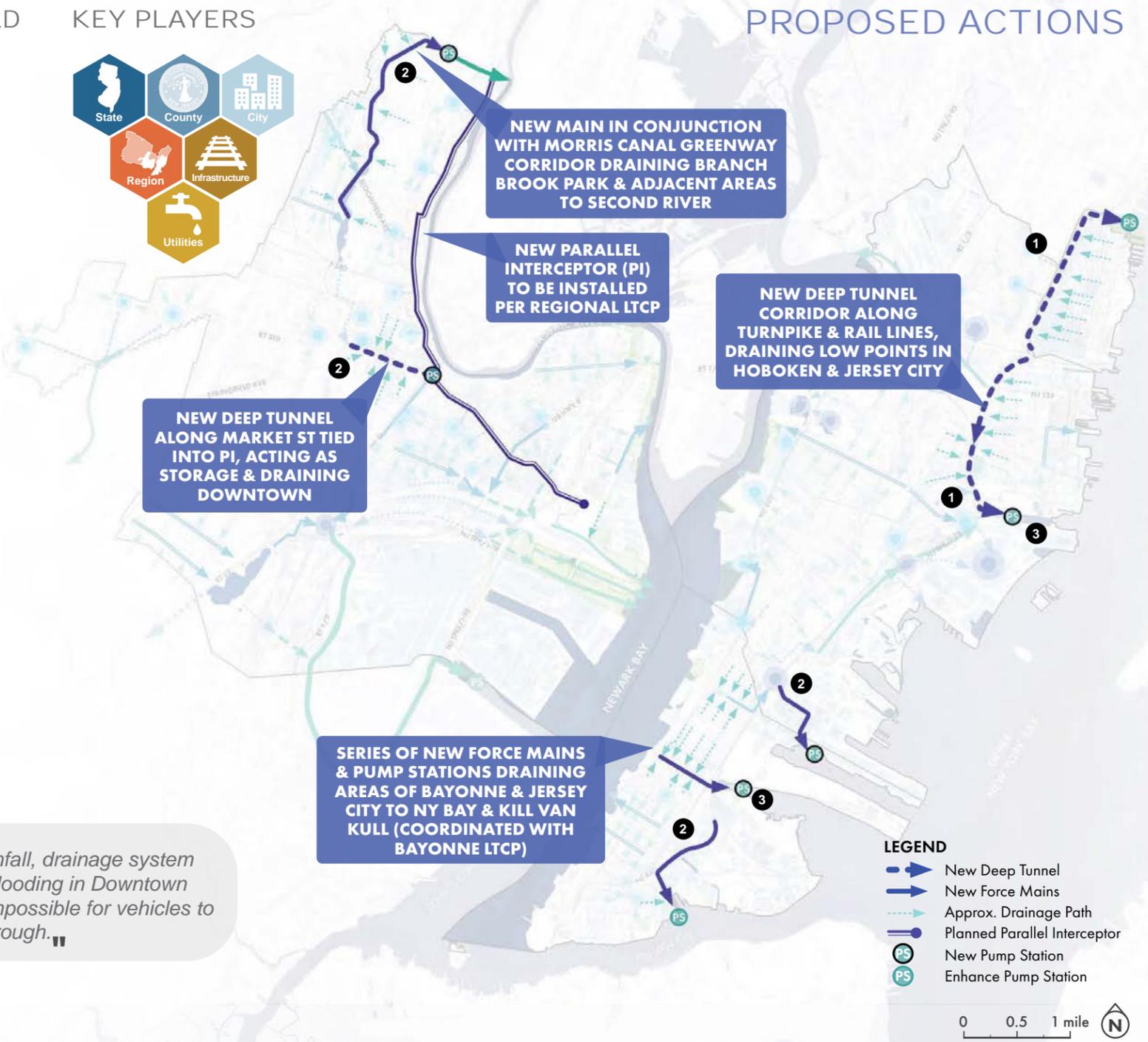


New Pump Station Ascension Parish, LA

## KEY PLAYERS



## PROPOSED ACTIONS



"During intense rainfall, drainage system is at full capacity. Flooding in Downtown Newark can make it impossible for vehicles to get through."

# 03. IMPROVE AND RESTORE NATURAL DRAINAGE CORRIDORS

Physical

EASE  
PROTECT  
CONNECT

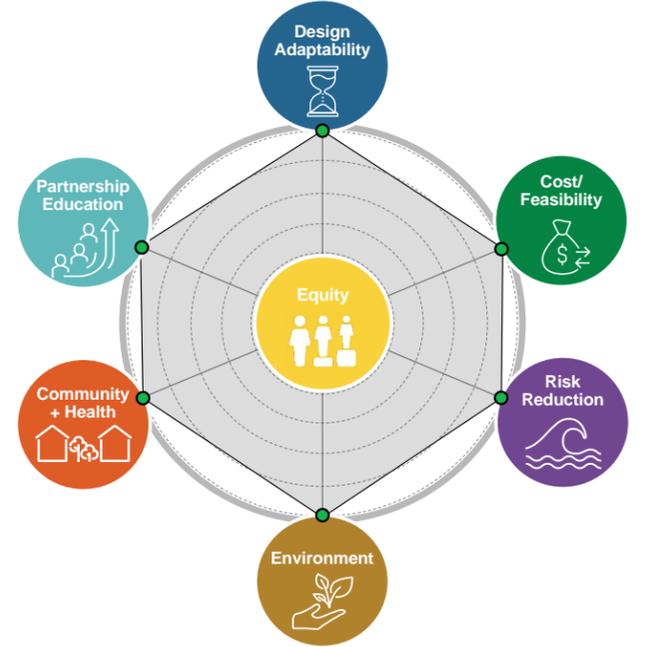
Historic fill and urbanization have altered natural flow paths and made it more difficult to drain areas throughout the region. The addition of infrastructure and land use barriers have further restricted existing drainage corridors. Improving and expanding these corridors is a key element to restoring natural ecosystem functioning and drainage capacity, especially considering future sea level rise and climate change impacts.

The region has some existing artificial surface drainage corridors that can be optimized with green and grey solutions to better drain stormwater, particularly in Newark. The ditch system that drains portions of the Ironbound neighborhood and Newark Airport is an example area where this action could be applied. Solutions involve expanding the channel and riparian space, widening obstructions such as culverts and bridges, and expanding pumping capacity to overcome elevation constraints. This approach requires more surface space, which would lead to land use changes around these practices, but can take advantage of existing protected areas such as Branch Brook Park.

These efforts are consistent with goals to expand green space in the region and can provide water quality and habitat benefits in addition to flood risk reduction. Due to this, the ditch system that drains the Ironbound section of Newark would be a high priority for this action.

## EVALUATION CRITERIA

This action is beneficial because it helps restore natural systems that existed pre-urbanization and enhances the natural process of how the natural environment manages stormwater runoff.



## CONSIDERATIONS FOR IMPLEMENTATION

PROJECT TIMELINE



CAPITAL COSTS



MAINTENANCE



Natural drainage corridors are dynamic systems, reliant on vegetation to provide stability. Specialized experience is needed to evaluate conditions and maintain vegetation.

PERMITTING



These practices are usually classified as Waters of the United States, which can fall under the jurisdiction of multiple agencies.

CONSTRUCTABILITY



Restoring stream functioning requires using natural construction materials, which are widely variable and require special experience to install.

## WHAT THIS COULD LOOK LIKE



Lick Run Creek Restoration Cincinnati, OH



San Pedro Creek Restoration San Antonio, TX

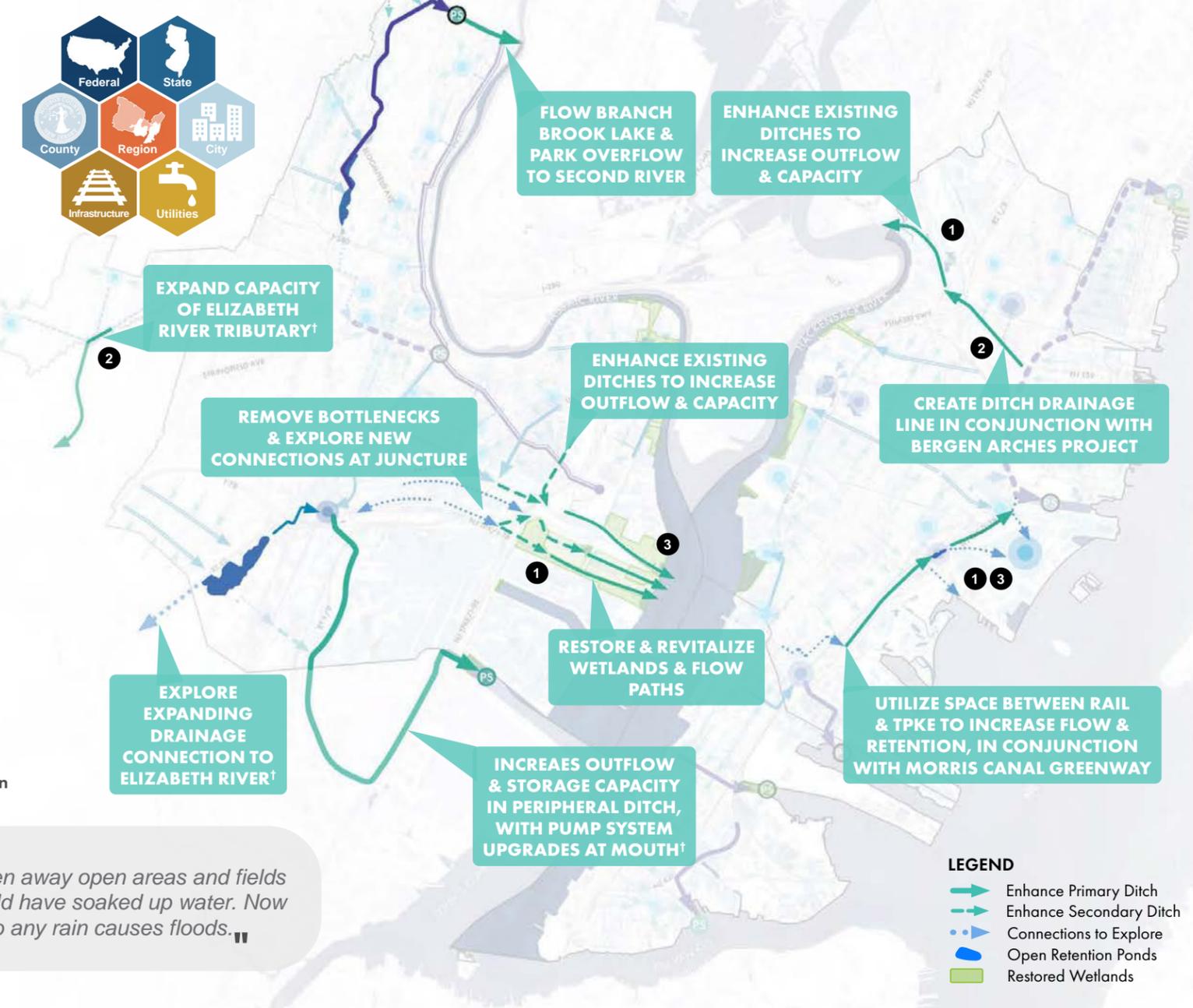


Lincoln Park Wetland Restoration Jersey City, NJ

## KEY PLAYERS



## PROPOSED ACTIONS



"The building has taken away open areas and fields of dirt that usually would have soaked up water. Now with no where to go any rain causes floods."

\*indicates a component of a multi-level defense †outside of study area, see note on page 128

# 04. REDUCE STORMWATER VOLUME THROUGH STORMWATER MANAGEMENT SITES

Physical

EASE  
PROTECT  
CONNECT

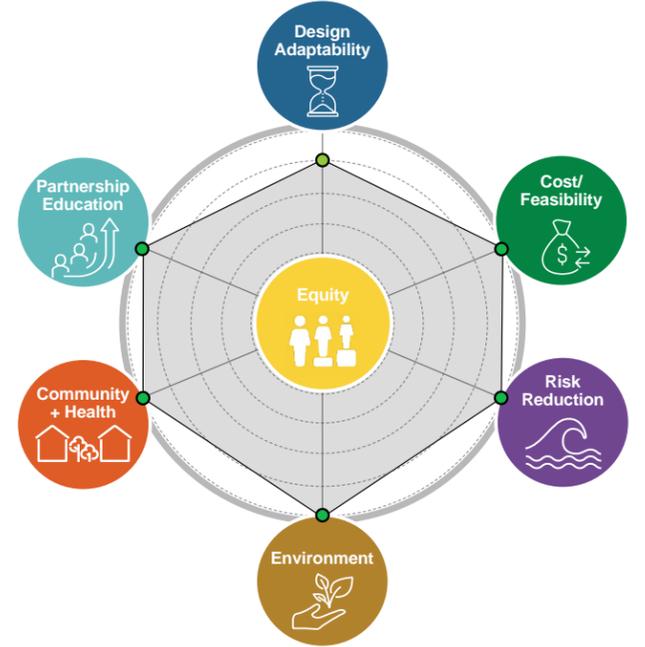
Existing sewer systems in the region are some of the oldest systems in the country. Land use, sewer condition, and rainfall patterns have changed since these systems were designed and installed, reducing the existing sewer systems capacity to effectively mitigate flood risk. Large retention or detention sites, if distributed throughout the watershed, can work with the existing sewer system to manage peak flows, essentially re-creating historic hydrologic conditions.

Large retention or detention sites require significant space, making it difficult to integrate these practices within heavily urbanized areas. Even so, larger stormwater management practices can be retrofitted into sites without changing the existing use. Examples include subsurface storage located under an existing park or parking lot, floodable areas that serve other functions during dry periods, and surface bioretention areas in parks that are already landscaped. These flexible practices are feasible for both public and private sites and present an opportunity to partner with local institutional landowners.

To leverage these opportunities, stormwater must be effectively routed to these sites. Since most of the region is served by combined sewers, re-routing flows from these existing sewers would result in health and maintenance issues. In certain areas, adding separate or high-level storm sewers can help direct drainage to these sites. Siting these practices in areas where flooding occurs can also take advantage of existing topography to direct stormwater into safe management areas more effectively. Balancing the need and opportunity is key to finding cost effective stormwater management sites.

## EVALUATION CRITERIA

This action is beneficial because it helps restore natural systems that existed pre-urbanization and enhances the natural process of how the natural environment manages stormwater runoff.



## CONSIDERATIONS FOR IMPLEMENTATION

PROJECT TIMELINE	
CAPITAL COSTS	
MAINTENANCE	MODERATE EFFORT Retaining water in urban environments presents problems associated with trash and pests. Some of this can be mitigated with design but these techniques still require regular maintenance.
PERMITTING	MODERATE EFFORT Large stormwater management sites require significant space at or near the ground surface. This can potentially impact other infrastructure or change the existing land use.
CONSTRUCTABILITY	LOW EFFORT Construction approaches and materials are widely available with multiple options, and can be implemented by many contractors.

## WHAT THIS COULD LOOK LIKE



Retention Park Milwaukee, WI



Water Square (Detention) Rotterdam, NL



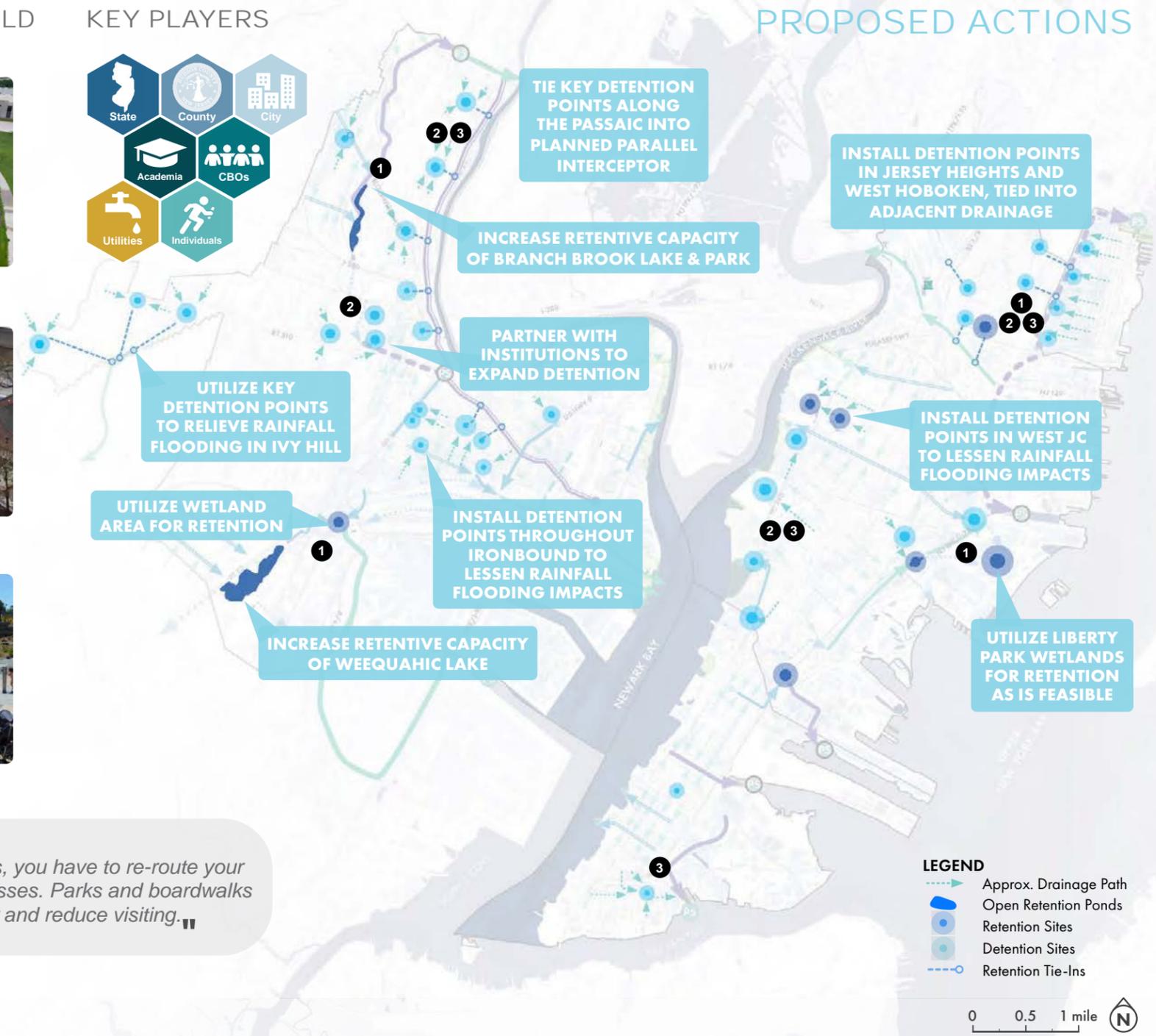
Jefferson Park (Detention) Seattle, WA

"During heavy rains, you have to re-route your trip to avoid underpasses. Parks and boardwalks go under water and reduce visiting."

## KEY PLAYERS



## PROPOSED ACTIONS



# 05. REDUCE IMPERVIOUS SURFACE & IMPROVE CONVEYANCE THROUGH GREEN INFRASTRUCTURE

Physical

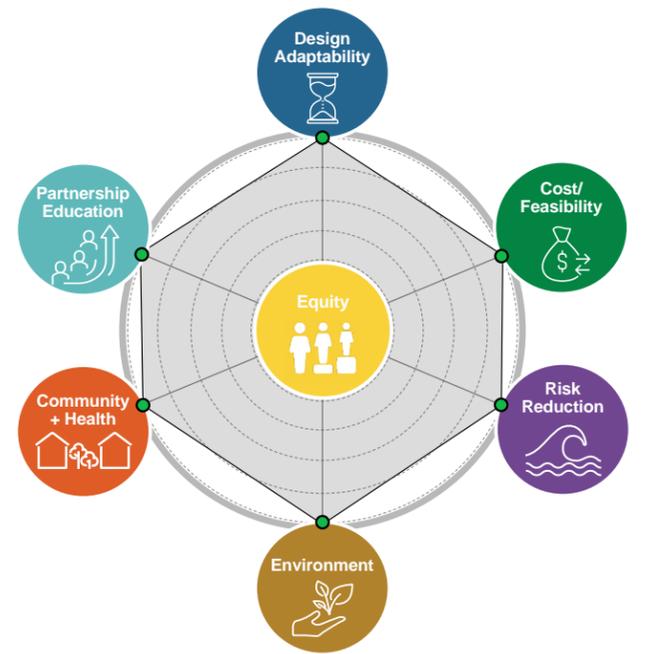
EASE  
PROTECT  
CONNECT

The effect of urbanization has led to impervious surfaces covering most of the region, exacerbating flood risk, leading to heat island effects, and limiting green space for the community. It is imperative to reduce impervious areas by converting these spaces to green space and green infrastructure. This approach will reduce runoff into the sewer system and provide additional space to manage stormwater. Taken as a distributed approach, these green spaces can provide a watershed solution to help mitigate flood risk.

As this technique converts impervious areas to green infrastructure, it will provide the most benefit when focused on areas where there is an overabundance of impervious areas, such as large parking lots, or where impervious areas can be converted with minimal impacts on the existing use, such as transition of a paved multipurpose play area to a turf or natural field. The Impervious Surfaces map helps show these areas of concentrated impervious surfaces, as well as those spaces that are publicly owned, to help prioritize areas for conversion.

## EVALUATION CRITERIA

This action is beneficial across board because of its integration of green infrastructure systems within the city which manages not only stormwater runoff but also increases green spaces within the city.



## CONSIDERATIONS FOR IMPLEMENTATION

PROJECT TIMELINE	🕒 🕒 🕒 🕒 🕒
CAPITAL COSTS	💰 💰 💰 💰 💰
MAINTENANCE	🏃 HIGH EFFORT
PERMITTING	🏃 LOW EFFORT
CONSTRUCTABILITY	🏃 MODERATE EFFORT

Impervious surfaces are easy to maintain, converting these to green spaces requires new and more frequent maintenance.

Converting impervious surfaces to natural uses is often seen as a beneficial project, care should be taken in areas of known contamination.

Construction techniques are well established but the conversion of land uses can require close coordination and outreach to stakeholders.

## WHAT THIS COULD LOOK LIKE



R.O.W. Green Infrastructure New York, NY



Permeable Paving Edison, NJ

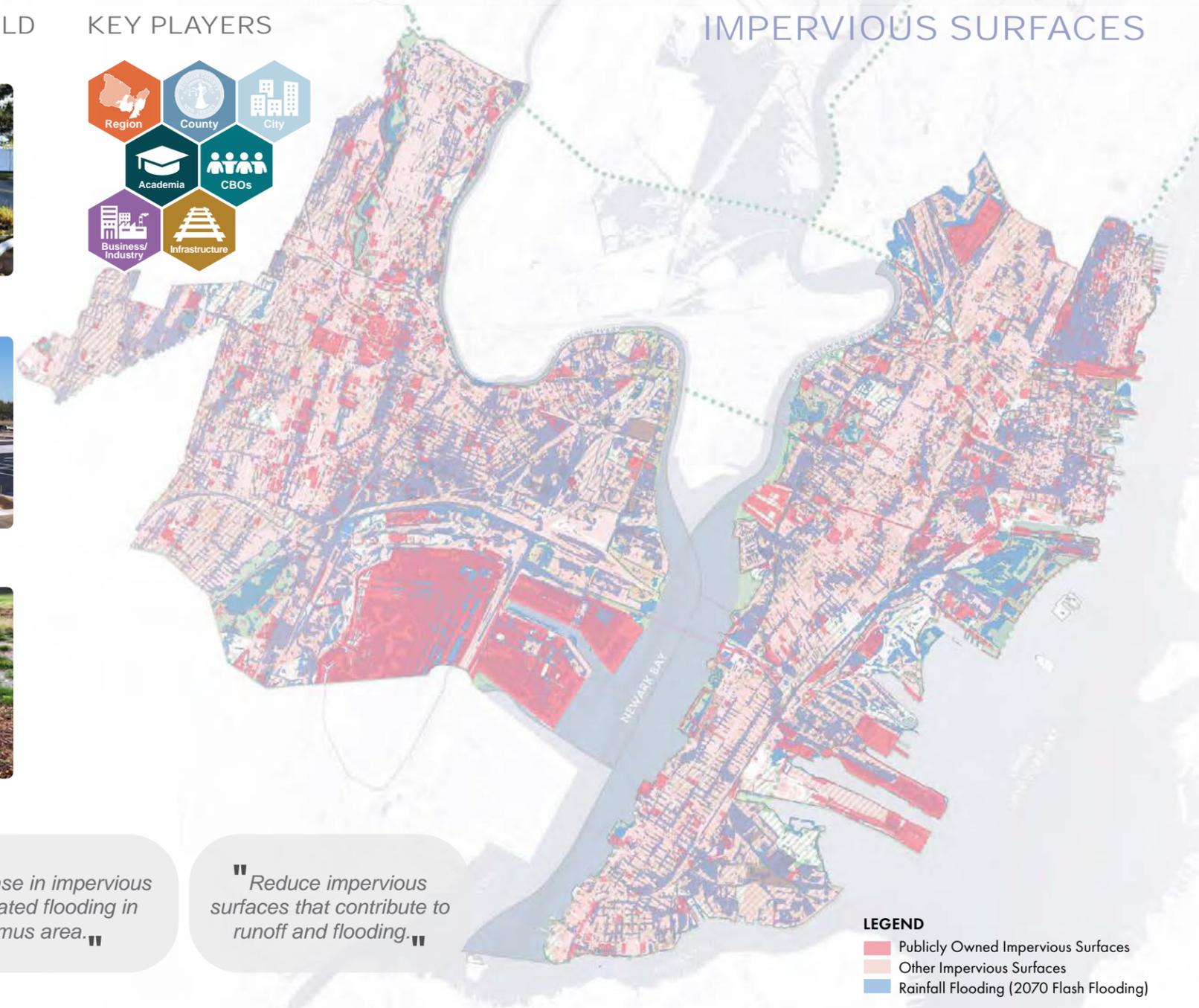


Rain Garden Woodland, CA

## KEY PLAYERS



## IMPERVIOUS SURFACES



**LEGEND**  
■ Publicly Owned Impervious Surfaces  
■ Other Impervious Surfaces  
■ Rainfall Flooding (2070 Flash Flooding)

0 0.5 1 mile

"I believe the increase in impervious areas has exacerbated flooding in Newark's Doremus area."

"Reduce impervious surfaces that contribute to runoff and flooding."



# 06. PROVIDE GUIDANCE TO MORE QUICKLY INTEGRATE STORMWATER MANAGEMENT IN OPEN SPACE

Policy

EASE  
PROTECT  
CONNECT

Open spaces, including parks, schoolyards, and playgrounds in urban areas like the Resilient NENJ region present opportunities for stormwater management (see action **Stormwater-04**). These sites are advantageous because they are largely publicly owned, may cover relatively large areas, and already include green spaces, such as grassy areas. Municipalities or other public entities are positioned to make decisions and advance projects at these spaces. By integrating stormwater management components such as subsurface storage, rain gardens / bio-retention, stormwater retention, or stormwater conveyance pathways, these places can serve as multi-purpose spaces that have recreational, public health, and flood reduction value. Publicly owned vacant lots or contaminated sites in the process of being cleaned up are also possible locations for integration of stormwater management and possible conversion to park space (see actions **All Hazards-01** and **All Hazards-02**). Implementation of this strategy furthers the goals of creating multi-purpose community spaces and converting vacant land for resilience, which were identified as key components of community vision through the Resilient NENJ engagement process.

Stormwater management can be integrated into existing open space through capital improvement projects alongside park improvements and renovations, or to convert vacant spaces into park space. Coordination with the NJDEP Green Acres program is key for implementation of projects because much of the existing open space in the region is encumbered, or limited, by Green Acres requirements (these sites are listed on local ROSIs, or Recreation and Open Space inventories) and Green Acres provides funding to support creation of new park space. Although the Green Acres requirements currently allow projects that include stormwater management, the approvals process can be clarified and simplified with creation of guidelines for project teams. NJDEP Green Acres and Resilient NENJ have been collaborating to develop guidelines to facilitate projects of this nature. Funding for these projects can be paired from multiple types of funding streams, for example by tying together FEMA funding for stormwater management components and Green Acres funding for park renovations.

## STREAMLINING APPROVALS FOR RESILIENCE PROJECTS IN PARKS

The Fitzpatrick Park renovation project in Bayonne is an example of a playground restoration project that integrated stormwater management and required coordination and approvals with NJDEP Green Acres. In late 2021, the City of Bayonne, in partnership with the Hudson County and the State, opened the renovated Fitzpatrick Park that included stormwater storage beneath the park and sewer separation in nearby streets. A streamlined process for approvals and guidelines for municipalities, which Green Acres is developing with Resilient NENJ's support, will allow more projects like Fitzpatrick Park to advance. The guidelines will include eligibility criteria for projects, example project features, and details on the process for engaging Green Acres.

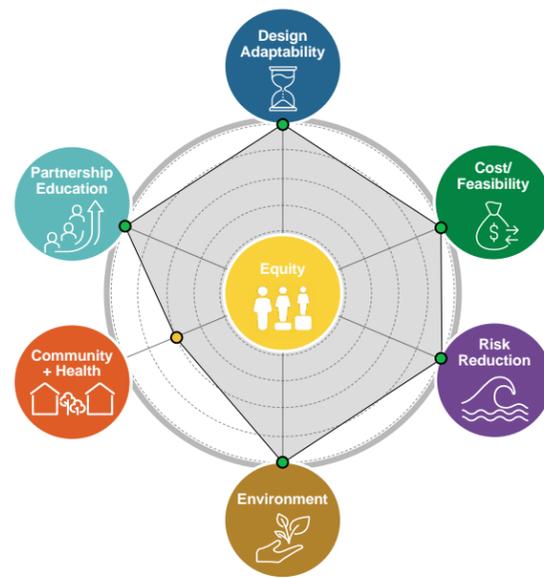
"We want resiliency more integrated into the public realm - all parks and waterfront open spaces should offer resilient functionality embedded in their design."

"(I want to see) incorporation of resilience and flood mitigation into public spaces and infrastructure so that infrastructure is multi-functional."

## KEY PLAYERS

- STATE**
  - The NJDEP Green Acres Program can streamline approvals for projects that integrate stormwater management by creating guidelines for project teams
- CITY**
  - Municipalities should adjust planning processes to ensure that consideration of stormwater management components is integrated into park construction and renovation projects.
  - When municipalities identify specific sites to advance projects, they should engage the Green Acres program early in the planning process to initiate approvals
  - Resilient NENJ has identified various locations for possible projects, as included in **Stormwater-04** actions
- ACADEMIA & COMMUNITY BASED ORGANIZATIONS**
  - These entities can support the goal by partnering with municipalities to identify project opportunities and supporting implementation as project partners

## EVALUATION CRITERIA



This action will help expedite achievement of region priorities in the areas of stormwater and green infrastructure.

## CONSIDERATIONS FOR IMPLEMENTATION

SCALE	ACTION TYPE
<p>STATE CITY</p>	<p>Guidelines for Green Acres can be implemented at the State scale. The Resilient NENJ municipalities can each adopt strategies for integrating stormwater into their own open space</p> <p>Policy and Governance Physical and Nature Based Solutions</p>
PRIORITY FOR IMPLEMENTATION	1
PROJECT TIMELINE	< 2 years for Green Acres guidelines Guidelines for Green Acres approval have been drafted and could be released within a year
COSTS	Minimal Minimal costs are needed to develop and implement Green Acres Guidelines. Costs will be for the time to draft and revise guidelines, publish, and disseminate them.
OPERATIONS	No new budget or funding streams needed for implementation of the guidelines.
COORDINATION	Green Acres guidelines already are largely conducive to these projects but require some coordination between local and state agencies to facilitate advancement.
IMPLEMENTABILITY	Storage is becoming increasingly popular as a practice for stormwater management, though relatively fewer projects that integrate stormwater management in open space have advanced through the approvals process.

# 07. UPDATE STORMWATER MANAGEMENT ORDINANCES

Policy

EASE  
PROTECT  
CONNECT

The action involves reviewing and updating the municipal stormwater management ordinance for each municipality to be consistent with State minimum standards plus additional higher standards based on best practices, where appropriate. Ordinances are adopted by the municipal governing body (i.e. City Council) with an advisory review from the planning board.

NJDEP's statewide models provide the basic ordinance structure and potential language. For each municipality, the ordinance needs to be tailored to fit within the numbering and structure of the municipal code. Higher standards that are appropriate for local conditions should be incorporated. For instance, in urban environments with smaller lots and infill development, the stormwater management threshold for major developments can be reduced to encompass more projects.

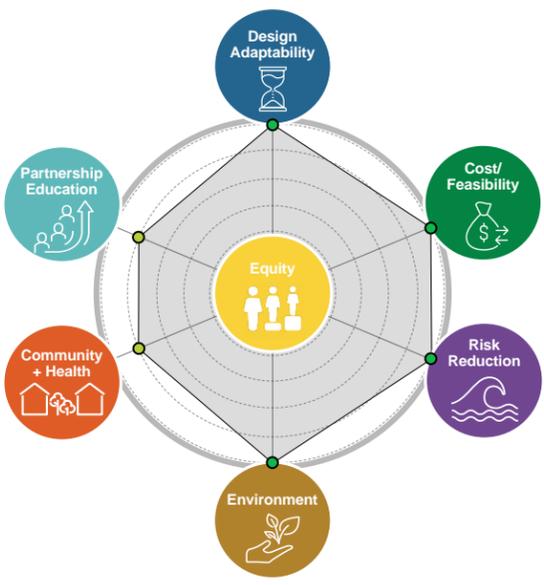
## KEY PLAYERS

- CITY**
  - Prepare updated ordinances and adopt them through the governing body process, with planning board review. As of September 2022, each of the cities are exploring opportunities to integrate higher standards into their stormwater management ordinances, which will need to be updated to align with the anticipated NJ PACT regulations once they go into effect
- INDIVIDUALS**
  - Participate in planning board and governing body review processes to ensure consistency with the Master Plan and best practices

## CONSIDERATIONS FOR IMPLEMENTATION

<b>SCALE</b> CITY Ordnances are adopted at the local level by each municipality.	<b>ACTION TYPE</b> Policy and Governance	<b>PRIORITY FOR IMPLEMENTATION</b> 1
<b>PROJECT TIMELINE</b> The Ordinance adoption process typically takes 2 to 3 months from start to finish.	<b>COSTS</b> <b>&lt; \$15,000 per municipality</b> Implementation assistance may be provided through the RNJ process, but generally nominal professional fees / staff time are required for implementation.	
<b>OPERATIONS</b> LOW EFFORT Ordinance updates are part of typical municipal operations.	<b>COORDINATION</b> LOW EFFORT Updates will require typical coordination for ordinance amendment process as well as coordination across the region for consistency.	<b>IMPLEMENTABILITY</b> LOW EFFORT Many of the higher standards for consideration are common measures to promote resilience.

## EVALUATION CRITERIA



Similar to land use policies, the flood damage prevention ordinance can help limit the creation of new risk. Nevertheless, these policies are currently tied to FEMA flood insurance studies, which look backward. Expansion of the policies to consider future expected risk could increase their long-term value.

## WHAT ISSUES DOES THE ACTION HELP ADDRESS?

New development is held to a higher standard for stormwater management, which can help reduce impacts on overburdened sewer systems and mitigate flooding by requiring developers to integrate stormwater management and green infrastructure.

## WHAT ARE THE EXPECTED OUTCOMES?

Stormwater management improvements will be installed for a wider range of development projects, which will have steady, incremental benefits to the overall sewer systems, and potentially more tangible and immediate benefits in specific local areas.



"New construction rattles old sewers, changes system and impacts drainage."

"Focus for the project should be on promoting smart land use and proper ordinances, especially given the industrial past of Bayonne and large concentration of areas that are ripe for redevelopment."

## COASTAL DEVELOPMENT

New developments in coastal areas must be built to higher standards and must not contribute to a worsening of existing hazard conditions.

Image Source: Resilient NENJ

3.2.3

ACTIONS THAT ADDRESS  
OTHER CLIMATE-RELATED  
AND ENVIRONMENTAL  
JUSTICE NEEDS

# INTRODUCTION

In addition to coastal and stormwater flooding, Northeastern NJ is subject to a variety of other climate-related hazards that are deeply intertwined with environmental justice issues. 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. As further detailed in the Resilient NENJ **Climate Hazards Assessment**, increasingly severe urban heat island and air pollution have serious implications for public health—issues that the community has repeatedly emphasized throughout the Resilient NENJ process. Additionally, hazards related to groundwater rise, such as possible interaction with contaminated sites, as well as long-term water supply and quality issues will put much of the region’s population at risk. Many climate-related hazards interact in complex ways. For example, heat contributes to air quality, fire risk, damage to transportation infrastructure, power outages, and other critical services.

