



RESILIENT NJ NORTHEASTERN NEW JERSEY

ACTION PLAN

A ROADMAP TO RESILIENCE

OCTOBER 2022

VERSION 2022.1



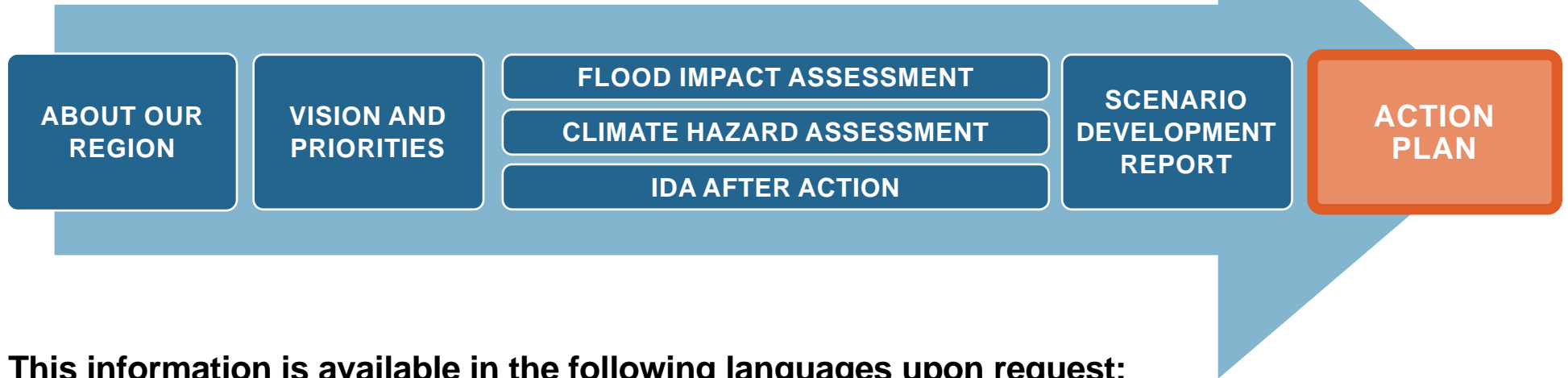
RESILIENT
NORTHEASTERN
NEW JERSEY

SHARE YOUR FEEDBACK

Resilient Northeastern NJ is always seeking your feedback to guide the program and ensure it is reflective of perspectives and priorities from across the region. Please continue to share your feedback on the program and get in touch with us through either of the options below:

- BY EMAIL: ResilientNENJ@gmail.com
- BY SOCIAL MEDIA: @ResilientNENJ on Twitter & Facebook, @resilient_nenj on Instagram

Please visit our website at www.resilient.nj.gov/nenj to learn more about the program and what we've done so far.



This information is available in the following languages upon request:

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www.renewjerseystronger.org

TRANSLATION SERVICES

English

Language translation assistance for limited or non- English speakers is available in eleven (11) languages. If you need to communicate in one of those languages, mark the box next to the language on this form and send the form along with your name, recovery program, and application number to Neda Hartman, 101 S. Broad St., PO Box 823 Trenton, NJ 08625.

You may also email or fax this form. Email to: neda.hartman@dca.nj.gov Fax to: 1-609-292-3726. Telephone assistance is available by calling 1-609-292-3750. When the agent answers the line, inform them of the appropriate language. The agent will either be able to immediately connect you with a translator or arrange for a translator to return your call at your convenience.

Name: _____

Program and application number: _____

Tagalog

Ang tulong sa pagsasalin ng wika para sa mga nakakapagsalita ng kaunting Ingles o hindi nakakapagsalita ng Ingles ay makukuha sa labing-isang (11) wika. Kung kailangan ninyong makipag-ugnayan gamit ang isa sa mga wikang iyon, markahan ang kahon sa tabi ng wikang nasa form na ito at ipadala ang form kasama ang inyong pangalan, programa para sa panunumbalik, at numero ng aplikasyon sa Neda Hartman, 101 S. Broad St., PO Box 823 Trenton, NJ 08625.

Maaari din ninyong i-email o i-fax ang form na ito. Mag-email sa: neda.hartman@dca.nj.gov. Mag-fax sa: 1-609-292-3726. Makakakuha ng tulong sa telepono sa pamamagitan ng pagtawag sa 1-609-292-3750. Kapag sinagot ng kinatawan ang telepono, ipaalam sa kanya ang naaangkop na wika. Maaari kayong maikonekta kaagad ng kinatawan sa isang tagapagsalin sa ibang wika o kaya naman ay maghahanap siya ng tagapagsalin sa ibang wika na siya namang tatawag sa inyo sa oras na gusto ninyo.

Pangalan: _____

Programa at numero ng aplikasyon: _____

Portuguese

O serviço de interpretação para quem fala pouco ou nada de inglês está disponível em onze (11) idiomas. Se precisar de comunicar em algum destes idiomas, assinale a caixa ao lado do idioma neste formulário e envie o formulário, juntamente com o seu nome, programa de recuperação e número de requisição, para Neda Hartman, 101 S. Broad St., PO Box 823 Trenton, NJ 08625

Também é possível enviar o formulário por e-mail ou fax. Por e-mail, envie para: neda.hartman@dca.nj.gov. Por fax para: 1-609-292-3726. O serviço por telefone está disponível, ligando para 609-292-3750. Quando o agente atender a chamada, indique o idioma pretendido. O agente estabelecerá imediatamente o contacto com um intérprete ou marcará com o intérprete para retomar a sua ligação num horário conveniente para si.

Nome: _____

Programa e número de requisição: _____

Spanish

Está disponible el servicio de traducción en once (11) idiomas para las personas que no hablan inglés o que tienen dominio limitado de ese idioma. Si usted necesita comunicarse en uno de los idiomas enlistados en este formulario, marque la casilla del idioma de su preferencia y envíe el formulario, junto con los datos de su nombre, programa de recuperación y número de solicitud, a Neda Hartman, 101 S. Broad St., PO Box 823 Trenton, NJ 08625.

Usted puede también enviar el formulario por correo electrónico a neda.hartman@dca.nj.gov o, por fax, al 1-609-292-3726. Se brinda asistencia telefónica llamando al 1-609-292-3750. Cuando el representante responda a su llamada, infórmele sobre el idioma que necesita ayuda. El representante le pondrá en contacto con un traductor o cuando mejor le convenga a usted.

Nombre: _____

Programa y número de solicitud: _____

Chinese (Traditional)

本公司以十一（11）種語言為英語能力有限或不諳英語的人士提供語言翻譯協助。倘若你需要使用以上其中一種語言溝通，請在此份表格中適當的方格做標記，標註所選語言，然後將表格連同你的姓名、計劃和申請編號郵寄至 Neda Hartman, 101 S. Broad St., PO Box 823 Trenton, NJ 08625.

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姓名 _____

計劃和申請編號： _____

French Creole

Gen asistans tradikisyon nan onz (11) lang ki disponib pou moun ki pa pale Anglè oswa ki limite nan Anglè. Si ou bezwen kominike nan youn nan lang sa yo, tchèke bwatt ki akote lang nan fòm sa epi voye fòm lan ansanm ak non ou, pwogram rekouvèt lan ak nimewo aplikasyon ou an bay Neda Hartman, 101 S. Broad St., PO Box 823 Trenton, NJ 08625.

Epitou ou ka voye fòm lan pa imèl oswa pa faks. Pa imèl nan: neda.hartman@dca.nj.gov. Pa faks: 1-609-292-3726. Asistans pa telefòn disponib lè ou rele nan 609-292-3750. Lè ajan an reponn, di yo ki lang ou bezwen. Ajan an pral kapab swa konekte ou touswit ak yon entèprèt oubyen fè aranjman pou yon entèprèt retounen apèl ou a nan lè ki pi bon pou ou.

Non: _____

Pwogram ak nimewo aplikasyon: _____

Gujarati

મર્યાદિત અથવા બિન-અંગ્રેજી બોલનારાઓ માટે અગિયાર (11) ભાષાઓમાં ભાષાંતર સહાય ઉપલબ્ધ છે. જો તમને આ ભાષાઓ પૈકી કોઈ એકમાં કોમ્યુનિકેશન કરવાની જરૂર હોય તો, આ ફોર્મ પર તે ભાષાની સામે આપેલા બોક્ષમાં નિશાની કરો અને આ ફોર્મ તમારા નામ, રિકવરી પ્રોગ્રામ અને એપ્લિકેશન નંબર સાથે Neda Hartman, 101 S. Broad St., PO Box 823 Trenton, NJ 08625 ને મોકલી આપો.

તમે ફોર્મને ઇમેલ અથવા ફેક્ષ પણ કરી શકો છો.ઇમેલ કરો: neda.hartman@dca.nj.gov. ફેક્ષ કરો:1-609-292-3726. ટેલિફોન સહાય 1-609-292-3750 પર કોલ કરવાથી ઉપલબ્ધ છે. જ્યારે એજન્ટ લાઇન પર જવાબ આપે, તો તેમને યોગ્ય ભાષા જણાવો.એજન્ટ કાં તો તરત જ તમને ભાષાંતરકાર સાથે જોડી આપશે અથવા વળતા કોલથી તમારી સગવડ પ્રમાણે ભાષાંતરકારની વ્યવસ્થા કરશે.

નામ: _____

પ્રોગ્રામ અને એપ્લિકેશન નંબર: _____

Italian

Per coloro che parlano poco o niente inglese, è disponibile un servizio di interpretariato in undici (11) lingue. Se hai necessità di comunicare con il nostro ufficio in una di esse, segna su questo modulo la casella che corrisponde alla tua lingua e invialo corredato del tuo nome, programma di assistenza e numero di domanda a Neda Hartman, 101 S. Broad St., PO Box 823 Trenton, NJ 08625.

Se preferisci, puoi spedire il modulo per fax o per posta elettronica. L'indirizzo di posta elettronica è il seguente: neda.hartman@dca.nj.gov. Il numero di fax è 1-609-292-3726. Puoi ricevere assistenza telefonica nella tua lingua chiamando il seguente numero: 1-609-292-3750 e dicendo all'impiegato che hai bisogno di assistenza per la lingua italiana. L'impiegato ti metterà subito in contatto con l'interprete o prenderà accordi perché l'interprete ti richiami a un orario per te più comodo.

Nome: _____

Programma di assistenza e n. di domanda: _____

Korean

영어에 미숙한 분들을 위해 11 개국 언어 통역을 도와드립니다. 해당 언어 중 한 언어의 의사소통이 필요한 분은 이 신청서에 해당 언어 박스에 표시를 하신 후, 이름, 복구 프로그램 및 신청번호와 함께 ‘Neda Hartman, 101 S. Broad St., PO Box 823 Trenton, NJ 08625’로 우편으로 보내시기 바랍니다.

신청서를 이메일이나 팩스로 보내셔도 됩니다. 이메일의 경우 ‘neda.hartman@dca.nj.gov’, 팩스는 ‘1-609-292-3726’, 전화로 도움을 받고 싶으신 분은 ‘1-609-292-3750’으로 전화하십시오. 상담원과 연결 후에 도움을 받고 싶은 언어를 말씀하십시오. 상담원이 통역사와 즉시 연결해 드리거나 아니면 편리한 시간에 통역사가 전화를 드릴 것입니다.