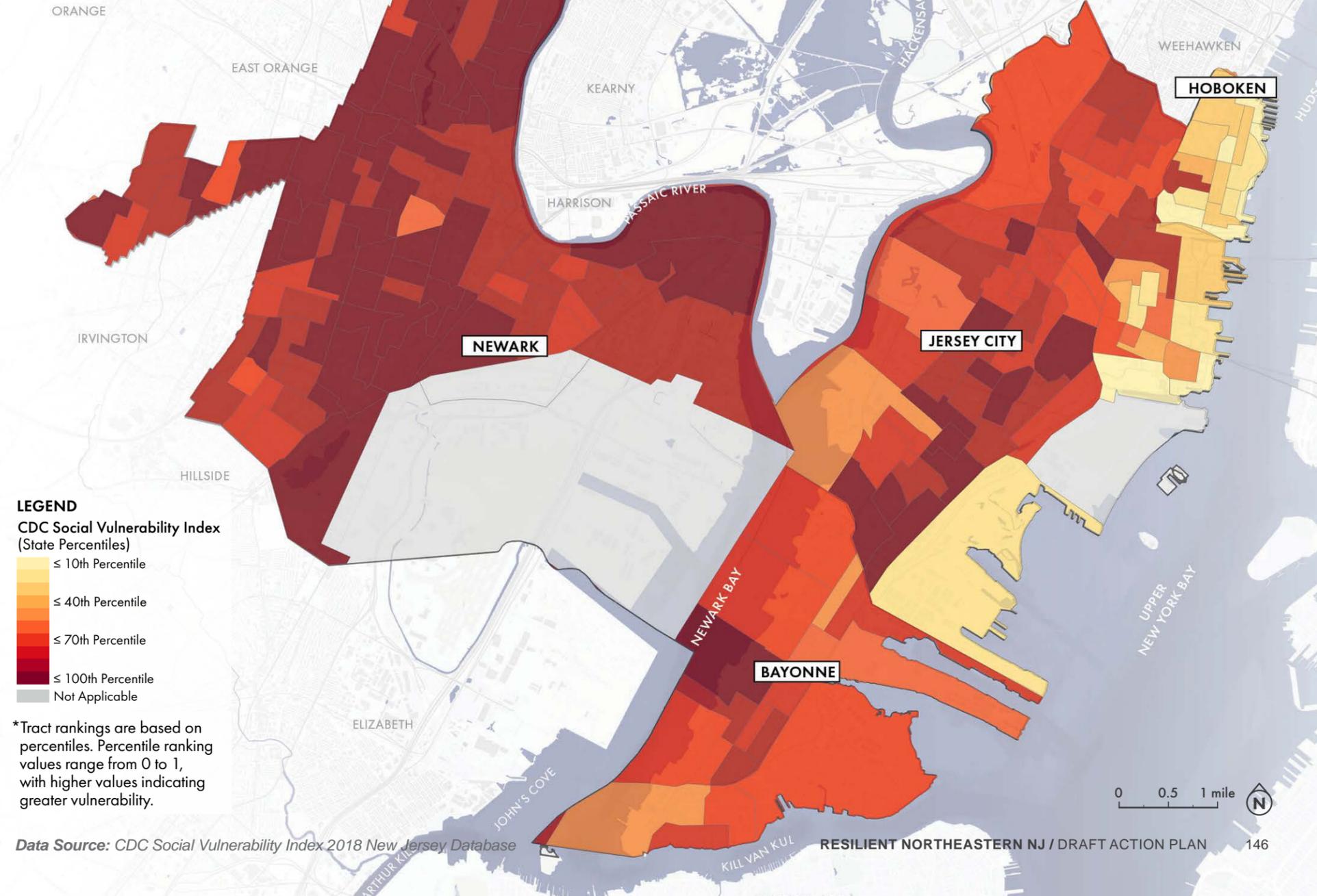
This section provides recommended actions that address a variety of these climate-related issues. Some may be focused on a single hazard, but most of these actions have co-benefits, meaning they can address multiple issues at once. For example, green infrastructure can mitigate flooding, improve air quality, improve water quality, and add aesthetic value. Clean-up of contaminated sites eliminates hazard from toxic chemicals, which may be exacerbated by flooding, and can present opportunities for open space or economic development.

## WHAT IS SOCIAL VULNERABILITY?

The Centers for Disease Control and Prevention (CDC) **Social Vulnerability Index** incorporates 15 factors grouped into four common themes: socioeconomic status, household composition, race/ethnicity/language, and housing /transportation. The index uses US Census data to rank the social vulnerability of each census tract. As shown, most of the Northeastern New Jersey region has a high concentration of socially vulnerable communities, including lower income, elderly, and minority populations.

*“Implement projects which make a meaningful impact for all of our region’s residents.”*

## Social Vulnerability Index (SVI)



## WHAT OTHER CLIMATE RELATED IMPACTS DOES NORTHEASTERN NJ FACE? THE CHALLENGE.

In general, socially vulnerable communities in the region—including, but not limited to, the nearly 141,000 people living in poverty in Northeastern NJ<sup>1</sup>—face a disproportionately high degree of potential exposure to and impacts from urban heat, poor air quality, hazardous waste, and contaminated drinking water. Many neighborhoods in the region that rank high in social vulnerability metrics will experience especially acute pockets of summer heat. Children, the elderly, the sick, and the poor are especially vulnerable to health impacts including heat stroke, dehydration, and other dangerous conditions.

Urban heat will also contribute to another serious hazard with its own primary causes—poor air quality. Northeastern New Jersey sees high ambient PM<sub>2.5</sub> (particulate matter, an air pollutant) concentrations relative to the rest of the state, with most census tracts in the region in the 80th-99th statewide percentiles.<sup>2</sup> High and increasing levels of PM<sub>2.5</sub> are largely a consequence of increased incidence of wildfires (including as far as the western U.S.), increased levels of dust due to droughts, and higher temperatures leading to increased evaporation of substances like sea salt, ash, and organic materials.<sup>3</sup> The region is also likely to see increasing concentrations of ground-level ozone, also known as haze or smog, largely driven by a combination of high temperatures, especially heatwaves and urban heat island, and direct emissions from things like motor vehicles, industrial activity, and gas stations. People with existing asthma, allergies, and other respiratory diseases may be especially vulnerable to respiratory impacts, leading to increased respiratory and cardiovascular health problems and, consequently, a greater number of premature deaths.<sup>4</sup> Socially vulnerable areas and communities with a history of redlining and segregation typically experience higher levels of air pollution, owing to a variety of factors, such as proximity to industrial uses and limited green space. These effects are exacerbated by higher prevalence of urban heat island in these neighborhoods, which captures ground-level ozone and contributes to stagnant air.<sup>5</sup> Such communities also tend to have less access to medical care and health insurance, increasing the health risks posed by poor air quality.

Further, communities in Northeastern New Jersey have very high proximity to hazardous waste compared to the rest of the state and the nation. According to the Environmental Protection Agency, sources of hazardous waste range from industrial manufacturing process wastes to batteries and may come in many forms, including liquids, solids, gases, and sludges. Rising sea and groundwater levels can remobilize contaminants that were previously held in soils above the water table. Released contaminants can also enter aquifers and become concentrated plumes that may flow with groundwater.<sup>6</sup> The presence of contamination has led to health hazards during past flood events as flood waters have mixed with pollutants and flooded residential areas and could increasingly pose a threat—especially as groundwater levels rise in parallel with sea level rise.

Due to the region's history of redlining practices, marginalized and minority communities face disproportionately high exposure to these hazards, as these populations were previously forced to settle in areas facing high industrial activity.

<sup>1</sup> U.S. Census Bureau. *QuickFacts. Population Estimates, July 1 2021 (V2021)*.

<sup>2</sup> US Environmental Protection Agency. (2022, April 1). *EJScreen: Environmental Justice Screening and Mapping Tool*.

<sup>3</sup> NJDEP. (2020). *New Jersey Scientific Report on Climate Change*. <https://dspace.njstatelib.org/xmlui/handle/10929/68415>.

<sup>4</sup> *Ibid*

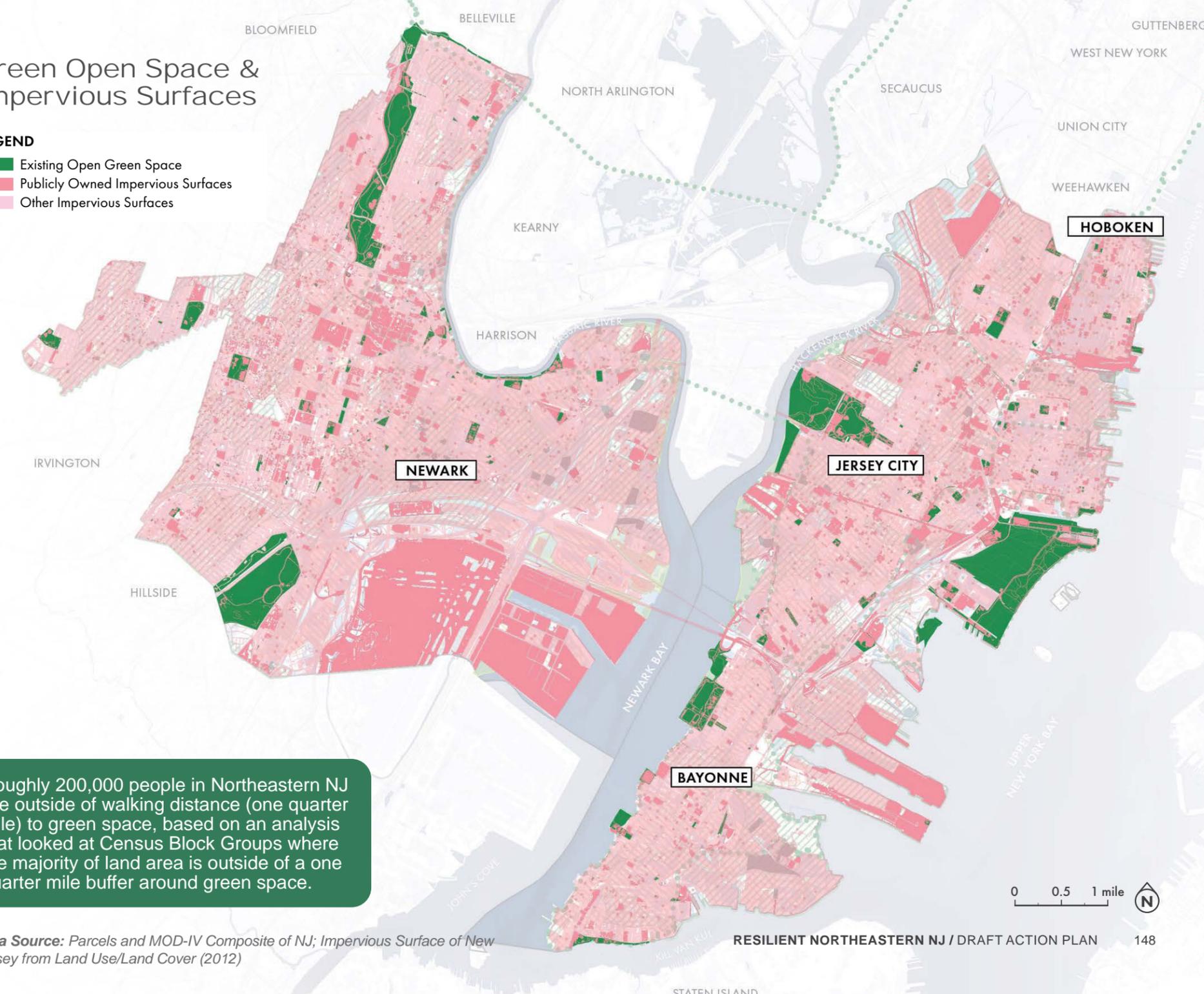
<sup>5</sup> US Department of Environmental Protection. (2016, August). *What Climate Change Means for New Jersey*. <https://19january2017snapshot.epa.gov/sites/production/files/2016-09/documents/climate-change-nj.pdf>.

<sup>6</sup> US EPA. (1993). *Wellhead Protection: A Guide for Small Communities*.

## Green Open Space & Impervious Surfaces

### LEGEND

- Existing Open Green Space
- Publicly Owned Impervious Surfaces
- Other Impervious Surfaces



Roughly 200,000 people in Northeastern NJ live outside of walking distance (one quarter mile) to green space, based on an analysis that looked at Census Block Groups where the majority of land area is outside of a one quarter mile buffer around green space.

# WHAT ARE WAYS WE CAN ADDRESS THESE CLIMATE-RELATED HAZARDS? THE TOOLBOX.

The climate hazard toolbox (non-flood related) is included in the **Climate Hazards Assessment**. Many tools within that assessment can be applied by individual residents, organizations, and municipalities, and are worth further exploration at those scales. For this Action Plan, Resilient NENJ recommends focusing on actions likely to have the biggest impact. This means leaning into tools to address environmental justice issues and hazards related to urban heat, air pollution, and hazardous waste (including its interactions with groundwater) that erode daily quality of life across the region.

Green infrastructure is a central tool. If thoughtful in its implementation, it can help mitigate multiple hazards in addition to flood and stormwater risk, especially urban heat island and poor air quality, but also potentially groundwater quality and risk from contaminants, water supply (via long-term groundwater recharge), and mosquito-borne illness. Green infrastructure can include anything from bioswales on the side of the road, to converting underused property to green space, to green roofs. Access to green space can also improve community health more generally.<sup>7</sup> The project team has heard a

great deal of excitement about green infrastructure, access to green space, in particular, throughout the Resilient NENJ engagement process due to its association with quality of life, temperature management, and a host of other reasons.

This report provides criteria for site selection and further feasibility study, and maps areas that provisionally align with those criteria. Resilient NENJ's recommendations are a tool that can be applied in different ways and at multiple scales. Green infrastructure demonstration projects have already been completed in areas across the region and various studies have been completed, or are currently ongoing, that identify specific sites for green infrastructure installations.

While thoughtful implementation of green infrastructure can accomplish a great deal, it must be paired with other tools, such as higher land use and building standards, comprehensive remediation efforts, and widespread, accessible technical and financial assistance for individuals and private property owners. These tools all play a critical role in the proposed actions presented below.

## WHAT ABOUT THE RELATIONSHIP BETWEEN AIR QUALITY AND VEHICLE TRAFFIC? WHAT ABOUT MOBILITY?

The region is doing a lot of work in this space<sup>8</sup> and should continue, lean into, and expand all explorations to convert to electric vehicles and increase non-vehicle dependent mobility to help address the risks that are increased by the presence and need for heavy vehicular traffic in the region. Roadways also take up space that, if repurposed, could be used for housing, green space, and other critical needs that will only become more urgent as time goes on. Transportation and mobility needs in Northeastern NJ are complex and intertwined with both the needs of individual neighborhoods and communities, and the broader metropolitan area (e.g., commuting between the region and New York City) and nation (e.g., major industry, ports, and the airport). Long-term, these initiatives could be connected through a similar initiative to Resilient NJ focused on transportation only, and could be explored by the Regional Infrastructure Coordination Council recommended in **Section 3.3.1**.

<sup>7</sup> University of Delaware Cooperative Extension. (n.d.) "Human Benefits of Green Space." <https://www.udel.edu/academics/colleges/canr/cooperative-extension/fact-sheets/human-benefits-of-green-spaces/>.

<sup>8</sup> For example, Newark's micromobility work, the State's requirements to identify electric vehicle charging stations, the pedestrian network master planning in each municipality, and more.

## PLANTED BIOSWALES (URBAN)

Right-of-way bioswales are vegetated drainage courses located in sidewalks to capture, detain, and infiltrate runoff from streets, allowing any excess rain water to enter the piped stormwater system.



**CO-BENEFITS**  
 ECONOMIC ECOLOGICAL

## INSTALL GREEN ROOFS

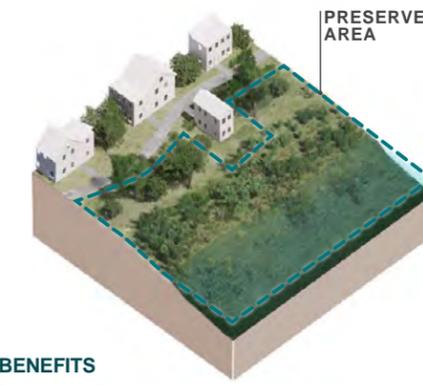
Green roofs can slow down, absorb and retain rainwater, as well as break up heat islands through naturally cooler surfaces and evapotranspiration.



**CO-BENEFITS**  
 ECONOMIC EDUCATION RECREATION ECOLOGICAL

## ACQUIRE LAND FOR OPEN SPACE PRESERVATION

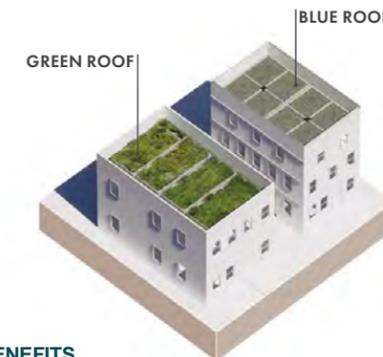
Acquiring, creating and preserving open space ensures that residents can have access to these much needed spaces and can help to improve several climate-related issues such as heat island and soil contamination.



**CO-BENEFITS**  
 ECONOMIC ECOLOGICAL

## GREEN & BLUE ROOFS

Green and blue roofs can slow down, absorb and retain rainwater, this temporary water storage then allows for the gradual release or evaporation of stored water.



**CO-BENEFITS**  
 ECONOMIC EDUCATION RECREATION ECOLOGICAL

## STREAM DAYLIGHTING & RESTORATION

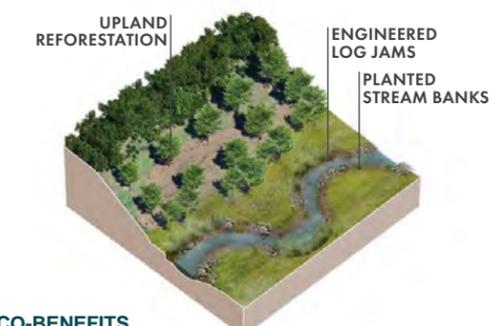
Stream daylighting is the exposure of some or all of the flow of waterways from pipes or culverts. This can help eliminate flooding issues by reconnecting piped stream channels with the floodplain and recreating a functioning floodplain and riparian area.



**CO-BENEFITS**  
 ECONOMIC EDUCATION RECREATION ECOLOGICAL

## NATURAL CHANNEL DESIGN/ STREAM RESTORATION

Streams that are artificially modified through straightened channels or altered stream banks result in instability where bed and bank erosion is a common consequence. Natural streams and floodplains provide stability to manage floodwaters safely, minimizing impacts to infrastructure.



**CO-BENEFITS**  
 ECONOMIC EDUCATION RECREATION ECOLOGICAL

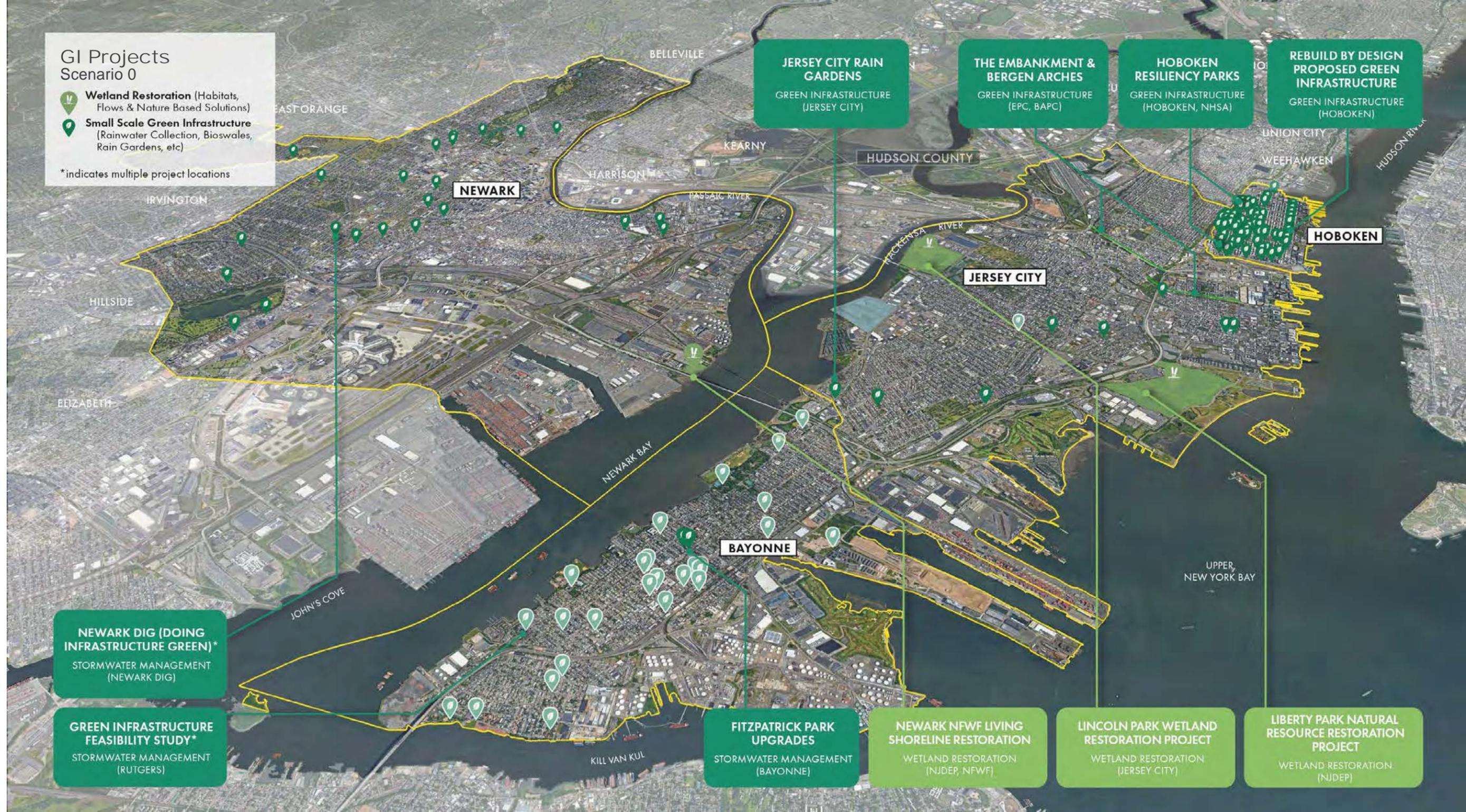
## WHAT IS ALREADY BEING DONE? SCENARIO 0.

There are several existing initiatives to create and design green spaces, including the NJDEP Green Acres Program that conducts land acquisitions and provides loans and grants to nonprofits for acquisition and conservation purposes. The Hoboken Green Infrastructure Strategic Plan and Jersey City Urban Environmental Green Infrastructure Design Plan each create a framework for city-wide green infrastructure investments as a mechanism for improving stormwater management, mitigating urban heat island and poor air quality, and creating socially resilient communities. Newark Doing Infrastructure Green (DIG) is a partnership between various entities including the City of Newark, consultants, community-based organizations, environmental groups, and PVSC that has implemented over a dozen green infrastructure projects across Newark. Infrastructure Feasibility Studies conducted by Rutgers and adopted by the Cities of Bayonne, Jersey City, and Newark could serve as initial guides for identifying projects and strategies for implementation. Several existing initiatives related to heat mitigation are described in action **All Hazards-03b**.

Other work has been done across the region to shore up infrastructure against additional climate hazards. NJDEP recently launched a Water Infrastructure Investment Plan (WIIP) to fund water-related capital improvement projects, including through NJ Water Bank-issued green bonds. The NJDEP Office of Environmental Justice's Community Collaborative Initiative (CCI) works to remediate brownfield sites in the state, and Jersey City is undertaking a Climate Vulnerability Assessment for priority assets. See the toolbox section of the **Climate Hazards Assessment** for more on existing work to address climate related hazards, including work related to other action types (i.e. outreach, policy, service and program development, emergency preparedness and response).

"Concern: pollutants from industry and polluted sites being spread and making their way into waterways when it rains."

"Consider using bump outs and traffic calming to both improve pedestrian experience and help provide GI for stormwater and urban heat."



## WHAT ARE OTHER KEY CONSIDERATIONS? DECISION DRIVERS.

### Climate-related risk is already high, prevalent, and complex across the region.

Climate-related risk is significant across the region on all fronts (coastal, stormwater, heat, and other climate hazards) and involves private property and densely populated, built-up areas. When risk is high, widespread, and complex, it can complicate targeting specific areas for action based on risk alone.

### As such, Resilient NENJ needs to focus attention on actions that will have the most impact most quickly.

There is a need for near-term solutions to build momentum, catalyze greater investment toward change, while having the most benefit to those most affected.

#### To do this, the Action Plan proposes to:

- 01 Provide green space and green infrastructure where it can have the most impact**
  - 01a** Provide green space where it is lacking
  - 01b** Increase green infrastructure where it can reduce heat impacts
  - 01c** Increase adoption through small-scale green infrastructure programs
- 02 Reduce risk from and incorporate resilience into contaminated sites**
  - 02a** Resilience-related higher standards on contaminated sites for remediation and redevelopment
  - 02b** Creating a resilient transformation pipeline
- 03 Incorporate resilience in new development, public space, and infrastructure**
  - 03a** Create or update Resilient Building Design Guidelines
  - 03b** Adopt requirements and incentives for heat mitigation in buildings and public properties
  - 03c** Integrate resilience-related needs and considerations into LTCPs

## WHAT SHOULD WE DO ABOUT IT? THE STRATEGY.

EASE burden by identifying high opportunity sites, using a “dig once” approach, and simplifying approval processes

CONNECT natural habitats through distributed green spaces and connect people to open space

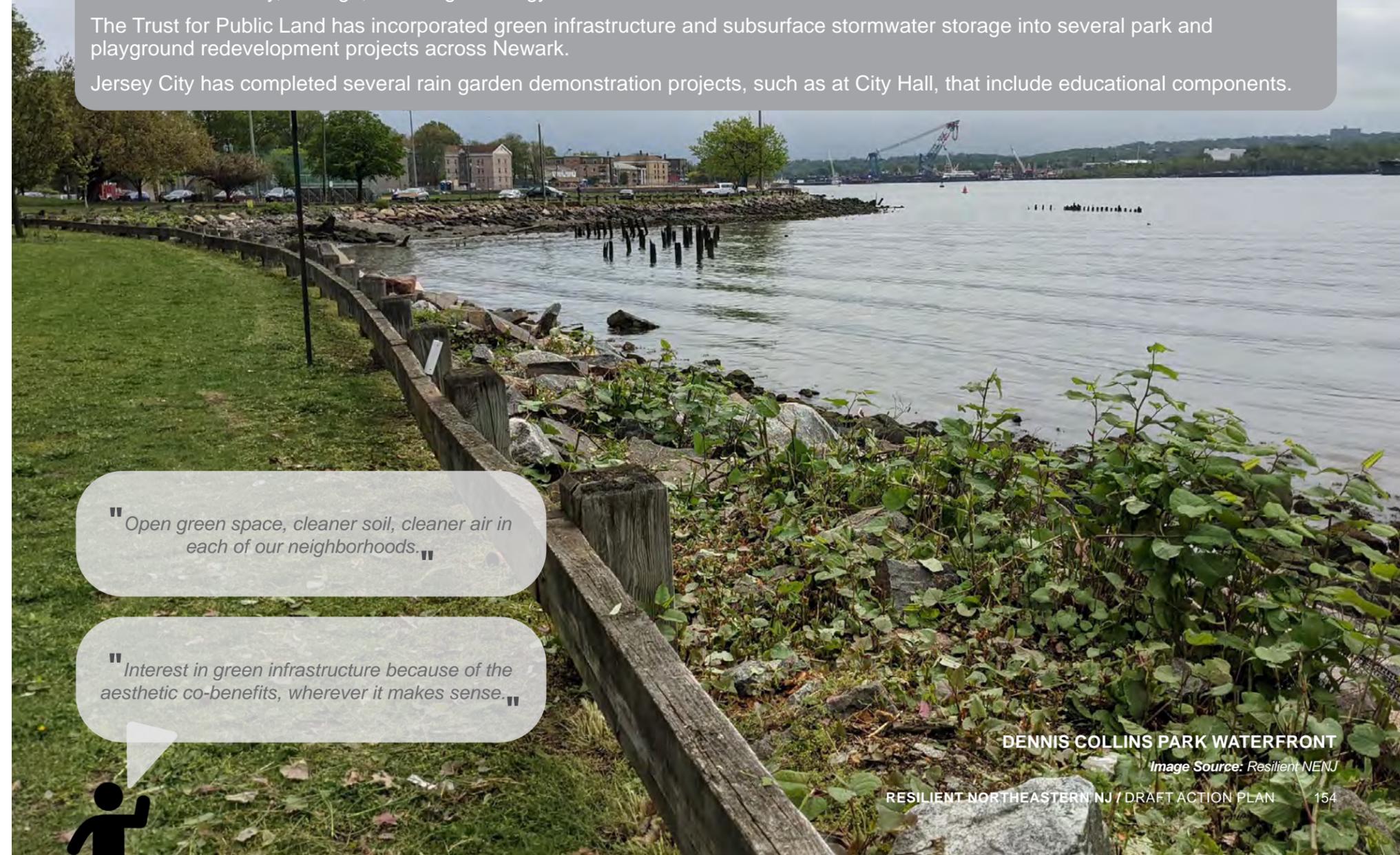
PROTECT people by cleaning up contamination and addressing climate hazards at the same time

### ADDITIONAL EXAMPLES OF GREEN INFRASTRUCTURE PROJECTS ON PUBLIC PROPERTY

Hoboken’s Washington Street Rehabilitation and Redesign project, which included water system improvements and roadway reconstruction on Washington Street, also integrated green infrastructure. The project constructed 15 rain gardens at intersections as part of the road reconstruction. Hoboken also has various green infrastructure projects planned as part of the Rebuild by Design-Hudson River Delay, Storage, Discharge strategy.

The Trust for Public Land has incorporated green infrastructure and subsurface stormwater storage into several park and playground redevelopment projects across Newark.

Jersey City has completed several rain garden demonstration projects, such as at City Hall, that include educational components.



“Open green space, cleaner soil, cleaner air in each of our neighborhoods.”

“Interest in green infrastructure because of the aesthetic co-benefits, wherever it makes sense.”

DENNIS COLLINS PARK WATERFRONT

Image Source: Resilient NENJ

# 01. PROVIDE GREEN SPACE AND GREEN INFRASTRUCTURE WHERE IT CAN HAVE THE MOST IMPACT

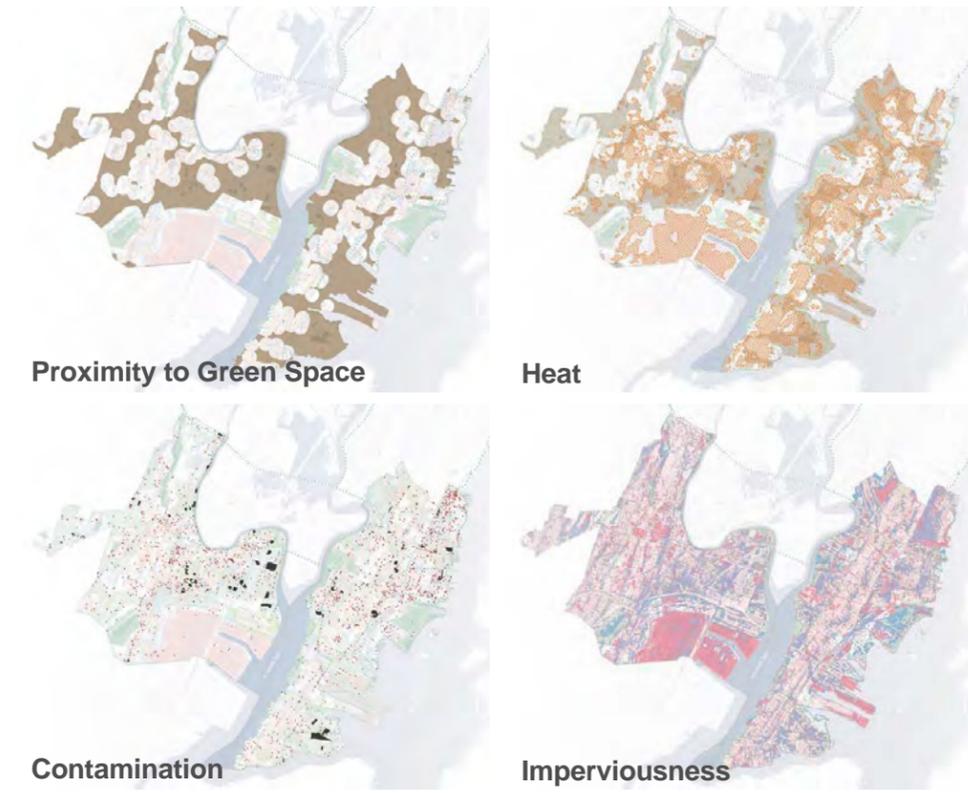
Physical

To provide green space and green infrastructure where it can have the most impact, the Action Plan proposes to:

- 01a Provide green space where it is lacking
- 01b Increase green infrastructure where it can reduce heat impacts
- 01c Increase adoption through small scale green infrastructure programs

## INCREASING URBAN TREE CANOPY

Trees address urban heat island effect and provide cooling shade, improve air quality, support ecosystems, and have aesthetic benefits. They also contribute to reducing stormwater runoff. The City of Jersey City and the community-based organization Sustainable JC have been working to increase tree canopy by starting with an assessment of what's already there. They have completed tree canopy censuses to track each tree and its health in Jersey City. Hoboken and Newark have also completed similar assessments, and they have included training and deploying community volunteers to help gather data.



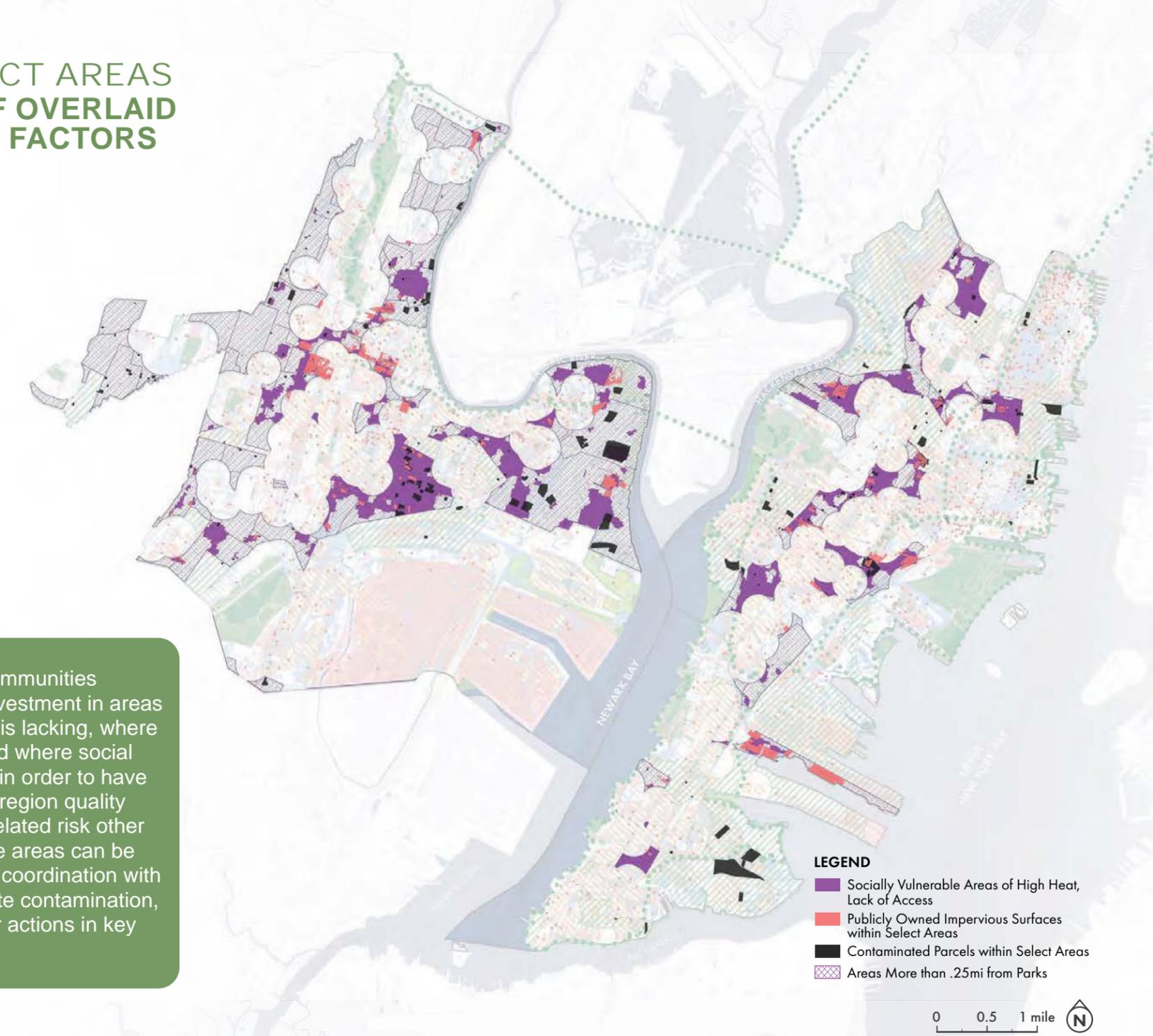
Mapped Resilience factors to be considered when siting Green Infrastructure

"Open green space, cleaner soil, cleaner air in each of our neighborhoods."

"Interest in green infrastructure because of the aesthetic co-benefits, wherever it makes sense."

## HIGH IMPACT AREAS RESULTS OF OVERLAID RESILIENCE FACTORS

Resilient NENJ's communities should first focus investment in areas where green space is lacking, where heat risk is high, and where social vulnerability is high in order to have the most impact on region quality of life and climate-related risk other than flooding. These areas can be further prioritized in coordination with actions to reduce site contamination, leading to first order actions in key areas of each city.



# 01a. PROVIDE GREEN SPACE WHERE IT IS LACKING

Physical

A key factor in identifying priority spaces for greening projects involves looking at how far people are from existing parks and open space. The project team considers ¼ mile to be walking distance to a park. The brown areas displayed in the map below are all the areas where people are more than ¼ mile from an existing park, so adding green space to these areas would have a greater impact in ensuring that people can access green space. This action involves a distributed, opportunistic approach to integrate green infrastructure projects in as many spaces as possible where it does not currently exist. Opportunities include around paved public parks, roadways, and at other publicly owned properties, in other privately owned sites, especially those that may be impervious surface or are in the process of being cleaned up due to contamination, and at people's homes and businesses.

EASE  
PROTECT  
CONNECT

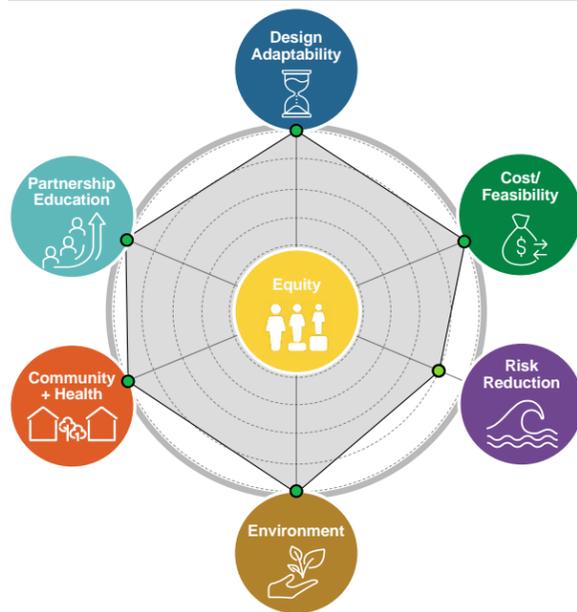
## WHAT ISSUES DOES THE ACTION HELP ADDRESS?

- Most census tracts within the NENJ region—many of which are also within areas currently experiencing above-average summer heat (as addressed in the next action)—have a very low density of green space by their total area, indicating a lack of distributed and connected urban green spaces. Instead, most green space in NENJ is concentrated within several large parks. This results in inequitable distribution of access to green space, especially in the areas that need it most to help mitigate concentrated impacts of urban heat and poor air quality. Depending on the type of green infrastructure used, green spaces can also mitigate stormwater and groundwater flooding while supporting various habitats (see Section 3.2.2).

## WHAT ARE THE EXPECTED OUTCOMES?

- Greater access to green space in communities where it is currently lacking; improved public health, mental health, and quality of life; improved walkability and connectivity—including habitat connectivity; and mitigation of urban heat island and poor air quality in socially vulnerable communities

## EVALUATION CRITERIA



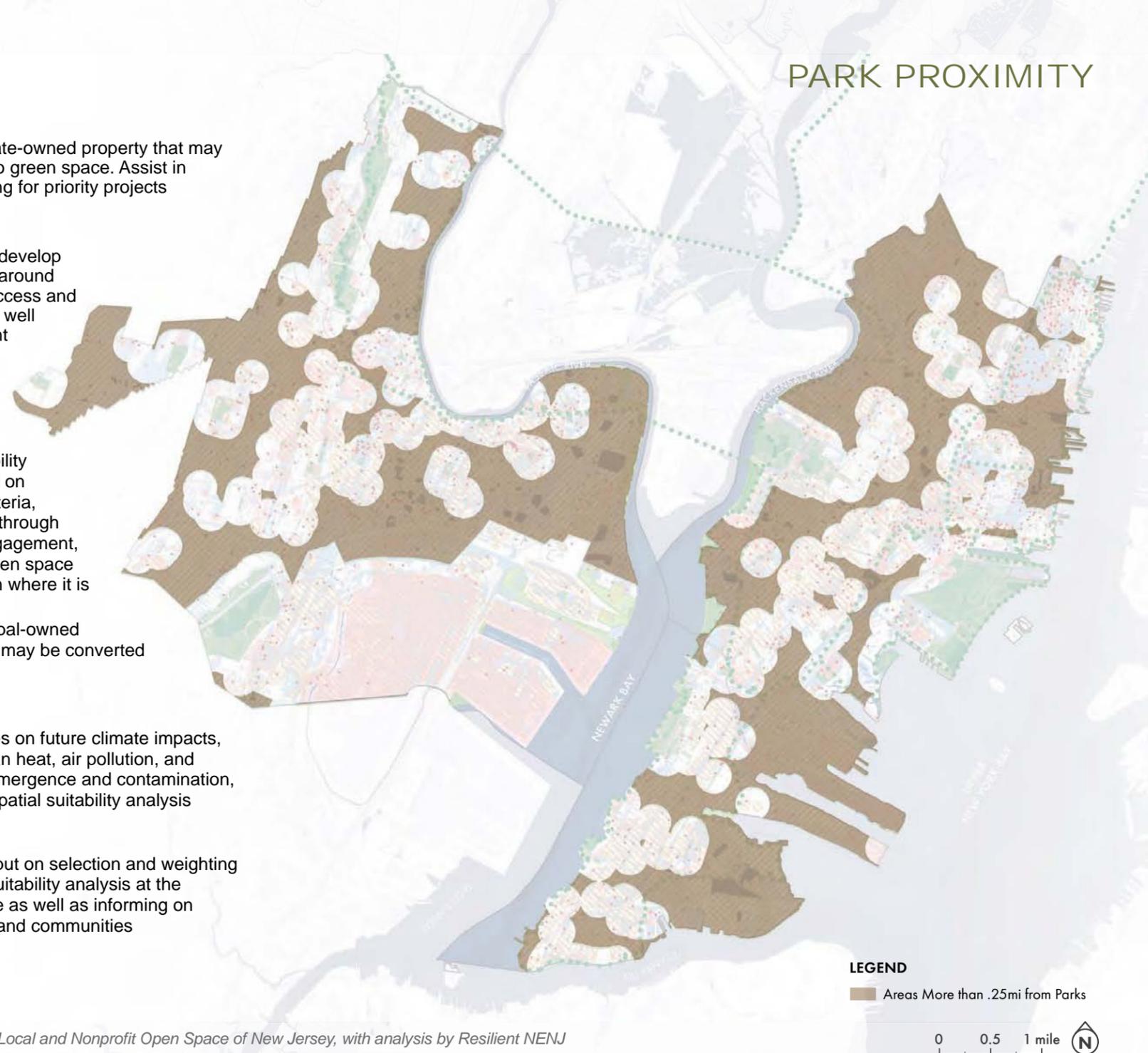
## CONSIDERATIONS FOR IMPLEMENTATION

SCALE	ACTION TYPE	PRIORITY FOR IMPLEMENTATION
CITY	Physical and Nature Based Solutions	1
		PROJECT TIMELINE
		CAPITAL COSTS
MAINTENANCE  MODERATE EFFORT	Operations needs are often cited as a barrier to green space and green infrastructure implementation. These can be mitigated by maximizing use of native species, using things like clover for groundcover, as opposed to grass that must be more regularly mowed, and partnering with community members and Community based organizations on maintenance, such as through the small-scale green infrastructure program.	
PERMITTING & CONSTRUCTABILITY  MODERATE EFFORT	This action uses existing pathways for coordination and implementation, but the scale of need is large while the opportunity to implement is heavily distributed, meaning that actions will require ongoing support to impact risk over time.	

## KEY PLAYERS

- STATE
  - Identify any state-owned property that may be converted to green space. Assist in securing funding for priority projects
- REGION
  - Collaborate to develop regional goals around green space access and connectivity as well as development of criteria for selection of projects
- CITY
  - Conduct suitability analysis based on established criteria, further refined through community engagement, to prioritize green space implementation where it is lacking
  - Identify municipal-owned properties that may be converted to green space
- ACADEMIA
  - Conduct studies on future climate impacts, especially urban heat, air pollution, and groundwater emergence and contamination, to help guide spatial suitability analysis
- CBOs
  - Provide key input on selection and weighting of criteria for suitability analysis at the municipal scale as well as informing on priority issues and communities

## PARK PROXIMITY



LEGEND  
Areas More than .25mi from Parks

Data Source: NJDEP State, Local and Nonprofit Open Space of New Jersey, with analysis by Resilient NENJ

# 01b. INCREASE GREEN INFRASTRUCTURE WHERE IT CAN REDUCE HEAT IMPACTS

Physical

EASE  
PROTECT  
CONNECT

This action involves targeted implementation of green infrastructure in areas that experience and/or are expected to experience acute urban heat island (UHI) effect. Trees, plantings, green roofs, bioswales, and rain gardens are examples of practices that can reduce UHI effect by providing shade and releasing moisture.<sup>9</sup> Parks and open spaces can also pair vegetation with other strategies for grounds-level strategies for heat mitigation, such as water-based cooling stations.

Maps of above-average summer 2021 heat hotspots can help give a preliminary sense of where these impacts are concentrated. In most cases, UHI hotspots overlap with areas of high social vulnerability.

<sup>9</sup> EPA's Reduce Urban Heat Island Effect webpage: <https://www.epa.gov/green-infrastructure/reduce-urban-heat-island-effect>

## WHAT ISSUES DOES THE ACTION HELP ADDRESS?

- Access to urban green space can help mitigate many of the worst effects of extreme heat and poor air quality by tempering localized ambient and land surface temperatures, providing shade canopies, providing additional cooling via evapotranspiration of plants, and improving air quality, which can deteriorate during heatwaves

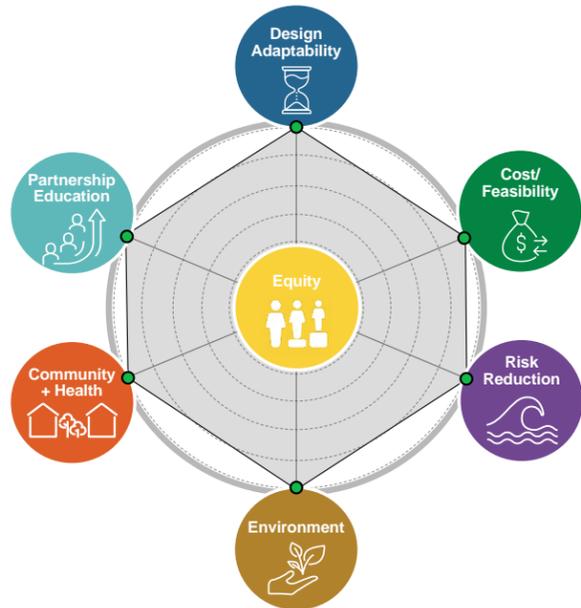
## WHAT ARE THE EXPECTED OUTCOMES?

- Cooler average land surface and ambient air temperatures, natural outdoor cooling spaces for relief during heatwave events
- Improved local air quality during heatwaves which might otherwise trap ground-level ozone, improved quality of life for residents and other users of the study area

## CONSIDERATIONS FOR IMPLEMENTATION

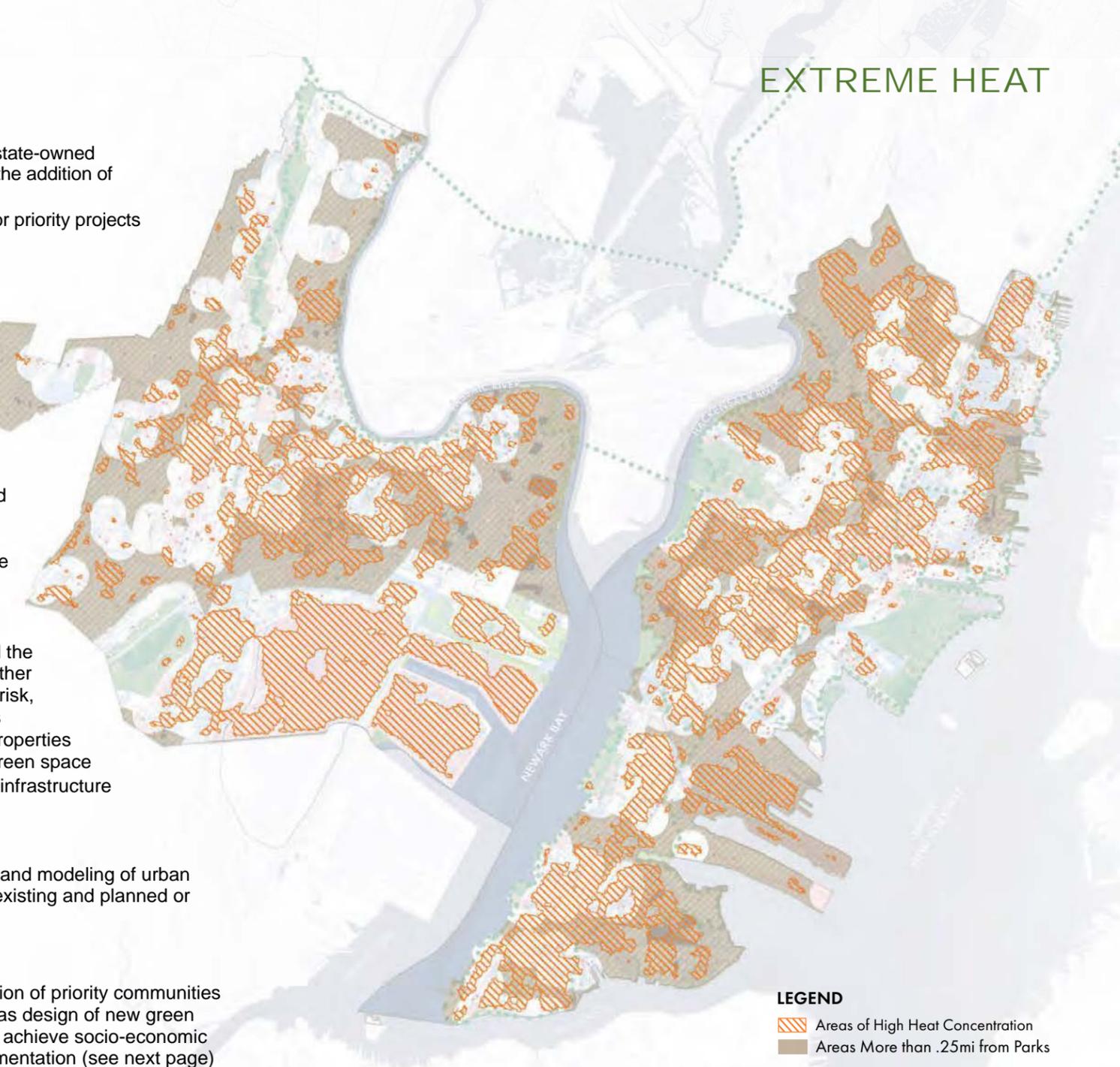
SCALE	ACTION TYPE	PRIORITY FOR IMPLEMENTATION	PROJECT TIMELINE	CAPITAL COSTS
CITY	Physical and Nature Based Solutions	1	🕒🕒🕒🕒🕒	💰💰💰💰💰
MAINTENANCE		Operations needs are often cited as a barrier to green space and green infrastructure implementation. These can be mitigated by maximizing use of native species, using things like clover for groundcover, as opposed to grass that must be more regularly mowed, and partnering with community members and Community based organizations on maintenance, such as through the small-scale green infrastructure program.		
PERMITTING & CONSTRUCTABILITY		This action uses existing pathways for coordination and implementation, but the scale of need is large while the opportunity to implement is heavily distributed, meaning that actions will require ongoing support to impact risk over time.		

## EVALUATION CRITERIA



## KEY PLAYERS

- STATE**
  - Support conversion of any state-owned property that is feasible for the addition of green space
  - Assist in securing funding for priority projects
- REGION**
  - Provide best practices and technical assistance to municipalities for effective heat mitigation using green infrastructure
  - Collaborate to accomplish goals around green space access and connectivity as well as monitor implementation and selection of projects
  - Leverage and share best practice green infrastructure feasibility criteria
- CITY**
  - Collaborate with CBOs and the academic community to further refine identification of high-risk, high priority neighborhoods
  - Identify municipal-owned properties that may be converted to green space
  - Leverage and share green infrastructure feasibility criteria
- ACADEMIA**
  - Conduct additional studies and modeling of urban heat and interactions with existing and planned or potential future landscapes
- CBOs**
  - Provide key input on selection of priority communities for implementation as well as design of new green infrastructure, especially to achieve socio-economic co-benefits. Support implementation (see next page)



**LEGEND**  
 Areas of High Heat Concentration  
 Areas More than .25mi from Parks

**Data Source:** (Heat) The Trust for Public Land, Descartes Labs, USGS, accessed through ESRI; (Areas far from parks) NJDEP State, Local and Nonprofit Open Space of New Jersey, with analysis by Resilient NENJ



# 01c. INCREASE ADOPTION THROUGH SMALL-SCALE GREEN INFRASTRUCTURE PROGRAMS

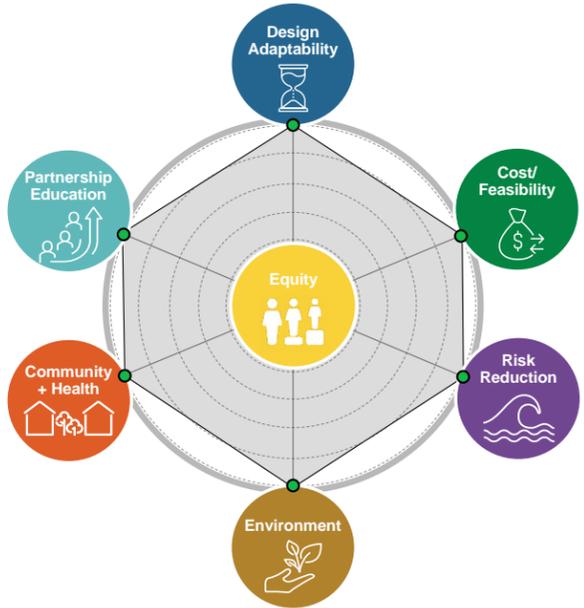
Policy

EASE  
PROTECT  
CONNECT

Like open spaces, private properties present a significant opportunity to help address climate related risks through stormwater management, increased tree canopy, and green space. Green infrastructure contributes to stormwater runoff reduction, which has a range of positive impacts, including reducing the amount of water that needs to be conveyed by sewers, reducing combined sewer overflows, and reducing chronic flooding. Green infrastructure can also reduce erosion and sedimentation, recharge groundwater, reduce urban heat island, and improve air quality. Participants in the Resilient NENJ engagement process continuously expressed desire to see increased green infrastructure in communities due to these many benefits.

In accordance with 2020 NJDEP stormwater management rules, green infrastructure is implemented on private properties when the site undergoes major development. Therefore, small-scale green infrastructure programs can increase the uptake of green infrastructure on private properties that are not undergoing redevelopment or as supplementary to what would be required as part of development. These programs can prioritize investment in areas of high social vulnerability with little access to green space and high heat indexes to have those most impact.

## EVALUATION CRITERIA



### JERSEY CITY FLOOD OVERLAY ZONE ORDINANCE

Municipalities can adopt additional standards to require green infrastructure on private properties during redevelopment. For example, the **Jersey City Flood Overlay Zone Ordinance** applies to all properties located in the current 1 percent annual chance floodplain. It includes requirements for green infrastructure and resilient site design for new developments in the AE or VE zones (based on regulatory FEMA maps). Strategies, such as vegetated walls, green roof, permeable pavement, bioretention, and WaterSense fixtures, can be used to meet these requirements.

NJFuture's **Green Infrastructure Toolbox**<sup>11</sup> provides a compendium of opportunities that stakeholders can take advantage of now to help implement small scale green infrastructure programs.

<sup>10</sup> <https://qitoolkit.njfuture.org/funding/>

## KEY PLAYERS

- STATE**
  - Support funding for small scale infrastructure programs targeting areas of highest need, partnering with community-based organizations for implementation
- REGION**
  - Develop a subgroup of diverse stakeholders to focus on this issue (see **Section 5.0** Roadmap for more on subgroups). Stakeholders should include academia, municipalities, the state, CBOs, and representatives from the community advisory council (which could be expanded to support this and other initiatives)
  - Continue to collect, elevate, and share best practices around the region, as well as communicate areas of highest need. Continue to support engagement around these issues
  - Consider developing a framework that can be used in each municipality, particularly in areas of lower capacity. Depending on funding available, consider implementing elements of the program regionwide or where municipalities do not choose to adopt independently
- CITY**
  - Dedicate staff to the region sub-group. Identify in the near-term which elements can be implemented or expanded independently and which will require support or broader coordination.
  - Continue to offer best practices that can be expanded regionwide
- ACADEMIA**
  - Consider expanding existing jobs training and education programs. Partner with the region to quantify and monitor the benefits of actions taken through the program
- CBOs**
  - Partner in implementation

## CONSIDERATIONS FOR IMPLEMENTATION

SCALE	ACTION TYPE	PRIORITY FOR IMPLEMENTATION
 REGION	<ul style="list-style-type: none"> <li>Outreach, Education &amp; Capacity Building</li> <li>Service &amp; Program Development</li> </ul>	1
PROJECT TIMELINE 	It will take time to develop and align around a governance structure for the program, secure funding, and procure materials and support staff for some of the options. Nevertheless, several of these opportunities are already ongoing or in exploration in the region.	
COSTS  annually	A sizable annual budget would be needed to accomplish all potential elements of the small-scale infrastructure program across the entire region. Costs could be scaled and phased over time, starting with pilot implementation of some components, then leaning into others.	
OPERATIONS 	New funding streams and staff required to implement and maintain the program.	
COORDINATION 	Significant coordination with residents, businesses, and other agencies needed.	
IMPLEMENTABILITY 	It will take time, resources, and new or expanded governance to stand up a program like this.	

## 01c. INCREASE ADOPTION THROUGH SMALL-SCALE GREEN INFRASTRUCTURE PROGRAMS *CONTINUED*

Policy

A small-scale green infrastructure program can have many different components, each driving green infrastructure projects in different ways. Several components are presented here along with a brief description and some examples of existing initiatives that serve as examples that can be expanded or replicated:

- Education and training programs. These programs provide residents with information on green infrastructure, including their benefits, how they are implemented, and how they can be maintained. A main goal of these programs to inspire and empower residents to use green infrastructure at their homes and businesses. See **Section 3.3.2** for more on outreach, education, and capacity building.
- Green jobs training programs. Related to resident education and training, small-scale green infrastructure programs can be partnered with green jobs training to help implement and manage larger scale green infrastructure that will be needed regionwide. Hoboken has a green jobs training program that can be considered for expansion into other municipalities, and Rutgers has a Green Job Training Partnership Program that could be considered for expansion into green infrastructure and climate hazard mitigation.
- Rain barrel or cistern programs. These programs provide residents with rain barrels or cisterns that they can install at their homes, along with guidance for installation. These resources are simple and relatively inexpensive ways to temporarily detain runoff from rooftop gutters (rain barrel) and ground surfaces (cistern). Bayonne’s Water Guardians<sup>11</sup> work to increase green infrastructure in Bayonne to reduce combined sewer overflows and improve quality of life in other ways. One of their initiatives encourages residents to use rain barrels to intercept stormwater. JCMUA also has an existing rain barrel distribution program for Jersey City residents.
- Incentive programs. These programs offer financial incentives toward the implementation of green infrastructure and increased tree canopy, where the most common incentives are tax breaks or the reduction of (future) stormwater utility fees, where applicable (see **Section 3.3.1** for more on stormwater utility exploration). To maximize their impact, these programs should consider scaling incentives based on system performance. A main goal of these programs is to overcome financial barriers to resident and businesses to construct or include green infrastructure.
- Grant programs. These programs allow for the direct reimbursement of costs associated with the implementation of green infrastructure. Grant programs typically have clear and specific criteria for the types of eligible projects, documents that must be submitted, and the types and amounts of costs that may be reimbursed. A main goal of these programs is to reduce the payback period for green infrastructure compared to other incentives. These grant programs can be managed in coordination with local community-based organizations in areas that will have the most impact (e.g., high social vulnerability, high distance to green space, high urban heat island) and can be partnered with green jobs training programs.
- Fulfillment programs. These programs are typically implemented as a contract with a company or other qualified entity that pays a set dollar value for green infrastructure once it has been installed. The dollar value can be specified several ways, such as by practice type and area or by storage volume. These contracts are unique in that the company or qualified entity receiving payment is responsible for generating projects, rather than property owners themselves. Fulfillment programs increase the reach of small-scale programs beyond methods that require owners to generate projects. Like other elements of the small-scale green infrastructure programs, this should be targeted in areas that will have the most impact in the region.

<sup>11</sup> <https://sites.google.com/view/bayonnewaterguardians/home>

### WHERE CAN GREEN INFRASTRUCTURE HAVE THE MOST IMPACT?

Investment should be accomplished in partnership with local community-based organizations and residents, prioritized first in areas identified as having high social vulnerability, are far from green space, and have high urban heat island (above average summer heat).

These program elements are not mutually exclusive and small-scale programs typically employ a multi-faceted approach to maximize positive outcomes. The small-scale green infrastructure programs can be phased, starting with education and partnerships with local community based organizations, then expanding to grants as funding is allocated, and then expansion of incentives and fulfillment programs.

### GREEN INFRASTRUCTURE AT CITY HALL

The demonstration project includes rain gardens, cisterns, porous concrete, and a green wall, and can capture rainwater from a 25-year storm.

*Image Source: Mayor of Hoboken Facebook Page*

# 02. REDUCE RISK FROM AND INCORPORATE RESILIENCE INTO CONTAMINATED SITES

Physical Policy

There are many contaminated sites and brownfields in Resilient Northeastern NJ linked to the region's industrial history. Due to the region's high population density, many people live in proximity to these sites, which increases possible exposure to toxic chemicals. Those closest to this site also live in areas identified as having high social vulnerability. This action aims to reduce risk associated with this exposure while leveraging them as opportunities for resilience. According to the database maintained by NJDEP, there are over 1,800 contaminated sites in the region. This only includes sites that have been raised to NJDEP, such as if contamination is found at an industrial facility during investigations when the property is sold, as required by the Industrial Site Recovery Act (ISRA). Brownfields and contaminated sites may be publicly or privately owned, may be vacant, abandoned, or active, and could be in various stages of the clean-up process.

### WHAT'S THE DIFFERENCE BETWEEN A CONTAMINATED SITE AND A BROWNFIELD?

**Contaminated sites** are properties where there is known presence of hazardous substances. Contamination can be in the soil or groundwater near the surface or below bedrock and can originate from different sources such as placement of historic fill (see **Section 3.1**), dumping of waste products above or below ground, and spills of toxic chemicals. As noted previously, NJDEP maintains a database of known contaminated sites that includes, among other factors, information about the owner, site clean-up status, and whether there is a classification exception area (CEA) and/or deed notice associated with the site, which are types of institutional controls to prevent exposure to contamination. Although NJDEP updates the database regularly, data are inherently imperfect. See **Appendix H** for recommendations related to data gaps.

**Brownfields** are, to some extent, a subcategory of contaminated sites. In that they are defined by the State (in the Brownfield and Contaminated Site Remediation Act) as "former or current commercial or industrial sites, currently vacant or underutilized, and on which there has been, or there is suspected to have been, a discharge of a contaminant." The distinguishing features of brownfields are that they are specifically commercial and industrial sites, and that there only needs to be a perception of contamination for a site to be considered a brownfield.

### To transform contaminated sites, the action plan proposes to:

**02a Resilience-related higher standards on contaminated sites for remediation and redevelopment**

This action creates requirements that help reduce risk from contaminated sites by increasing standards for their remediation (clean-up). The presence of contamination could pose potential hazards to health or ecosystems due to impacts of climate change, based on the nature and extents of contamination. Risks could manifest through spreading of surface-level contamination in floodwaters, spreading of subsurface contamination with groundwater rise, or damage to engineered controls due to storms or other climate events

**02b Creating a resilient transformation pipeline**

This action integrates community resilience into the process of cleaning up contaminated sites by facilitating the transformation of sites into open space or community assets while incorporating components that reduce risk from climate-related hazards such as flooding.

## CONTAMINATED SITES

### INTERAGENCY COORDINATION ON BROWNFIELDS

Redevelopment of brownfields and contaminated sites already has significant coordination across various scales. For example:

- NJDEP's Office of Brownfield and Community Revitalization houses the Community Collaborative Initiative, which is a partnership between NJDEP and NJ Economic Development Authority (NJEDA) to support municipalities in brownfield redevelopment.
- The State's **Brownfield Redevelopment Interagency Team (BRIT)** is made up of representatives of various State agencies and supports brownfields redevelopment by connecting developers, municipalities, and the State and providing resources to support projects.
- The State **Brownfields Interagency Working Group (IAWG)** brings together Federal and State agencies to provide technical support and guidance to municipalities on individual brownfields redevelopment projects.



Data Source: NJGIN Open Data Known Contaminated Site List Layer; See Appendix H for flood data sources

# 02a. DEVELOP RESILIENCE-RELATED HIGHER STANDARDS ON CONTAMINATED SITES FOR REMEDIATION & REDEVELOPMENT

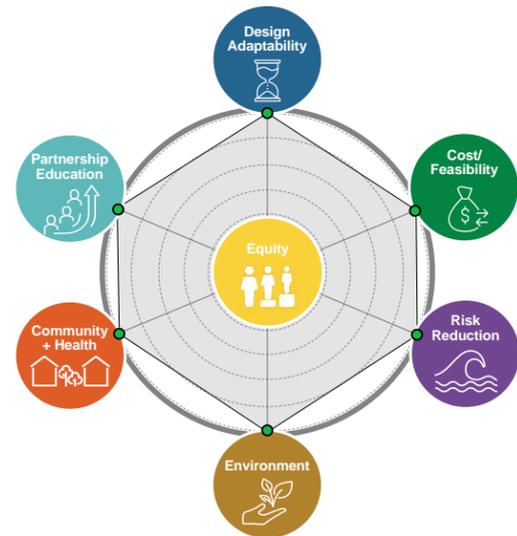
Policy

EASE  
PROTECT  
CONNECT

This action involves a multi-faceted effort to address resilience and impacts related to historic contamination and brownfield sites. The action includes updates and expansions of state-managed databases to improve transparency and information about the nature of contamination, remedial designs, and potential resilience best practices. State funding programs should be aligned to support remediation efforts in concert with resilience improvements.

At the regional and local level, a climate-related risk assessment of brownfields can be conducted to inform prioritization of remedial efforts and resilience measures. Local zoning ordinances and redevelopment plans should incorporate best practices to address resilience for contaminated sites.

## EVALUATION CRITERIA



## CONSIDERATIONS FOR IMPLEMENTATION

SCALE



ACTION TYPE



PRIORITY FOR IMPLEMENTATION

1

PROJECT TIMELINE



Initial framework can be accomplished more quickly, but remediation efforts tend to have long time horizons.

CAPITAL COSTS



Remediation efforts may have significant costs – substantial public and/or private funding is required.

MAINTENANCE



MODERATE EFFORT

Likely to require additional staffing and streamlined procedures for sustained monitoring and evaluation.

COORDINATION & IMPLEMENTABILITY



MODERATE EFFORT

This action uses existing pathways for coordination and implementation, but the scale of need is large while the opportunity to implement is highly distributed, meaning that actions will require ongoing support to impact risk over time.

## WHAT ISSUES DOES THE ACTION HELP ADDRESS?

- The NENJ Region is burdened with a substantial number of contaminated sites, placing it in the high 90th to 100th percentile for exposure to site contamination. Future SLR and other climate-change related outcomes will impact known, and unknown contaminated sites and introduce further risk. Brownfields are priorities for redevelopment efforts and removal of their blighting influence will benefit community health and quality of life

## WHAT ARE THE EXPECTED OUTCOMES?

- State-level programs enable expedited remediation of priority sites and help incorporate resilience measures into clean-up and redevelopment efforts. Present and future risks associated with contaminated properties and noxious uses are mitigated, and the sites are transformed into assets rather than blighting influences

## KEY PLAYERS



STATE

- Upgrades to brownfield reporting and monitoring system (NJDEP DataMiner) to provide more easily accessible, public-facing information. Targeting incentive programs to clean-up priority sites and incorporate resilience upgrades
- Conduct a statewide climate-related risk assessment for contaminated and remediated sites to understand the magnitude of risk and make the potential case for further investment. As part of this assessment, consider including a study of the impacts of climate-related hazards such as groundwater rise on risks posed by various types of site contamination



REGION

- Sharing best practices, contributing information, and participating in studies and prioritization of brownfield sites



CITY

- Supporting remediation efforts and adoption of higher standards



ACADEMIA

- Studying and monitoring climate-change related impacts of brownfield sites, including sites with ongoing groundwater remediation



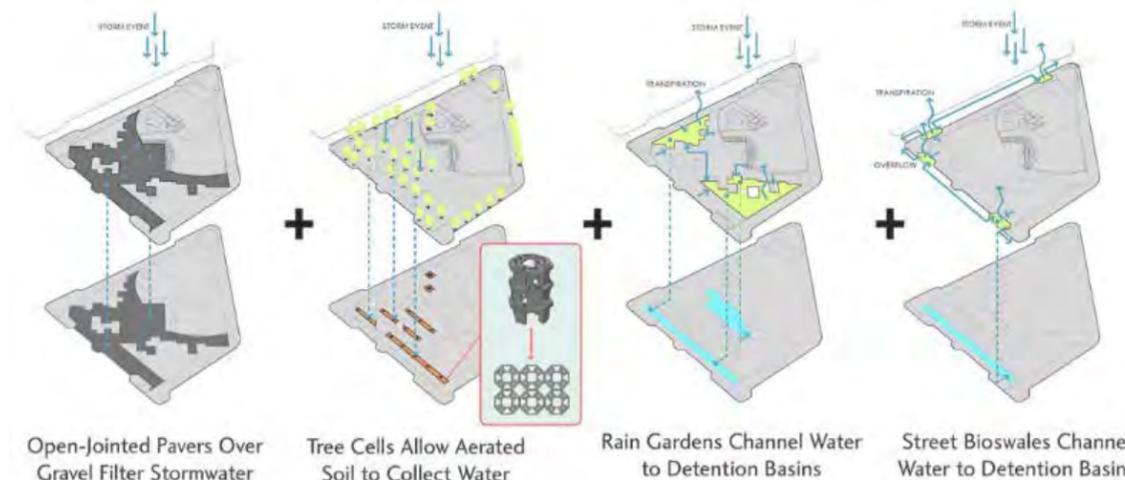
CBOs

- Sharing local knowledge, education, and advocacy associated with impacts and prioritization of clean-up sites. Specifically support documentation of impacts on people from the presence of contaminated sites to advocate for and inform statewide risk assessment

## HOBOKEN SOUTHWEST RESILIENCY PARK

Hoboken has invested in several co-beneficial green infrastructure projects in recent years, including the Southwest Resiliency Park pictured here, with a planned expansion to the adjacent paved lot. The diagrams above illustrate the resilience components built into the park.

Image Sources: City of Hoboken, Starr Whitehouse



## 02b. CREATE A RESILIENT TRANSFORMATION PIPELINE FOR CONTAMINATED SITES

Physical

EASE  
PROTECT  
CONNECT

This action develops a pipeline of contaminated sites and brownfields that can be prioritized for remediation and transformation into open space or other uses that increase community resilience. A “pipeline” is a system to prioritize and prepare sites to go through the transformation process, from identification to funding to clean-up and construction. Sites can enter the pipeline based on criteria regarding proximity to residential areas, being in areas lacking green space, or areas ripe for economic development. Stormwater storage can be built into the sites during remediation and redevelopment into parks or other uses. By expediting clean-up and transformation, the pipeline can reduce risk of exposure to contamination, reduce risk from flooding, address urban heat island effect, and create additional green space or other community benefit.