이름: _____

프로그램과 신청 번호: _____

Polish

Dla osób nieznających języka angielskiego lub dla osób znających go w ograniczonym stopniu dostępna jest pomoc tłumacza w jedenastu (11) językach. Jeżeli potrzebują Państwo porozumieć się w jednym z tych języków, prosimy zaznaczyć kratkę obok danego języka na formularzu, a następnie wysłać go wraz z imieniem, nazwiskiem, programem pomocy i numerem wniosku do Neda Hartman, 101 S. Broad St., PO Box 823 Trenton, NJ 08625.

Formularz można również wysłać emailem lub faksem. Adres email: neda.hartman@dca.nj.gov. Numer faksu: 1-609-292-3726 Pomoc telefoniczna jest dostępna pod numerem 609-292-3750. Kiedy agent odbierze telefon, prosimy podać język, w którym chcą się Państwo porozumiewać. Agent będzie mógł natychmiast połączyć Państwa z tłumaczem lub też tłumacz oddzwoni w dogodnym dla Państwa terminie.

Imię i nazwisko: _____

Program i numer wniosku: _____

Arabic

نقدم المساعدة اللغوية من خلال توفير خدمات الترجمة بإحدى عشر (11) لغة للأشخاص الذين لا يتكلمون اللغة الإنجليزية أو لغتهم الإنجليزية محدودة. إذا احتجت إلى التواصل بإحدى هذه اللغات، فبُرجى التأشير في المربع بجانب اللغة في هذا النموذج وإرسال النموذج مع اسمك وبرنامج التعافي من الكوارث ورقم الطلب إلى . Neda Hartman, 101 S. Broad St., P.O. Box 823 Trenton, NJ 08625. ويمكنك أيضًا إرسال النموذج بواسطة البريد الإلكتروني أو الفاكس. لإرساله عن طريق

البريد الإلكتروني استخدم العنوان neda.hartman@dca.nj.gov. لإرساله بواسطة الفاكس استخدم الرقم 1-609-292-3726. تتوفر المساعدة التليفونية عن طريق الاتصال بالرقم 609-292-3750. عندما يرد الوكيل على مكالمتك، أبلغه باللغة التي تناسبك. وسيقوم الوكيل بتوصيلك بمترجم على الفور أو ترتيب اتصال أحد المترجمين بك في موعد يناسبك.

الاسم: _____

البرنامج ورقم الطلب: _____

REGION TEAM

Steering Committee Members

JERSEY CITY

City of Jersey City Office of Sustainability

NEWARK

Nathaly Agosto Filión, Robert Thomas,
and Juba Dowdell

HOBOKEN

Caleb Stratton, Jennifer Gonzalez,
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BAYONNE

Suzanne Mack and Andrew Raichle

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IRONBOUND COMMUNITY CORPORATION

Drew Curtis and Maria Lopez-Nuñez

HOPES CAP

Evelyn Mercado and Barbara Reyes

COMMUNITY ADVISORY COUNCIL

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CONSULTANT TEAM

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ONE ARCHITECTURE & URBANISM

HGA

INGROUP

SAM SCHWARTZ ENGINEERING

SCAPE LANDSCAPE ARCHITECTURE

IRYS

Thank you to the many community-based organizations, community members, municipal leaders, agencies, and regional stakeholders that have contributed their time and expertise to the Resilient NENJ process to date.



RESILIENT NJ NORTHEASTERN NEW JERSEY

ACTION PLAN

OCTOBER 2022

VERSION 2022.1



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LOOK OUT for this icon throughout the report for quotes and paraphrased feedback we’ve heard from around the Region



LETTER OF SUPPORT

By the NJ Department of Environmental Protection (NJDEP)

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

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

The Resilient Northeastern NJ region is a dense and extremely diverse urban environment. It is bounded by rivers and bays, and flooding impacts a huge number of people and assets of local, regional, state, and national importance. This Regional Resilience and Adaptation Action Plan (Action Plan) is the result of a nearly two-year, whole community planning process. It presents a suite of innovative and implementable solutions that align with the community vision to increase climate resilience in both the short- and long-term.

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

Sincerely,



Nicholas J. Angarone, PP/AICP
New Jersey Chief Climate Resilience Officer

FOREWORD

By the NENJ Steering Committee

Resilient Northeastern NJ (Resilient NENJ) seeks to build climate resilience while improving quality of life for the 700,000 people who live in Jersey City, Newark, Hoboken, and Bayonne, as well as those who work and play in the region. The program launched in the Spring of 2021 to develop a regional Resilience and Adaptation Action Plan (Action Plan) for addressing current and future flooding. Through community feedback, Resilient NENJ expanded to consider other climate-related hazards like heat, poor air quality, and drought. These hazards interact with vulnerability to impact our people, infrastructure, and environment. Our communities have already experienced these impacts from recent storms such as the remnants of Hurricane Ida in September 2021, less recent storms such as Hurricane Sandy which catalyzed attention to resilience across much of the northeast, and the prevalence of health disparities due to polluted air and heat waves.

The science to understand the complex role that climate change plays in the future of our region is constantly evolving through studies led by federal agencies, the New Jersey Department of Environmental Protection (NJDEP), and other academic and scientific entities. Nonetheless, sea level rise, higher intensity precipitation, declining air quality, increasing temperatures, invasive species, and other hazards will continue to affect quality of life in this region unless urgent action is taken. The flood impact assessment completed for this project estimates that losses from severe rainfall and coastal storm surge events could be in the billions and tens of billions of dollars, respectively. These hazards compound other challenges faced by this region, including a history of discriminatory housing practices, insufficient affordable housing stock, contamination, the consequences of the region’s past and current industrial centers, and aging infrastructure.

The need for action is urgent. The time to act is now. Resilient NENJ will continue to lead, collaborate, and innovate on these issues. The Action Plan outlines clear measures such as policy changes, programs, and capital projects that can ease the financial and resource burdens of unmitigated climate-related risk, protect people and places from hazards, and foster connectivity and the capacity to adapt. The actions aim to advance efforts already ongoing in the region and to work alongside the **New Jersey Statewide Climate Change Resilience Strategy** and other statewide and local initiatives.

We can all play a role in increasing resilience, and the Action Plan provides calls to action for anyone who could be affected. Involvement from everyone in our region, especially those who could face the most significant impacts from climate change, will continue to be critical for successful implementation of the Action Plan’s recommendations. By taking the next steps as charted in the Action Plan and working iteratively to improve and complete its recommendations, we can collectively build thriving communities in the region.

ACRONYMS

BAPC – Bergen Arches Preservation Coalition
BCRP – Bureau of Climate Resilience Planning
BIOCC – Black, Indigenous, and People of Color
BRIC – Building Resilient Infrastructure and Communities, a FEMA program
BRIT – New Jersey’s Brownfield Redevelopment Interagency Team
CAC – Community Advisory Council
CBO – community-based organization
CBP3 – community-based public private partnerships
CCATF – New York City Climate Change Adaptation Task Force
CCI – Community Collaborative Initiative, a NJDEP and NJEDA program
CCRUN – Consortium for Climate Risk in the Urban Northeast
CDBG – Community Development Block Grant
CDBG-DR – Community Development Block Grant Disaster Recovery program
CDBG-Mit – Community Development Block Grant Mitigation program
CDC – Centers for Disease Control and Prevention
CEA – Classification Exception Area
CERT – Community Emergency Response Teams
COG – Metropolitan Council of Governments
C-PACE – Garden State Commercial Property Assessed Clean Energy
CRS – Community Rating System, a FEMA program
CSO – combined sewer overflow
CSS – combined sewer system
DEWS – drought early warning system
DRBC – Delaware River Basin Commission
EJ – environmental justice
EJScreen – USEPA Environmental Justice Screening and Mapping Tool

EM – emergency management
EMPG – Emergency Management Performance Grant, a FEMA grant program
EO – executive order
EPA – United States Environmental Protection Agency
EPC – Embankment Preservation Coalition
FEMA – Federal Emergency Management Agency
FIRM – Flood Insurance Rate Map, a part of FEMA’s NFIP
FMA – Flood Mitigation Assistance, a FEMA program
FTA – Federal Transit Administration
GI – Green Infrastructure
HATS – New York & New Jersey Harbor and Tributaries Study, a USACE study
HDSRF – Hazardous Discharge Site Remediation Fund
HEP – New York & New Jersey Harbor & Estuary Program
HMGP – Hazard Mitigation Grant Program, a FEMA program
HUC – Hydrologic Unit Code
HUD – United States Department of Housing and Urban Development
HVAC – heating, ventilation, and air conditioning
IAWG – New Jersey’s Brownfields Interagency Working Group
I-Bank – New Jersey Infrastructure Bank
ICMA – International Capital Markets Association
IECC – International Energy Conservation Code
IIJA – Infrastructure and Investment Jobs Act
IPCC – International Panel on Climate Change
ISRA – Industrial Site Recovery Act
JC – Jersey City
JCMUA – Jersey City Municipal Utilities Authority
LESO – Law Enforcement Support Organization

LIHEAP – New Jersey’s Low-Income Home Energy Assistance Program
LPR UWFP – Lower Passaic River Urban Waters Federal Partnership
LTCP – Long-Term Control Plans
LWI – Louisiana Watershed Initiative
MAP – Metropolitan Area Planning Forum
MBTA – Massachusetts Bay Transportation Authority
MOTBY – Military Ocean Terminal at Bayonne
MOU – memorandum of understanding
MPO – metropolitan planning organization
MS4 – municipal separate storm sewer system
NDRC - National Disaster Resilience Competition
NENJ – Northeastern New Jersey
NFIP – National Flood Insurance Program, a FEMA program
NFWF – National Fish and Wildlife Foundation
NHSA – North Hudson Sewerage Authority
NJAC – New Jersey Administrative Codes
NJBPU – New Jersey Board of Public Utilities
NJDCA – New Jersey Department of Community Affairs
NJDEP – New Jersey Department of Environmental Protection
NJDOT – New Jersey Department of Transportation
NJEDA – New Jersey Economic Development Authority
NJIT – New Jersey Institute of Technology
NJOEM – New Jersey Office of Emergency Management
NJPACT – New Jersey Protecting Against Climate Threats
NJSEA – New Jersey Sports Exposition Authority
NJTA – New Jersey Turnpike Authority
NJTPA – North Jersey Transportation Planning Authority
NOAA – National Oceanic and Atmospheric Administration

NPCC – Northeast Power Coordinating Council
NWS – National Weather Service
OEM – Office of Emergency Management (used at various scales)
OSHA – Occupational Safety and Health Administration
P3 – public private partnership
PA – Public Assistance, a FEMA program
PANYNJ – Port Authority of New York and New Jersey
PE&D – Por
PI – parallel interceptor
PM2.5 – fine particulate matter, equal to or smaller than two and a half microns in width
PSE&G – Public Service Electric and Gas
PVSC – Passaic Valley Sewerage Commission
RBD – Rebuild by Design, a HUD competition program
REAL – Resilient Environments and Landscapes, part of NJ PACT
RICC – Regional Infrastructure Coordination Council
RNJ – Resilient New Jersey
ROSI – Recreation and Open Space Inventory
RPA – Regional Plan Association
SFHA – Special Flood Hazard Area
STAP – Science and Technical Advisory Panel
SVI – Social Vulnerability Index
TAB – the NJIT Technical Assistance to Brownfield Communities program
TFN – The Funders Network
UHI – urban heat island
USACE – United States Army Corps. of Engineers
USDOE – United States Department of Energy
WWTP – wastewater treatment plant

DEFINITIONS

Adaptation – The process of modifying behaviors, policy, or the built and natural environment to adjust to risk.