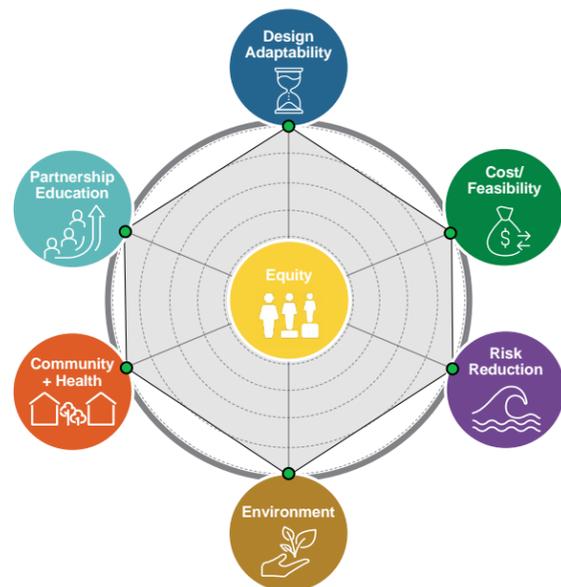
Resilient NENJ has developed preliminary methodology to identify priority sites for transformation, included in **Appendix H**. The methodology separates sites into two categories that each include several factors:

- **Opportunities to increase resilience and create community benefits by creating open space and green space**
- **Opportunities for economic development**

In addition, considerations such as site ownership (public vs. private), property size, current use of the site (and whether it is an operational business vs. vacant), and planned uses would contribute to determining whether a transformation project would be feasible and effective at a given site.

### EVALUATION CRITERIA

The transformation pipeline would convert community risks into community assets.



### WHAT ISSUES DOES THE ACTION HELP ADDRESS?

- Climate change will impact both known and unknown contaminated sites and introduce further risks to human health and ecosystems from spreading of surface-level contamination in floodwaters, spreading of subsurface contamination with groundwater rise, or damage to engineered controls due to storms or other climate events. This action aims to reduce these risks by facilitating clean-up of sites
- Contaminated sites and brownfields often blight communities, but they can provide significant opportunity when mindfully redeveloped for economic or open space purposes. By incorporating stormwater management and resilience components in transformation, this action aims to reduce a potential threat from flooding, combat urban heat island and poor air quality, and use sites to fuel economic growth

### WHAT ARE THE EXPECTED OUTCOMES?

- Remediation and re-use of contaminated sites and brownfields as stormwater storage in flood-prone areas and open space where it is currently lacking, which will contribute to reducing urban heat island effect. Redevelopment of sites can also contribute to economic development

### KEY PLAYERS



#### STATE

- Expand the brownfields inventory across the state
- Continue data improvements to Known Contaminated Site List and other state-managed databases to provide more complete information on resilience-related factors (e.g., expand available information or accuracy on contaminant type and extents, remedial design type, site status)
- Coordinate and align state funding programs to accelerate resilient transformation of contaminated sites. Funding programs already exist that can advance projects such as the Hazardous Discharge Site Remediation Fund (HDSRF) and Green Acres funding. These funding sources can be dovetailed to support all phases of a site’s transformation. When partnered with programs that fund stormwater improvements, such as FEMA’s Building Resilient Infrastructure and Communities (BRIC) program and the NJ I-Bank State Revolving Fund program, sites can be fully transformed to help address multiple needs.
- Consider collaborating in the development of guidelines and requirements a site might follow to flow through the pipeline process. Advance the prioritization methodology described herein and included in **Appendix H** for prioritization of sites for risk and opportunity, and support application of the criteria to transform high priority sites.



#### COUNTY

- Support refinement of prioritization methodologies and support municipalities in confirming high risk and high opportunity sites
- Support implementation by partnering on funding pursuits
- Support advocacy for increased funding and action to address resilience-related needs around contaminated sites



#### CITY

- Support refinement of prioritization methodologies and support municipalities in confirming high risk and high opportunity sites for action
- Advance catalyst resilient transformation projects at high risk and high opportunity publicly owned contaminated sites and brownfields
- Engage private property owners to explore partnership opportunities for resilient transformation of privately owned sites



#### ACADEMIA

- Academic institutions can provide expertise to support site redevelopment. The NJIT Technical Assistance to Brownfield Communities (TAB) program, in particular, provides support to municipalities to assist with brownfields projects and navigating regulatory processes



#### CBOs

- Participate in partnerships to advance resilient transformation of sites
- Support advocacy for increased funding and action to address resilience-related needs around contaminated sites

### CONSIDERATIONS FOR IMPLEMENTATION

SCALE ACTION TYPE PRIORITY FOR IMPLEMENTATION



ACTION TYPE



PRIORITY FOR IMPLEMENTATION

1

#### PROJECT TIMELINE



This action is an opportunity to foster projects that create multiple benefits at the same time.

#### COSTS

Varies

The pipeline will continue to evolve and expand. The cost associated with site transformation can vary depending on site conditions and needs.

#### OPERATIONS



MODERATE EFFORT

New budget allocation will be required to implement site transformation led by municipalities.

#### COORDINATION



MODERATE EFFORT

This action is most effectively implemented with coordination at multiple scales, although these coordination channels already exist to varying extents.

#### IMPLEMENTABILITY



MODERATE EFFORT

Although this action packages projects together in a unique way, there are precedent examples like Fitzpatrick Park in Bayonne and the Northwest and Southwest Resiliency Parks in Hoboken.

# 03. INCORPORATE RESILIENCE IN NEW DEVELOPMENT, PUBLIC SPACE, AND INFRASTRUCTURE

Physical Policy

At the regional level, best practices, standards, and engagement can be coordinated to provide a uniform approach to public investment and consistency for private developers. Actions **Coastal-06**, **Coastal-07**, and **Stormwater-07** detail ways to adopt higher standards through municipal ordinances and redevelopment plans. In addition to those measures to address coastal and stormwater flooding, higher standards can be adopted to mitigate heat. Furthermore, resilient design guidelines and incentives programs can support and catalyze redevelopment in enhancing existing conditions and limiting future losses.

Long-Term Control Plans represent significant investments that should be aligned with broader resilience goals to increase benefit, wherever possible.

Together, these actions can help ensure that new development is constructed to higher standards to reduce climate risk, enhances (or at least does not exacerbate) existing conditions, while public investments serve to support resilient infrastructure and open space.

**To help ensure new developments, substantial improvements, infrastructure, and public spaces are designed to respond and be resilient to present and future climate risks, the Action Plan proposes to:**

- 03a Create or update resilient building design guidelines**
- 03b Adopt requirements and incentives for heat mitigation in buildings and public properties**
- 03c Integrate resilience-related needs and considerations Long-Term Control Plans**

*"Improved land use regs that incorporate SLR predictions and climate change."*

*"New development areas should incorporate flood prevention and protection measures."*



**HOBOKEN TERMINAL**

Hoboken Terminal is an inter-modal transportation hub for passenger rail, PATH trains, light rail, buses, and ferries. Its waterfront setting also makes it particularly vulnerable to flooding.

*Image Source: Resilient NENU*



# 03a. CREATE OR UPDATE RESILIENT BUILDING DESIGN GUIDELINES

Policy

This action prepares guidance and/or land development ordinance language related to resilient building design guidelines. A guidance document can provide information, education, and guidance without regulatory or enforcement powers. Incorporating some or all of the standards into a land development / zoning ordinance at a later date can make them enforceable requirements.

A mixed approach that includes non-regulatory guidance targeted at small developments / property owners, and regulatory requirements that apply to larger developments and redevelopments can be an appropriate response and is a common practice throughout the region through its redevelopment plans. Larger-scale interventions are incorporated into redevelopment plans to ensure resilient design for large, transformative projects.

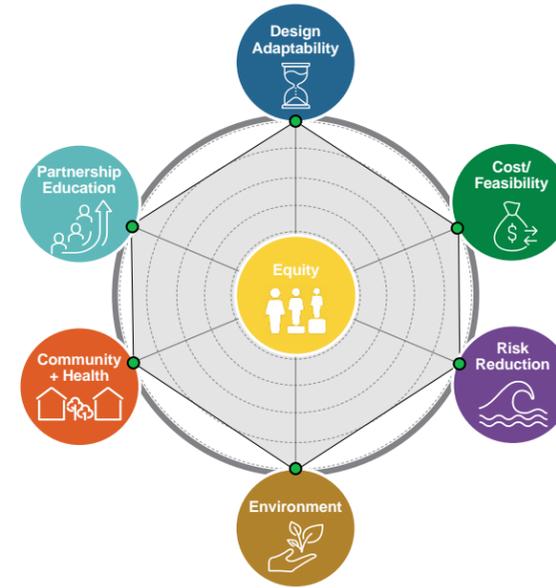
This action is connected to and could be implemented as part of, or independent from, the action **Increase Adoption through Small Scale Green Infrastructure Programs** earlier in this **Section 3.2.3**. The action is also connected to actions to update ordinances described in **Section 3.2.1** and **3.2.3**, as well as requirements to mitigate heat described on the following page. This action could be marketed as part of the Resilience 101 campaign described in **Section 3.3.2**.



Hoboken prepared a Resilient Buildings Design Guide in 2015 and is in the process of updating it. The updated version could serve as a model that can be used region-wide with local modifications to address different building types and conditions.

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## EVALUATION CRITERIA



## KEY PLAYERS

- REGION**
  - Coordinate to facilitate development and promotion of a baseline set of design guidelines throughout the region that can either be published as is or modified for the needs of each municipality
- CITY**
  - Prepare and disseminate guidance documents and/or adopt land use or zoning ordinance amendments
- STATE, COUNTIES, & CBOs**
  - Support development, implementation, and engagement around this action

## WHAT ISSUES DOES THE ACTION HELP ADDRESS?

- Many community members have expressed a need to know more about what they can do to reduce climate related risk on their own properties and also contribute to reduced climate risk more broadly
- Guidelines can sometimes be used to test higher standards that could be later integrated into regulation to help build resilient improvements at scale

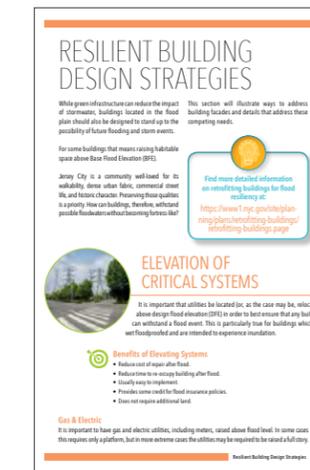
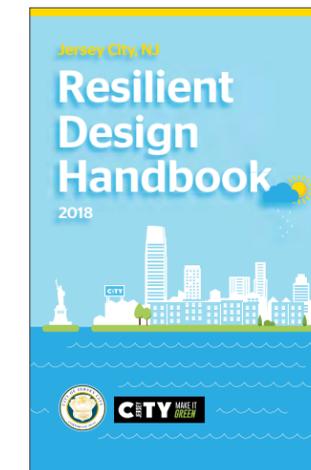
## WHAT ARE THE EXPECTED OUTCOMES?

- Residents are empowered to implement widespread small-scale interventions
- Widespread small-scale interventions and improvements in new development can create a more resilient and efficient city while reducing demands on strained public infrastructure

The development community's perspective would be valuable to the implementation of this action. Their engagement could help Resilient NENJ better understand what works and doesn't work in existing industry guidelines, and how guidelines could be structured to maximize use and implementation. For example, in addition to articulating design considerations for developments, the guidelines could provide permitting approval roadmaps to help property owners and developers navigate those processes. Resilient NENJ already has practice doing this in the development of guidelines to support Green Acres coordination to integrate stormwater into open space as described in **Section 3.2.2**.

## CONSIDERATIONS FOR IMPLEMENTATION

<p><b>SCALE</b></p> <p><b>REGION</b></p>	<p><b>ACTION TYPE</b></p>	<p><b>PRIORITY FOR IMPLEMENTATION</b></p> <p>1-2</p>	<p><b>OPERATIONS</b></p> <p>MODERATE EFFORT</p> <p>Concerted engagement will be needed to support and maximize utility, use, and adoption.</p>	<p><b>IMPLEMENTABILITY</b></p> <p>MODERATE EFFORT</p> <p>Specific context and building stock needs within each municipality could complicate regional guidelines publication, but some of the municipalities may not be able to prioritize staffing and resources to modify them for their own purposes. In this case, the region should seek to fill gaps and help customize the guidelines where needed and appropriate.</p>
<p><b>PROJECT TIMELINE</b></p>	<p><b>CAPITAL COSTS</b></p> <p>LOW EFFORT</p> <p>Very low cost to share and workshop best practices. Expenses will be needed to print and publish, as well as conduct public outreach and engagement to support development and adoption.</p>	<p><b>COORDINATION</b></p> <p>LOW EFFORT</p> <p>The Steering Committee is already set up to share best practices across municipalities and has a platform to engage around key issues.</p>		



## JERSEY CITY'S RESILIENT DESIGN HANDBOOK

In 2018, Jersey City published its Resilient Design Handbook to better inform residents and business owners about flooding and best practices for Green Infrastructure & Resilient Building Practices.

Image Sources: City of Jersey City

## 03b. ADOPT REQUIREMENTS AND INCENTIVES FOR HEAT MITIGATION IN BUILDINGS AND PUBLIC PROPERTIES

Policy

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The summer of 2022 had record-breaking heat in NENJ, including 5 consecutive days of triple digit temperatures recorded at Newark-Liberty International Airport. Approximately 40-percent of the total Northeastern New Jersey study area experienced above-average summer heat temperatures in 2021. The portion is likely to increase over time, while existing hotspots become hotter. By the end of the century, Bayonne will experience an annual average of 90 days with the heat index greater than 90 degrees Fahrenheit (32 degrees Celsius), Hoboken and Jersey City 87 annual days, and Newark 92 days—collectively up from a historical (1971-2000) average range of approximately 21 to 26 annual days. Hotspots of especially severe summer heat are concentrated in central Bayonne, the area around Greenville Yard as well as western Jersey City, pockets of Hoboken, the area around Oak Island Yard in Newark as well as pockets of eastern Newark. Although many of these hotspots are industrial, residential areas experiencing severe heat averages in eastern Newark and western Jersey City overlap with areas of high social vulnerability. See the Resilient NENJ Climate Hazards Assessment for more detail on heat hazard and its impacts.

This action will help address urban heat island at the individual and site-specific scales. For publicly owned properties, this could involve requirements for outdoor heat mitigation features at new buildings, facilities, and new transportation infrastructure, such as canopy cover, photovoltaic (PV) shade canopies, water-based cooling stations, or cool pavements, dependent on the context. Heat mitigation can also be addressed at public properties through creation of resilience hubs that serve as cooling centers while providing information and resources to residents, as described in **Section 3.3.3**.

To help enable and encourage heat mitigation on privately owned properties, this action should be paired with technical and resources support described in action **Service-03 (Section 3.3.3)** and action **All Hazards-01c** (earlier in this **Section 3.2.3**). Example actions to encourage and support selection, planning, and implementation of include green and high-albedo roofs, façades and glass glazing with low U-values (a measure of how well the glass is at insulating), sun control and exterior shading feature, and outdoor heat mitigation features. This action is also connected to the development of guidelines described on the previous page. Guidelines could be used first as a pilot and test for future requirements that could be integrated in local ordinances long-term, similar to the manner through which local ordinances work to limit flood damage (see **Update local flood damage prevention ordinances** under **Section 3.2.1**).

### CONSIDERATIONS FOR IMPLEMENTATION

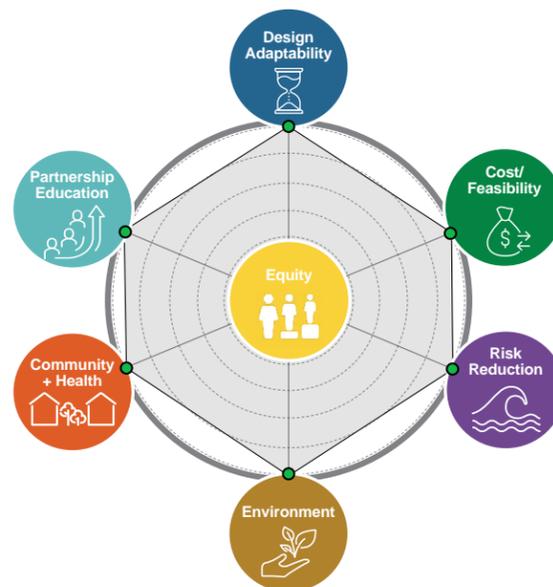
<p><b>SCALE</b></p>  <p><b>REGION</b> <b>STATE</b> <b>CITY</b></p> <p>Physical solutions are implemented at the site-specific, or neighborhood, scale. Requirements for public properties would likely be implemented a statewide or municipal scale.</p>	<p><b>ACTION TYPE</b></p>  <p><b>PRIORITY FOR IMPLEMENTATION</b></p> <p>1</p>	<p><b>OPERATIONS</b></p>  <p><b>COORDINATION &amp; IMPLEMENTABILITY</b></p> 	<p>Concerted engagement will be needed to support and maximize utility, use, and adoption.</p> <p>Coordination and alignment of objectives is necessary across the state, utilities, municipalities, and across municipal departments. May involve logistical challenges in efficient distribution of resources and technical assistance, potentially requiring added staffing capacity. Will also need to be paired with substantial and thoughtful community outreach.</p>
<p><b>PROJECT TIMELINE</b></p>  <p>State requirements for heat mitigation on public properties could likely be integrated in the near-term.</p> <p><b>CAPITAL COSTS</b> <b>Varies</b></p>			

<sup>12</sup> NJ.com. <https://www.nj.com/essex/2022/07/nj-city-set-two-heat-records-sunday-one-for-hitting-100-degrees-for-a-5th-straight-day.html>  
<sup>13</sup> Calculated by land areas using the Trust for Public Land heat severity dataset. <https://www.arcgis.com/home/item.html?id=cdd2ffd5a2fc414ca1a5e676f5fce3e3>.  
<sup>14</sup> University of California MERCED. Multivariate Adaptive Constructed Analogs (MACA) Datasets. [https://climate.northwestknowledge.net/MACA/tool\\_summarymaps2.php](https://climate.northwestknowledge.net/MACA/tool_summarymaps2.php)

### KEY PLAYERS

- STATE**
  - Investigate the possibility of implementing a statewide requirement for public properties to incorporate heat mitigation features into any new design. See the Climate Hazards Toolbox within the **Climate Hazards Assessment** for specific optional elements
- REGION**
  - Prioritize heat for implementation in action **Service-03** under **Section 3.3.3**. After flood, prioritize heat for implementation as part of the development of Resilient Building Design Guidelines described on the previous page. Support engagement and coordination to advance heat-related ordinance investigations and improvements
- CITY**
  - Continue to explore and implement opportunities to incorporate requirements into municipal codes, ordinances, and redevelopment plans

### EVALUATION CRITERIA



### WHAT ISSUES DOES THE ACTION HELP ADDRESS?

- This action addresses the acute effects urban heat island and heatwave events can have both on people - especially those susceptible to negative health effects - as well as to structures and facilities

### WHAT ARE THE EXPECTED OUTCOMES?

- Noticeable uptick in buildings and infrastructure that are more heat-resistant and energy efficient, which enables a feedback loop that can reduce urban heat island in general
- An increase in the accessibility of cooling features offers relief and increased safety for outdoor workers, commuters, and other people outdoors during hot days

### INCENTIVES FOR HEAT MITIGATION

To complement requirements for heat mitigation, incentives are also important to support implementation of projects on private properties. Incentives can come in the form of low-interest loans, grants, rebates, or tax breaks, for example, and there are various programs across the United States that can serve as models for this region.

### ONGOING OR COMPLETED EFFORTS TO ADDRESS HEAT

Jersey City's 2021 Climate and Energy Action Plan identified requirements for cool roofing as a priority action item. The plan proposes a requirement for new buildings "over 25,000 square feet to utilize their roof for solar panels, a green roof, or a cool roof."<sup>15</sup> There have also been data collection and assessment efforts to understand the nature of urban heat island across the region, to support advocacy for requirements. For example, Sustainable JC, South Ward Environmental Justice Alliance, and Groundwork Elizabeth, in partnership with CAPA Strategies and Rutgers, used volunteers to collect temperature data across Jersey City, Newark, and Elizabeth on a summer day to help understand temperature variability.

<sup>15</sup> 2021 Jersey City Climate and Energy Action Plan: [https://us.ftp.opendatasoft.com/analyzejerseycity/files/Sustainability/Jersey%20City%20Climate%20Energy%20Action%20Plan\\_FINAL.pdf](https://us.ftp.opendatasoft.com/analyzejerseycity/files/Sustainability/Jersey%20City%20Climate%20Energy%20Action%20Plan_FINAL.pdf)

# 03c. INTEGRATE RESILIENCE-RELATED NEEDS AND CONSIDERATIONS INTO LONG-TERM CONTROL PLANS

Policy

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NJDEP requires utilities that operate combined sewer systems (CSS) to develop Long-Term Control Plans (LTCPs) that outline steps they will take to reduce combined sewer overflows to improve water quality. See **Section 2.0** for details on the contents of the current draft LTCPs as of July 2022. While the primary goal of the LTCPs is to address water quality issues, they also relate to resilience in the following ways:

- **Increasing storage capacity and reducing bottlenecks within the region’s sewer systems can help to alleviate flooding.** The combined sewer systems in the region are outdated, often undersized for current capacities and needing repair due to deterioration or collapse. Capacity issues contribute to flooding when pipes become bottlenecks and sewage backs up behind it. There are areas within the region where people have experienced sewer back-ups in their homes repeatedly, and back-ups also contribute to flooding in streets, which limits mobility. In some cases, although a certain size storage tank may be needed to achieve the required reduction in combined sewer overflows, it could make sense to increase its size to also address flooding. This supports a “dig once” approach to limit repeated construction for different projects at the same place.
- **The design processes for projects associated with the LTCPs should consider climate change.** Many of the proposed components of the LTCPs are in coastal or other flood prone areas, and therefore must be resilient to sea level rise and heavy rainfall. Due to the critical role that the LTCPs will play in improving water quality and mitigating flooding, as well as the significant investments that will be needed for their implementation, they should be designed to withstand future conditions. This includes considering strategies to prevent high tides from blocking outfalls, which is already a problem in the region today.
- **LTCP projects can help improve other issues such as urban heat island effect and lack of access to green space, and can reduce public health risk.** Green infrastructure is a component of the LTCP strategies, and as discussed in **All Hazards-01**, green infrastructure has multiple co-benefits, such as providing green space and improving air quality. Sewer back-ups expose people to raw sewage, which could have health impacts. By reducing combined sewer overflows and improving water quality of receiving waterbodies, LTCPs can support ecosystem growth.

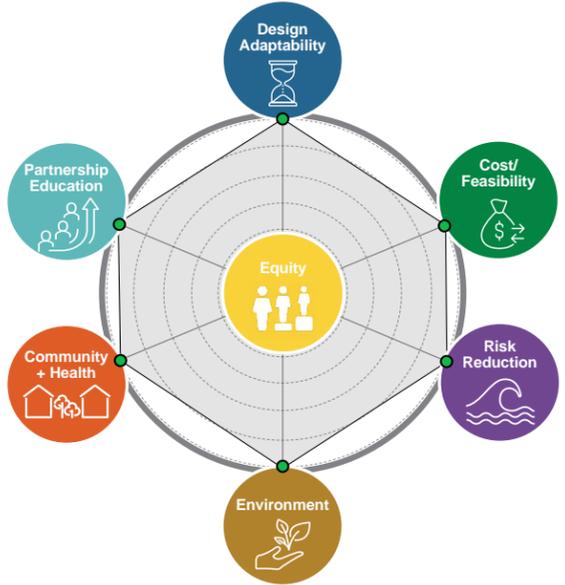
## WHAT ISSUES DOES THE ACTION HELP ADDRESS?

- LTCP projects will require significant community investment. By ensuring that LTCP components are resilient to long-term climate-related hazards and designing them to contribute to community resilience, LTCP investments can address various issues including flooding, water quality, lack of access to green space, and exposure to hazardous sewage

## WHAT ARE THE EXPECTED OUTCOMES?

- Design processes for LTCPs include climate change considerations to ensure the projects are resilient over their useful lives
- In planning implementation of LTCPs, water quality improvement projects are leveraged to provide other co-benefits

## EVALUATION CRITERIA



## KEY PLAYERS



### STATE

- Provide guidance to municipalities and utilities on how to integrate climate considerations into design of LTCP components. Integrate expectation of these considerations into design reviews. Guidelines should be consistent with the “single source of truth” (see **Section 3.3.2**). At a minimum, the projects will be required to adhere to the new rules associated with NJ PACT, which create higher design flood elevations, to an extent that varies by location. Additional guidance would be needed to address more than flood damage prevention to the new assets.
- Provide support to ensure that utilities demonstrate coordination with appropriate stakeholders on capital improvements associated with the LTCP process



### REGION

- Support outreach efforts as LTCPs move into design
- Support infrastructure coordination through actions described in **Section 3.3.1**



### CITY & UTILITIES

- Municipal sewer departments and sewer utilities integrate state guidance in the design of their LTCPs
- Municipal sewer departments and sewer utilities coordinate with other municipal departments to identify and advance LTCP projects with co-benefits that optimize “dig once” opportunities. This could involve integrating green infrastructure into roadway and curb improvements projects as they arise or requiring separate sewers in new construction.
- During design, upsize critical infrastructure to increase flood mitigation potential when feasible
- Continue to explore feasibility of a stormwater utility to support implementation of elements that can lead to stormwater resilience improvements



### COMMUNITY BASED ORGANIZATIONS

- Partner with municipalities / utilities on green infrastructure projects that integrate community involvement

## CONSIDERATIONS FOR IMPLEMENTATION

SCALE	ACTION TYPE	PRIORITY FOR IMPLEMENTATION
 CITY	 Physical and Nature Based Solutions	 Policy and Governance
 PROJECT TIMELINE		<p>2</p> <p>Implementation of the LTCPs will span over decades, although individual projects may have shorter timelines.</p>
 COSTS		<p>As noted previously, LTCPs involve large scale infrastructure that will require significant funds. Nevertheless, integration of climate considerations will vary and may be incremental and will certainly provide economies of scale.</p>
 OPERATIONS	 LOW EFFORT	<p>Falls within existing processes.</p>
 COORDINATION & IMPLEMENTABILITY	 MODERATE EFFORT	<p>Coordination and alignment of objectives is necessary across the state, utilities, municipalities, and across municipal departments. Nevertheless, coordination is already taking place to complete the LTCPs and the timing is good to be contemplating and integrating these considerations as the plans have not yet been approved by NJDEP (as of July 2022) and therefore have not begun detailed design.</p>

## WHAT IS ALREADY BEING DONE?

Currently, the LTCP process does not require climate change considerations in design beyond what is required to address permitting and/or funding agency requirements, which is focused on flood damage prevention. Some utilities have stated specific actions they will take to incorporate flood resilience. The Jersey City Municipal Utilities Authority (JCMUA), for example, has committed to elevate critical infrastructure associated with the LTCP above the 500-year (0.2 percent annual chance) flood elevation and to floodproof critical infrastructure and system components.

3.3

ACTIONS THAT WILL CHANGE  
THE WAY WE WORK  
TOGETHER

## 3.3 ACTIONS THAT WILL CHANGE THE WAY WE WORK TOGETHER

Actions that will change the way we work together are as necessary as actions that will change the built and natural environment. They will help support implementation of actions that will change the built environment, build awareness and capacity that will help ensure sound decision making into the future, and reduce risk that cannot be addressed through physical changes.

As for the actions that will change the built and natural environment, Resilient NENJ developed “cut-sheets” on each recommended action that readers can extract and share as needed. Cut-sheets are organized by whether the actions will help improve policy and governance, support outreach, education, and capacity building, develop or enhance services and programs, or support emergency preparedness and response. Each “cut-sheet” includes:

- Action type and description
- Issues the action could help address
- Expected outcomes
- Scale of action and benefit
- Key players and the actions they need to take to implement the action, generally organized by scale (e.g. federal, state, region, county, municipality, others)
- Key considerations for implementation, including: priority, timeline, costs, and level of effort expected for operations, coordination, and implementability

Key considerations include priority, timeline, costs, and level of effort expected for operations, coordination, and implementability.

In the interest of space, this report uses abbreviations to title the actions, as follows:

<b>Policy</b>	Policy and Governance ( <b>Section 3.3.1</b> )
<b>Outreach</b>	Outreach, education, and capacity building ( <b>Section 3.3.2</b> )
<b>Service</b>	Service and program development or enhancement ( <b>Section 3.3.3</b> )
<b>EM</b>	Emergency preparedness and response ( <b>Section 3.3.4</b> )

### Section 3.3.1: Actions that improve policy and governance

**Policy-01:** Continued and advance regional collaboration

**Policy-02:** Increase coordination on infrastructure investments

### Section 3.3.2: Actions that support outreach, education, and capacity building

**Outreach-01:** Provide a “single source of truth”

**Outreach-02:** Expand leadership and capacity to manage climate risk

**Outreach-03:** Conduct a Resilience 101 Campaign

**Outreach-04:** Increase availability of project-related information on websites

**Outreach-05:** Improve outreach to and emergency planning for vulnerable and at-risk populations

**Outreach-06:** Conduct youth engagement

**Outreach-07:** Leverage community expertise and advance real-time understanding of hazard conditions

**Outreach-08:** Improve systems for post-disaster recovery funding

### Section 3.3.3: Actions that develop or enhance services and programs

**Service-01:** Create resilience hubs

**Service-02:** Reduce waste impacts

**Service-03:** Increase resident access to resilience-related resources

### Section 3.3.4: Actions that support emergency preparedness and response

**EM-01:** Improve community preparedness through communication and warning systems

**EM-02:** Support scalable response to flood events and other climate emergencies

**EM-03:** Improve availability and access to financial assistance systems for recovery

3.3.1

## ACTIONS THAT IMPROVE POLICY AND GOVERNANCE

# INTRODUCTION

This section includes policy and governance related actions that will enhance the way we work together to build resilience through increased coordination primarily between municipalities, counties, state agencies, federal agencies, infrastructure and utility entities, community-based organizations, and academia.

*If the decision-making process is sound, the outcome will be sound.*

## WHAT DO WE MEAN WHEN WE SAY GOVERNANCE?

Governance refers to the ways people coordinate to make, implement, and account for decisions.

## WHAT DO WE MEAN WHEN WE SAY POLICY?

Policies are the rules or plans that guide those decisions and their accompanying actions.

## HOW DO ISSUES OF POLICY AND GOVERNANCE RELATE TO RESILIENCE IN NORTHEASTERN NJ?

Climate risk in Northeastern NJ did not evolve naturally. As evidenced through the **Climate Hazard Assessment** and **Flood Impact Assessment**, risk and inequity today are the product of hundreds of years of decisions made and executed through policy and governance at the private, local, state, federal, and even global levels. Likewise, policy and governance have the power to build resilience into the future if they require resilience-related considerations in decisions made about the built environment (see **Section 3.2**), support more inclusive, holistic decision making (as described herein), and increase the effectiveness of those processes by building the capacity of people to shape and act upon decisions that affect them (see other parts of this **Section 3.3**).

## WHAT DO WE NEED TO ADJUST? THE CHALLENGE.

Resilience, or lack thereof, is heavily affected by interdependencies across all types of infrastructure (physical, social, economic, environmental, and governance). Decisions made in one area can have reverberating and cascading consequences for generations in others – for example, fill added in the 1800s (see **Section 3.1**) affects public health, flood risk, and the environment today. While perhaps well-intentioned, decisions made by a limited set of stakeholders with incomplete information – as well as discrete scales or single applications – will rarely yield positive long-term outcomes. Conversely, decisions that center those who could be affected by the outcomes of such decisions and consider long-term and residual impacts are more likely to not only produce positive long-term outcomes, but also to identify and accomplish other co-benefits.

Current governance structures do not always support the latter type of decision making. For example, State agencies are not required to adhere to local code when making capital improvements. Entities that are interdependent, and whose decisions collectively shape the quality of life and resilience of a region must coordinate those decision-making processes and their associated actions. Further, coordination to support learning and decision-making can both build capacity and provide a platform to facilitate improved policy and governance.

## HOW CAN WE ADDRESS THE CHALLENGE? THE TOOLBOX.

In this case, policy and governance are both the challenges and the tools. These tools come in the form of regulations and ordinances, coordinating bodies, jurisdictions, municipal and agency departments, and master plans that set and guide decision making. Additionally, Resilient NENJ researched regional authorities and other regional coordinating bodies to identify entities that could serve as models for the region. For a synopsis of case studies and lessons learned, see **Appendix J**.

## WHAT IS ALREADY BEING DONE? SCENARIO 0.

There is a lot of work happening within or affecting the region to coordinate and guide decisions related to resilience, both with and in parallel to Resilient NENJ. For example:

- **New Jersey Protecting Against Climate Threats (NJ PACT)** is a regulatory reform initiative, required under New Jersey Executive Order 100, in which the State is updating regulations and permitting processes to integrate climate change considerations, while also taking steps to track and reduce greenhouse gas emissions. Updates to land use rules to consider climate change are within the Resilient Environments and Landscapes (REAL) initiative within NJ PACT and are expected to include updates to the Stormwater Management Rule and the Flood Hazard Area Control Act Rules. See **Section 3.2** for Resilient NENJ recommendations related to land use and development.
- State law requires municipalities to develop master plans that guide growth and change in the community. Master plans must be updated at least once every 10 years, and this typically includes a visioning process with community engagement, like the process to create this Action Plan. They are made up of multiple elements, or chapters, that cover a range of topics related to population, housing, economic development, land use, open space, transportation and mobility, utilities, and resiliency. Each of these topics has components that may relate to one of the five pillars of resilience, and this Action Plan and other resilience efforts should align with municipal master plans. New Jersey's 2021 amendment to the Municipal Land Use Law (MLUL) also requires municipalities to complete climate change vulnerability assessments as part of their land use element updates. The Resilient NENJ **Climate Hazards Assessment** meets many of those requirements. State law also requires counties to develop county master plans under the County Planning Act.
- New Jersey's Environmental Justice Law requires NJDEP to evaluate the contributions of certain facilities to negative environmental and public health impacts in overburdened communities when reviewing certain permit applications. Newark also has a similar Environmental Justice and Cumulative Impacts Ordinance that requires developers to consider environmental impacts and submit information to the Newark Environmental Commission. These rules aim to reduce burdens from development projects on people who have historically been underserved.

- The State's Brownfield Redevelopment Interagency Team (BRIT) is made up of representatives of various State agencies and supports brownfields redevelopment by connecting developers, municipalities, and the State and providing resources to support projects. The State Brownfields Interagency Working Group (IAWG) brings together Federal and State agencies to provide technical support and guidance to municipalities on individual brownfields redevelopment projects.
- The North Jersey Transportation Planning Authority (NJTPA) is a metropolitan planning organization (MPO) made up of representatives of thirteen counties, Jersey City, and Newark that collaborates on transportation studies, planning, and investments. Related to resilience, NJTPA has created a region-wide inventory of vulnerable infrastructure and provides support for sub-regional climate change mitigation and adaptation efforts.
- The NY/NJ Harbor Estuary Program is governed by a policy committee consisting of Federal, State, and local representatives with the purpose of bringing the benefits of the Clean Water Act to the NY/NJ Harbor area.
- New Jersey's Interagency Council on Climate Resilience brings together representatives from the Executive Branch and state agencies to develop short- and long-term action plans.



## WHAT ARE OTHER KEY CONSIDERATIONS? DECISION DRIVERS.

**The role of Resilient NENJ is not to disrupt, duplicate, or supplant existing work to improve policy and governance, but to help sew it together and fill in the gaps.**

A key value of a regionally coordinated initiative, like Resilient NENJ, is to elevate existing best practices. Because there is so much work happening around policy and governance, Resilient NENJ actions and recommendations in this section focus specifically on what can only be accomplished through regional coordination.

**New governance structures are often very difficult to implement.**

New governance structures that are legislated require significant political will and often new funding to establish. The success of coordinating bodies that are not legislated often relies on the leadership of key individuals or organizations whose priorities can shift over time. This means that such entities, when new, can have a high fail rate.

**There is policy and governance-related work and momentum ongoing that can be further coordinated, enhanced, and leveraged to help build resilience.**

Existing opportunities can be leaned into for increased value and benefit to Northeastern NJ. New Jersey's Interagency Council on Climate Resilience is a pre-existing coordination body that State agencies are already required to participate in. Resilient NENJ has been meeting and taking action together as a coordinating body consistently for almost two years. Both the Interagency Council on Climate Resilience and the Resilient NENJ structure provide important platforms to advance resilience-related improvements to policy and governance.



*The Interagency Council on Climate resilience is working to coordinate governance and decision-making across state agencies while Resilient NJ is working to coordinate resilience-related decision making regionally. There is opportunity for these initiatives to work together and complement one another.*

## WHAT SHOULD WE DO ABOUT IT? THE STRATEGY.

**EASE** and share the collective burden of studying, planning for, engaging around, advocating for, and acting toward increased resilience through continued regional collaboration.

**CONNECT** organizations that make decisions to the people who are affected by those decisions to provide better outcomes long-term.

**PROTECT** people and communities by integrating resilience considerations in all capital improvements, and coordinating those improvements to limit possible negative impacts.

### To do this, the Action Plan proposes to:

- 01 Continue and advance regional collaboration
- 02 Increase coordination on infrastructure investments

**Actions in other sections that also affect the way we work together through policy and governance, or address policy and governance related issues include:**

- Adopt additional land use policies to reduce flood risk (**Section 3.2.1**)
- Update flood damage prevention ordinances (**Section 3.2.1**)
- Reduce impervious surface and improve conveyance through green infrastructure (**Section 3.2.2**)
- Integrate stormwater management in open space (**Section 3.2.2**)
- Update stormwater management ordinances (**Section 3.2.2**)
- Incorporate resilience in new development, public space, and infrastructure (**Section 3.2.3**)
- Reduce risk from and incorporate resilience into contaminated sites (**Section 3.2.3**)
- Expand leadership and capacity to manage climate risk (**Section 3.3.2**)
- Create and provide a “single source of truth” (**Section 3.3.2**)
- Increase resident access to resilience-related resources (**Section 3.3.3**)
- Improve financial assistance systems for recovery (**Section 3.3.3**)

# 01. CONTINUE AND ADVANCE REGIONAL COLLABORATION

Policy

EASE
PROTECT
CONNECT

## HOW DO WE DEFINE THE REGION?

Resilient Northeastern NJ's Steering Committee includes representatives of Jersey City, Newark, Hoboken, Bayonne, Hudson County, and the community-based organizations Ironbound Community Corporation and HOPES CAP, Inc. These partners transcend geographic and organizational boundaries, including portions of Hudson and Essex Counties and different types of stakeholders (i.e. municipal and county representatives and community-based organizations). Throughout the development of the Action Plan, project participants have raised questions about other entities and how they fit in with the program. For example, Essex County could become more involved and there are neighboring towns that face similar risks and are interdependent that could benefit from collaboration such as Harrison, Kearny, Weehawken, and Elizabeth. The Resilient NENJ Steering Committee could consider engaging these other stakeholders over time for a more comprehensive regional approach.

Collaboration across the region between municipalities, counties, State agencies, community-based organizations, community members, planners, and engineers has been vital to developing this Action Plan and incorporating community feedback. Although each of these entities has already been working to increase resilience individually, the Resilient NJ program has demonstrated that collaboration at the regional scale will be beneficial for implementation of the plan and for continued coordination to address resilience-related issues. This action includes recommendations to outline the framework for continued regional collaboration beyond the original mandate to create this plan.

This Action Plan includes resilience actions that may be most effectively implemented at the regional scale through a regional coordinating entity. Advancing actions at a regional scale, in collaboration with other stakeholders such as community-based organizations and academia, can help to leverage resources and expertise across the region and improve consistency to achieve more progress. Some other actions may not be implemented by a regional coordinating body, but Resilient NENJ partners can collectively plan, guide, support, or advocate for policies or projects led by others.

## WHY AND WHEN DOES IT MAKE SENSE TO COORDINATE REGIONALLY?

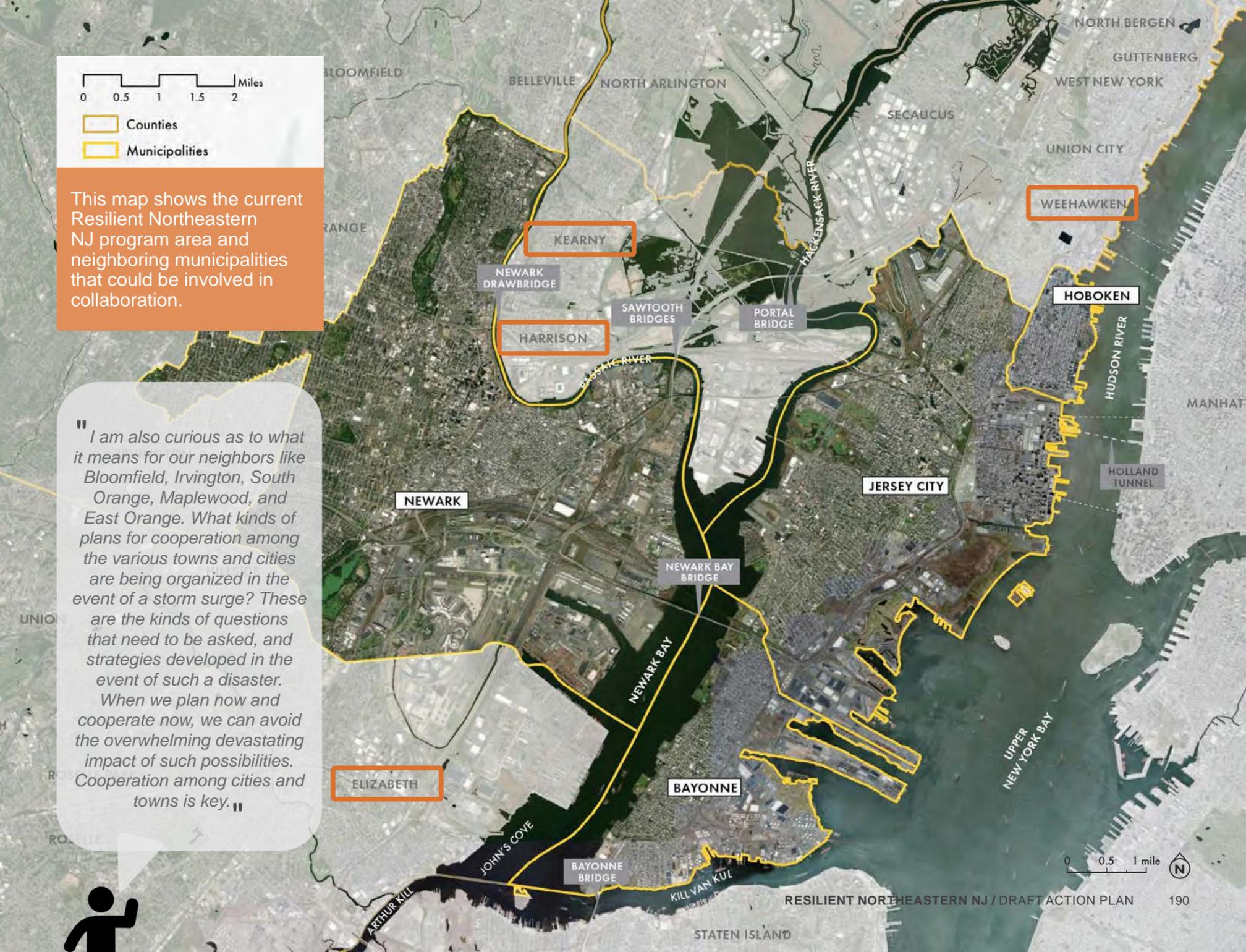
These are examples of issues that could or could not most effectively be advanced through regional collaboration in order to honor existing work and avoid duplicating or supplanting what is working elsewhere.

**MOST RELEVANT**

- Issues that cannot be addressed by other existing forms of coordination or are not being effectively addressed at other scales
- Issues that would likely benefit from a regional approach (see later in this section)
- Issues that participating entities have agreed to address
- Issues that would benefit from sharing knowledge / comparing notes at the regional level

**LEAST RELEVANT**

- Issues that are being addressed effectively at other scales or may not benefit from regional coordination
- Issues that are not agreed upon by participating entities



This map shows the current Resilient Northeastern NJ program area and neighboring municipalities that could be involved in collaboration.

" I am also curious as to what it means for our neighbors like Bloomfield, Irvington, South Orange, Maplewood, and East Orange. What kinds of plans for cooperation among the various towns and cities are being organized in the event of a storm surge? These are the kinds of questions that need to be asked, and strategies developed in the event of such a disaster. When we plan how and cooperate now, we can avoid the overwhelming devastating impact of such possibilities. Cooperation among cities and towns is key. "

# 01. CONTINUE AND ADVANCE REGIONAL COLLABORATION CONTINUED

Policy

## WHAT ARE THE GOALS OF REGIONAL COORDINATION?

Resilient Northeastern NJ has already involved various types and degrees of coordination for development of this Action Plan. For example, the Steering Committee has met on a weekly basis for most of the project period to make decisions related to scope, recommendations, and deliverables. The Steering Committee also shares information and announcements related to resilience and monitors policy changes and funding opportunities. The Community Advisory Council has met quarterly to plan engagement, advise on engagement materials, and provide feedback on project deliverables. Continued regional collaboration can be multi-faceted and aim to continue knowledge and capacity building, to foster a platform for engagement between local, regional, and state organizations and entities and with community members, to serve as a collective voice for advocacy, and to carry forward the recommendations of this Action Plan. Where differences exist between organizations or geographies, materials or decisions can be customized or separated from the regional coordinating body. Although many of the recommendations in this plan could be implemented by individual entities, many could be streamlined, expanded, or catalyzed through regional coordination, which will help create a more resilient region overall.



### LEARN

**Gather, share, and leverage information to improve resilience**

- Promote community service
- Share best practices related to policies, procedures, engagement, deliverables, projects, etc.
- Conduct regional impact assessments, such as a detailed assessments for contaminated sites or air quality impacts
- Gather climate science specific to the region, such as new data or projections related to groundwater rise, drought, etc.



### ENGAGE

**Provide a platform for inclusive and effective resilience-related engagement and connectivity across multiple scales**

- Implement Resilience 101 campaign
- Promote youth engagement and empowerment
- Include representation from and engagement around decisions to be made by or affecting...
  - Municipalities and municipal agencies
  - State and federal agencies
  - CBOs and institutions
  - Development community and private sector
  - Community members and neighborhood associations
  - Infrastructure and utility entities
  - Special interest groups
- Engage other agencies and groups as a collective body



### SHARE

**Build momentum, will, and clarity through a shared voice**

- Advocate for funding and state/federal policy
- Advocate for support and action from elected officials
- Host “Single source of truth” resource and knowledge platform
- Disseminate information, resources, and other announcements on regional and individual channels



### ACT\*

**Execute shared decisions to improve resilience in our region to climate related hazards**

- Develop consistent policies, such as design standards, development requirements, etc
- Develop and support programs, such as resilience hubs, resilience outreach, ambassadors, etc
- Plan capital projects to build resilience
- Coordinate capital project decisions that could affect resilience and have regional significance
- Pursue funding opportunities to advance resilience actions
- Plan and implement near and long-term capacity building investments

## Example priority areas for continued regional collaboration in the near-term include:

- Coordination of infrastructure investments (see **Policy-02** Increase Coordination on Infrastructure Investments)
- Provide a platform for engagement around resilience related issues in the region
- Advance and share results of feasibility studies for municipal stormwater utilities
- Collaborate to review and comment on the USACE HAT Study
- Collaborate to comment on NJ PACT regulations
- Collaborate to elevate regional best practices in residential resilience-building and co-develop guidelines that can be modified and used by municipalities (See more on Hoboken’s guidelines that can serve as a model in **Section 3.2.3**)
- Collaborate to explore first floor evacuation policies and procedures (see **Section 3.3.4**)
- Advance and track implementation of the Resilient NENJ Action Plan
- Collaborate to comment on NJ Department of Community Affairs’ (DCA) Ida Action Plan for use of Ida recovery funds

## Longer term:

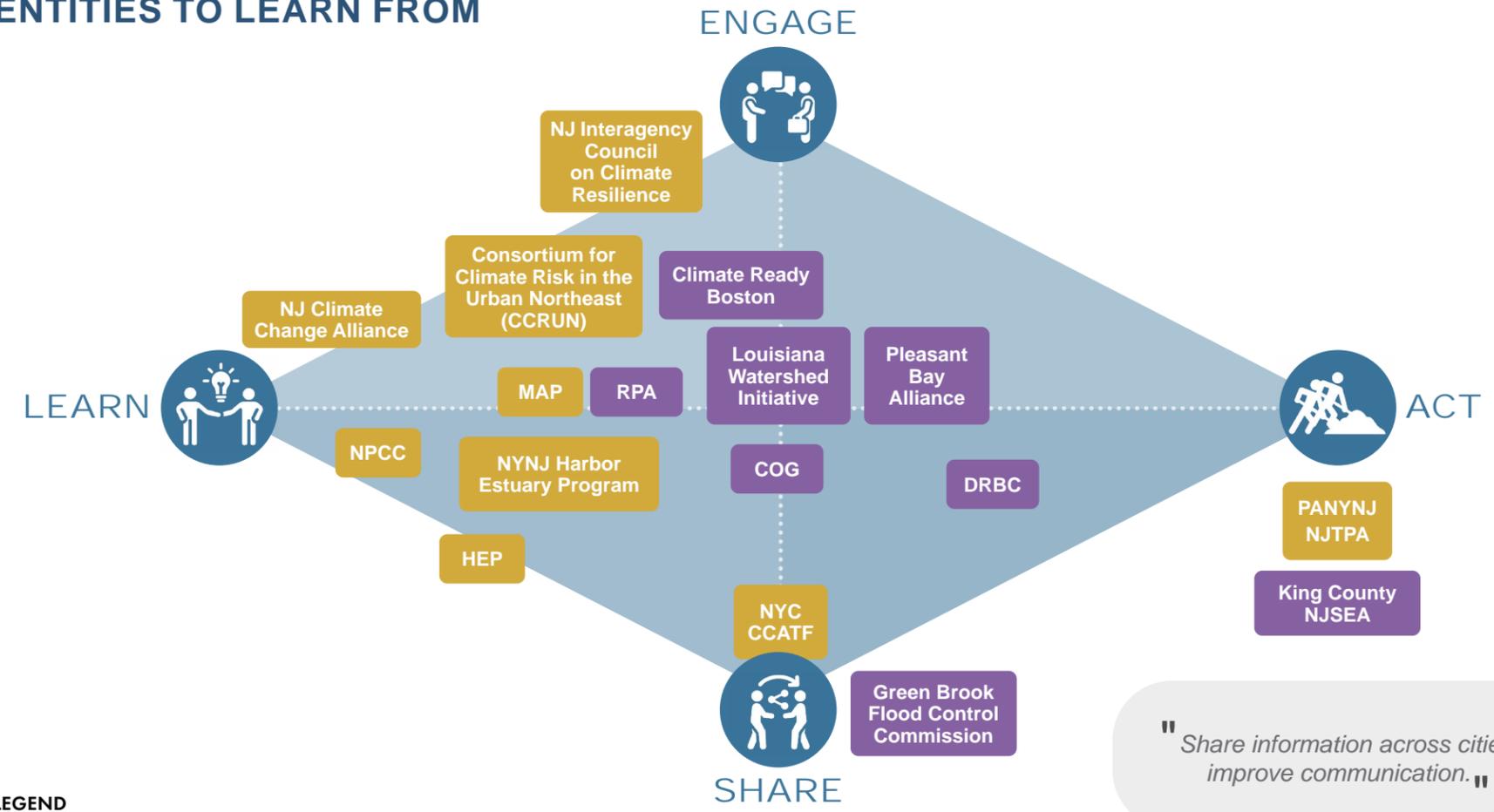
- Collaborate in the consideration and framework for various programs recommended by Resilient NENJ (e.g., urban forestry and habitat program advancement)
- Consider expanding collaboration to include more sustainability-focused goals, such as energy consumption and greenhouse gas emission reductions

# 01. CONTINUE AND ADVANCE REGIONAL COLLABORATION CONTINUED

Policy

Resilient NENJ researched regional authorities and other regional coordinating bodies to identify entities that the region could coordinate with, as well as those it could learn from, and mapped those entities to the goals for regional coordination. For a synopsis of regional coordination case studies and lessons learned, see **Appendix J**.

## CASE STUDIES ENTITIES TO LEARN FROM



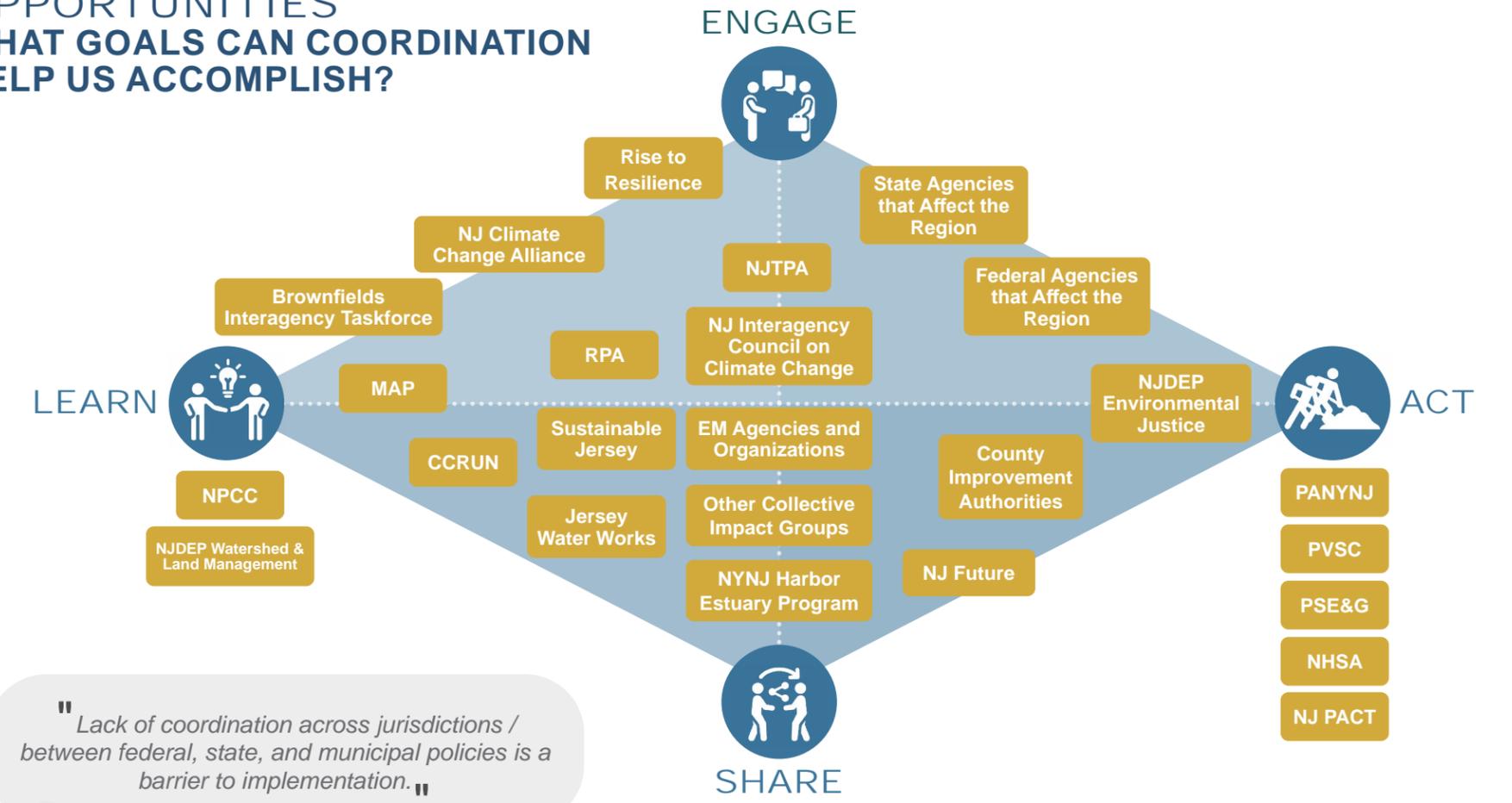
"Share information across cities to improve communication."

**LEGEND**  
 Yellow box: Entities to collaborate with  
 Purple box: Entities to learn from

## WHAT IS THE DIFFERENCE BETWEEN AN AUTHORITY AND A COORDINATING BODY?

An authority has decision making power that is typically provided through some form of legislation. A coordinating body is voluntarily established

## POTENTIAL COLLABORATION OPPORTUNITIES WHAT GOALS CAN COORDINATION HELP US ACCOMPLISH?



"Lack of coordination across jurisdictions / between federal, state, and municipal policies is a barrier to implementation."

# 01. CONTINUE AND ADVANCE REGIONAL COLLABORATION CONTINUED

Policy

## KEY PLAYERS

**FEDERAL**  
 Continue or begin to participate in Resilient NENJ initiatives and engagement processes, as appropriate. Ensure federal funding allocations are structured to support actions that build resilience identified through Resilient NENJ.

Provide opportunities for collaboration and engagement with Resilient NENJ. Leverage Resilient NENJ as a platform to engage with the communities and key stakeholders around federal resilience-related issues.

**STATE**  
 In the near-term, continue to administer the Resilient NJ program. Allocate funding to support continuation and advancement of Resilient NJ, generally, and Resilient NENJ, more specifically. Support funding and administration for the following related actions in **Section 3.3.2**:

- **Outreach-01:** Create and provide a “single source of truth”
- **Outreach-02:** Expand leadership & capacity to manage climate risk

**REGION**  
 Construct a memorandum of understanding for partner entities to sign onto that includes the goals and structure for continued collaboration. Establish an updated meeting schedule and develop subgroups that will collaborate and advance various initiatives. Develop simple bylaws for decision making, to include voting procedures to identify which initiatives the Steering Committee or subgroups will pursue. Monitor and drive implementation of regional initiatives identified in the Roadmap in **Section 5.0**. Consider hiring staff or a consultant (similar to an executive director) to specifically support long-term coordination and logistics needs.

**CITY & COUNTY**  
 Continue to dedicate staff to the Resilient NENJ process. Consider creating a “resilience committee” within each municipality comprised of staff from various departments to ensure that the initiative is providing the most value and service to the needs of communities within each city.

**COMMUNITY BASED ORGANIZATIONS**  
 Continue and expand participation in the Resilient NENJ process and support implementation and monitoring to ensure that it continues to listen and address community feedback, particularly with regard to recommendations associated with **Section 3.3.2**.

**INFRASTRUCTURE/UTILITIES & BUSINESS/INDUSTRY**  
 Continue and expand participation in the Resilient NENJ process to support planning and implementation, as well as integrate lessons learned.

**ACADEMIA**  
 Continue and expand participation in the Resilient NENJ process and support implementation and monitoring to ensure use of best available data in decision making.

**INDIVIDUALS**  
 Continue and expand participation in the Resilient NENJ process and support implementation and monitoring to ensure that it continues to listen and address community feedback

**Section 5.0 The Roadmap** provides more on recommended process for this action’s implementation.

## CONSIDERATIONS FOR IMPLEMENTATION

SCALE ACTION TYPE



PRIORITY FOR IMPLEMENTATION

1

Continued regional coordination is key to the implementation of the recommendations of this Action Plan, as many have been determined to be most effective when implemented at a regional scale. Coordination will contribute to increased resilience beyond the scope of the Action Plan as the region continues to iteratively learn, share, engage, and act.

PROJECT TIMELINE



Many of the components of regional coordination already exist between the Resilient NENJ Steering Committee. Additional partnerships with other municipalities could also be forged within the next 2 years.

OPERATIONS



There are no direct capital costs associated with regional coordination, other than the time associated with planning and meetings. Expenses will be required for staff or consultant support and to implement decisions made by Resilient NENJ.

COORDINATION



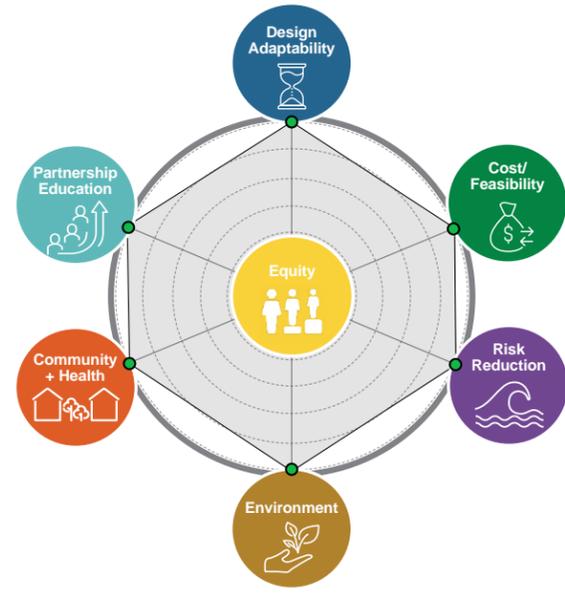
This action aims to promote additional coordination crossing typical geographic and governance boundaries in the region, with the aim of improving consistency and catalyzing implementation. While Resilient NENJ has made headway to date, more is needed.

IMPLEMENTABILITY



Although the proposed regional coordination goes beyond the norm within the region, there are various examples of similar coordinating bodies that serve as models for this type of coordination and the Steering Committee has already been meeting and collaborating for almost two years.

## EVALUATION CRITERIA



Continued regional collaboration will support achievement of all evaluation criteria by supporting the region and its partners to learn, engage, share a voice, and act together, as needed. Connectivity across the region will also help produce economies of scale and empower community based organizations and residents to be a part of resilience-related actions.

## 02. INCREASE COORDINATION ON INFRASTRUCTURE INVESTMENTS

Policy

EASE  
PROTECT  
CONNECT

Physical infrastructure includes the roads, rail lines, public transportation stations, bridges, tunnels, airports, pipes, and other built assets that help move people and things across the region. These systems are key to resilience both because they must themselves be protected against hazards and because they can be part of the solution to reduce risks. In other words, they can be both resilient infrastructure and resilience infrastructure. Coordination of infrastructure investments will help increase the resilience of infrastructure systems and increase benefits, and reduce negative impacts, of that infrastructure to those who could be affected by its existence or construction.

Various agencies at different scales are responsible for the construction, operation, and maintenance of infrastructure and making sure that they are resilient. For example, the Port Authority of NY and NJ (PANYNJ) is responsible for Newark Airport, the port, and other transportation places, while NJ TRANSIT owns and operates bus, train, and light rail systems. Counties and municipalities maintain their own roads, while NJDOT has jurisdiction over state highways and interstate highways. Utility companies or towns own their pipe networks beneath these roads.

### WHAT TYPES OF ENTITIES DEVELOP AND MAINTAIN INFRASTRUCTURE IN NORTHEASTERN NJ?



**Resilient infrastructure** can withstand shocks and stresses that might otherwise disrupt an asset's ability to meet its mission.

**Resilience infrastructure** increases the resilience of other entities, infrastructure, or communities.

Some of these agencies already collaborate through existing platforms. For example, state departments and agencies, including NJDEP, NJ Department of Community Affairs (NJDC), NJ Office of Emergency Management (NJOEM), NJ Board of Public Utilities (NJBPU), NJ TRANSIT, PANYNJ, NJ Sports & Exposition Authority (NJSEA), and NJTA are required to participate in the State's Interagency Council on Climate Resilience. While this Council on Climate Resilience is not currently coordinating infrastructure investments, a natural evolution could be to do so.

Collaboration between the various entities is important to support a "dig once" approach to infrastructure improvements, so that overlapping projects are coordinated to avoid duplication of efforts and repetitive disruption to systems and people. Although significant coordination between various agencies and governmental entities already takes place, opportunities exist to expand this coordination. Coordination between municipalities and infrastructure entities was identified by project participants as a particular barrier to implementation of projects. The complex approvals process was also identified as a challenge. One possible mechanism that should be explored to address these issues is a Regional Infrastructure Coordination Council (Council or RIC). The RIC could:

- Maintain a living, public inventory of infrastructure needs, proposed investments, and resilience-related projects so that "dig once" opportunities and opportunities to integrate resilience components in infrastructure improvements are readily identified. The Council could also facilitate prioritization of projects and funding and potentially develop a regional capital improvements plan
- Foster early planning coordination on projects to streamline approvals and permitting processes
- Coordinate public engagement on infrastructure-related improvements in collaboration with Resilient NENJ
- Support and benefit from the actions to **Increase availability of project-related information** and **Provide a single source of truth** as outlined in **Section 3.3.2**
- Share lessons learned in implementation of projects
- Coordinate on emergency preparedness and response, such as on communications and warnings in advance of storms

Resilient NENJ received positive feedback for such a Council through a survey shared with various regional infrastructure representatives, and received considerable feedback throughout the plan engagement process on the need for increased and improved infrastructure coordination.

### A "DIG ONCE" APPROACH

The New Jersey Turnpike Authority (NJTA) Newark Bay-Hudson County Extension Program that proposes to reconstruct and widen the turnpike from Newark to Jersey City is an example of a possible project that could benefit from regional coordination. Coordinated standards and design guidelines could ensure that the drainage systems and structures have sufficient capacity to manage stormwater and withstand other impacts of climate change. The turnpike reconstruction could incorporate flood barrier and deployable gate components, such as what is shown in action **Coastal-01** in **Section 3.2.1**. The project has also raised several local and community concerns, and coordination between NJTA and the appropriate Resilient NENJ representatives could support inclusive engagement, planning, and outcomes.



Image Source: New Jersey Turnpike Authority

## 02. INCREASE COORDINATION ON INFRASTRUCTURE INVESTMENTS CONTINUED

Policy

### WHAT ISSUES DOES THE ACTION HELP ADDRESS?

- Coordination challenges between stakeholders such as municipalities and infrastructure entities have been identified as a barrier for implementation of projects.
- Increased coordination among infrastructure entities can create opportunities to piggyback or merge projects that are taking place in the same area. This will reduce disruption from repeated construction by different entities while addressing multiple goals at once and/or creating multi-purpose infrastructure.

### WHAT ARE THE EXPECTED OUTCOMES?

- Promoting a “dig once” approach to projects, which leads to more effective use of funds, creates more impactful projects, and reduces community disruption and other negative impacts
- Increased integration of resilience into projects
- Alignment of standards regionally, including application of the “single source of truth”

### EXPANDING THE STATE’S INTERAGENCY COUNCIL ON CLIMATE RESILIENCE

**New Jersey Executive Order No. 89** was a pivotal directive that, among other things, established the role of the State Chief Climate Resilience Officer, required development of a Scientific Report on Climate Change and a Statewide Climate Change Resilience Strategy (Strategy), and established the Interagency Council on Climate Resilience (Council) to develop and implement the Strategy. The Council includes State departments and infrastructure agencies that are also relevant stakeholders for Resilient NENJ as identified in this Action Plan. Therefore, a possible expansion and enhancement of the Council could be to participate with and support regional infrastructure coordination through collaboration with Resilient NENJ (and other Resilient NJ regions).

This collaboration could create a conduit for flow of information between local and state agencies, streamline implementation and approvals, and prioritize projects. For example, the Council could require semi-annual group meetings between any Council agency affecting the built environment in the region and Resilient NENJ and its partners to discuss project plans, resilience needs, collaboration needs, and associated engagement opportunities. Together, these entities could form the Infrastructure Coordination Council. It could also be beneficial for a representative or liaison from Resilient NENJ to sit on the Council.

**Strategy 3.2 of the Statewide Climate Change Resilience Strategy (Actively Engage Local Governments and Other Partners to Develop Resilience Solutions)** includes three actions, below, that will work towards achieving the goal of improved coordination on infrastructure by engaging local and county governments with the Council. Implementation of these actions will be key to supporting implementation of this Action Plan, the Strategy, and other related projects and initiatives.

- Excerpt from the Strategy:*
- 3.2.1 *Develop active communication channels between the Council and local and county governments to ensure transparency and an exchange of ideas*
  - 3.2.2 *Create opportunities for local and county governments to work with the Interagency Council*
  - 3.2.3 *Encourage local and regional entities to designate a champion responsible for reporting local resilience work to the state*

### KEY PLAYERS



#### STATE

Advance actions 3.2.1 through 3.2.3 from the State Climate Change Resilience Strategy for the State's Interagency Council to expand to include collaboration with local and county governments. Coordination with Resilient NENJ could be a pilot for this expansion.

Identify opportunities to leverage and align the State's Interagency Council and Resilient NJ with the **New Jersey Silver Jackets** team, which is supported by the USACE.



#### REGION

Establish and pilot an Infrastructure Coordination Council (or Infrastructure Advisory Group) in coordination with the State's Interagency Council.

"Focus on dig once policy - coordinate projects achieving different goals."

"[In response to the question, 'What are the region's top flood priorities?'] Coordinated efforts between municipalities/county/states and transportation agencies."

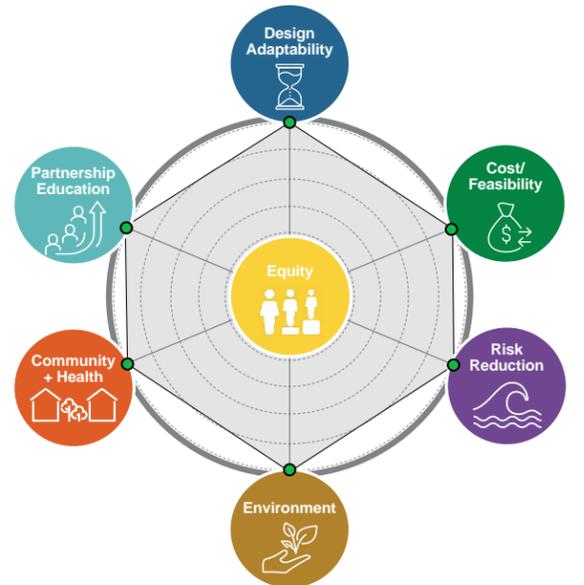


#### FEDERAL, STATE, COUNTY, CITY, ACADEMIA, INFRASTRUCTURE & UTILITIES

Participate in the Council by:

- Supporting development of a project inventory and/or joint regional capital improvements plan
- Sharing best practices and standards related to resilience
- Supporting development of a streamlined process for project protocols and approvals

### EVALUATION CRITERIA



Similar to continued regional collaboration, increased coordination on infrastructure investments provides increased opportunities to achieve the regional vision, while reducing the risk that new or improved infrastructure might yield negative community impacts. Integrating this coordination with Resilient NENJ increases the opportunity for community engagement in decision making processes that may have been less inclusive in the past.



# 02. INCREASE COORDINATION ON INFRASTRUCTURE INVESTMENTS *CONTINUED*

Policy

## CONSIDERATIONS FOR IMPLEMENTATION

<p>SCALE</p>  <p>REGION</p>	<p>ACTION TYPE</p>  <p>Policy &amp; Governance</p>	<p>PROJECT TIMELINE</p> 	<p>OPERATIONS</p>  <p>MODERATE EFFORT</p>	<p>Much of the coordination for a Regional Infrastructure Coordination Council would be covered within the standard operating budgets of agencies. The most intensive operational aspect would likely be maintenance of a regional inventory of projects, as this would require gathering information from multiple entities on a regular cadence.</p>
<p>PRIORITY FOR IMPLEMENTATION</p> <p>1</p>	<p>This action could expedite implementation of projects and produce more effective projects through coordinated planning processes by ensuring coordination of entities across all scales that affect infrastructure within the region.</p>	<p>COORDINATION</p>  <p>MODERATE EFFORT</p>	<p>This action proposes ways to expand coordination beyond its current limits with a new framework of a Regional Infrastructure Coordination Council, but this council would be similar to various other existing coordination platforms.</p>	
<p>COSTS</p> 	<p>Costs would primarily be needed for creation of and maintenance of a project inventory.</p>	<p>IMPLEMENTABILITY</p>  <p>MODERATE EFFORT</p>	<p>A coordinated regional project inventory that is publicly available would require careful planning to ensure it is clear, informative, and digestible.</p>	



**LOWER HACKENSACK RAIL BRIDGE**

As a transportation hub, the Resilient NENJ Region is criss-crossed with critical infrastructure.

*Image Source: Dan Deluca*



## INTRODUCTION

Outreach, education, and capacity building actions can increase resilience by empowering people - whether they are residents, municipal employees, business owners, or part of agencies or organizations - to get involved and take action. They can also improve resource access to help leaders more effectively do their jobs. The recommended actions aim to be accessible to all community members and to increase people's awareness and adaptive capacity to recover from climate events like floods or heat waves. The most at-risk people, many of whom have historically been left out of planning and recovery processes, must be centered.

Many of the recommendations in this section have arisen as priorities through the Resilient NENJ engagement process due to their power in building individual resilience and to have a multiplying effect on other resilience-related efforts. Engagement has been critical to Resilient NENJ to date and will continue to be important throughout implementation to ensure continued alignment with community vision.

Resilient NENJ and its partners have already been working to advance many of the actions that support outreach, education, and capacity building. For example, Resilient NENJ has been working with community-based organizations to lead outreach, has developed and promoted engagement materials and videos, and has conducted youth engagement. There are many other ways that these types of actions are already being implemented in the region, and examples of ongoing or completed efforts are included throughout this section.