After Action – A document intended to capture observations of an event or exercise and make recommendations based on the outcomes of the event or exercise.

Alignment – Another word for the location along a linear stretch of land. This term can be used to refer to siting for solutions such as barriers or pipes.

All Hazards Actions – Actions that address other climate-related vulnerabilities and environmental justice needs, beyond flooding.

Allocation – Funding distributed by an entity (e.g., the state or federal government) for a particular purpose.

Areal Floods – Floods that occur when flooding develops more gradually and comes from sustained rainfall over a longer period. The NJDEP models use around 8 to 9 inches over 24 hours, which is similar to Ida or Irene, depending on the area.

Authority – A group with decision-making and enforcement power.

Base flood elevation – The flood height that must be considered and used in new developments and major improvements to existing properties in FEMA-defined special flood hazard areas.

Brownfields – 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.

Coastal Actions – In this Action Plan, actions that address coastal and tidal flooding

Coastal Storm Surge – Flooding that occurs when tropical storms, hurricanes, and nor’easters temporarily raise water levels along the coast.

Community Emergency Response Teams – 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.

Community Resilience – The capacity and capability of communities to respond, adapt, and transform in response to natural hazards and climate change.

Contaminated Sites – Properties where there is a known presence of hazardous substances.

Coordinating Body – A voluntarily established group without formal decision-making power.

Critical Asset – Places that are essential for a community to thrive. Examples are utilities and transportation infrastructure. Assets can include places where people gather, build relationships, and enjoy themselves.

Cut-sheet – In this Action Plan, a short section for each recommended action that provides information about issues the action will address, key considerations for implementation, evaluation criteria, and expected outcomes or changes, along with community feedback that contributed to the recommendations.

Design elevation – The elevation at which buildings must be constructed or floodproofed, equal to the base flood elevation plus a certain amount of freeboard (additional height as a safety factor).

Dig once – An intentional effort to facilitate the simultaneous construction of different projects at the same site, limiting repeated disruption.

Flash Floods – Floods that 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.

Hazard Mitigation – Action to reduce long-term risk to life and property from hazard events.

Infrastructure – The system of structures and resources (systematic, natural, and human-built) that provide services to communities. Infrastructure can fall into five categories: physical, social, institutional/governance, economic, and environmental.

Level of Protection – The magnitude of flooding a coastal solution can manage.

Level of Service – The magnitude of rainfall a stormwater solution can manage.

Mean Higher High Water – High tides happen twice a day and one is usually higher than the other. Mean higher high water is the average height of the daily highest tide.

Outreach – The provision of services, communications, and engagement to the community at large including historically excluded groups.

Preparedness – The continuous cycle of planning, organizing, training, equipping, exercising, evaluating, and taking corrective action to ensure effective coordination during response.

Rainfall Flooding – Flooding as a result of excessive rainfall, including stormwater flooding, areal flooding, and flash flooding.

Recovery – The phase following a disaster focused on restoring infrastructure that was affected.

Resilience Hub – A multi-functional place for people to access information and go before, 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.

Resilience infrastructure – Infrastructure that increases the resilience of other entities, infrastructure, or communities.

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

Response – As defined by FEMA, the ability to, “respond quickly to save lives, protect property and the environment, and meet basic human needs in the aftermath of a catastrophic incident.”

Scenario – In this Action Plan, “Scenario” refers to a suite or package of solutions to increase resilience. In other climate contexts, the term may refer to different projects for climate conditions depending on various factors.

Scenario 0 – An inventory of existing planning initiatives/completed actions that are already working to increase resilience in the region, this is a baseline scenario that imagines what risk would look like with completion of all in-progress projects.

Single source of truth – A centralized resource of aggregated data to facilitate the development consistent understandings and actions across locales and entities.

Sinking Fund – A common method to fund infrastructure improvements made necessary through development over time. The model could apply to redevelopment areas or areas of private ownership and shared risk, in particular.

Social Vulnerability – The degree to which a community’s people are challenged when faced with significant disruptions, such as natural disasters or disease. Social vulnerability is often used as a metric in planning processes to ensure that actions benefit those people who might need additional support.

Special flood hazard area – Shown on a FEMA Flood Hazard Boundary Map, this is “an area having special flood, mudflow, or flood-related erosion hazards” that put it at greater risk. In general, these areas have a 1% chance of being inundated in any given year under current conditions.

Stormwater Actions – Actions that address stormwater flooding

Stormwater Flooding – Flooding that occurs when rainfall overwhelms drainage systems.

Tidal Flooding – The inundation of low-lying areas with high tides, which occurs independently from storm surge events.

Urban Heat Island effect – Increased temperatures in urban areas compared to nearby rural areas as a result of human structures (i.e. buildings and roads) and activities.

Vertical Evacuation – Temporarily moving residents upward and away from hazards (e.g., flooding), such as within a tall resilient structure.



EXECUTIVE SUMMARY

WHO CREATED THIS PLAN AND FOR WHOM?

WHAT IS RESILIENT NJ?

Resilient NJ is a planning program, administered by the New Jersey Department of Environmental Protection (NJDEP) Bureau of Climate Resilience Planning (BCRP), that supports local and regional climate resilience planning. Resilient NJ brings together resilience experts, local leaders, community organizations, residents, and regional infrastructure entities to address flood and climate-related hazards at a regional scale, while ensuring local community input in developing recommendations, particularly from underserved and socially vulnerable populations.

Resilient NJ received initial funding through the U.S. Department of Housing and Urban Development (HUD) National Disaster Resilience Competition (NDRC). This funding supported pilot planning projects to develop Regional Resilience and Adaptation Action Plans (Action Plans) in four regions in New Jersey, including Northeastern NJ (NENJ).

WHAT IS RESILIENT NENJ?

Resilient Northeastern NJ (Resilient NENJ) is one of four pilot projects and focuses on developing solutions to reduce risk and build resilience in Jersey City, Newark, Hoboken, and Bayonne. These four municipalities, Hudson County, and two community-based organizations, Ironbound Community Corporation and HOPES CAP, Inc., comprise the Resilient NENJ Region Team. Representatives from each of these entities sit on a Steering Committee that leads the project.

RESILIENT NENJ MISSION STATEMENT

Resilient NENJ will provide a clear vision and roadmap for reducing flood risk and impacts from climate-related hazards through collaboration between local and state governments and community-based organizations along with valuable input from the public and other stakeholders. The Action Plan will support regional investment, information, and resource sharing to help our people and places thrive in the decades to come. The Action Plan will be driven by best available data, technical evaluation, and inclusive and equitable engagement. It will leverage best practices to create social, environmental, and economic benefits and bring value to those who live in the region now and for future generations.



The Resilient NENJ Team on a site visit in Jersey City.

Image Source: Resilient NENJ



A PLAN CREATED WITH COMMUNITY MEMBERS

Implementation of this Action Plan will change the built and natural environment and the way that people work together to build resilience. As such, it is critical that the Action Plan reflects the perspectives and needs of those who could be affected, and especially the most vulnerable and historically underrepresented. The planning process has centered community members and community feedback from the start. Other stakeholders, such as elected officials, emergency managers, and infrastructure and utility entities, also participate to help guide the process and to share input related to specific processes and assets.

This timeline shows key dates of meetings and other direct engagement where feedback supported Action Plan development. **Appendix I** includes additional detail on the engagement planning process, engagement materials, promotion methods, and other engagement with municipal and state agencies.

The 12-member Community Advisory Council (CAC), made up of a diverse group of residents from each of the four municipalities, has met roughly quarterly throughout the process to provide feedback on materials, plan engagement, and ensure inclusion of historically underrepresented people.

Resilient NENJ gathered feedback iteratively in waves to correlate with key project milestones: visioning, risks and tools, solution scenarios (optional pathways to resilience), and draft recommendations. Each wave coincided with a regional community meeting to report out on progress and gather feedback, with additional city-specific community meetings in March and April of 2022.

Resilient NENJ also engaged “partner organizations,” or groups such as community-based organizations, neighborhood and block associations, and environmental groups who already have strong connections and working relationships with community members. Gathering feedback from and conducting outreach through these partner organization multiplied engagement while strengthening existing relationships and empowering local leaders to take ownership.

Engagement materials included a range of paper and digital approaches, and Resilient NENJ also gathered “anytime” feedback through the website, social media, email, a voicemail hotline in five languages, and the Irys engagement app.

KEY ENGAGEMENT STRATEGIES

WAVES OF ENGAGEMENT

- Each major milestone included its own engagement process with different investigations partnered with questions to the community and stakeholders
- Continuous integration of feedback

LEADERSHIP BY THE COMMUNITY

- 12 person Community Advisory Council guides the engagement process and provides early feedback
- Steering committee includes community based organizations

MULTIPLYING ENGAGEMENT

- Working with partner organizations who are already working in communities to help spread the word and share their perspectives

A VARIETY OF ENGAGEMENT CHANNELS

- Anytime engagement opportunities (eg social media)
- Project hotline in multiple languages
- In person events
- Paper and digital surveys
- Irys App
- And more...

RISK CONTEXT

Both rainfall flooding and coastal flooding can impact large swaths of this area. Residential neighborhoods like Country Village and Society Hill, parks, transportation infrastructure, and community buildings are especially at risk.

24 HOUR, 100 YEAR STORM
2070 MODEL (HIGH TIDE + SLR
+ 10% RAINFALL INCREASE)
STORM SURGE
100% EXTERIOR FLOODING

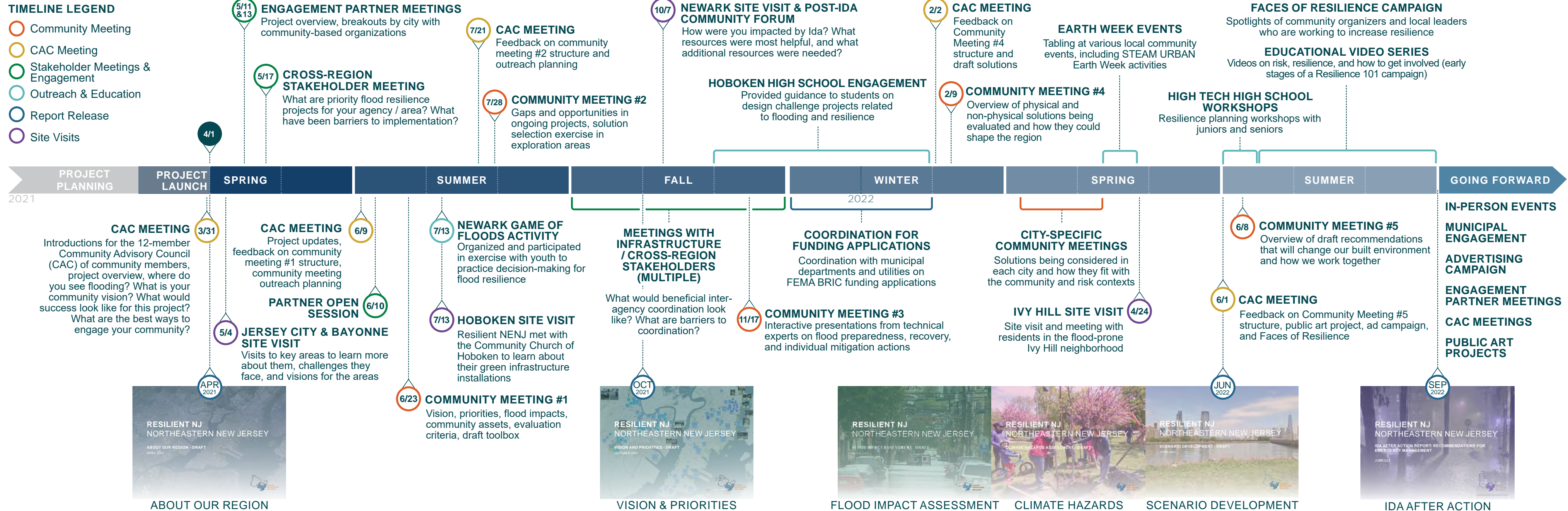


(top) Discussion session at a NENJ virtual community meeting. Source: Resilient NENJ

(bottom) left - Residents gathered for the STEAM URBAN Earth Week Event at Kaboom Playground in Newark; right - Resilient NENJ speaking with a Newark community member as he discusses the height of the floodwaters during inundation from Hurricane Ida. Source: Resilient NENJ



ENGAGEMENT TIMELINE



WHY IS THIS ACTION PLAN IMPORTANT?

WHAT MAKES THIS REGION UNIQUE AND IMPORTANT?

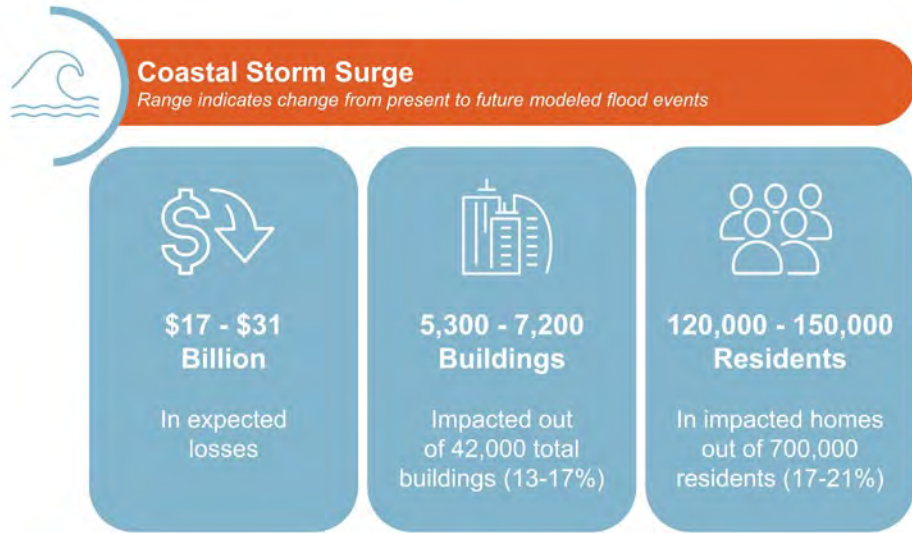
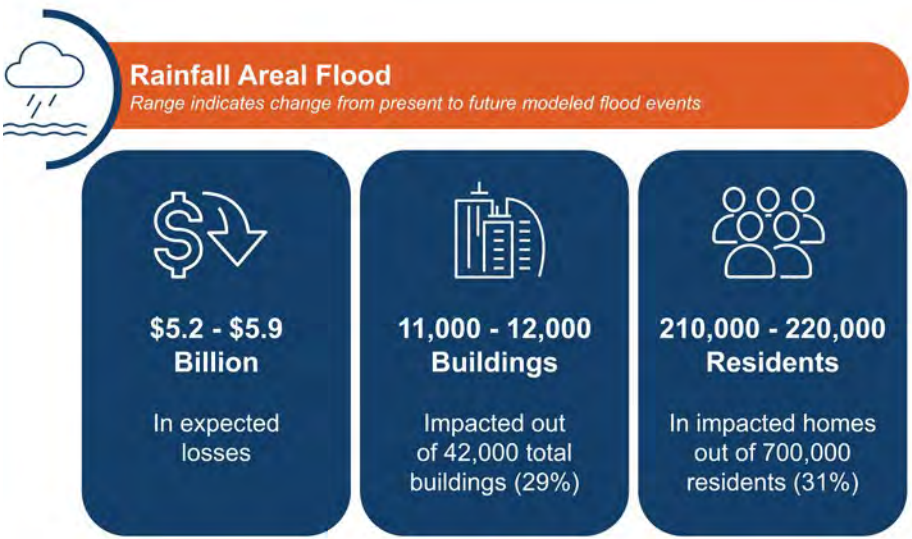
The Resilient NENJ project region includes the cities of Jersey City, Newark, Hoboken, and Bayonne, an area home to 700,000 people. This region is lively, densely populated, and heavily urbanized. It is interconnected through transportation and maritime networks, water bodies, cultures, commerce, and workers. The region is home to infrastructure and transportation systems that support the movement of goods and people to and from Newark-Liberty International Airport and the Port of New York and New Jersey, connect the region to New York City and the Northeast Corridor, and drive the economy of these areas and the country.

Many community members shared that they value the mobility these systems offer, as well as the strong sense of community and home in the region. Community members also identified the region's parks, festivals, cultural centers, places of worship, and diverse small businesses as important community places, among others (see more in the **Vision and Priorities** report).

See Resilient NENJ's **Flood Impact Assessment** and **Climate Hazards Assessment** for more on climate-related risk.



Liberty State Park wetlands
Image Source: Hudson County Division of Planning



Faces of Resilience



RESILIENT NENJ'S *FACES OF RESILIENCE* SERIES

NENJ is an extraordinary place with a lot to be treasured, celebrated, and preserved. It is a diverse region that many people are proud to call home. At the same time, NENJ communities face challenges and risk today that stem from historical and continued inequities. For example, effects of the region's history of racially discriminatory housing practices can still be felt today in economic and health disparities. These practices, such as redlining¹, led to the settling of marginalized and minority communities – especially Black and Brown communities – in areas with high industrial activity.

In addition to Black and Brown people—due to a long history of discriminatory practices—low-income, non-English speaking, elderly, children, homeless, or physically disabled people are also more likely to need support to prepare, respond to, or recover from a flood or other disastrous event, as they are more likely to have limited financial and physical resources.

Today, these same communities face high exposure to flooding and other hazards, such as high concentrations of contaminated sites, high rates of urban heat island, and poor air quality. Because of their experience and demonstrated resilience, Resilient NENJ community members have built-in expertise on how flooding and other hazards manifest across the region, and how a program like Resilient NENJ can help ease the burden. Resilient NENJ's most socially vulnerable continue to persevere through past challenges and daily inequities, and there are extraordinary leaders in these communities helping to drive change.

It is therefore critical that Resilient NENJ centers the needs and perspectives of people who could be most affected by the outcomes of this Action Plan. The ongoing Faces of Resilience series is one example of Resilient NENJ's efforts to highlight the voices and experiences of community members. In this series, leaders in the resilience space and people who have demonstrated resilience to climate hazards share their stories on social media, the Resilient NENJ website, and public art. More work is needed to empower and lift these voices, and Resilient NENJ welcomes criticism and support to continue toward this goal.

¹ Redlining is a practice seen in the early- to mid-twentieth century that involved classification of areas that were predominantly Black and Brown as riskier areas for investment, making it more difficult for people in these areas to access financial services to support home ownership. Today, redlining is often used more broadly to refer to discriminatory housing practices.

THE RISK: CLIMATE-RELATED HAZARDS AND HOW THEY IMPACT THE REGION

The NENJ region faces a complex array of challenges associated with hazards like flooding, heat, and contamination, and the impacts on the region's people, environment, and infrastructure will continue to worsen without significant investment. The climate is changing to increase the frequency and magnitude of climate hazard events. Meanwhile, changes to the built and natural environment over time have made NENJ communities more vulnerable.

The region has a storied and complex relationship with water as a source of both vitality and destruction. It is a coastal region and much of its land was formerly wetlands that supported the Lenape people. Through colonization and industrialization, the Lenape people were displaced and the wetlands were filled, which destroyed natural ecosystems and weakened people's relationship with water while making the region more vulnerable to flooding and heat at the same time. The waterfront today, for example, offers open space, economic opportunity, and sweeping views of the Manhattan skyline, while also presenting risks like those exposed during Hurricane Sandy in 2012, the remnants of Hurricane Ida in 2021, and the heat waves of 2022.

Resilient NENJ's detailed Flood Impact Assessment investigated current and future flooding conditions and estimated the potential financial losses that the region could face from various types of flooding. As described in the Flood Impact Assessment report, the region stands to lose an estimated \$6 billion from future areal (extended rainfall) flooding. Now and in the future, NJDEP models show that flooding from an intense rainfall event will be widespread and most concentrated in areas like the Ironbound in Newark and southwest Hoboken. The region is densely populated with increasing amounts of impervious surfaces, such as concrete and asphalt. As NENJ continues to grow, combined sewer systems designed for past population and rainfall levels are undersized, further contributing to flooding from rainfall and water quality and public health concerns.

In the future, NJDEP models show that storm surge flooding will affect large areas along the Hudson River, New York Bay, Newark Bay, Passaic River, and Hackensack River, and estimate \$31 billion dollars in losses from this flooding. Overall, the NJDEP models predict that 280,000 residents will have their homes exposed to either rainfall or coastal storm surge flooding, representing over 40 percent of the population in the region (2 out of every 5 residents). Of these residents, half live in areas of high social vulnerability, according to the Center for Disease Control's Social Vulnerability Index (SVI). The SVI looks at fifteen different factors, such as income, language, and age to identify people who are more likely to need support to prepare, respond to, or recover from a flood or other disastrous event.

Exposure to other hazards, such as heat and poor air quality, poses risks to the health of the region's people and environment. For example, the region ranks high in the State and nation for cancer risk from air toxics and proximity to hazardous waste. Groundwater often rises along with sea level rise, and risk of groundwater rise in contaminated sites must be better understood.

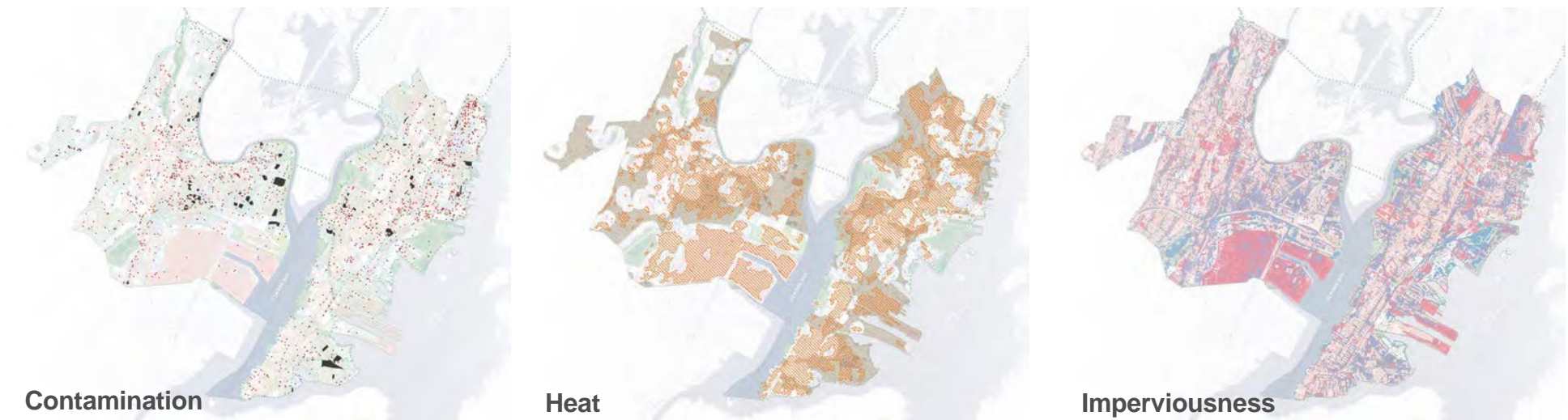
Climate-related hazards are not the only important issues for the region, which also grapples with challenges that span beyond its boundaries, such as the lingering COVID-19 pandemic, housing and affordability issues that are linked to broader economic challenges, and concerns over access and quality of education and healthcare. People in positions to address these issues must decide how to prioritize their time and resources. Fortunately, many actions that aim to increase climate resilience also address other issues.