### To do this, the Action Plan proposes to:

- |   |  |
|---|--|
| 01 Provide a "single source of truth"   | 05 Improve outreach to and emergency planning for vulnerable and at-risk populations     |
| 02 Expand leadership and capacity to manage climate risk                      | 06 Conduct youth engagement  |
| 03 Conduct a Resilience 101 campaign  | 07 Leverage community expertise and advance real-time understanding of hazard conditions |
| 04 Increase availability of project-related information on municipal websites | 08 Improve systems for post-disaster recovery funding                                    |

## WHAT SHOULD WE DO ABOUT IT? THE STRATEGY.

**EASE** the access to and usage of information and tools related to resilience. Create systems and processes that support people in doing their jobs and making decisions

**CONNECT** people to each other, information, data, and resources. Improve clarity and consistency of information, while using strategies like outreach ambassadors and other engagement to communicate that information

**PROTECT** people by ensuring they have the information and resources that they need to prepare for and respond to hazards

## PUBLIC ART CAMPAIGNS

Resilient NENJ has hired a public art coordinator who is leading an effort to install interactive mural art in Jersey City, Newark, Hoboken, and Bayonne. The art projects will build upon the Faces of Resilience series (see **Section 2.0** and **Appendix I**), as well as videos and social media. The murals and art project will highlight leaders in resilience and environmental justice to raise awareness, elevate the labor and accomplishments of individual people in this space, and hopefully empower others to get involved.



STEAM URBAN  
EARTH WEEK EVENT  
Image Source: Resilient NENJ

# 01. PROVIDE A "SINGLE SOURCE OF TRUTH"

## Outreach

Municipal leaders, infrastructure leaders, community members, and stakeholders at all levels have consistently provided feedback about confusion with sources for information, data, and tools to guide decision-making. There may be multiple tools or sources for information and a lack of clarity on which information should be viewed as the authority or truth. For example, as of the writing of this Action Plan, there are competing sources of information on rainfall data for use in planning and construction. This action includes recommendations for the State to work with stakeholders to create a "single source of truth," which involves conducting information and policy reviews, compiling duplicative sources of information, using consistent logos and formatting to denote authority sources under the Resilient NJ banner, improving availability of online and print information, and improving cross-linking between websites with credible resilience-related information. Example types and sources of information that should be reviewed for consistency and clarity include:

- Data and maps best used in resilience-related analyses
- Tools and portals to support planning and analyses
- The best source for emergency-related communications
- Information about accessing resources for recovery after disasters, and who are authorities that should be trusted on such issues (and how to know what to avoid)

Additionally, information could be compiled at the region- or municipal level to provide message continuity. For example, Resilient NENJ and / or the individual municipalities could compile input and feedback that community members have shared across discrete, but related, projects to demonstrate that decision makers are listening and to track achievement of public will.

Other actions in this section relate to and advance this action, particularly action **Outreach-02** (Expand leadership and capacity to manage climate risk), action **Outreach-03** (Conduct a Resilience 101 campaign), and action **Outreach-04** (Increase availability of project-related information on websites). Regional infrastructure coordination will also benefit from clear guidance from the State related to design considerations (action **Policy-02**).

EASE  
PROTECT  
CONNECT

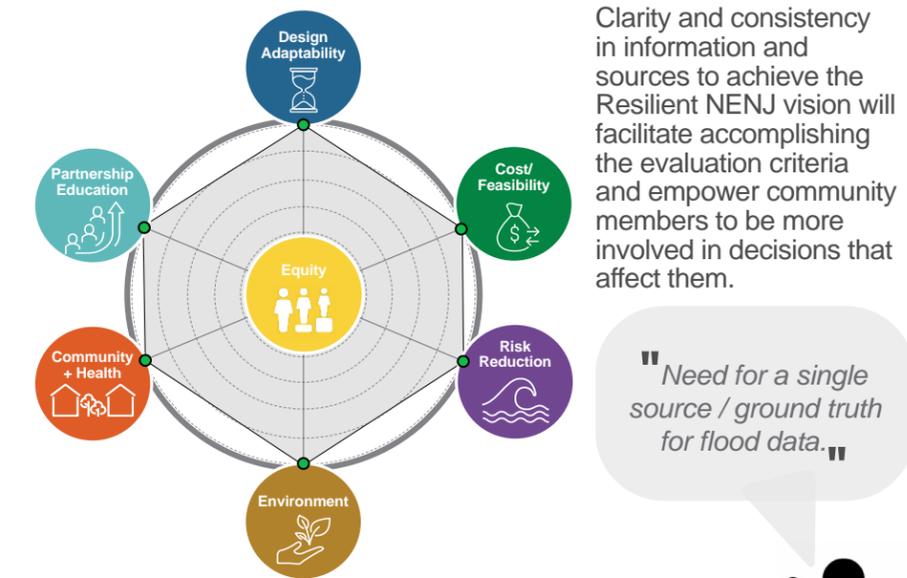
### WHAT ISSUES DOES THE ACTION HELP ADDRESS?

- Portal proliferation syndrome – confusion about what resources to use and who is an authority on information being shared
- Lack of clarity on what models, projections, and maps to use in decision making leads to inconsistencies across geographies, agencies, and even within individual agencies

### WHAT ARE THE EXPECTED OUTCOMES?

- Creation of a "single source of truth" for decision makers and residents at all scales
- Improved consistency, efficiency, and effectiveness in resilience efforts

### EVALUATION CRITERIA



### KEY PLAYERS

- #### STATE\*
- Advance creation of a "single source of truth" under the RNJ banner. Consider using a unified branding, heading, or seal of approval on appropriate documents, webpages, and communications
  - Review existing sources for information and compile duplicate sources
  - Provide clarity on different tools, who should use them, and for what purposes
  - Conduct a detailed data gap analysis to understand various sources, quality, and needs around data. Develop a plan to address these gaps

- #### REGION
- Work with municipalities to compile studies, data, best practices, and engagement feedback relevant at the region level into a single resource that can be redistributed online, to certain stakeholders, and elevated to the State "single source of truth" as appropriate

- #### CITY/COUNTY
- Share information and data appropriate for inclusion in the "single source of truth"
  - Communicate about and leverage resources provided

- #### FEDERAL, COUNTY, REGIONAL, CITY & ACADEMIA
- Conduct similar reviews of any available data and information to ensure consistency
  - Link to State resources and improve cross-referencing of links as applicable

\*The recommendations for the State align with Strategy 3.1, Ensure Continuing Efforts by the Interagency Council on Climate Resilience to Lead a Coordinated, Whole-of-Government Approach to Resilience, in the State Climate Change Resilience Strategy.

### CONSIDERATIONS FOR IMPLEMENTATION

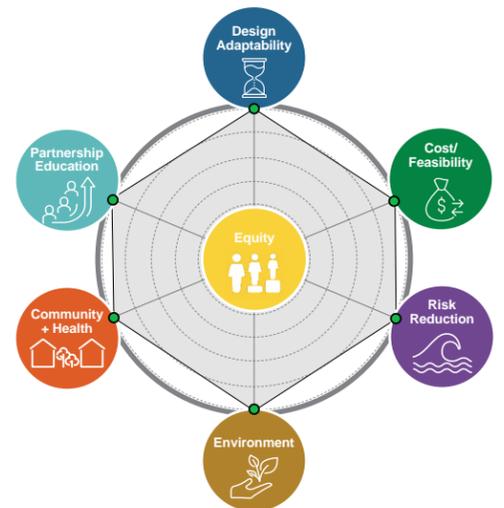
<p><b>SCALE</b></p> <p>STATE</p>	<p>This action includes roles at the municipal or regional levels, but primarily aims to increase consistency across the state.</p>	<p><b>ACTION TYPE</b></p> <p>Outreach, Education &amp; Capacity Building</p>
<p><b>PRIORITY FOR IMPLEMENTATION</b></p> <p>1</p>	<p><b>PROJECT TIMELINE</b></p> <p>There are various components that work towards creating a single source of truth that may come together beyond this time period, but an initial review and effort to increase consistency at the state level could take less than two years.</p>	
<p><b>COSTS</b></p>	<p>Costs include time to review existing tools and information and collaborate across departments, agencies, and other stakeholders to compile. Additional costs will be required to address data gaps.</p>	
<p><b>OPERATIONS</b></p> <p>MODERATE EFFORT</p>	<p>Budget will need to be allocated to accomplish and maintain this action, but it does not involve an entirely new management structure.</p>	
<p><b>COORDINATION</b></p> <p>MODERATE EFFORT</p>	<p>This action aims to achieve a deeper level of coordination in pursuit of a single source of truth and may require working with entities to absorb or eliminate duplicated efforts.</p>	
<p><b>IMPLEMENTABILITY</b></p> <p>MODERATE EFFORT</p>	<p>Implementation of this action may be challenging due to the complexity of information and the reconciling that will need to be completed. Nevertheless, there is significant community, subject matter expert, and Resilient NENJ process feedback that this is needed.</p>	

# 02. EXPAND LEADERSHIP AND CAPACITY TO MANAGE CLIMATE RISK

The Resilient NENJ municipalities play a key leadership role in increasing resilience of the region, and therefore it is crucial that they are supported from staffing, funding, and skill development perspectives. By creating roles dedicated to resilience and making guidance and financial assistance available to support people in their work, we can ensure that other actions in this Action Plan are implemented. Specific activities that can increase capacity for emergency management are discussed in **Section 3.3.4** **Actions that support emergency preparedness and response.**

## EVALUATION CRITERIA

Deliberate increased capacity in the resilience space will support achievement of all factors identified in the evaluation criteria.



## KEY PLAYERS

### STATE

- Explore development of a grant program to support hiring of resilience staff and capacity building (see Louisiana's Regional Capacity Building Grant Program)
- Continue to publish state-level guidance for municipalities on tools, data, and models to use for decision-making
- Offer trainings to municipalities for incorporating resilience into planning and policy

### REGION

- Continue to share resources and best practices across the region
- Consider hiring a staff person to help drive implementation of Resilient NENJ
- Identify leaders in various focus areas of Resilient NENJ to help drive coordinated action (see **Section 5.0**)

### CITY/COUNTY

- Increase staff dedicated to resilience, sustainability, and planning (e.g., by hiring a Chief Resilience Officer, as Hoboken has done)
- Create resilience committee with representatives of different departments who will benefit from inter-departmental coordination. Continue to provide a Steering Committee member and liaison to coordinate with Resilient NENJ and elevate needs and best practices regionwide.
- Flag a portion of budget specifically to address resilience needs

### ACADEMIA

- Continue to provide consultation and resources to municipal leaders

EASE  
PROTECT  
CONNECT

## CONSIDERATIONS FOR IMPLEMENTATION

### SCALE

This action aims to increase cities' capacities for leadership, although State support will be critical.



### ACTION TYPE



### PRIORITY FOR IMPLEMENTATION

1

### PROJECT TIMELINE



### COSTS



### OPERATIONS



### COORDINATION



### IMPLEMENTABILITY



If funding can be allocated through existing State post-disaster resources, additional funding for staff to support resilience initiatives could be allocated within 2 years.

Costs include funding dedicated to support staffing and salaries. They also include time and funding for development and implementation of training resources.

This will vary by municipality and will depend on whether a state grant opportunity is available. New management structures will be needed for roles like Chief Resilience Officer. A refocus of existing funding or new funding streams may be needed.

State leaders will coordinate with local leaders to provide support and implement the leadership grant program.

Creation of new municipal roles is common practice and therefore, with appropriate funding, is relatively simple to implement.

## WHAT ISSUES DOES THE ACTION HELP ADDRESS?

- Need for increased local staff capacity to advance resilience-related initiatives
- Need for resources and support for municipal leaders

## WHAT ARE THE EXPECTED OUTCOMES?

- Increased leadership capacity will remove bottlenecks and aid the implementation of projects and programs that reduce risk and increase resilience



NENJ WORKSHOP IN NEWARK  
Image Source: Resilient NENJ

## LOUISIANA'S REGIONAL CAPACITY BUILDING GRANT PROGRAM



Louisiana's Regional Capacity Building Grant Program provides \$400,000 in funding over a three-year period to hire staff and support to help accomplish the goals of the Louisiana Watershed Initiative (e.g., to conduct outreach and floodplain management activities). Eligible entities submitted applications to the State to obtain support funding. The program is funded through HUD's (United States Housing and Urban Development Agency) Community Development Block Grant (CDBG) Mitigation (-Mit) allocation stemming from Louisiana's Great Floods of 2016. The program provides precedent for the State to consider in its allocation of post-Ida and other post-disaster federal funding.

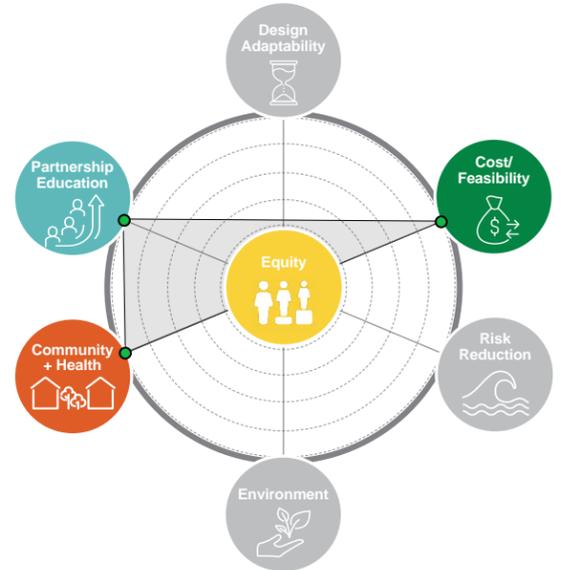
"Limited local capacity: local staff are spread too thin and don't have the capacity to manage complicated projects over the short or long term. Planning or project fatigue."

# 03. CONDUCT A RESILIENCE 101 CAMPAIGN

## Outreach

The Resilience 101 Campaign, an educational and awareness campaign that involves multiple forms of media, will increase community resilience by enhancing adaptive capacity and fostering empowerment through education and resources. Resilient NENJ has already initiated components of a campaign by creating flyers, information on the website and social media, an educational video series, posters, and initiating a public ad campaign. As a coordinated body, Resilient NENJ can continue to develop and distribute materials covering various aspects of resilience.

### EVALUATION CRITERIA



This action is most relevant to the Community and Health Benefits and Partnership and Community Involvement criteria. The Resilience 101 campaign will build community resilience through awareness and empowerment, and will hopefully bring more people into direct engagement with Resilient NENJ and resilience-related improvements in their communities.

- EASE
- PROTECT
- CONNECT

#### WHAT ISSUES DOES THE ACTION HELP ADDRESS?

- Need for improved awareness and empowerment around issues related to resilience
- General sense of confusion about where to go for information and resources, both in times of emergency and for mitigation

#### WHAT ARE THE EXPECTED OUTCOMES?

- Community members will have improved awareness of hazards they face and capacity to make effective decisions
- Community members feel prepared and know what to do in times of need / emergency situations
- Community members take proactive measures to prepare for hazards
- Community members feel informed and take action to support advancement of resilience projects

### KEY PLAYERS



#### REGION

- Advance Resilience 101 Campaign by continuing development of materials, in partnership with the municipalities and by gathering feedback from community-based organizations and academia, as appropriate
- Create a multi-faceted plan for distribution that considers the key audiences and partners for distribution, including leveraging outreach ambassadors (action 05 within this section.)
- Promote materials on Resilient NENJ channels
- Monitor participation and effectiveness of the campaign
- Set metrics and goals for the campaign



#### STATE

- Provide funding and support for the campaign



#### CITY/COUNTY

- Support distribution of the campaign through municipal or county platforms, such as websites, social media, digital kiosks, etc.
- Provide input on the content of materials, including linking to relevant municipal or county resources



#### ACADEMIA & SCHOOLS

- Consult with the region for development of campaign to ensure that materials are comprehensive, digestible, and effective



#### CBOs

- Participate directly in the goals, development, and implementation of materials and the campaign. CBOs, along with schools, libraries, and other community-centered organizations, can partner with Resilient NENJ, the State, and municipalities to support development and equitable distribution of materials
- While funded through the State's Resilient NJ program, Ironbound Community Corporation has hired the Resilient NENJ public art coordinator. This relationship should continue to develop and enhance awareness of resilience in the region.
- Advise on what is working and not working, of people who are being left out, and of adjustments needed



#### INDIVIDUALS

- Use materials and take action to increase individual preparedness or advocate for action at larger scales. Provide feedback about materials through available channels



#### INFRASTRUCTURE & UTILITIES

- Contribute to materials development and distribution related to assets, such as providing information related to resilience of public transportation and utility systems

### CONSIDERATIONS FOR IMPLEMENTATION

#### SCALE



#### REGION

Develop materials and use them across the region to promote consistency in communications.

#### ACTION TYPE



#### PRIORITY FOR IMPLEMENTATION

1

#### PROJECT TIMELINE



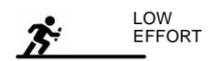
The campaign should be enhanced on an ongoing basis, with annual reviews of what is working and not working, to calibrate approach.

#### COSTS



Costs will include time to plan, develop, and distribute materials and printing / production costs, as well as time and materials for artists and ads campaigns, as appropriate.

#### OPERATIONS



LOW EFFORT

Budget will need to be allocated for material production, but the campaign will largely rely on typical communication and production channels.

#### COORDINATION



LOW EFFORT

Development of materials and promotion will require continuation of existing coordination between the municipalities and across departments.

#### IMPLEMENTABILITY



LOW EFFORT

The campaign will weave together existing materials and promotion channels that are already standard practice but may not have been implemented together in this same way.

# 03. CONDUCT A RESILIENCE 101 CAMPAIGN CONTINUED

## Outreach



**FACES OF RESILIENCE SERIES**

Resilient NENJ has hired a public art coordinator and is advancing a Faces of Resilience campaign to raise awareness about issues around resilience, as well as the incredible work that individuals are empowered to do in this space. The campaign will include interactive mural art in each city, as well as videos and social media highlighting leaders in resilience and environmental justice in Hoboken, Newark, Bayonne, and Jersey City.

### WHAT INFORMATION SHOULD BE INCLUDED?

Topics for the Resilience 101 Campaign should help community members understand concepts of risk and resilience related to flooding and other climate-related hazards, such as heat and poor air quality, along with information and tools that people need to support preparedness, mitigation, and advocacy. Existing informational materials should be leveraged where possible. The content can include, for example:

- Definitions of key terms
- Information about different hazards, how exposure is changing due to climate change, and possible impacts
- How to prepare for and respond to different hazards and where to go for help during emergencies
- How to access resources after emergencies
- How to access flood insurance
- Links to other resources that may already exist or may be developed through other recommendations of this plan. Examples: interactive flood mappers, additional programs available for risk mitigation

### WHO ARE WE TRYING TO REACH?

The Resilience 101 Campaign should be accessible to all residents and visitors in Northeastern NJ, while ensuring that people who have been historically underrepresented or those with additional needs are centered in communication and prioritized for outreach. Businesses and industrial users should also be included, especially because of their role in the local and regional economy. Examples of people that are key audiences for the campaign include:

- People who are deaf, blind, or hard of hearing
- People or businesses in areas of higher hazard exposure
- People who may need additional resources or support with disasters such as disabled persons, lower-income people, seniors and youth, and people with limited English proficiency
- Renters, new residents, and people in communal or public housing

### HOW SHOULD WE REACH THEM?

To make the campaign accessible to all residents, the materials should be made available in multiple languages and distributed through multiple types of digital and non-digital engagement platforms. The materials can take the form of social media content, videos, webpage materials, flyers, mailers, signage or posters, TV and transit ads, murals, and curricula. Existing engagement channels can be leveraged to promote information, such as social media and websites of Resilient NENJ, municipalities, and community-based organizations. Community-based organizations, neighborhood associations, libraries, schools, and houses of worship will play a key role in distribution of materials, including through possible in person distribution such as door knocking, flyering, or tabling at events. Materials can also be distributed through resilience hubs and by outreach ambassadors, which are detailed in separate actions (see section 3.3.3 Action 1 and Action 5 herein, respectively).

#### 1 WHERE DO NEW FLOOD MODELS SAY WE SHOULD EXPECT IT TO FLOOD?

A RANGE OF PHYSICAL PROJECTS CAN HELP ADDRESS DIFFERENT SOURCES OF FLOODING.

**NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION (NJDEP) DEVELOPED NEW FLOOD MODELS OF RAINFALL AND ALSO PREDICTED HOW FLOODING FROM A SANDY-LIKE EVENT MIGHT CHANGE WITH 2.4 FEET OF SEA LEVEL RISE, EXPECTED BY 2070.**

This map shows flooding from rainfall that might occur over a 24-hour period from a major storm (like Ida).

The map shows potential flooding that would be expected for current conditions and what we think conditions could look like in 2070.

The light blue is present day with high tide and the dark blue is 2070 with high tide.

You're not seeing a lot of dark blue because so much flooding is already occurring under the present day. It's mainly just going to get deeper with more rainfall.

These are regional level models and so they don't take into consideration the details of the drainage system, but they do make an assumption about what amount of rainfall we could reasonably expect the current drainage system to take away.

This model adds 2.4 feet of sea level rise to Hurricane Sandy high water marks to approximate what that storm might look like if it happened in 2070.

Similar to the rainfall map, we expect flooding mostly to get deeper, not spread too much further. This is the NO ACTION map. This is the map of flooding as it would occur without existing planned projects being implemented. There are some projects like Rebuild by Design - Hudson River in Hoboken and the Newark Flanking Plan, for example, that will help address a lot of the flooding you see in those areas.

**DROP A POST IT TO SAY WHERE YOU'VE EXPERIENCED FLOODING**

**HOW DO YOUR PAST EXPERIENCES AND EXPECTATIONS OF FLOODING COMPARE WITH THESE MAPS?**

#### 2 WHAT MIGHT FLOOD PROTECTION ACTIONS LOOK LIKE?

A RANGE OF PHYSICAL PROJECTS CAN HELP ADDRESS DIFFERENT SOURCES OF FLOODING.

**GREEN INFRASTRUCTURE**

**DRAINAGE SOLUTIONS**

**CONCRETE SOLUTIONS**

WHICH EXAMPLES APPEAL TO YOU MOST? DROP A POST-IT

WHAT AREAS OR STREETS ARE MOST IN NEED OF GREENING OR TRANSFORMATION? DROP A POST-IT

WHERE WOULD YOU LIKE TO SEE RESILIENCE HUBS? DROP A POST-IT

#### 3 WHAT NON-PHYSICAL OPTIONS ARE AVAILABLE TO HELP US ADDRESS FLOODING?

DROP US A POST-IT TO LET US KNOW WHAT YOU LIKE AND DON'T LIKE ABOUT THESE OPTIONS.

WHAT'S MOST IMPORTANT? WHAT'S NEEDED SOONER RATHER THAN LATER?

DROP A POST-IT

#### 4 HOW SHOULD WE EVALUATE DIFFERENT POSSIBLE FLOOD RISK SOLUTIONS?

THRESHOLD CRITERIA are things a solution must accomplish or meet. Every solution or measure we propose will meet these criteria.

ALTERNATIVE EVALUATION CRITERIA are the factors we will use to compare or weigh alternatives against each other. A threshold criterion may also be an alternative evaluation criterion.

MARK YOUR TOP TWO EVALUATION CRITERIA

WHAT ARE WE MISSING? DO YOU HAVE ANY OTHER CRITERIA? DROP A POST-IT OR USE THE DRY ERASE MARKER.

RESILIENT NENJ'S INTERACTIVE POSTERS ON FLOOD RISK, SOLUTIONS, AND EVALUATION CRITERIA  
Image Source: Resilient NENJ

# 04. INCREASE AVAILABILITY OF PROJECT-RELATED INFORMATION ON MUNICIPAL WEBSITES

Outreach

EASE  
PROTECT  
CONNECT

The municipalities in the region each have various departmental webpages, with varying levels of detail, that provide information and updates about resilience-related initiatives. Each city should consider creating a webpage that provides summaries and links to more information about planning initiatives, capital projects, and other programs across all departments (this could be focused on those that advance or affect resilience and sustainability, or be all encompassing). Resilient NENJ should create a page that links to these pages, as well as tracks initiatives at the region level. This does not conflict with the need for a single source of truth, as the State can simply link to these source pages and / or collect information that is of critical relevance. It is important for community members to have access to information at their scale of relevance.

### WHAT ISSUES DOES THE ACTION HELP ADDRESS?

- Need for improved awareness and empowerment around issues related to resilience

### WHAT ARE THE EXPECTED OUTCOMES?

- Community members will have greater awareness of projects and initiatives that are being undertaken. This awareness can help increase community involvement in projects, and thereby increase support for their advancement, which will improve effectiveness and efficiency of implementation.
- By improving availability of information about ongoing projects, different entities can improve their ability to collaborate and build off existing initiatives.

## EVALUATION CRITERIA

Making project information more accessible will help residents and other stakeholders to understand and potentially influence impacts and benefits to communities during and after project construction, as well as encourage community partnership though transparency.



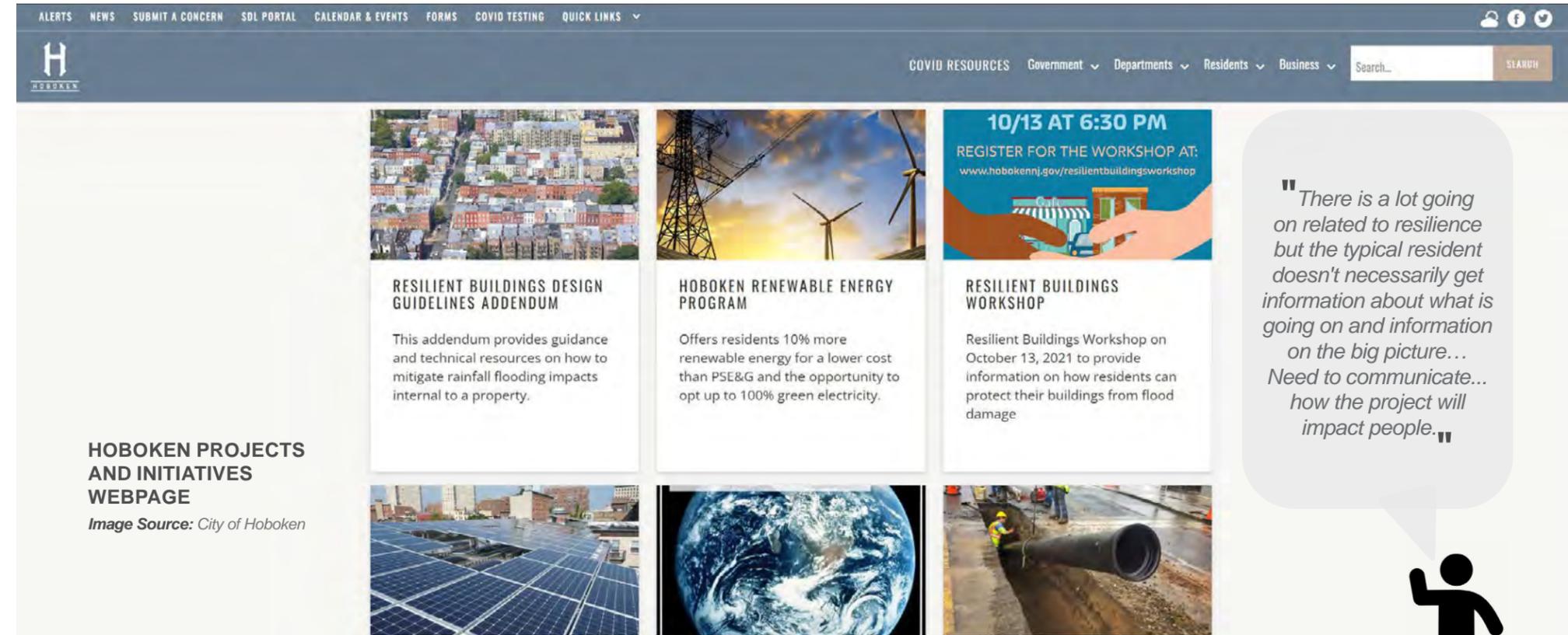
## CONSIDERATIONS FOR IMPLEMENTATION

SCALE	ACTION TYPE	PRIORITY FOR IMPLEMENTATION
<p><b>VARIOUS</b></p> <p>Various entities at different scales can complete this action.</p>	<p>Outreach, Education &amp; Capacity Building</p>	<p><b>3</b></p>
<p><b>PROJECT TIMELINE</b></p> <p>+ ongoing maintenance</p>	<p><b>OPERATIONS</b></p> <p>LOW EFFORT</p>	<p>Each entity already has a website and developer teams. Resilient NENJ already has a website.</p>
<p><b>COSTS</b></p> <p>Costs for implementation include costs for time to compile information and for website developer teams to design and create webpages.</p>	<p><b>COORDINATION</b></p> <p>MODERATE EFFORT</p>	<p>Coordination is needed between entities to ensure that info is appropriately cross-referenced and presented.</p>
	<p><b>IMPLEMENTABILITY</b></p> <p>LOW EFFORT</p>	<p>Effort will be needed to keep information current, but this can likely be accomplished with existing governance and staffing structures.</p>

## KEY PLAYERS

- REGION, STATE, COUNTY, CITY, CBOs, UTILITIES & INFRASTRUCTURE**
  - Provide centralized sources of information about ongoing projects and initiatives, including details such as the following: name, purpose, status and timeline, project partners, cost, ways to get involved, etc.
  - Link to relevant information provided by other entities
  - Make the webpages easily accessible from the homepage
  - Consider periodically sharing mailers, flyers, newsletters, letters to the editor, short local TV updates, and other non-digital updates for those without access to the internet
- INDIVIDUALS**
  - Interact with webpages and other materials, ask questions about projects through available channels, and provide support as relevant

During community meetings and meetings with the Community Advisory Council, Resilient NENJ heard that it can be frustrating for community members to find out about planned development and capital projects after the fact. By partnering a progress tracker for resilient initiatives (such as **Climate Ready Boston's Progress Tracker**), with a portal that provides consistent updates about potential development (projects, such as that being piloted by **Irys**), community members will be empowered with information about changes that could affect them in their communities. This recommendation also connects with the action recommendation, Increase coordination on infrastructure investments in **Section 3.3.1**.



"There is a lot going on related to resilience but the typical resident doesn't necessarily get information about what is going on and information on the big picture... Need to communicate... how the project will impact people."

# 05. IMPROVE OUTREACH TO AND EMERGENCY PLANNING FOR VULNERABLE AND AT-RISK POPULATIONS

Outreach

EASE  
PROTECT  
CONNECT

Higher risk individuals, such as people who are Deaf or Hard of Hearing, blind, neurodivergent, non-English speaking, or with mobility limitations are often left out of planning processes. Community members also expressed that current warning and evacuation systems for disasters often do not reach these community members, which compounds their risk. Renters and new residents to communities also have elevated risk because they may not be familiar with hazards or typical communication channels. People living in garden apartments (basement / first floor units) are also at higher risk. This action addresses these issues primarily through the creation of a paid outreach ambassador program in which community members serve as local leaders who connect high-risk people with information and resources. The action also includes other activities that can support outreach to vulnerable people, such as resources for translation of materials into other languages, and activities that support first responders to reach higher risk people during emergencies, such as through promotion of the NJ Register Ready platform.

### COMMUNITY EMERGENCY RESPONSE TEAMS (CERT)

These teams are volunteer “train the trainer” organizations that educate residents in disaster preparedness and response so that they can support other neighbors during emergencies. FEMA provides training resources and guidance for instructors. Hoboken has an active CERT group that also operates heating and cooling centers. This best practice could be expanded across the region. Learn more about the CERT concept on FEMA’s website [here](#) and about Hoboken’s team [here](#).

### EVALUATION CRITERIA



### WHAT ISSUES DOES THE ACTION HELP ADDRESS?

- Some people such as those who are Deaf or hard of hearing, non-English speaking, neurodivergent, or seniors may be left out of outreach, communications, and planning processes. This creates additional risk for these people during emergencies
- Some people, such as renters & new residents, may not realize their risk

### WHAT ARE THE EXPECTED OUTCOMES?

- Outreach ambassadors serve as a conduit to provide information from the Resilience 101 campaign to people who are often left out. Youth (e.g. high school seniors or college students), become outreach ambassadors and the program can serve as a platform to connect and empower youth and elderly. See action **Outreach-06** for more on youth engagement.
- Emergency planning, practices, and communications account for people with additional needs
- Additional resources are available for translation in resilience projects

### KEY PLAYERS

- FEDERAL**
  - Create funding opportunities for outreach ambassador programs
  - Ensure eligibility of federal funds for use in hiring of local translators and community advocates
- STATE**
  - Create funding opportunities for outreach ambassador programs. Explore whether State Community Services programs could be expanded to help meet this need.
  - Pursue contract flexibility in federally funded programs to facilitate hiring of local translators and community advocates
- REGION**
  - Create regional paid outreach ambassador program and funnel materials through this program. Include preparedness capacity building and other ambassador trainings in the program. While the outreach ambassador program could be implemented at a municipal scale, a regional approach will achieve cost reductions and improve consistency. Resilience hubs (see **Section 3.3.3**) can serve as stations for ambassadors.
  - Identify ambassadors that are advocates for Deaf and Hard of Hearing people and non-English speakers to collaborate on needs (see **Appendix I** for priority languages identified for the region).
- CITY/COUNTY**
  - Conduct specific outreach through Resilience 101 to at-risk populations (e.g., homeowners, renters, businesses, etc. in flood areas)
  - Promote NJ Register Ready with community members and use database in emergency planning
- CBOs**
  - Collaborate on creation of outreach ambassador program and recommend potential ambassadors
- INDIVIDUALS**
  - Become ambassadors
  - Leverage resources available from ambassadors
  - Support friends and family in registering for NJ Register Ready as applicable

### CONSIDERATIONS FOR IMPLEMENTATION

<b>SCALE</b>	<b>ACTION TYPE</b>	Improved outreach, engagement, and capacity building is achieved through development of an outreach ambassador program, which could be leveraged for emergency preparedness and response.
<b>REGION</b>		
<b>PRIORITY FOR IMPLEMENTATION</b>	<b>1</b>	
<b>PROJECT TIMELINE</b>		Some activities within this action could be quick to implement, including promotion of NJ Register Ready and improvements for hiring of translators in State contracts.
<b>COSTS</b>		Costs include that to support time to develop and start-up the outreach ambassadors program and funds to compensate ambassadors.
<b>OPERATIONS</b>		Although some of the activities included in this action can be accomplished within the existing governance and management structures, the outreach ambassador program is a new approach to conducting outreach and sharing information with the general public and will require a greater amount of management.
<b>COORDINATION</b>		This action will require significant coordination at the regional level and between municipal leaders, community-based organizations, and community members.
<b>IMPLEMENTABILITY</b>		An outreach ambassador program is not common industry practice, but mirrors community emergency response team (CERT) programs that exist across New Jersey.

# 06. CONDUCT YOUTH ENGAGEMENT

Outreach

EASE  
PROTECT  
CONNECT

This action includes the planning, coordination, and execution of youth engagement activities to educate and empower youth across the region on topics related to resilience. The Resilient NENJ engagement process has identified youth, or people college-age or younger, as a priority target group for engagement. Youth are higher risk because of their lack of resources and independence, leading to greater vulnerability resulting from the decisions of others, and they are often overlooked in planning processes. Conducting youth engagement, particularly in low-income neighborhoods and areas with higher climate-related risks, can empower youth to counter these vulnerabilities and encourage them to get involved to affect change in the decisions that they typically inherit from previous generations.

Partnerships between Resilient NENJ, municipalities, schools, and community-based organizations will be key in planning and implementing youth engagement activities to leverage existing relationships and programs. Youth engagement can take several forms with varying levels of involvement. This can range from development and distribution of educational materials to development of activity packets to direct facilitation of activities.

### WHAT ISSUES DOES THE ACTION HELP ADDRESS?

- Youth are particularly vulnerable to climate hazards due to their limited resources and mobility
- At the same time, today's youth will be the leaders of tomorrow, and therefore their active involvement is critical to ensuring that recommendations advance
- Youth inherit the decisions of generations before them, but are often not centered in those decision making processes

### WHAT ARE THE EXPECTED OUTCOMES?

- Increased awareness and understanding about resilience-related concepts among youth so that they are empowered to be part of the solution to increase resilience
- Increased awareness about resilience efforts among the general public as youth spread their knowledge and excitement to their families
- Climate change and hazards become integrated into school curriculum
- In the long term, the current youth are champions for change in the future implementation of the recommendations in this plan

"Including young people / students in engagement is also a priority."