THE SCIENCE BEHIND THE PLANNING

Resilient NENJ used best available scientific information about climate-related hazards and how they might change, including:

- New flood models that NJDEP developed for the Resilient NJ program.
 - These models incorporated sea level rise projections from the **2019 New Jersey's Rising Seas and Changing Coastal Storms Report by the Science and Technical Advisory Panel (STAP)**.
- Climate change projections from the **2020 New Jersey Scientific Report on Climate Change**
- Climate change projections and data available in reports from the **International Panel on Climate Change (IPCC)**
- Information on climate-related hazards and impacts through data available in the **NJfloodmapper.org** tool developed by Rutgers University (in collaboration with others)

As new data becomes available about our changing risk context, the Resilient NENJ team will need to integrate those data to ensure sound decision making over time. The **Flood Impact Assessment** and **Climate Hazards Assessment** also include recommendations for the State related to closing data gaps and for tools to address non-flooding climate hazards.



*Mapped Resilience factors to be considered when siting Green Infrastructure, see **Section 3.2.3** for more details on climate hazards.*

Data Sources: NJGIN Open Data Known Contaminated Site List Layer - Heat severity dataset by TPL, accessed through ESRI - Parcels and MOD-IV Composite of NJ; Impervious Surface of NJ from Land Use/Land Cover (2012)

WHAT DO OUR RECOMMENDATIONS FOR INCREASING RESILIENCE INCLUDE?

THE VISION

Through the community engagement process, Resilient NENJ asked people what they love about their communities and how they would like their communities to change in the future. This feedback helped establish a regional community vision, organized by pillars of resilience (environmental, economic, social, physical, and governance). Resilient NENJ developed the resilience strategy, described on **page 23**, and the recommendations in this Action Plan with the goal of aligning with the community vision while addressing the region’s unique challenges and risks.

REGIONAL COMMUNITY VISION FOR THE FUTURE

ENVIRONMENTAL



- More green space and trees
- Use of green infrastructure
- Less trash in the streets
- Cleaner water bodies

ECONOMIC



- New high-quality green jobs, and training for those jobs
- Economic diversity and preservation of small businesses

SOCIAL



- Preserve sense of home, community, and cultural diversity
- Improved cleanliness, health & safety, food access
- More affordable housing
- More parks and public spaces

PHYSICAL



- Improved access to transportation
- Improved pedestrian & biker experiences

GOVERNANCE

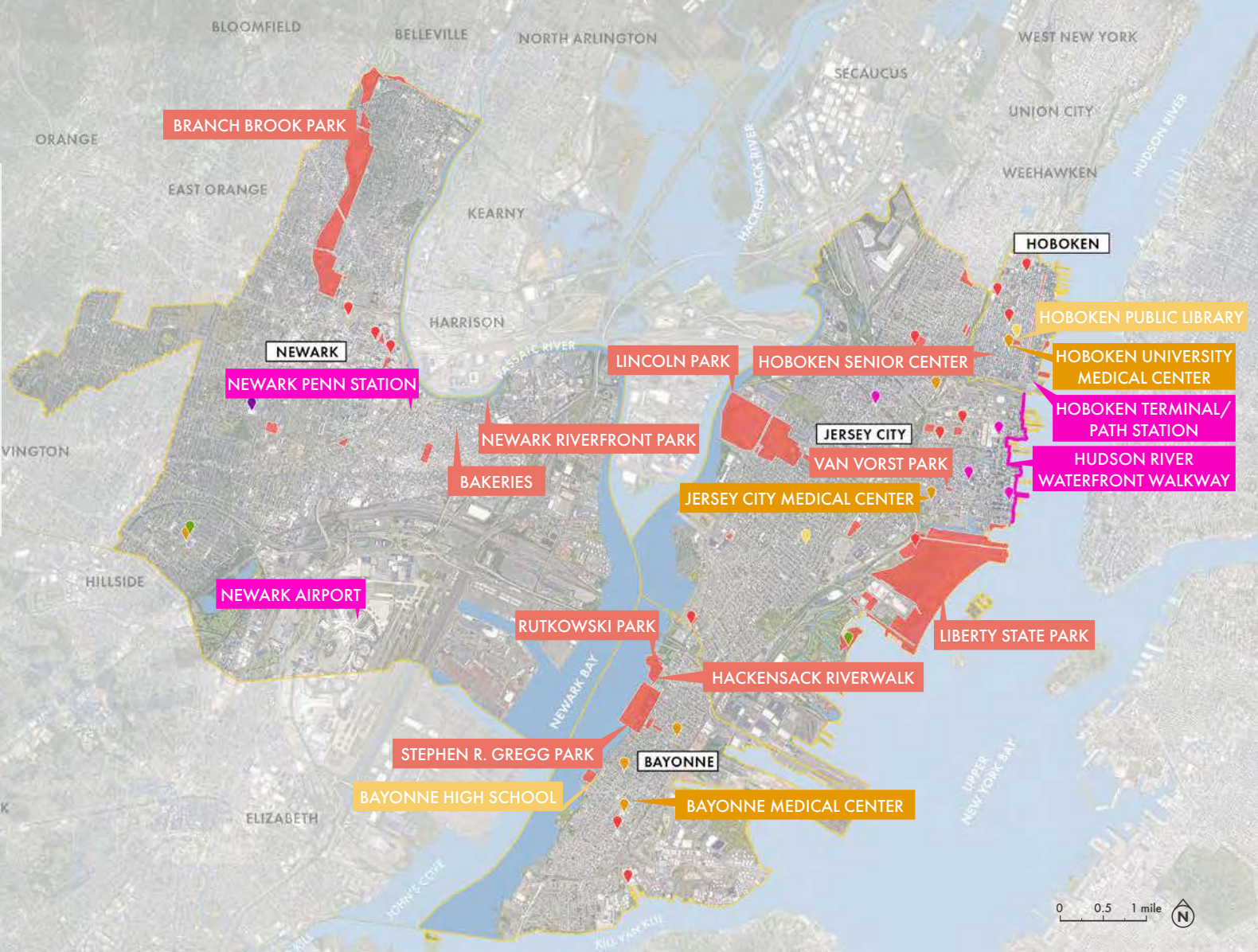


- Greater transparency in government
- Greater public involvement and investment in relationship between government & community members

Community Identified Assets

- **Ecosystem and environmental health** (natural areas, critical habitats, etc.)
- **Health, safety, and emergency response** (hospitals, police, fire, etc.)
- **Industry and business** (industrial sites, private businesses, major employers, etc.)
- **Infrastructure** (public transit stations and routes, airports, utilities, etc.)
- **Public services and institutions** (schools, community centers, libraries, etc.)
- **Quality of life and culture** (parks, restaurants, festivals, etc.)

We heard about many places and services that are important to community members like parks, community centers, and transportation services. This map shows assets that were specifically called out to give us a general picture of the types of places that matter most.



We asked: What do you value most about your community?

“It’s both a village and a city” – Hoboken resident

“I see faces like mine” – Jersey City resident

“Diversity of family-owned businesses! I love being able to shop local and support minority-owned businesses” – Newark resident

“Looking out for each other” – Bayonne resident

“Family-friendly feel and inclusivity” – Jersey City resident



THE STRATEGY

The Action Plan’s strategy revolves around themes of EASE, PROTECT, CONNECT, THRIVE, and REGENERATE. The region’s ability to THRIVE and REGENERATE should arise from pursuing the first three themes through actions that EASE, PROTECT, and CONNECT.

EASE

Recommendations seek to EASE the technical, financial, resource, and health burdens associated with climate hazards, and to “take the edge off” the highest risks and people while improving quality of life. For example, increasing green infrastructure, depending on the area and design, can help ease frequent flooding from rainfall, urban heat, and quality of water and air and can improve access to green space.

PROTECT

Recommendations lean mostly into the PROTECT strategy for flood hazard. This means keeping water out or removing it, rather than using an approach like retreat, due to the density of the region and the nature of the risk. Retreat would be a challenging strategy in this region due to the concentration of people and critical infrastructure systems, and an approach such as protect allows communities to stay intact in the near-term, while also providing ways to get people out of harm’s way during emergencies.

CONNECT

The recommendations 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.

THRIVE

By starting with our areas of most need and opportunity, by having multiple options in case a first line of defense fails, and by focusing on improvements that can connect our communities more effectively to themselves, 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.

REGENERATE

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.



THE PLAN

There is no silver bullet to adapt the region for climate change. The region needs different types of actions to address various sources of risk, at multiple scales, led by a range of stakeholders. Due to the sheer magnitude of risk, actions are needed on both public and private properties. The actions require a strategic array of funding sources and must be phased over time. Through extensive community and stakeholder collaboration, technical analyses, and with guidance from NJDEP, Resilient NENJ developed a multi-pronged strategy for increasing resilience.

This Action Plan proposes a range of types of actions that align with the community vision and address risk. The actions fall into one or more of five categories for solution types. Further, each action increases resilience through changes to the built environment or changes to the way that people work together. Actions can also be classified into capital projects (actions that will change the built or natural environment through construction of physical and nature-based solutions) and non-capital actions (actions that will change the way we work together through policy and governance;

outreach, education, and capacity building; service and program development; and emergency preparedness or will change the built or natural environment through policies or programs). Within actions that change the built environment, actions may primarily address coastal flooding, stormwater flooding, or other climate-related hazards. **Pages 27 and 28** show the actions recommended by Resilient NENJ, which are further described in **Section 3.0**. **Section 3.0** also shows where actions align with the themes of EASE, PROTECT, and CONNECT.

The recommended actions leverage, continue, expand, and multiply efforts already completed or underway within the region. Resilient NENJ documented projects, plans, and initiatives that exist separately from the program, and integrated recommendations related to these other efforts as relevant (see **Appendix A**).

TOOLBOXES

Action Plan recommendations build off various toolboxes developed and evolved through engagement. The Flood Resilience Toolbox is available in the **Vision & Priorities** report and the Climate Hazard Resilience Toolbox is available in the **Climate Hazards Assessment** report.

ACTIONS THAT CHANGE OUR PHYSICAL ENVIRONMENT

Physical & Nature-Based Solutions
page 86



Recommended Changes to Policy & Governance
page 186



Outreach, Education, & Capacity Building
page 206



Service & Program Development*
page 230



ACTIONS THAT CHANGE THE WAY WE WORK TOGETHER

Emergency Response & Preparedness*
page 244



*includes some capital project aspects

CAPITAL PROJECTS

NON-PHYSICAL ACTIONS

EXECUTIVE SUMMARY	THE ACTIONS		THE ACTIONS	
	THAT WILL CHANGE OUR BUILT AND NATURAL ENVIRONMENT		THAT WILL CHANGE THE WAY WE WORK TOGETHER	
	Coastal	Actions that address coastal and tidal flooding (Section 3.2.1)	Policy	Policy and Governance (Section 3.3.1)
	Stormwater	Actions that address stormwater flooding (Section 3.2.2)	Outreach	Outreach, education, and capacity building (Section 3.3.2)
	All Hazards	Actions that address other climate-related and environmental justice needs (Section 3.2.3)	Service	Service and program development or enhancement (Section 3.3.3)
			EM	Emergency preparedness and response (Section 3.3.4)
	Section 3.2.1: Actions that address coastal and tidal flooding		Section 3.3.1: Actions that improve policy and governance	
	Coastal-01: Add physical flood barriers to ease flooding and protect communities		Policy-01: Continue and advance regional collaboration	
	Coastal-02: Raise existing infrastructure to act as barriers and protect communities		Policy-02: Increase coordination on infrastructure investments	
	Coastal-03: Integrate flood protection into parks, walkways & boardwalks		Section 3.3.2: Actions that support outreach, education, and capacity building	
	Coastal-04: Provide flood protection at the site and building scale		Outreach-01: Provide a “single source of truth”	
	Coastal-05: Take action to restore the coastal environment		Outreach-02: Expand leadership and capacity to manage climate risk	
	Coastal-06: Adopt additional land use policies to reduce flood risk		Outreach-03: Conduct a Resilience 101 Campaign	
	Coastal-07: Update flood damage prevention ordinances		Outreach-04: Increase availability of project-related information on websites	
	Section 3.2.2: Actions that address stormwater flooding		Outreach-05: Improve outreach to and emergency planning for vulnerable and at-risk populations	
	Stormwater-01: Separate stormwater to safe, dedicated outfalls		Outreach-06: Conduct youth engagement	
	Stormwater-02: Direct stormwater to deep storage and conveyance infrastructure		Outreach-07: Leverage community expertise and advance real-time understanding of hazard conditions	
	Stormwater-03: Improve natural drainage corridors		Outreach-08: Improve systems for post-disaster recovery funding	
	Stormwater-04: Reduce stormwater volume through stormwater management sites		Section 3.3.3: Actions that develop or enhance services and programs	
	Stormwater-05: Reduce impervious surface and improve conveyance through green infrastructure		Service-01: Create resilience hubs	
	Stormwater-06: Provide guidance to more quickly integrate stormwater management in open space		Service-02: Reduce waste impacts	
	Stormwater-07: Update stormwater management ordinances		Service-03: Increase resident access to resilience-related resources	
	Section 3.2.3: Actions that address other climate-related and environmental justice needs		Section 3.3.4: Actions that support emergency preparedness and response	
	All Hazards-01: Provide green space and green infrastructure where it can have the most impact		EM-01: Improve community preparedness through communication and warning systems	
	All Hazards-02: Reduce risk from and incorporate resilience into contaminated sites		EM-02: Support scalable response to flood events and other climate emergencies	
	All Hazards-03: Incorporate resilience in new development, public space, and infrastructure		EM-03: Improve availability and access to financial assistance systems for recovery	
27	RESILIENT NORTHEASTERN NJ / ACTION PLAN			RESILIENT NORTHEASTERN NJ / ACTION PLAN 28

THE REGIONAL APPROACH

Due to the magnitude of risk, recommendations include significant investment in capital projects to address flooding. The recommendations restore natural functions of the environment where possible, such as through wetland restoration and areas for surface flow. The design processes can further explore opportunities to integrate nature-based solutions. Several other recommendations rely on grey infrastructure to achieve the volume of stormwater storage or height of protection needed, and lean into multiple lines of defense for a phased approach. Recommendations include opportunities to expand distributed green infrastructure wherever possible, due to the importance of increased green space, reduction in heat island effect, and other benefits associated with these projects.

Non-physical actions, not visualized on this page, are a critical piece of the Action Plan. Non-physical actions will build leadership and community capacity, increase awareness about resilience and availability of resources and information, involve community members in the solution, and keep people out of harm's way during disasters.

LEGEND

Coastal Actions

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

Drainage Solutions

- Deep Tunnel
- New Parallel Interceptor
- New Main
- New Drainage Line
- Sewer Separation
- Ditch Drainage
- Retention Sites
- Detention Sites

HOW TO GET THIS DONE

Climate-related risk affects everyone in NENJ, directly or indirectly. Just as climate risk is ubiquitous, implementation requires coordinated action across many different types of actors at multiple scales and dedicated funding from a variety of different sources. Everyone has a part to play, but someone will always need to take the lead. The leader will vary depending upon the action.

Advancing the recommendations will involve reconfiguring existing capital and operational programs to focus on resilience elements. The region may need new funding sources, programs, and departments or entities dedicated to resilience measures.

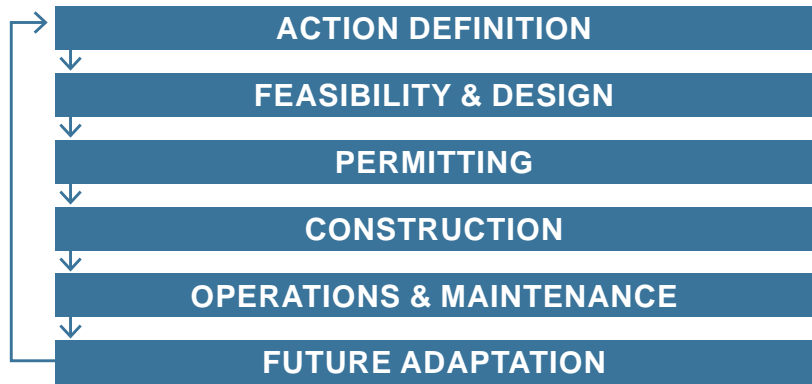
Implementation costs will vary significantly for each action. Some actions, such as providing additional information on websites, require little to no additional allocation of funds. Other actions, such as hiring additional staff dedicated to resilience, may not have high price tags but will require new allocations of funds. Costs for other actions, such as physical flood barriers, could vary significantly depending on the location and be upwards of hundreds of millions of dollars to design and build.

Feasibility studies will refine approach, design, costs, and schedule for major capital investments recommended in this Action Plan. Implementation of other projects, political will and public support, and funding availability will also affect factors such as cost and schedule. Further, Resilient NENJ exists in a dramatically changing risk context that scientists, planners, engineers, and others are all actively working to understand and anticipate. As new data and science emerge, and the people, places, and needs of the region evolve, new and different actions may be needed. As such, Resilient NENJ's Action Plan should be considered a living document.

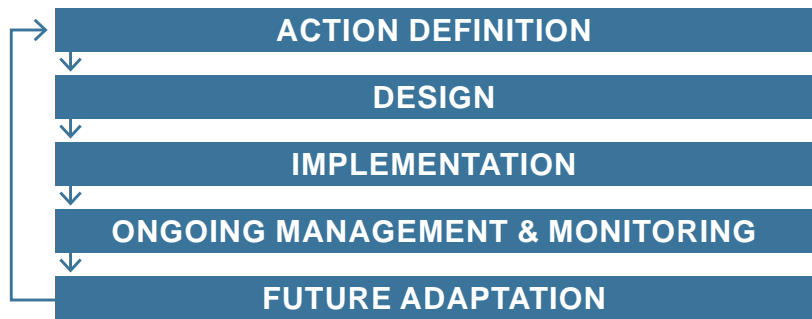
The Action Plan summarizes individual actions, providing high level cost estimates, roles by stakeholder, and information about key considerations and evaluation criteria for each (see Section 3.0). The roadmap outlines timelines for implementation and ideal sequences, identifies responsible parties and support needs, projects year-over-year cost needs, and ties actions to funding sources (see Section 5.0).

What are the stages of implementation for...

An action that will change the built or natural environment through construction?



An action that will change the way we work together or a policy or program that will affect the built and natural environment?



This Action Plan covers a large geographic area and a broad range of solutions. Physical and nature-based solutions that involve construction will need feasibility studies and conceptual and detailed design before progressing to construction. Next steps for non-physical solutions may include more detailed program development, writing of ordinances or codes, or planning and implementation of engagement.

THE RESILIENT NENJ REGION BY THE NUMBERS

4 municipalities

700,000 residents here today

46 square miles

65 miles of coastline

Over \$81B in total economic output with 385,800 employees²

40% of existing land is fill

About 20% of the region's population lives below poverty level.³ 2/3 of the population lives in the highest quartile of social vulnerability, and 1/3 lives in census tracts above the 90th percentile of social vulnerability, based on the Centers for Disease Control and Prevention (CDC) Social Vulnerability Index (SVI).⁴

>1,800 known contaminated sites

>\$30B in expected losses from a future Hurricane Sandy⁵

>\$5.2B - 5.9B in expected losses from a major rainstorm⁶

Approximately \$13B in projected new investment regionwide needed over the next 20 years

Recommended reassessment every 5 years

² Based on 2019 IMPLAN data

³ Based on 2021 US Census Bureau Population Estimates Program data

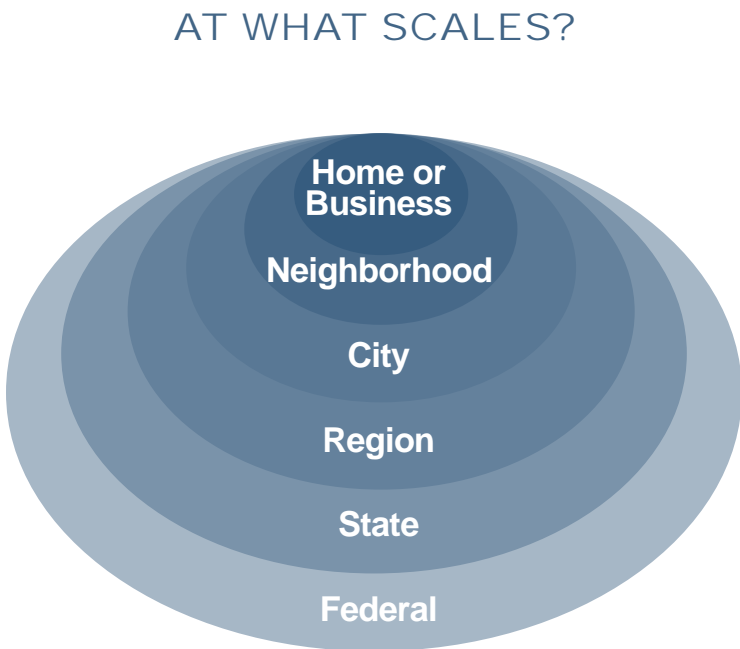
⁴ 2018 CDC Social Vulnerability Index

⁵ Hurricane Sandy 2012 high water marks with 2.4 feet of sea level rise

⁶ 8.3 – 9.2 inches of rainfall over 24-hours

IMPLEMENTATION OF THE RESILIENT NENJ ACTION PLAN WILL REQUIRE

LEADERSHIP COORDINATION FUNDING



BY WHAT MEANS?

- Continuation of Resilient NENJ as a coordinating and leadership body
- Local, regional, and state subgroups to provide focus and drive specific initiatives forward
- Direct funding allocations, grants, staff resource allocation, refinement and refocusing of existing planned investment, and possibly new revenue generation.

WHEN?

The time for action is now. Resilient NENJ proposes implementing these initial recommendations over the next 20 years, with significant activity around capacity building, funding, and initial next steps over the next three years. This is because most of the recommended actions are needed now based on current climate risk in the region. Resilient NENJ recommends reassessing and updating the plan every 5 years, with ongoing coordination toward implementation.