## KEY PLAYERS

-  **STATE**
  - Create funding opportunities to support time and resources for material development and activities and for youth internship programs
  - Continue to advance development and implementation of climate change curriculum and resources for educators<sup>2</sup>
-  **COUNTY**
  - Leverage existing relationships to identify opportunities for partnership on engagement, and participate in engagement activities
-  **REGION**
  - Continue to develop and share engagement materials and collaborate on engagement activities where applicable
  - Explore opportunities to directly engage school leader and teachers to provide trainings to teachers on the materials to promote their use in curricula
-  **CITY/COUNTY**
  - Leverage existing relationships to identify opportunities for partnership on engagement, and participate in engagement activities
-  **CBOs**
  - Partner with Resilient NENJ to develop and implement engagement activities, including opportunities for youth to become involved earlier in planning process, possibly through shadowing or internships
-  **ACADEMIA / EDUCATION**
  - Partner with Resilient NENJ to develop activities and curricula for students
-  **INDIVIDUALS**
  - Participate in activities, take next steps to get more involved
  - Conduct meetings-in-a-box, or meetings using materials provided by Resilient NENJ or others

<sup>2</sup> See more on New Jersey's updated 2020 Student Learning Standards that incorporate climate change on the NJ Department of Education website: <https://www.nj.gov/education/standards/climate/learning/index.shtml>

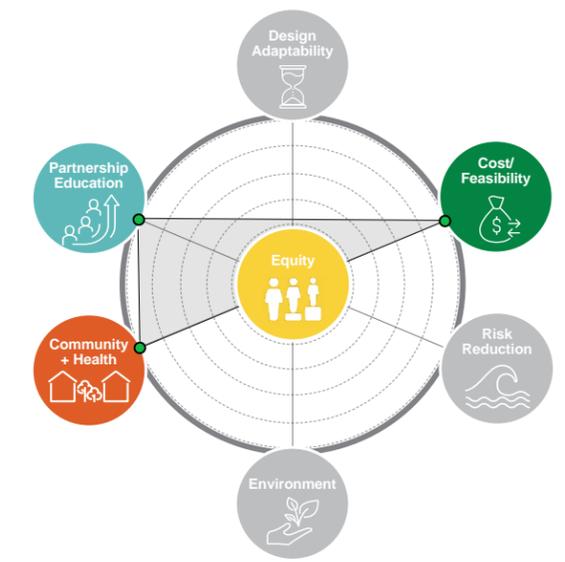
## CONSIDERATIONS FOR IMPLEMENTATION

SCALE	ACTION TYPE
 <b>REGION</b>	
<b>PRIORITY FOR IMPLEMENTATION</b>	<b>1</b>
<b>PROJECT TIMELINE</b> Ongoing	Materials are already developed that can be used in new settings. Additional materials or activities can take several weeks to draft and finalize.
<b>COSTS</b> \$ \$ \$ \$ \$	A strategy that includes a range of forms of engagement, from in-person facilitation to materials development, over the course of a year could potentially be partnered with the regional art coordinator position and initiative.
<b>OPERATIONS</b>  LOW EFFORT	Although budget may need to be allocated, youth engagement activities do not involve any unique operations.
<b>COORDINATION</b>  LOW EFFORT	Youth engagement activities are best as collaborative efforts but there are also many groups already leading this work.
<b>IMPLEMENTABILITY</b>  LOW EFFORT	Implementation of this action is straightforward and relies on engagement techniques that are common practice, although creative thinking will be applied to create engaging activities.

# 06. CONDUCT YOUTH ENGAGEMENT CONTINUED

## Outreach

### EVALUATION CRITERIA



This action is most relevant to the Community and Health Benefits and Partnership and Community Involvement criteria. Engagement will build community resilience through awareness and empowerment, and will hopefully bring more people into direct engagement with Resilient NENJ and resilience-related improvements in their communities.



**RABBIT HOLE RABBIT**  
Students gardening at an event co-hosted by Newark's Office of Sustainability and the NJ Tree Foundation for students in 2017.  
*Image Source: City of Newark Press Office*

### EXAMPLES OF RESILIENT NENJ'S YOUTH ENGAGEMENT

- Resilient NENJ developed community art sheets that youth can write or draw on to share their vision for their communities and science experiments to illustrate concepts of flooding and climate change. These sheets have been distributed through tabling events at street fairs, Earth Week events, farmers markets, and other events organized by community-based organizations.
- Resilient NENJ has partnered with STEAM URBAN, a Newark-centered community-based organization, to participate in their youth-focused events with interactive posters that provide information about flood exposure and types of solutions that can address climate-related hazards
- Resilient NENJ developed and shared youth workshop materials on the Resilient NENJ website
- Resilient NENJ worked with students at Hoboken High School to discuss opportunities for resilience hubs and new green infrastructure
- Resilient NENJ worked with high school student climate ambassadors in Newark to facilitate a "Game of Floods" workshop, a type of **resilience planning workshop designed by the Urban Sustainability Directors Network (USDN)**
- Resilient NENJ led interactive resilience planning workshops at High Tech High School to give an overview to high school students about resilience planning and ongoing initiatives and to gather feedback on important community assets and priorities for advancing projects
- The Community Advisory Council for Resilient NENJ includes a high school student

#### RESILIENT NORTHEASTERN NEW JERSEY RISING SEA LEVEL EXPERIMENT

**What You Will Need:**

- 3 Glasses
- Ice Cubes
- Water

**What's Next:**

- Fill one glass with water and a few ice cubes, fill another glass with only water and fill the final glass with ice. Leave an inch unfilled in each cup to watch water level.
- Let the ice melt (or safely use a heat source to help speed up the process).
- Finally, take the glass of melted ice and pour it into the full glass of water.

**Background:**  
As the planet warms, glaciers and ice sheets are melting. As the ice melts, it flows into the oceans causing the sea level to rise. Sea ice is also melting because of the warming that's occurring, but that does not contribute to rising sea level.

**What Happened:**  
The glass with the water "and" ice simulated melting sea ice. The melting ice in the glass didn't cause the water to spill out. Adding melted ice to the full glass of water will cause the water to spill out of the glass, which simulates the melting glaciers and ice sheets.

**For More Information:**  
Take your phone, open the camera app and point at the QR code on the below to learn more about Resilient NENJ.

#### RESILIENT NORTHEASTERN NEW JERSEY STORM SURGE EXPERIMENT

**What You Will Need:**

- 1 Glass
- Deep Breath
- Water

**What's Next:**

- Fill the glass of water to the top of the rim.
- Aim your mouth at the top of the glass and lightly use your breath to blow.
- Increase the intensity of your breath until the water spills out of the glass.

**Background:**  
Storm surge is flooding typically associated with coastal storms, particularly hurricanes. As sea level rises, more communities face the risk of storm surge flooding. As the wind from the coastal storms pushes across the water, the water is pushed towards the shoreline. When the water reaches the shore, it pushes inland and causes flooding.

**What Happened:**  
Your breath simulated the winds associated with a coastal storm. The more you increased the "wind" created by your breath, the more the water was displaced. The highest storm surge ever recorded was during Hurricane Katrina in 2005. The surge reached 27.8 feet! Keep in mind - one foot of moving water is enough to wash a vehicle off the roadway!

**For More Information:**  
Take your phone, open the camera, and point it at the QR code below to learn more about Resilient NENJ.

#### RESILIENT NORTHEASTERN NEW JERSEY FLASH FLOODING EXPERIMENT

**What You Will Need:**

- 3 Glasses
- Dirt
- Water

**What's Next:**

- Fill two glasses to the top with dirt and fill the third glass with water.
- Gradually pour half the water over one of the glasses filled with dirt.
- Quickly dump the remaining water on top of the other glass filled with dirt.

**Background:**  
As the atmosphere warms, it holds more moisture. For every degree of warming, the atmosphere holds 4% more moisture. We see the impacts of these warming through flash flooding. Flash flooding is a high intensity, short duration rainfall.

**What Happened:**  
When you gradually poured the water over the first glass filled with dirt, the dirt absorbed most of the water. In the second scenario, the dirt didn't have the opportunity to absorb the water and some or most of the water spilled out of the glass. Aging infrastructure was never designed to handle the high intensity rainfalls that are becoming common with climate change. Urban areas also have a lot of impervious surfaces (the inability to absorb water), which forces the water to "runoff" and collect, which can make flooding worse.

**For More Information:**  
Take your phone, open the camera, and point it at the QR code below to learn more about Resilient NENJ.

### HANDS ON YOUTH ENGAGEMENT

Resilient NENJ developed science experiments for teachers, partner organizations, and school aged children and teens to better connect them to the practical implications of climate change. This is just one example of the types of materials and collaboration possible through Resilient NENJ.

*Image Source: Resilient NENJ*

"More education for kids related to green infrastructure, planning, climate change."



# 07. LEVERAGE COMMUNITY EXPERTISE AND ADVANCE REAL-TIME UNDERSTANDING OF HAZARD CONDITIONS

Outreach

EASE  
PROTECT  
CONNECT

Resilient NENJ partners have created platforms to crowdsource and increase availability of real-time data to supplement existing resources to understand where flooding and other hazards might occur. Strategies include development or continued promotion of city, region, or statewide reporting platforms to gather information from community members about where they have experienced flooding or other hazards, as well as the connection of these platforms with the “single source of truth” and the sharing of data. These data can be used by emergency managers and first responders to plan response to future events and can also be integrated with State platforms such as the NJ Floodmapper to create a more complete picture of flooding. This action also includes activities to improve data availability through sensor programs or advanced modeling, with ties to alert systems.

## WHAT ISSUES DOES THE ACTION HELP ADDRESS?

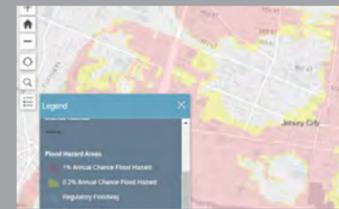
- Community members have first-hand experience about hazards that is important to integrate into planning processes.
- Models are inherently limited. At the hyper-local scale, hazard conditions can be variable depending on the event.
- Much flood related data are out of date, and real-time data can help with emergency response, as well as long-term planning.

## WHAT ARE THE EXPECTED OUTCOMES?

- Multiple sources for information about hazards are pooled into useful databases and the “single source of truth” to guide planning
- Community members feel involved in local processes
- Data sharing and compilation supports “single source of truth”
- Data sensors support and complement “on the ground” observations

## REPORT FLOODING WITH INTERACTIVE FLOOD MAPPERS

Responding to feedback in the aftermath of repeated rainfall flooding in summer of 2021, each of the Resilient NENJ cities is developing a mapper where residents can report flood locations as they occur. Having this information can help the cities respond to flooding as it happens and to track repeat locations of flooding. Links to the live interactive flood mappers are below:



Newark: [nwkfloodmapper](#)

Hoboken: [hobokenfloodmap](#)

Flood mappers for Jersey City and Bayonne are coming soon.

## EVALUATION CRITERIA



This action is most relevant to the Cost and Feasibility, Risk Reduction and Effectiveness, and Partnership and Community Involvement criteria. Community members have direct experience with flooding and its impacts, and are well positioned to share where and when flooding happens and how much disruption it causes.

## KEY PLAYERS



### STATE

- Solicit and integrate flood report data into NJ Floodmapper and make available for download and planning
- Solicit 911 call data post-disaster to complement these data
- Work with municipalities that do not have individual flood or hazard mappers to promote State flood reporting tool (currently MyCoast)



### REGION

- Share best practices about development of tools and hazard mapping. Promote and facilitate data sharing
- Explore program for installation of sensors to detect flooding in real-time to complement resident reports (Hoboken and Jersey City currently have pilot programs underway)



### CITY/COUNTY

- Create or continue to use, incorporate, and promote online resident flood reporting services. Consider expanding to include other hazards such as extreme heat, and tie to alert systems
- Continue to promote existing or explore creation of hotlines for residents to report hazards via phone
- Coordinate with State to share data periodically



### CBOs

- Collaborate on creation of outreach ambassador program and recommend potential ambassadors



### ACADEMIA

- Coordinate with municipalities and the region to implement High Resolution Rapid Refresh 48-hour modeling of severe weather and PM2.5 transport plumes to support early warning systems at various scales



### INDIVIDUALS

- Take photos and incorporate experiences into reporting systems



### INFRASTRUCTURE & UTILITIES

- Use flood report and/or real-time data to guide mitigation, preparedness, and response

## CONSIDERATIONS FOR IMPLEMENTATION

### SCALE



Although some activities within this action could be implemented at a regional scale, such as High Resolution Rapid Refresh modeling, most activities would be implemented at a city-level

### ACTION TYPE



### PRIORITY FOR IMPLEMENTATION

2

### PROJECT TIMELINE



Hazard report systems and hotlines can be developed in several months. Flood sensor pilots and advanced modeling would take more time.

### COSTS



Costs include time and any online platforms needed to develop reporters and time and tools for advanced modeling or sensor deployment.

### OPERATIONS



New budget or reallocation of budget will likely be needed to develop new reporting platforms. Funding applications may be needed to support advanced modeling or pilot sensor programs.

### COORDINATION



Coordination is needed across municipal and state agencies and utilities for development and integration of reporting platforms and to implement regional modeling.

### IMPLEMENTABILITY



Existing reporting platforms, such as the Newark and Hoboken flood reporters, can be starting points. Advanced modeling and sensor programs are unique depending on the scope and geography but have been implemented in other areas, including pilot sensor programs in Jersey City and Hoboken.

# 08. IMPROVE SYSTEMS FOR POST-DISASTER RECOVERY FUNDING

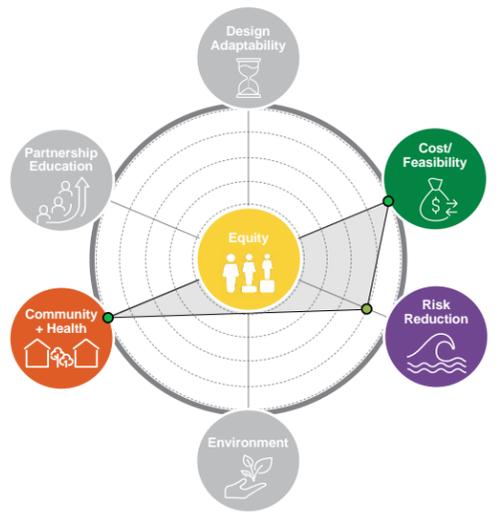
Outreach

EASE  
PROTECT  
CONNECT

This action focuses on activities that build capacity for municipalities to access funding that becomes available after disasters. Several funding streams are specific for post-disaster situations, such as the FEMA Hazard Mitigation Grant Program, FEMA Public Assistance, and HUD's Community Development Block Grant-Disaster Recovery program. Municipalities can take specific steps to better position themselves to access these types of funding programs.

## EVALUATION CRITERIA

This action will increase community capacity to recover post-disaster and will primarily impact Cost and Feasibility, Risk Reduction / Effectiveness, and Community and Health Benefits criteria.



## KEY PLAYERS

- FEDERAL**
  - Explore and consider incentivizing post-disaster redevelopment operations and plans
- STATE**
  - Explore and consider post-disaster redevelopment operations and plans
  - As part of effort to **Provide a single source of truth**, improve consistency and availability of information related to post-disaster recovery and funding
- CITY & COUNTY**
  - Create systems and processes to better position for post-disaster funding, including having current inventories of assets, priority areas and projects (including those with feasibility studies or conceptual designs). Resilient NENJ is working to achieve this by helping to prioritize resilience actions at multiple scales.
  - Establish post-disaster funding support contracts with contractors who can support preparation of funding applications.
- REGION**
  - Continue to coordinate on best practices and identify and advocate for funding needs at the regional scale
  - Support the development of "shelf-ready" projects that can be rolled into emergent funding pursuits
  - Provide a platform to collectively advocate for post-disaster funding, when the need arises

## CONSIDERATIONS FOR IMPLEMENTATION

<p><b>SCALE</b></p> <p><b>CITY</b></p> <p>This action aims to increase cities' capacities for leadership, although support at the state level will be critical</p>	<p><b>ACTION TYPE</b></p> <p>Outreach, Education &amp; Capacity Building</p>	<p><b>PRIORITY FOR IMPLEMENTATION</b></p> <p>3</p>
<p><b>PROJECT TIMELINE</b></p> <p>While establishing post-disaster funding contracts is relatively quick, taking time to put systems in place to become better positioned for post-disaster funding could take 2-4 years.</p>	<p><b>OPERATIONS</b></p> <p>LOW EFFORT</p>	<p>Leverage existing governance structures to support funding contracts and improvement of processes.</p>
<p><b>COSTS</b></p> <p>Costs include those for the funding contract and the time to organize systems for positioning.</p>	<p><b>COORDINATION</b></p> <p>LOW EFFORT</p>	<p>Limited new coordination is required for this action.</p>
	<p><b>IMPLEMENTABILITY</b></p> <p>MODERATE EFFORT</p>	<p>This action includes industry best practices for post-disaster funding, but implementations of new systems and processes may be challenging.</p>

## WHAT ISSUES DOES THE ACTION HELP ADDRESS?

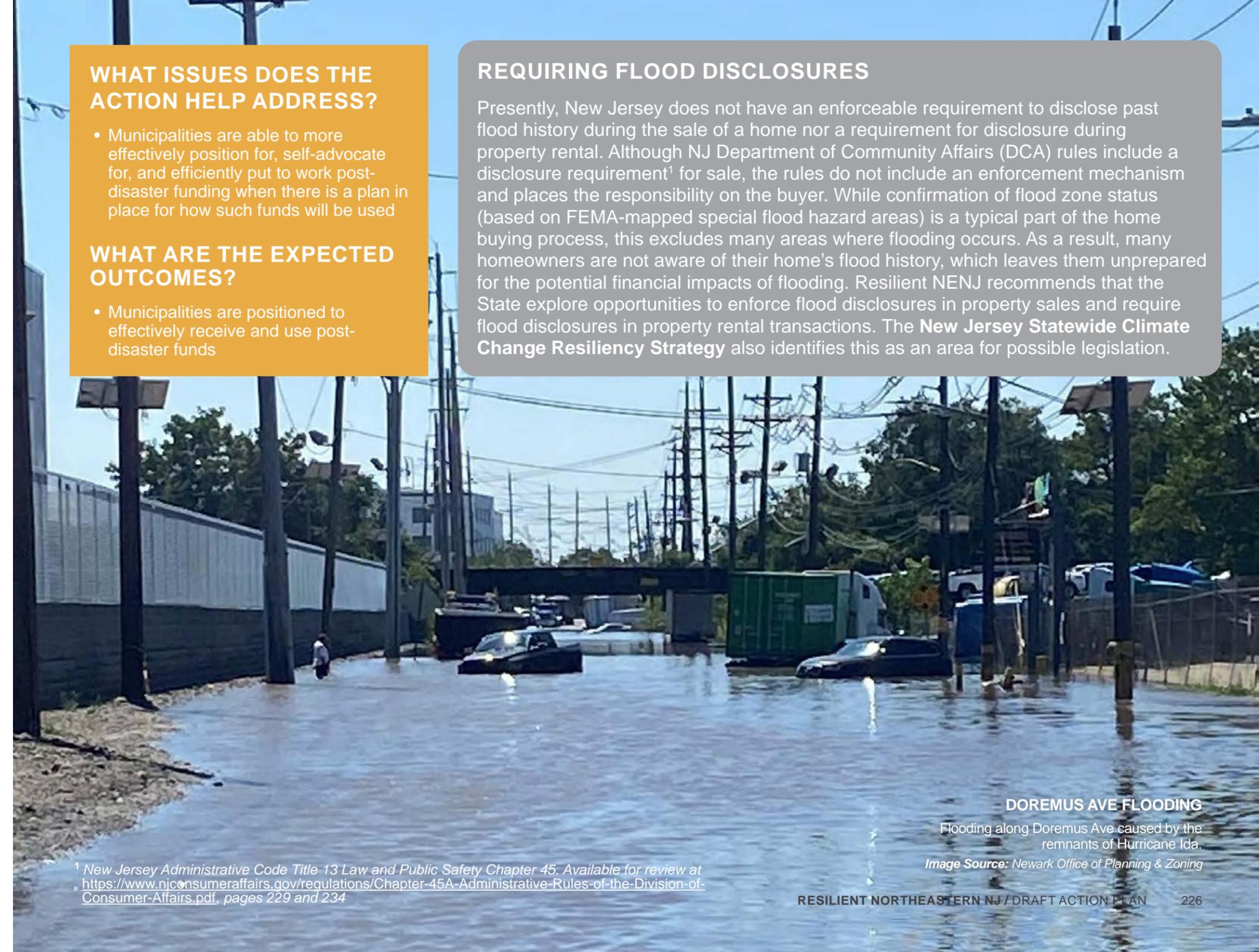
- Municipalities are able to more effectively position for, self-advocate for, and efficiently put to work post-disaster funding when there is a plan in place for how such funds will be used

## WHAT ARE THE EXPECTED OUTCOMES?

- Municipalities are positioned to effectively receive and use post-disaster funds

## REQUIRING FLOOD DISCLOSURES

Presently, New Jersey does not have an enforceable requirement to disclose past flood history during the sale of a home nor a requirement for disclosure during property rental. Although NJ Department of Community Affairs (DCA) rules include a disclosure requirement<sup>1</sup> for sale, the rules do not include an enforcement mechanism and places the responsibility on the buyer. While confirmation of flood zone status (based on FEMA-mapped special flood hazard areas) is a typical part of the home buying process, this excludes many areas where flooding occurs. As a result, many homeowners are not aware of their home's flood history, which leaves them unprepared for the potential financial impacts of flooding. Resilient NENJ recommends that the State explore opportunities to enforce flood disclosures in property sales and require flood disclosures in property rental transactions. The **New Jersey Statewide Climate Change Resiliency Strategy** also identifies this as an area for possible legislation.



**DOREMUS AVE FLOODING**  
Flooding along Doremus Ave caused by the remnants of Hurricane Ida.  
Image Source: Newark Office of Planning & Zoning

<sup>1</sup> New Jersey Administrative Code Title 13 Law and Public Safety Chapter 45. Available for review at <https://www.njconsumeraffairs.gov/regulations/Chapter-45A-Administrative-Rules-of-the-Division-of-Consumer-Affairs.pdf>, pages 229 and 234

3.3.3

ACTIONS THAT  
DEVELOP OR ENHANCE  
SERVICES AND PROGRAMS

## INTRODUCTION

Community members participating in meetings and other engagement for Resilient NENJ have repeatedly expressed the need for more clear and coordinated opportunities they can be involved in to help build resilience in their own communities. This section presents several types of services and programs that can be developed or enhanced to provide informational and physical resources to community members to help them prepare and get involved in activities that increase resilience.

Some resilience-related programs already exist to certain extents within the region or are already being advanced through Resilient NENJ, and these instances are noted as relevant throughout this section. Several programs are covered in other sections of this plan because they related to multiple action types, such as the outreach ambassador program (see **Actions that support outreach, education, and capacity building**), and grant and incentives programs (see **Actions that address other climate-related and environmental justice needs**).

### To do this, the Action Plan proposes to:

- 01 Create resilience hubs
- 02 Reduce waste impacts
- 03 Increase resident access to resilience-related resources

## WHAT SHOULD WE DO ABOUT IT? THE STRATEGY.

**EASE** access to information and resources through programs that distribute free and low-cost materials. “Take the edge off” by reducing loads to the drainage system and helping people access helpful tools.

**CONNECT** people through a regional support network that distributes consistent information. Connect people to the solution by giving them opportunities, like trash clean-up days, to get involved.

**PROTECT** people by directly giving them resources and materials to reduce impacts of hazards, especially those who may have limited means to purchase materials themselves.



### CELEBRATING DRAINAGE

Programs such as “adopt-a-catch basin” in Newark help to raise awareness, keep drains clean and functioning, and create opportunities for public art!

*Image Source: Jersey City Municipal Utilities Authority (JCMUA)*

# 01. CREATE RESILIENCE HUBS

## Service

This action focuses on creation of a regional network of resilience hubs led by the cities, coordinated through leadership at the regional level, and managed in coordination with community-based organizations or other partners. A resilience hub is a multi-functional place for people to access information and go during and after climate events, such as to shelter from flooding or extreme heat. Depending on the site, resilience hubs can also directly reduce hazards by providing stormwater storage or increasing green infrastructure and green space (read more about resilience hubs on the Urban Sustainability Directors Network site [here](#)). The hubs themselves must be hardened against hazards to ensure that they can effectively serve as safe spaces during disasters.

Cities are well-positioned to lead in creation of resilience hubs because many publicly owned spaces are good candidate locations – for example, schools, libraries, community centers, public housing, and emergency shelters. Other possible locations for resilience hubs include houses of worship, privately-owned recreation and community centers like YMCAs, and large apartment buildings. Such spaces already act as known community gathering spaces and could be adapted to do even more.

The cities could collaborate across departments (such as sustainability, engineering, and education) to implement projects. To create a regional network, Resilient NENJ could create a framework and guidelines for resilience hubs to follow

for consistency in their design and function. Other outreach, education, and capacity building actions at the regional level could be integrated into the network of resilience hubs. For example, the hubs could be managed by outreach ambassadors, and they could house and distribute materials from the Resilience 101 campaign (see **Section 3.3.2**).



### WHAT ISSUES DOES THE ACTION HELP ADDRESS?

- Many neighborhoods face risk from multiple hazards
- People expressed the need for a single place to go for resources and information before, during, and after disasters
- It is important for people to be familiar with and trust a resource before they urgently need it – it is difficult to use new resources while in crisis

### WHAT ARE THE EXPECTED OUTCOMES?

- Provide a hub for information and resources before, during, and post-disaster
- Provide a safe, accessible, and appropriately equipped space to gather temporarily in times of need
- Resilience hubs will work with and complement other actions, including **Conduct a resilience 101 campaign** and **Improve outreach to and emergency planning for vulnerable and at-risk populations**

"(I would like to see) Stronger block associations to help connect neighbors during emergency situations."

"Would love public food hubs."

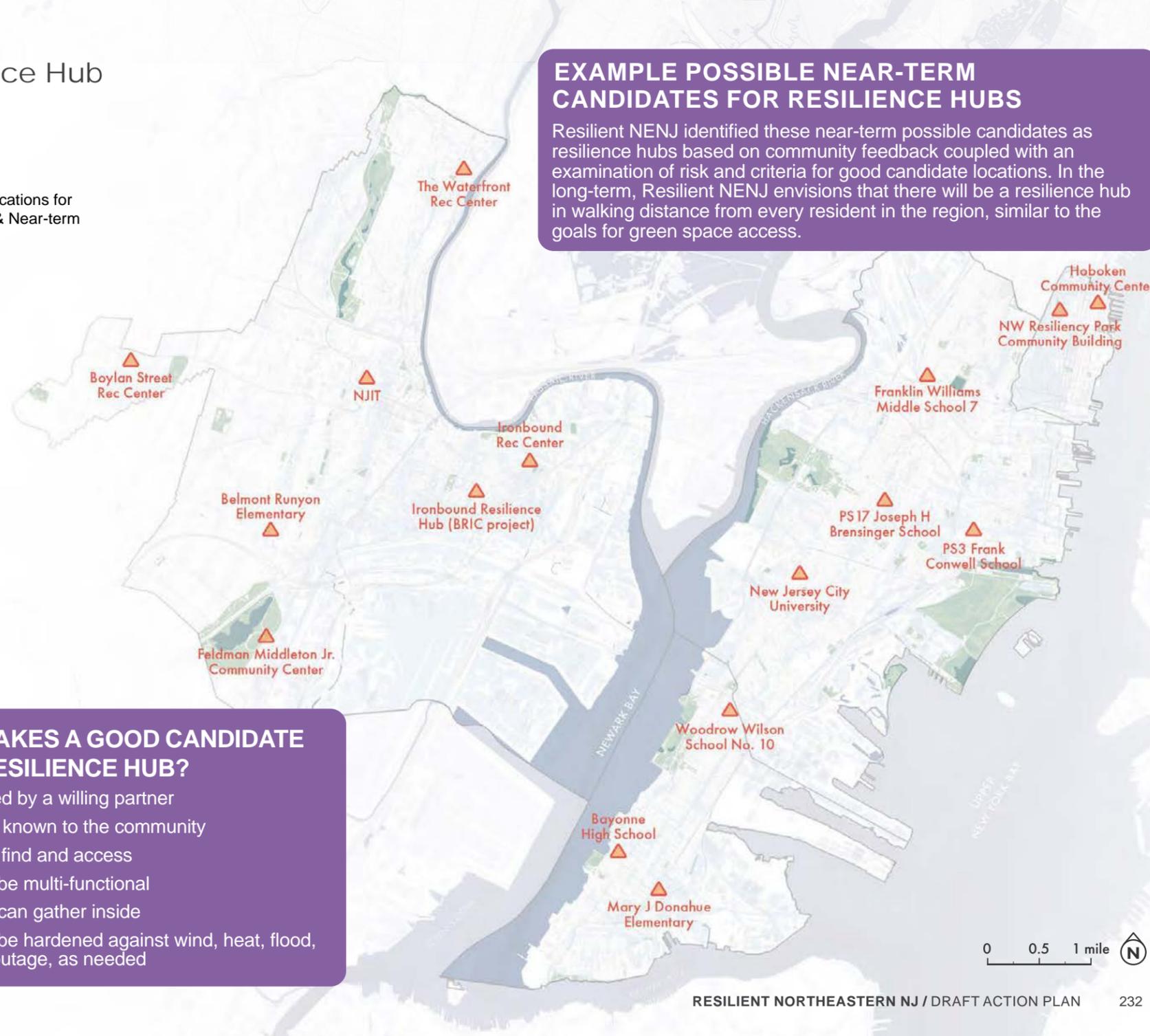
"(I would like to see) Effective education on vulnerability and tools/resources available - need multiple ways of getting information out to different groups of people."



## Resilience Hub Pilots

### LEGEND

▲ Possible Locations for Pilot Hubs & Near-term Concepts



### EXAMPLE POSSIBLE NEAR-TERM CANDIDATES FOR RESILIENCE HUBS

Resilient NENJ identified these near-term possible candidates as resilience hubs based on community feedback coupled with an examination of risk and criteria for good candidate locations. In the long-term, Resilient NENJ envisions that there will be a resilience hub in walking distance from every resident in the region, similar to the goals for green space access.

### WHAT MAKES A GOOD CANDIDATE FOR A RESILIENCE HUB?

- ▲ Operated by a willing partner
- ▲ Already known to the community
- ▲ Easy to find and access
- ▲ Able to be multi-functional
- ▲ People can gather inside
- ▲ Able to be hardened against wind, heat, flood, power outage, as needed

# 01. CREATE RESILIENCE HUBS

Service CONTINUED

## KEY PLAYERS

- FEDERAL**
  - Continue to provide and expand funding opportunities that can support implementation of resilience hubs
- STATE**
  - Fund and support resilience hubs under the Resilient NJ program
  - Explore piloting and possible long-term funding for resilience hubs as part of the state's strategy for increasing equity and resilience in emergency management
- REGION**
  - Provide framework, network, platform, and information to be shared for a regional network of resilience hubs
  - Continue to develop initial possible priority locations
  - Continue to support funding applications to pursue resilience hub implementation
- CITY**
  - Collaborate to identify locations and specific needs for resilience hubs. City-owned sites that may be catalyst opportunities include schools, recreation centers, public housing, and shelters.
  - Partner with other stakeholders, including across municipal agencies, to implement hubs, first as pilot, then to be expanded
- CBOs**
  - Collaborate with municipalities to identify priority locations for hubs
  - Support management of resilience hubs, and/or participate in and support promotion of outreach ambassador program to deploy ambassadors at the hubs
- ACADEMIA**
  - Get involved with resilience hubs in the vicinity of universities / promote use of volunteer hours and directed individual study and partnerships with local hubs to better connect universities with the communities they inhabit
- INFRASTRUCTURE & UTILITIES**
  - Support stand-up of hubs on an as-needed basis. For example, the electric utility may partner to support design of solar power or a microgrid, and the sewer utility may partner for integration of subsurface stormwater storage
- INDIVIDUALS**
  - Identify the need and advocate for a hub in specific neighborhoods
  - Use resources available from hubs and go to hubs as needed during emergencies
- BUSINESS/INDUSTRY**
  - Communicate about useful services that could be provided by resilience hubs. Support implementation as applicable

## IRONBOUND RESILIENCE HUB

In January 2022, the City of Newark, through Resilient NENJ and with collaboration across multiple city departments, submitted a successful funding application for the design and construction of the Ironbound Resilience Hub at Ann Street School. The resilience hub will include stormwater storage beneath the school's parking lot, solar panels on the school, changes to allow the school to act as a cooling center, and related educational programming at the school.

In addition to providing public education, Ann Street School is well known to the local community, which is largely Spanish speaking; it served as a COVID testing and food distribution center during the pandemic. The school is in the Ironbound neighborhood and at a little lower flood risk than some other areas, and is the subject of a solar power project that could be partnered with other power resilience measures, and has parts of the school (i.e., cafeteria or gymnasium) that could be retrofitted for central heat and air conditioning. These factors coupled with the inter-agency partnership with Newark Public Schools and Ironbound Community Corporation's role on the Resilient NENJ Steering Committee made the site an excellent candidate for a pilot.

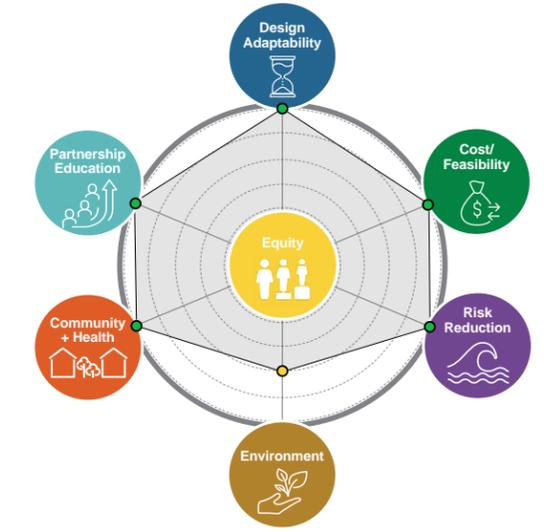
The hub can act both as a place that community members go during extreme heat and flooding while directly addressing flooding, heat, and increasing the capacity for the community to withstand flood or heat events.



PROPOSED IRONBOUND RESILIENCE HUB & COMPONENTS AT ANN STREET SCHOOL

## EVALUATION CRITERIA

Resilience Hubs are not expected to have an impact on the environment, but could be beneficial, depending on programming. They are flexible and designed specifically to meet the needs of the community across multiple areas of resilience building.



## CONSIDERATIONS FOR IMPLEMENTATION

<b>PRIORITY FOR IMPLEMENTATION</b>	1	<b>SCALE</b>	Resilience hubs address multiple needs and, can help provide resources to highest-risk people, and tie in with other recommendations in this Action Plan.
<b>PROJECT TIMELINE</b>	🕒🕒🕒🕒🕒	<b>REGION</b>	Design and construction of an individual resilience hub could take 2-4 years. Creation of a regional network will be accomplished over time as additional hubs are created.
<b>COSTS</b>	💰💰💰💰💰 <b>TO</b> 💰💰💰💰💰	<b>ACTION TYPE</b>	Stand up costs will vary widely, depending on the features included in each hub, and the extent to which building or area retrofits will be needed to ensure safe passage to and presence at the hub. Ann Street School's funding application, for example, requested about \$14 million for extensive stormwater flood mitigation, power resilience measures, and retrofitting for heat and air conditioning.
<b>OPERATIONS</b>	🧑🏃⬆️ HIGH EFFORT		Resilience hubs propose a new management structure that involves partnership between municipalities, community-based organizations, and outreach ambassadors while using resources and information funneled from the state and region.
<b>COORDINATION</b>	🧑🏃⬆️ MODERATE EFFORT		This action involves significant coordination across multiple scales, but coordination largely already exists across many of these stakeholders.
<b>IMPLEMENTABILITY</b>	🧑🏃⬆️ HIGH EFFORT		Relative to other actions in this plan, resilience hubs involve more innovative management and coordination to implement and maintain long-term.

# 02. REDUCE WASTE IMPACTS

Service

EASE  
PROTECT  
CONNECT

The presence and impact of trash on flooding, health, water quality, and quality of life is a recurring theme in community feedback, and comes up at every meeting. Trash in streets can contribute to flooding by blocking catch basins, where stormwater enters the drainage system. Accumulations of trash in streets affects the aesthetics of streetscapes and can also pose safety hazards. If trash does enter catch basins, it can make its way into waterbodies and impact water quality. Activities that reduce the creation of waste so that there is less of it in the first place and activities that help clear trash from streets can both contribute to addressing the problem.

Resilient NENJ proposes to help reduce the negative consequences of waste and trash build-up in streets through new and enhanced programs and awareness campaigns.

One of the activities included in this action is creation or continuation of adopt-a-catch-basin programs that work to reduce clogged

catch basins. These programs already exist to varying levels in the region. Newark and the Jersey City Municipal Utilities Authority (JCMUA, the sewer utility for Jersey City) have existing programs. These programs allow residents to apply to “adopt” a catch basin, provides them with guidance and resources to clear trash, and facilitates artistic paintings of the catch basins. Resilient NENJ has heard from several residents in the region who already take it upon themselves to clean their nearby catch basins and adopt-a-catch-basin programs can help provide them with resources to do this and spread the solution to other places.