THE NEXT THREE YEARS

This Action Plan and the other efforts that are ongoing in the region are just the beginning of the process to create a more resilient NENJ. In the near term, priorities to continue advancement of this Action Plan include:

- 1 Creation of resilience committees at different levels of government and infrastructure agencies (including creation of an Infrastructure Coordination Council) and coordination between representatives of each and Resilient NENJ
- 2 Allocation of funding at the federal, state, regional, and local scales to support advancement of recommendations and increased staff capacity
- 3 Coordination on funding programs and approvals processes at the State level to facilitate advancement of multi-functional projects
- 4 Alongside #3, creation and advancement of a pipeline of parks, contaminated sites, vacant lots, or other sites to convert to green space and other uses with flood mitigation and climate resilience components
- 5 Program development and continuation of outreach initiatives as a collaboration between Resilient NENJ, the municipalities, community-based organizations, and academia
- 6 Advancement of the capital projects and strategies identified in **Section 3.0** and **Section 5.0** of the roadmap, while striving for a “dig-once” approach to construction

WHAT YOU CAN DO NEXT

- Share this Action Plan with your friends, family, neighbors, and colleagues
- Reach out to elected officials to advocate for actions you want to see happen
- Continue to carefully review the Action Plan and stay informed about and involved in the implementation process to the extent that works for you
- Learn more about your own risks and take steps to improve your preparedness, and spread the word

1.0

ABOUT THIS REPORT

WHAT THIS REPORT INCLUDES

Resilient Northeastern NJ (NENJ) is an initiative dedicated to increasing community resilience and improving quality of life for all people who live, work, and play in Jersey City, Newark, Hoboken, and Bayonne. These four municipalities, Hudson County, and two community-based organizations—Ironbound Community Corp. and HOPES CAP, Inc.—comprise the Region Team. The New Jersey Department of Environmental Protection (NJDEP) Bureau of Climate Resilience Planning (BCRP) funds and administers the program, with funding from the U.S. Department of Housing and Urban Development (HUD). It is one of four pilot planning regions under the Resilient NJ program umbrella.

This Action Plan is the culmination of almost two years of planning, coordination, and engagement to create recommendations to address climate-related hazards while building off and supporting existing efforts in the region. Resilient NENJ intends for this Action Plan to be a roadmap, providing clear next steps to implement the recommended resilience strategies. The Action Plan is organized into the following sections:

SECTION 2.0: HOW DID WE GET HERE?

Provides background on the region, the planning process, and the community vision, as well as information on the completed impact assessments and work that is already being done in the region, which contributed to development of this Action Plan.

SECTION 3.0: PREFERRED SCENARIO AND RECOMMENDATIONS

Outlines actions that can help build physical, environmental, social, economic, and institutional resilience. It includes “cut sheets” of actions that can be torn out and shared or referenced to help drive change.

SECTION 3.1: OVERVIEW AND HIGHLIGHTS

Provides an overview of the recommended actions and how they can create change in the region.

SECTION 3.2: ACTIONS THAT WILL CHANGE OUR BUILT AND NATURAL ENVIRONMENT

Outlines actions to address coastal and tidal flooding, stormwater flooding, and other climate-related and environmental justice needs through physical changes.

SECTION 3.3: ACTIONS THAT WILL CHANGE THE WAY WE WORK TOGETHER

Details actions that improve policy and governance, support outreach, education, and capacity-building, develop or enhance services and programs, and support emergency preparedness and response.

SECTION 4.0: IMPLEMENTATION PATHWAYS

Provides information on project development cycles and funding, capacity, and resource needs and ways to answer questions of who, when, and how the actions can be implemented.

SECTION 5.0: ROADMAP

Provides details on the potential costs, timeline, and next steps the region can take to coordinate, fund, and implement the Action Plan to build a thriving and resilient community.

WHAT YOU NEED TO KNOW AND WHAT YOU CAN DO NEXT

Everyone has a role to play in reducing flood risk and increasing resilience in NENJ. The information in the chart below provides additional guidance on next steps that different groups of stakeholders in NENJ can take to help share and implement this Action Plan. Check out other suggestions throughout this Action Plan to get or stay involved in ways that work for you.

IF YOU ARE	WHAT YOU NEED TO KNOW	WHAT YOU CAN DO NEXT
A RESIDENT, BUSINESS OWNER, OR PROPERTY OWNER IN THE REGION	<ul style="list-style-type: none">Building resilience in the region depends on you and the actions you advocate for and take to reduce flood risk to your home, business, or propertyYour voice matters in this process and in making changes that affect your community. Your elected officials need to hear from youThis Action Plan includes a variety of strategies that may affect the places you care about, so review it and stay involved in the process as strategies are implemented	<ul style="list-style-type: none">Know your risk today and in the future and take steps to improve preparedness, including following alerts and warnings when hazards are in the forecastPurchase and maintain flood insuranceReach out to elected officials to support actions you want to see happenShare this plan with your friends, family, and neighbors
A REPRESENTATIVE OF A COMMUNITY-BASED ORGANIZATION	<ul style="list-style-type: none">This Action Plan recommends a variety of strategies that will involve partnership and coordination with organizations like yoursImplementation of this plan provides an opportunity for strategies to realize additional benefits including those for your organization & people you work withEffective implementation of this Action Plan will involve ongoing conversations with community members, and you can play a key role as a leader and conduit to communities	<ul style="list-style-type: none">Carefully review this Action Plan and stay informed about and involved in the implementation process by coordinating with Resilient NENJ, and municipal and county staffWork with municipal and county staff to identify partnership opportunities that advance identified resilience strategiesHelp raise public awareness of flood and other climate hazards risk and the Action Plan through your networks
A MEMBER OF MUNICIPAL, COUNTY, OR STATE STAFF	<ul style="list-style-type: none">This Action Plan recommends strategies that affect property, infrastructure, and services owned and managed by municipalities and counties in the region and various NJ State agenciesMunicipal, County, and State agency staff will lead implementation of many of the recommended strategiesEffective implementation will require active coordination and involvement of staff across municipal, County, and State departments and functions	<ul style="list-style-type: none">Carefully review this Action Plan and stay informed about and involved in the implementation process and advocate for implementation of priority strategiesSupport finding, developing, and overseeing funding opportunities from various sourcesShare the Action Plan with colleagues

2.0

HOW DID WE GET
HERE?

PROJECT TIMELINE AND PROCESS

Resilient NENJ’s Steering Committee includes representatives from each of the Region Team entities. This group meets regularly with support from NJDEP and a team of resilience experts. A Community Advisory Council (CAC) also guides the project, provides early feedback on materials, and helps to plan engagement. The CAC is a diverse group of twelve community members, three from each of the four municipalities. They help ensure that the project centers the voices of people who have been historically underrepresented or excluded from planning processes.

Resilient NENJ builds off resilience-related work that is already taking place in the region and across the state by integrating recommendations, coordinating with leaders of other initiatives, and avoiding duplication of efforts (see **Section 2.7**).

Resilient NENJ structured the Action Plan process to gather input and regularly report out on progress. The team continuously integrated feedback into decision-making, technical evaluations, recommendations, and engagement efforts.

The Action Plan development process kicked off in Spring 2021 with the release of the **About Our Region** report. This report summarizes the region’s infrastructure, people, and places, as well as the work already underway. The visioning process, conducted Spring to Fall 2021, established long-term goals for the future of the region (see **Section 2.3** and the **Vision & Priorities** report for more detail on the regional community vision). The team also used visioning feedback to refine NJDEP’s draft evaluation criteria used to compare individual actions and solution scenarios (options). This vision therefore set the direction of this Action Plan and all recommendations.

Resilient NENJ began with a focus on flooding, which is an important issue in the region. Although Hurricane Sandy occurred ten years before the release of this Action Plan, residents still remember its widespread impacts. The many significant rainfall events that occurred during this planning process demonstrate the impacts flooding has on daily quality of life. In September 2021,

the remnants of Hurricane Ida caused significant flooding and resulted in a federal Major Disaster Declaration that included Hudson and Essex Counties. Feedback in the aftermath of Ida and other flooding in the summer of 2021 led Resilient NENJ to conduct additional engagement with local and state emergency managers to develop an Ida After Action report and accompanying recommendations.

An After Action is a document intended to capture observations of an event or exercise and make recommendations based on the outcomes of the event or exercise.

Resilient NENJ conducted a detailed assessment to evaluate the impacts of flooding on the region’s people, infrastructure, and other systems using new flood models NJDEP developed for this project. The **Flood Impact Assessment** (see **Section 2.4**) summarizes the findings of this effort and includes estimates of possible damages from current and future flood events. The **Flood Impact Assessment**, the **Vision & Priorities** report, and **Ida After Action** report provide more detail on the nature of various flood events that occurred in recent years and impacts on people’s lives, property, and regional infrastructure.

Community feedback also led to the expansion of the Action Plan to consider other climate-related hazards. Community based organizations and community members expressed early in the project that certain other issues concern them at least as much as flooding. Extreme heat and poor air quality, for example, may be exacerbated by climate change and are significant concerns in the region (see **Section 2.5** for more detail on the findings of the **Climate Hazards Assessment**).

Long-Term Control Plans (LTCPs), which are a regulatory requirement for combined sewer utilities, also address water quality hazards by reducing pollutant discharge and mitigating flooding through sewer system improvements. Resilient NENJ reviewed the LTCPs of the utilities that serve this region to ensure that the plans complement each other. Resilient NENJ integrated findings from these additional assessments (see summaries in **Appendix G**) into the development of recommendations.

Resilient NENJ also heard concerns related to the interaction between toxic chemicals and flooding due to the density of contaminated sites in the region.

Responding to this feedback, Resilient NENJ studied risks related to known contaminated sites and brownfield sites in the area, including the potential role of groundwater rise in increasing risk (see **Appendix H**).

Resilient NENJ used these technical assessments and toolboxes of solutions partnered with the engagement process to develop initial solution options. Resilient NENJ first organized solutions into three scenarios (see **Section 2.6** and the **Scenario Development** report), or suites of actions, to help understand different options and approaches. Feedback on the three scenarios and technical evaluations helped the team to develop the preferred scenario and recommendations, presented in **Section 3.0** in this plan.

THE ACTION PLAN DEVELOPMENT PROCESS



PREVIOUSLY PUBLISHED NENJ REPORTS



ABOUT OUR REGION

Describes key aspects, features, and hazards of the region and its cities.



VISION & PRIORITIES

Summarizes what the team heard through engagement from spring to fall 2021 and what Resilient NENJ understands is the region's vision for itself.



FLOOD IMPACT ASSESSMENT

Summarizes what will likely happen under certain coastal storm, rainfall events, and tide conditions if nothing more is done to protect the region from current and future flooding.



CLIMATE HAZARDS

Summarizes findings on how climate-related hazards affect the region today, how risk will evolve, and the types of impacts expected.



IDA AFTER ACTION

Summarizes the remnants of Hurricane Ida event and recommendations from the emergency management community based on lessons learned in response and recovery.



SCENARIO DEVELOPMENT

Presents possible scenarios, or suites of actions, evaluated for inclusion in the Action Plan.