Other ways to remove trash from streets include increased street cleaning, led by municipalities, or community trash clean-up days, which are another opportunity to involve community members. Sustainable JC is an example of a community-based organization that leads **neighborhood trash clean-ups** in Jersey City.

Adopt-a-catch-basin programs can be coupled with other activities to reduce waste before it enters the streets. Educational campaigns can increase awareness about the impacts of trash and provide information on how to sort waste and recycling. Many people are not aware that trash can contribute to flooding. Composting programs can also support this goal. Although composting is a small piece of the solution, it can play a role in reducing waste in landfills that contributes to greenhouse gas emissions and exacerbates climate change.

## WHAT ISSUES DOES THE ACTION HELP ADDRESS?

- Excess trash builds up in streets and clogs catch basins, exacerbating flooding
- Trash that is exposed to flood waters can complicate waste management and may be hazardous
- People may not be familiar with the possible impacts of litter

## WHAT ARE THE EXPECTED OUTCOMES?

- Waste reduction campaign limits trash in streets and reduces load on the drainage system
- Promote cleaner streets while involving community members in the solution

" There are no trash cans on the corners, e.g. at Ferry and Hawkins Streets - leads to trash in the streets. "

" ... trash blocks catch basins and stays in streets during flooding. Recently, residents have been doing their own street cleaning to prevent blockages. "

" (I want to see a) Waste management and reduction program to prevent trash from blocking drainage system. "



CLEANING UP THE CITY

The Great Jersey City Clean-up is an example of the recommendations within this action for programming that involves community members in trash clean-up days.

Image Source: City of Jersey City



# 02. REDUCE WASTE IMPACTS

## CONTINUED

Service

### KEY PLAYERS

- REGION & STATE**
  - Create a regional waste reduction educational campaign about best practices for waste disposal and ways to get involved in solutions. Promote materials on engagement platforms. This could be tailored to the needs of individual municipalities and leverage existing municipal successes, as applicable.
  - Continue to share best practices and recommendations across municipalities about adopt-a-catch-basin programs and other activities such as street cleanings and trash and debris removal
  - Help connect community based organizations working on this issue to one another
  - Consider developing a regional program framework to support individuals and municipalities with composting
- CITY**
  - Continue, expand, or create adopt-a-catch basin program, in partnership with the sewer utility if applicable. Although these programs can be explored at the regional level to pool resources, since some already exist at the local levels, the most effective approach may be to proceed with individual programs and share best practices across the region
  - Explore opportunities for additional street cleaning or to increase availability of trash receptacles
  - Partner with community-based organizations to organize community trash clean up days
  - Explore municipal composting programs in partnership with housing complexes
  - Contribute to development of and promote waste reduction campaign through municipal platforms
- CBOs**
  - Support promotion of adopt-a-catch-basin programs
  - Help disseminate materials for waste reduction campaign
  - Partner with municipalities to organize trash clean-up days
- ACADEMIA / EDUCATION**
  - Encourage student volunteer hours & credits associated with engagement in clean-up, composting, and waste reduction programs to promote involvement in these programs
- INFRASTRUCTURE & UTILITIES**
  - Continue, expand, or partner with the city for development and implementation of adopt-a-catch-basin programs
- INDIVIDUALS**
  - Participate in adopt-a-catch basin programs, trash clean up days, and composting programs
  - Help spread the word about waste reduction best practices
- BUSINESS/INDUSTRY**
  - Partner with municipalities to create composting stations
- COUNTY**
  - Through the Hudson County Improvement Authority (HCIA), continue education and enforcement as integral components of development and implementation of County's Solid Waste Management Plan.
  - Continue and expand community educational programs and development and distribution of educational materials on waste management and recycling
  - Through enforcement, provide education to residents and businesses on benefits of proper waste disposal and environmental impacts of improper disposal while ensuring compliance with regulations
  - Work with NJ Clean Communities Council to continue providing grants to non-profit/volunteer groups for initiatives to remove litter and adopt and beautify vacant lots

### CONSIDERATIONS FOR IMPLEMENTATION

**SCALE**

REGION CITY

Most of the activities within this action can be advanced at the local level, such as adopt-a-catch-basin programs, municipal trash clean-up, and community clean-up days. A waste reduction campaign can be advanced at the state, regional, or local scales, and the municipalities can collaborate at a regional level to share best practices related to these issues.

**OPERATIONS**

MODERATE EFFORT

Although these activities are largely within existing governance strategies, some additional funds may be needed, particularly to support materials for adopt-a-catch-basin programs and development and implementation of the waste reduction campaign

**COORDINATION**

MODERATE EFFORT

These activities involve coordination between municipalities, utilities, and community-based organizations, but can be fun and have been widely requested by community members

**IMPLEMENTABILITY**

LOW EFFORT

These activities are fairly common in the industry and are being packaged together to achieve waste reduction.

### EVALUATION CRITERIA

**PRIORITY FOR IMPLEMENTATION**

2

These activities are valuable but small scale solutions to reduce flooding, create cleaner streets, and address climate change.

**COSTS**

Costs include those to cover development and distribution of waste reduction campaign materials, those to cover management and materials for adopt-a-catch-basin programs, and for increased trash clean-ups and organization of clean-up days

**Equity**

Reducing waste will help address near-term needs to increase the capacity of the stormwater system, while supporting community health and engagement.

"Trash in Newark Riverfront Park during rain or high tide - mattresses, baby diapers, plastic cups. Erosion of the river is also visible."

# 03. INCREASE RESIDENT ACCESS TO RESILIENCE-RELATED RESOURCES

Service

The cost of materials can be a barrier for residents to access certain resilience-related resources. Examples of resources include air conditioners, clean energy technology, soil moisture sensors, water quality test kits, at-home water filtration, bug sprays, and screen protections. This action aims to increase access to these resources through development of a program or programs to distribute free or low-cost materials to residents, with guidance and support for installation and use. The program development process could determine priority materials or resources for distribution. The program can target or prioritize distribution of resources to low income and highest-risk people.

This action is similar to the small-scale green infrastructure program, which includes distribution of rain barrels (for example), because it provides direct materials to residents. It is also related to grants and incentives programs that support residents in undertaking individual mitigation projects, although this action provides materials while those are focused on funding. Information and tools related to these programs could be disseminated through resilience hubs, which is a recommended action within **Outreach, Education, and Capacity Building**.

EASE  
PROTECT  
CONNECT

**WHAT ISSUES DOES THE ACTION HELP ADDRESS?**

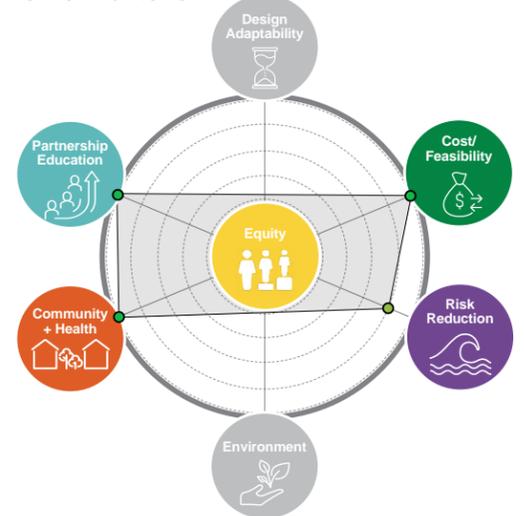
- Depending on the resources included, this action could help improve access to resources that address various hazards such as heat waves, poor water quality / water supply, and vector-borne diseases.

**WHAT ARE THE EXPECTED OUTCOMES?**

- People have increased access to resources to protect themselves from hazards

**EVALUATION CRITERIA**

Increasing community access to resilience related resources will increase resident capacity to reduce their own risk and will primarily impact Cost and Feasibility, Risk Reduction / Effectiveness, Community and Health Benefits, and Partnership and Community Involvement criteria.



New Jersey's Low Income Home Energy Assistance Program and Community Services programs provide possible models or existing pathways for a program that increases resident access to resilience-related services.

**KEY PLAYERS**

**STATE**

- Create funding opportunities and administration support for the distribution of resources as part of a home resilience program. This could potentially include allocation of funds and administration through the NJ Department of Community Affairs's **Low Income Home Energy Assistance Program (LIHEAP)** or **Community Services Program**.

**REGION**

- Explore grants and opportunities to pool resources across the region and fund purchase of these materials
- Provide a platform to engage around resource needs
- Share best practices and information.
- Develop guidance materials for installation and use of different resources.

**CBOs**

- Help communicate resource needs to municipalities and the region
- Help prioritize hazards and identify potential resources / materials for distribution
- Help connect and direct materials and assistance to residents and businesses for specific climate-related hazards.
- Help provide guidance to residents on use of the resources
- Help connect people with and provide assistance related to the program, possibly through resilience hubs

**COUNTY**

- Support distribution of resources to residents

**CITY**

- Support distribution of resources and provide guidance to residents on use of the resources

**INDIVIDUALS & BUSINESS/INDUSTRY**

- Obtain and use resources, seek guidance and support as needed

**ACADEMIA**

- Help prioritize hazards and identify potential resources / materials for distribution

**CONSIDERATIONS FOR IMPLEMENTATION**

SCALE	ACTION TYPE	PRIORITY FOR IMPLEMENTATION	OPERATIONS
REGION	Service & Program Development	3 This action is largely aimed at "taking the edge off" of impacts from hazards and could complement grant and incentives programs	HIGH EFFORT This program will require a refinement of existing programs or creation of a new program to support the purchase and distribution of materials
PROJECT TIMELINE		Time may be needed to prioritize resources and develop the program, identify funding streams, identify sources for materials and acquire them, and establish the program	COORDINATION MODERATE EFFORT This action requires significant coordination with community members to ensure success. This action also involves coordination with community-based organizations to support implementation of the program.
COSTS		Program development and available funding sources can determine the scale of the program (quantity of resources / materials available for distribution). This program will operate best if funded annually	IMPLEMENTABILITY HIGH EFFORT Relative to other programmatic actions recommended in this Action Plan, the resilience resources program would be more resource intensive to establish because of the coordination and material acquisition aspects.

3.3.4

ACTIONS THAT SUPPORT  
EMERGENCY PREPAREDNESS  
AND RESPONSE

# INTRODUCTION

Emergency management (EM) leaders play an integral role in preparedness, response, recovery, and mitigation, and working to enhance these activities is an important part of building resilient communities. Although Resilient NENJ initially did not include emergency preparedness and response within its scope, community members provided feedback that reinforced the importance of integrating emergency management. While steps are being taken to lower the risk of climate related hazards, lessons learned from Ida show that it's important to be prepared for the worst-case scenario.

Resilient NENJ developed recommendations in this section through conversations with community members and local and state emergency managers and subject matter experts. The Ida After Action report provides more information on these conversations and lessons learned from the remnants of Hurricane Ida.

Resilient NENJ and other entities have already been working to advance several recommended actions in this section. For example, Resilient NENJ used flood modeling and 9-1-1 data from Newark, Hoboken, and Bayonne to show areas most affected by extreme rain events. Other examples of ongoing or completed efforts are included throughout this section. These actions relate to those detailed in other parts of **Section 3.3**, as described within this section. Further, actions to improve resilience through hazard mitigation, such as those included in **Section 3.2**, will reduce the burden on emergency managers to prepare and respond.

**WHAT IS HAZARD MITIGATION?**

The goal of mitigation is to, “reduce the loss of life and property by lessening the impact of future disasters.”<sup>1</sup> This often takes the form of actions to remove people and assets from harm’s way, harden assets against possible hazards like flood and heat, and lessen severity of the hazard itself, like how stormwater improvements move water away from people.

<sup>1</sup> FEMA’s Five Mission Areas. <https://www.fema.gov/emergency-managers/national-preparedness/mission-core-capabilities>

**EMERGENCY MANAGEMENT (EM) DEFINITIONS**

**PREPAREDNESS** is the continuous cycle of planning, organizing, training, equipping, exercising, evaluating, and taking corrective action to ensure effective coordination during response, both by EM leaders and individual community members.

**RESPONSE** occurs during and immediately following a disaster and is the ability for EM leaders to, “respond quickly to save lives, protect property and the environment, and meet basic human needs in the aftermath of a catastrophic incident.”<sup>1</sup>

**RECOVERY**, depending on the severity and scale of a disaster, is the longest phase and can take months to years. Recovery focuses on restoration of all types of infrastructure that were affected by an incident. An important part of resilience is integrating mitigation projects during recovery, so that the same places do not have repeated damage.

*“ Issue with lack of evacuation routes / bottlenecks leaving city: two exits to the north and one major route at the south end. Not enough capacity on roadways to evacuate the city. ”*



Image Source: Bayonne PD Body Cam footage from Ida

**WHAT SHOULD WE DO ABOUT IT? THE STRATEGY.**

**EASE** the strain on emergency management resources and vulnerability of the public during extreme weather events exacerbated by climate change

**CONNECT** the community with the resources they need to lower their risks and impacts *before, during, and after* severe and hazardous weather events

**PROTECT** vulnerable and at-risk populations by identifying and planning for their needs in advance, and ensuring they are out of harms way

- To do this, the Action Plan proposes to:**
- 01 Improve community preparedness through increased communication and warning systems
  - 02 Support scalable response to flood events and other climate emergencies
  - 03 Improve availability and access to financial assistance systems for recovery

# 01. IMPROVE COMMUNITY PREPAREDNESS THROUGH INCREASED COMMUNICATION & WARNING SYSTEMS

Emergency

EASE  
PROTECT  
CONNECT

Improving preparedness is an important part of building and maintaining a resilient community so that people know how to act when climate hazard events occur. This action includes specific recommendations for improving community preparedness through communication and warning systems, which generally involves an understanding of the upcoming risk and the proper, most effective ways to disseminate information. It includes recommendations related to the way that municipal leaders and emergency management teams gather weather information and share it with the community.

Northeastern NJ is richly diverse. This is an extraordinary asset to the region, but certain differences, such as those related to language, can complicate effective and complete communication. In the map shown on the next page, the neighborhoods shaded in dark red are ranked in the 95-100 percentile nationally for being linguistically isolated (limited English proficiency). This information is important to support emergency managers in planning to ensure that everyone is reached during emergencies.

This action intersects with action **Outreach-05** in **Section 3.3.2** (Improve outreach to and emergency planning for vulnerable and at-risk populations). That section describes how outreach, education, and capacity-building actions can increase resilience by empowering people (such as residents or community-based organizations) to get involved and act. This action is more focused on responsibilities of emergency managers, but there is some overlap.

## WHAT ISSUES DOES THE ACTION HELP ADDRESS?

- Many community members did not feel that they knew what risks they faced going into Ida and other recent storms
- Some community members are harder to reach through typical alert systems

## WHAT ARE THE EXPECTED OUTCOMES?

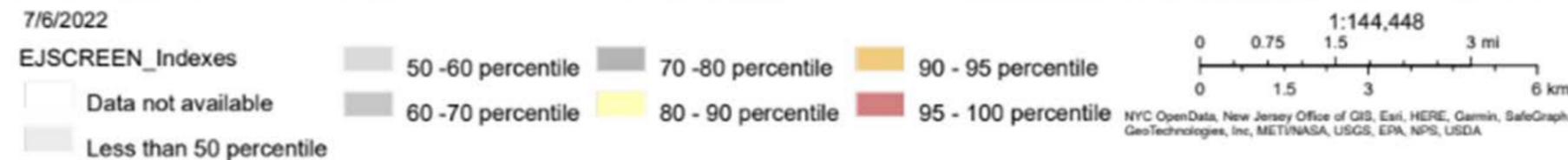
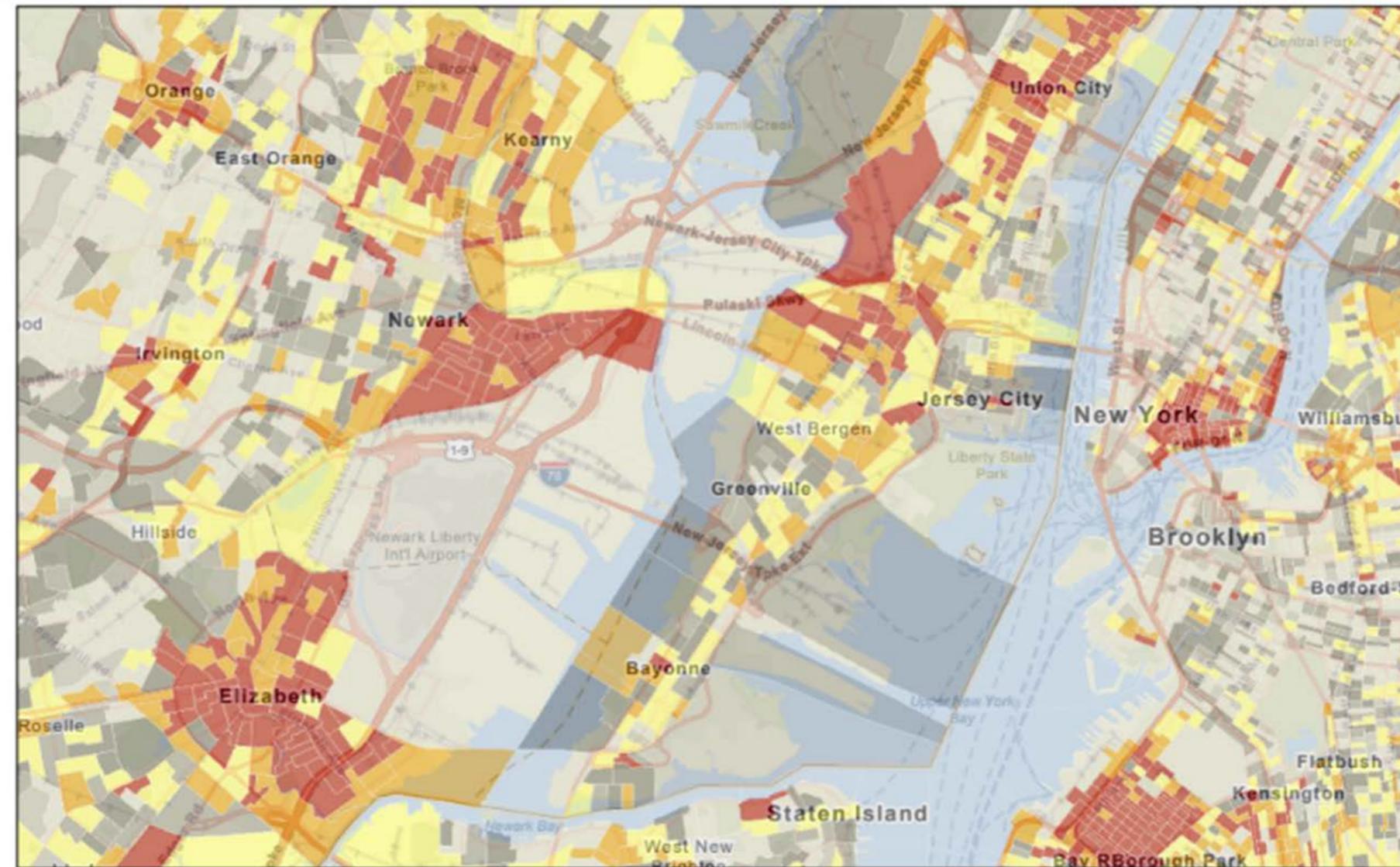
- Community members are informed and aware of possible risks leading up to a storm

## NJ REGISTER READY AS A TOOL TO IDENTIFY AND HELP THOSE WITH ADDITIONAL NEEDS

NJ Register Ready gives New Jersey residents with disabilities or access and functional needs and their families, friends, caregivers, and associates an opportunity to provide information to emergency management agencies so emergency responders can better plan to serve them in a disaster or other emergency. Responding agencies can also enter information for residents that they know about. Local or County OEM departments can begin, continue, or expand use of **NJ Register Ready** to plan for those with additional needs. Such planning might include prioritizing door to door notification of evacuation needs and targeting different types of communications for different people depending on their needs.

"Need for warning system for which streets will be flooded."

"Received phone calls from city (robocalls) in advance saying to stay off of streets. These were great."



Darkest red areas show where the most linguistically isolated people reside. Accessed via EPA EJScreen: <https://www.epa.gov/ejscreen>.



# 01. IMPROVE COMMUNITY PREPAREDNESS THROUGH INCREASED COMMUNICATION & WARNING SYSTEMS CONTINUED

## EXAMPLE BEST PRACTICES WITHIN THE REGION

This page highlights best practices throughout the region that can be leveraged and expanded at the municipal level.

### Steps taken during the planning process:

- Creation of interactive flood mappers that integrate mapping of regulatory flood areas, repeat flood locations, and/or locations where barricades are deployed in advance of heavy rainfall (see **Outreach-07** in **Section 3.3.2** for more detail). Residents can reference these sites to understand if they live in a repeat flood area, in addition to other sources for flood information.
- Use of Register Ready-New Jersey's Special Needs Registry for Disasters to understand where the most vulnerable community members reside, including those with physical or mental disabilities (Newark has been expanding their use of Register Ready for pre-disaster communications)
- Use of Community Emergency Response Teams (CERT) to train community members to pass along preparedness information to neighbors (Hoboken's CERT is especially active)
- Have multiple sources to receive weather data and forecast. Contract a private sector meteorologist firm, which can be used to provide guidance as needed (this is leveraged by Hoboken).

### Strategies to disseminate risk information:

- Repeating messaging across as many different communication pathways as possible is important to ensure messages are received and acted upon by all community members. Example channels for communication include:
- Social media and websites (all four communities use these)
  - Automated phone calls (all four communities use these)
  - Nixle / text alerts (these are leveraged by Jersey City and Hoboken and are being explored in Newark)
  - Coordination with local television and radio stations (Bayonne is a best practice community in this area)
  - Notification of areas of flood risk (all four communities put out alerts for high-risk flood areas.

## ADDITIONAL PREPAREDNESS AND RESPONSE COMMUNICATION BEST PRACTICES FOR THE REGION'S CONSIDERATION

- Join NWSChat to receive critical messaging from the National Weather Service to pass along to the public and to ask questions to forecasters in real-time.
- Issue warnings on transportation systems, in coordination with transportation agencies
- Partner with CBOs to support communications through Resilience Hubs (see action **Service-01** in **Section 3.3.3**)
- Implement door knocking in highest risk areas and with highest risk populations (such as those in Register Ready database) in advance of disasters (could leverage outreach ambassadors; see action **Outreach-05** in **Section 3.3.2**)
- Install sirens in known high risk / evacuation areas / public spaces. Adding early warning systems with sirens to warn or evacuate residents before hazardous weather events occur can transcend language barriers and can reach residents who may not use the internet or own mobile devices. Nevertheless, this must be partnered with clear advanced communication so that residents know what the sirens mean.
- Coordination with industry and infrastructure to support emergency preparedness and response

" [One area for opportunity is having a] Multi-hazard early warning system – especially when it comes to air quality and heat index risk. Jersey City does not capture and share any local data on air quality. "

## KEY PLAYERS

### CITY & COUNTY

- Continue to use a multi-pronged approach to disseminate warnings (i.e., best practices above)
- Consider addition or expansion of best practices identified above, as appropriate (e.g., sirens in public places, warnings on transportation systems)
- Promote Register Ready on city websites

### STATE

- Continue to support forums where emergency managers can share best practices and communicate and elevate support needs
- Review existing sources for information and compile duplicate sources for reconciliation as part of the single source of truth (see **Outreach-01** in **Section 3.3.2**)

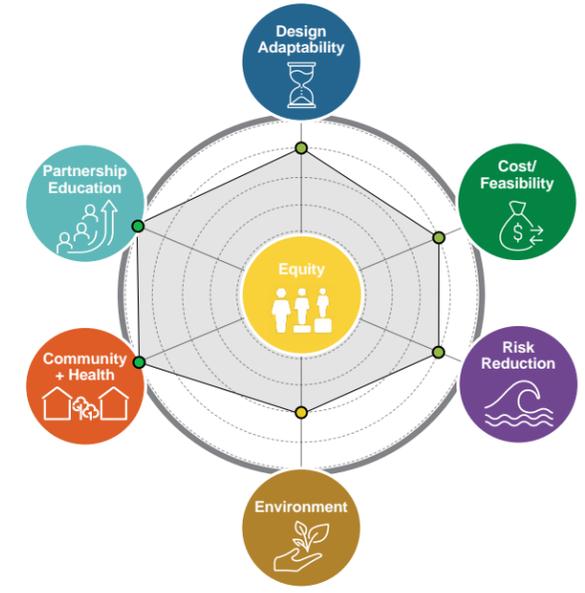
### REGION

- Continue to share best practices across municipalities
- Support implementation of related actions under **Section 3.3.2** and **3.3.3**

### CBOs, INDIVIDUALS, BUSINESS/INDUSTRY, UTILITIES

- Continue to share communication needs with EM community, region, and state
- Continue to monitor and share known sources of key emergency information

## EVALUATION CRITERIA



This action will be able to address near-term needs and adjust over time and will reduce risk to life safety during disasters. Increased communications and warning systems will empower residents to be better prepared for and respond to emergencies.

## CONSIDERATIONS FOR IMPLEMENTATION

**SCALE**  
**REGION/STATE/ COUNTY/CITY**

**ACTION TYPE**

**PRIORITY FOR IMPLEMENTATION**  
**1**

**COSTS**

**PROJECT TIMELINE**

**OPERATIONS**  
**MODERATE EFFORT**

**COORDINATION & IMPLEMENTABILITY**  
**MODERATE EFFORT**
**HIGH EFFORT**

This action includes roles at the municipal level, but primarily aims to increase consistency across the state.

Most communication mechanisms are low effort to stand up but will require long term operations and maintenance. The exception is sirens, which would require up front capital investment.

It will be an ongoing need and challenge to monitor success of communications and coordinate to ensure all people in the region who need critical preparedness and response communications receive them.

# 02. SUPPORT SCALABLE RESPONSE TO FLOOD EVENTS AND OTHER CLIMATE EMERGENCIES

Even with effective mitigation and adaptation, including the capital project recommendations in **Section 3.2**, weather emergencies will continue to occur. Before an impending weather-related disaster occurs, it's critical to take steps to protect life and property. These steps may include evacuating residents from flood-prone areas. Evacuation typically occurs upon a declared state of emergency. The mayor can declare a state of emergency, but this process is usually carried out in conjunction with the state and federal government. Flash flood events can also complicate the prospect of evacuations. It's difficult to forecast areas of heaviest rainfall, and that can make it nearly impossible for people to physically leave their home or business by the time the flash flooding occurs.

Vertical evacuations—moving residents upward and away from hazards like flooding close to grade level—are difficult. In many buildings throughout the region, the boiler room and generators are on the ground floors. Water intrusion can cause this equipment to go offline, making it hard for people to vertically evacuate. Elevators may stop working and using stairs may prove difficult or impossible for those with physical or age limitations. Garden or basement apartments, or apartment spaces that are below street level, are also prevalent in this region and pose additional risks and limitations for residents.

### WHAT ISSUES DOES THE ACTION HELP ADDRESS?

- Leverage best practices and share available assets to protect life and property during a flood event or other climate-related emergencies

### WHAT ARE THE EXPECTED OUTCOMES?

- Steps will help expedite the recovery process and help protect life and property

EASE  
PROTECT  
CONNECT

## PRACTICES IN EMERGENCY RESPONSE

Unlike planning and recovery, the response phase of a disaster is the shortest of the phases that make up the disaster cycle. There are proactive steps that can be taken in the planning process that can ease the stresses associated with an emergency response. Examples of best practices in the region are listed below. Expanding these practices across the region is part of the recommendations of this action.

- Preventing damage to vehicles.** The New Jersey Office of Emergency Management (NJOEM) encourages public/private partnerships to open private parking garages to support vertical evacuation of vehicles during times of expected flooding.<sup>1</sup> Hoboken has a system in place to give residents emergency access to parking garages and encourages residents to move their vehicles from flood-prone areas to these garages when advised.
- Deploying barricades in repeat flood areas.** In Jersey City, there are two roadways that historically flood where the Office of Emergency Management will pre-position barricades to discourage through traffic. Hoboken also deploys barricades in repeat flood areas in advance of storms and is working on automating this system. Unfortunately, according to the Jersey City Office of Emergency Management (JC OEM), some residents disregard the barricades and proceed through the flooded roadways, which can lead to life safety risk.
- Acquiring response equipment and vehicles.** Cities like Newark have waterborne assets (i.e. boats), which can help transit areas inundated by flood waters. These assets are costly, but there is a potential solution to that cost. Jersey City has used the Law Enforcement Support Organization (LESO) 1033 program, which helps them acquire surplus assets. The type of property available includes, but is not limited to: desks, tables, chairs, first aid gear, high water rescue vehicles, passenger vehicles, gym equipment, laptops, watercraft, binoculars, and optical sights.

<sup>1</sup>Waugh, B., Pagano, C., & Visone, L. (2022, April 27). *Regional Emergency Management Discussion. Virtual.*

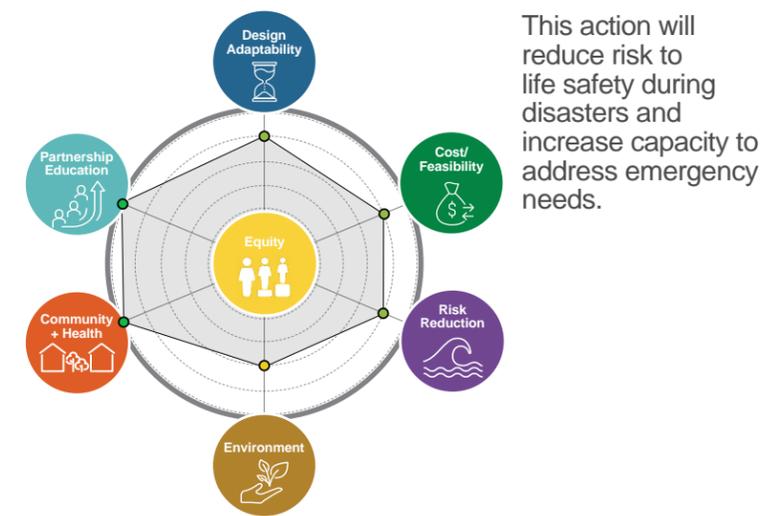
## KEY PLAYERS

- CITY**
  - Consider participating in LESO 1033 Program to obtain low-cost or free supplies and equipment from the Department of Defense
  - If not already available, develop municipal-scale response and/or contingency plans for heat waves, water supply emergencies and severe food shortages, aquifer contamination and/or hazardous plumes, severe wildfire smoke, and West Nile virus outbreak
  - Where not already in progress, pursue public-private partnerships to open private parking spaces where people can move cars in advance of storms
  - Continue to or start barricading repeat flood streets in advance of storms. Use flood modeling and data on reported flood locations to prioritize streets.
- REGION**
  - Share regional best practices
- BUSINESS/INDUSTRY**
  - Raise critical infrastructure out of the flood zone, which would help residents shelter in place and/or vertically evacuate

## CONSIDERATIONS FOR IMPLEMENTATION

SCALE	ACTION TYPE	COSTS	PROJECT TIMELINE	PRIORITY FOR IMPLEMENTATION
CITY, REGION	Emergency Response & Preparedness	VARIABLES	Actions require development and communication of procedures, as well as acquisition and logistics planning for vehicles and equipment	1

## EVALUATION CRITERIA



OPERATIONS	COORDINATION	IMPLEMENTABILITY
Moderate Effort Varies by best practice	Moderate Effort	Moderate Effort

" Issue with lack of evacuation routes / bottlenecks leaving city [Hoboken]: two exits to the north and one major route at the south end. Not enough capacity on roadways to evacuate the city "

" Additional need: emergency preparedness of utilities to respond issues. "

# 03. IMPROVE AVAILABILITY AND ACCESS TO FINANCIAL ASSISTANCE SYSTEMS FOR RECOVERY

Emergency

EASE  
PROTECT  
CONNECT

Recovery is the longest phase of any disaster. It may take a community months, years, and even decades to fully recover. Individual and Public Assistance funds that are provided by FEMA, along with SBA small business loans, can help municipalities, counties, utilities and infrastructure entities, as well as businesses, residents, and communities get back on their feet. Navigating the process can be difficult for all potential support and funding recipients. In the wake of the remnants of Hurricane Ida, Resilient NENJ, FEMA, and various other stakeholders hosted townhall meetings where people could go and apply for assistance in person. However, even months after Ida, Resilient NENJ heard from residents that they had not been able to apply or receive funding to cover their damages. Communication with residents during recovery should also be frequent, clear, and concise. Many of the outreach recommendations included in **Section 3.3.2** also apply to recovery operations. For example, information should be published on multiple communication channels, including websites, social media, newspapers, and radio. Resilience outreach ambassadors (see action **Outreach-05** in **Section 3.3.2**) can be leveraged to help spread information to people who may typically be excluded. Efforts to create a single source of truth (see **Outreach-01** in **Section 3.3.2**) will help connect residents with the right information. This should include providing information about steps to access funds, including the documentation needed such as pictures and receipts for damaged items.

Public education and outreach outside of the recovery period are also important, which are also covered in **Section 3.3.2**. For example, the Resilience 101 Campaign will increase community resilience by enhancing adaptive capacity and fostering empowerment through education and resources. As a coordinated body, Resilient NENJ can continue to develop and distribute materials covering various aspects of resilience.

Debris removal of damaged items is another aspect of recovery that can be burdensome, challenging, and frustrating for residents. Some residents reported that delays and limitations with debris removal after Ida led to health and safety concerns associated with lingering debris. Newark does regular bulk debris removal after flood events.

### WHAT ISSUES DOES THE ACTION HELP ADDRESS?

- The recovery phase of a disaster is often long and complex
- The financial and emotional burden on homeowners post-disaster can be crippling and lead to long-term financial impacts and loss of productivity due to mental stress and anxiety

### WHAT ARE THE EXPECTED OUTCOMES?

- Community members feel prepared and know what to do in times of need / emergency situations
- An action like purchasing flood insurance will lower out of pocket expenses covering potential losses
- Residents feel able to navigate Individual Assistance, Small Business Administration Assistance, and debris removal support, as well as other forms of assistance

"Basement was destroyed in South Ward. Landlord had to buy her own dumpster because the city did not come for bulk pick up."

"We're still trying to understand debris removal & when it's supposed to happen. Lack of clear communication about it: the messages change so we don't know what info is accurate."

## KEY PLAYERS

- REGION**
  - Share information with community members about access to resources through the Resilience 101 Campaign and resilience hubs (see **Section 3.3.2** and **3.3.3**, respectively). Include information about flood insurance and how to access it
- INDIVIDUALS**
  - Consider purchasing flood insurance even if not in a FEMA designated flood zone
  - Follow guidance on proper documentation of damages from storms to support applications for funding and reimbursement
- STATE & FEDERAL**
  - Establish single source of truth on information related to post-disaster recovery and funding (see **Section 3.3.2**)
- CITY & COUNTY**
  - Establish post-disaster funding support contracts and develop processes to position for post-disaster public funding (see **Section 3.3.2**)
  - Explore opportunities to expand bulk debris removal following storms
- CBOs**
  - Partner with municipalities, state, and federal agencies to provide recovery support post-disaster (see **Section 3.3.2**)

## CONSIDERATIONS FOR IMPLEMENTATION

**SCALE**  
VARIOUS

**ACTION TYPE**  
Emergency Response & Preparedness  
Outreach, Education & Capacity Building

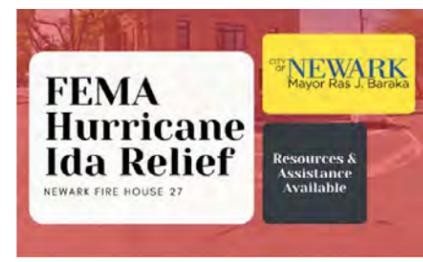
**OPERATIONS**  
MODERATE EFFORT  
New budget allocation may be needed to advance resilience campaigns, resilience hubs, debris removal, and post-disaster funding contracts.

**COORDINATION**  
MODERATE EFFORT  
This action includes coordination across multiple stakeholders at different levels and across various programs and recommendations.

**IMPLEMENTABILITY**  
LOW EFFORT  
The majority of activities are standard industry best practices.

**PRIORITY FOR IMPLEMENTATION**  
1  
Accessing funds post-disaster is a significant challenge for many people. Many of the activities included here also help advance other goals to contribute to more resilient communities.

**COSTS**  
Implementation costs vary by activity. Expanded debris removal may be more costly. Debris removal from the public right-of-way is reimbursable under Public Assistance & could be eligible on private property in especially damaging presidential disaster declarations, such as occurred in many areas during Hurricane Sandy



Promotion for a townhall meeting in Newark following Ida

## EVALUATION CRITERIA

Improved access to financial assistance and resources for recovery will reduce community health impacts post-disaster and increase community members' capacity for resilience.