PLANNING ON OUR FEET

Some community members shared early on that they need to see action to trust and want to engage with the Resilient NENJ process. In response, Resilient NENJ worked with the State, municipalities, and other stakeholders to submit four funding applications to the Federal Emergency Management Agency's (FEMA) Building Resilient Infrastructure and Communities (BRIC) program for Fiscal Year 2021 (FY2021) to advance physical projects that can mitigate risks. Hoboken also submitted a fifth application for expansion of their resilience park. FEMA advanced four of the five applications for funding under the FY2021 allocation, and the fifth, McGovern Park, may be resubmitted for FY2022 or another future round. These projects will protect the lives and property of hundreds of people.

1. In Newark, Resilient NENJ partnered with Newark Public Schools to develop a pilot resilience hub based on feedback received early in the project. A resilience hub is a central gathering point in times of need with access to information and resources and may double as an emergency shelter. Newark's pilot will take place at Ironbound's Ann Street School. Due to the severity of flood risk in Newark, the pilot location is incorporating subsurface stormwater storage and pervious pavement to mitigate flooding in addition to central air conditioning and power resilience improvements. Ultimately, the Ironbound Resilience Hub project will reduce recurrent flooding for 60 homes and 17 businesses and schools. This effort will reduce flood risk to hundreds of people in the Ironbound neighborhood, providing \$53 million in expected avoided losses in flood risk alone. It will also provide a cooling center, consistent power supply, and critical resource for community members to go to in times of emergencies.
2. In Jersey City, the McGovern Park Resilience Project if funded through a future cycle of the BRIC program or other source, would leverage existing park and open space to capture stormwater that currently floods approximately 80 homes.
3. In Bayonne, the Cottage Street Flood Mitigation Project will mitigate repetitive flooding to 32 structures through both underground storage and increasing the capacity of the stormwater conveyance system.
4. Also in Bayonne, the 63rd Street Pumping Station Power & Flood Resilience Project will stop sewage from entering the homes of elderly people in the community, it did multiple times in 2021. There are 59 properties directly benefitting from this project, and at least 177 people will hopefully never again have to deal with the stress of having raw sewage backup into their homes once this project is complete.
5. Hoboken submitted an application to expand the Southwest Resilience Park, a public park that includes green infrastructure like rain gardens, porous pavers, rainwater harvesting, and underground storage to manage stormwater and provide green space. The expansion will continue the benefits of the Rebuild by Design – Hudson River project, which includes coastal flood barriers and rainfall flood mitigation components, as described in more detail in **Section 2.7**.

Appendix C provides additional detail on the funding applications submitted.

ENGAGEMENT PROCESS

Resilient NENJ provided various forums for feedback to ensure that people with different needs and preferences could participate. The COVID-19 pandemic required most engagement to be virtual, although in-person engagement opportunities also happened when safe, feasible, and accessible. Resilient NENJ held five regionwide virtual community meetings open to all community members. Live Spanish and American Sign Language (ASL) interpreters attended each and contributed valuable services to the process. Recordings in Spanish and English with ASL interpretation, meeting materials, virtual meeting boards, and summaries of meetings, as well as opportunities to continue to provide feedback on meeting content, exist on the project website. Resilient NENJ hosted a virtual community forum for Newark residents following Ida, and other cities hosted similar events to provide resources to residents. In March and April of 2022, Resilient NENJ held several city-specific community meetings to gather feedback on the three scenarios and recommendations that are unique to individual cities. Site visits, small group meetings and interviews, and electronic formats provided opportunities for direct engagement.

MULTIPLYING ENGAGEMENT

Many community-based organizations and other neighborhood and advocacy groups work with people in local communities throughout the region. Resilient NENJ reached out to these groups to learn about their needs and insights, and to help multiply engagement (spread and grow involvement). Resilient NENJ held engagement partner meetings in May of 2021 and September of 2022 to provide additional information and resources to community-based organizations so that they could conduct their own meetings (using meetings-in-a-box), share materials with their networks, and provide direct feedback on the project and engagement processes. Resilient NENJ also participated in multiple existing partner meetings when invited or permitted to do so.

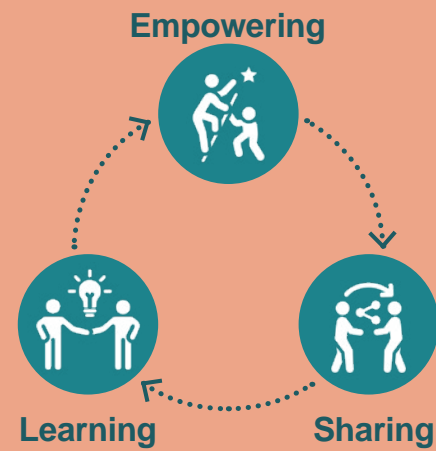
LANGUAGE ACCESSIBILITY

Resilient NENJ and NJDEP translated key outreach materials into 10 different languages and provided ASL and Spanish interpreters at each meeting. NJDEP translates reports into Spanish. **Section 3.3** includes recommendations to improve language accessibility. Recommendations will help increase direct engagement with and welcoming of non-English speaking and Deaf and Hard of Hearing communities.



The project description flyer was translated into Arabic, along with the 9 other languages prioritized for this region.

GUIDING PRINCIPLES



- Meet people where they're at
- Honor their history and expertise
- Understand that people have conflicting priorities, particularly right now
- Make the time mutually valuable
- Show how feedback is incorporated in the planning process

Representatives of government, municipal departments, utilities, infrastructure agencies, State agencies, and similar programs will be key to implementation of the Action Plan. Resilient NENJ engaged these groups at various times throughout the process to ensure that recommendations align with their priorities and capabilities. This engagement, along with other engagement activities, will need to continue moving forward (see **Section 3.3**).

Resilient NENJ collected feedback continuously through anytime engagement opportunities, which included surveys (both online and in print), report-specific feedback forms, the Irys app, and various contact avenues including email, multi-lingual hotline voicemail, and social media. The team shared project description flyers and meeting promotion flyers electronically and in print. The team shared announcements about meetings, deliverables, and other updates on social media and with Resilient NENJ's opt in email list. Social media accounts (@resilient_nenj on Instagram and @resilientNENJ on Facebook and Twitter) also shared other content related to resilience, flooding, and other hazards. All materials, reports, and additional project information are available at www.resilient.nj.gov/nenj. Most materials and major reports are available in English and Spanish, and flyers and surveys are available in English, Spanish, and nine other languages prioritized based on the needs of the region.

Resilient NENJ adapted the engagement process continuously based on input from the Steering Committee, CAC, community-based organizations, other project participants, as well as the types of decisions and analyses being completed at any major milestone. The team worked to leverage existing events, festivals, and meetings to share project-related information. Resilient NENJ developed additional engagement materials such as educational videos and a Faces of Resilience social media series and collaborated with schools and community-based organizations to conduct youth engagement. These efforts are already working to advance some of the recommendations in this plan detailed in **Section 3.3.2**.

See **Appendix I** for detail on the engagement process to date (as of September 2022).

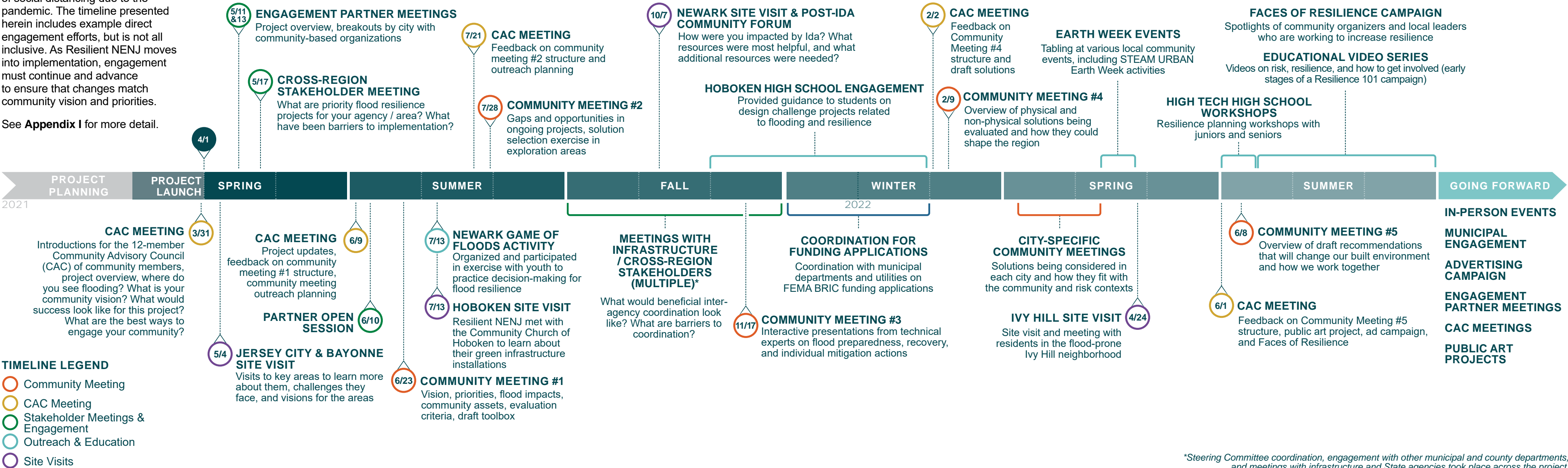


Resilient NENJ's engagement strategy included any-time engagement opportunities, various forms of outreach to share information, and direct engagement to collaborate and gather input.

ENGAGEMENT TIMELINE

Resilient NENJ engagement kicked off in the spring of 2021, at a time of social distancing due to the pandemic. The timeline presented herein includes example direct engagement efforts, but is not all inclusive. As Resilient NENJ moves into implementation, engagement must continue and advance to ensure that changes match community vision and priorities.

See **Appendix I** for more detail.



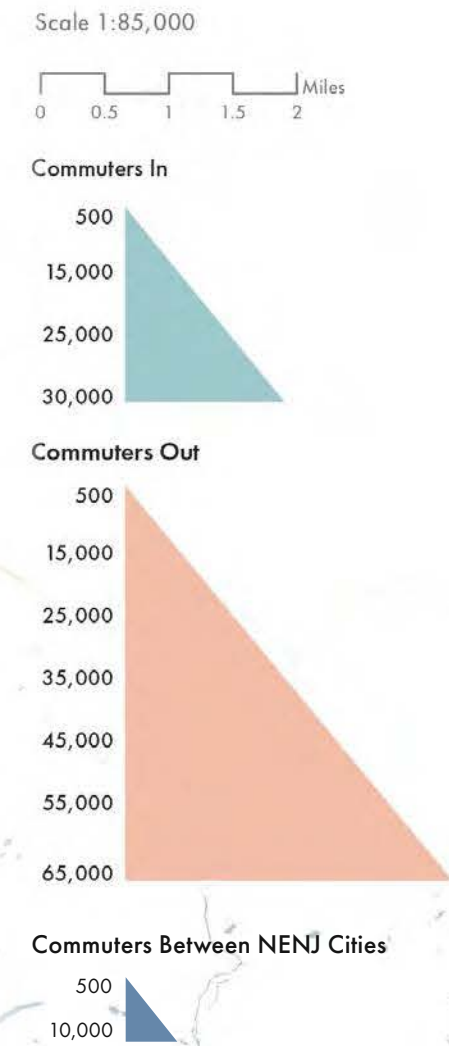
ABOUT OUR REGION

As described in the **About Our Region** report, the Resilient NENJ region is a complex urban environment with some of the most densely populated cities in the state and some of the oldest infrastructure in America. The region is heavily interconnected through transportation and maritime networks, waterbodies, cultures, commerce, and workers. It houses infrastructure and dense transportation networks that support the movement of goods across the region and drive the regional economy.

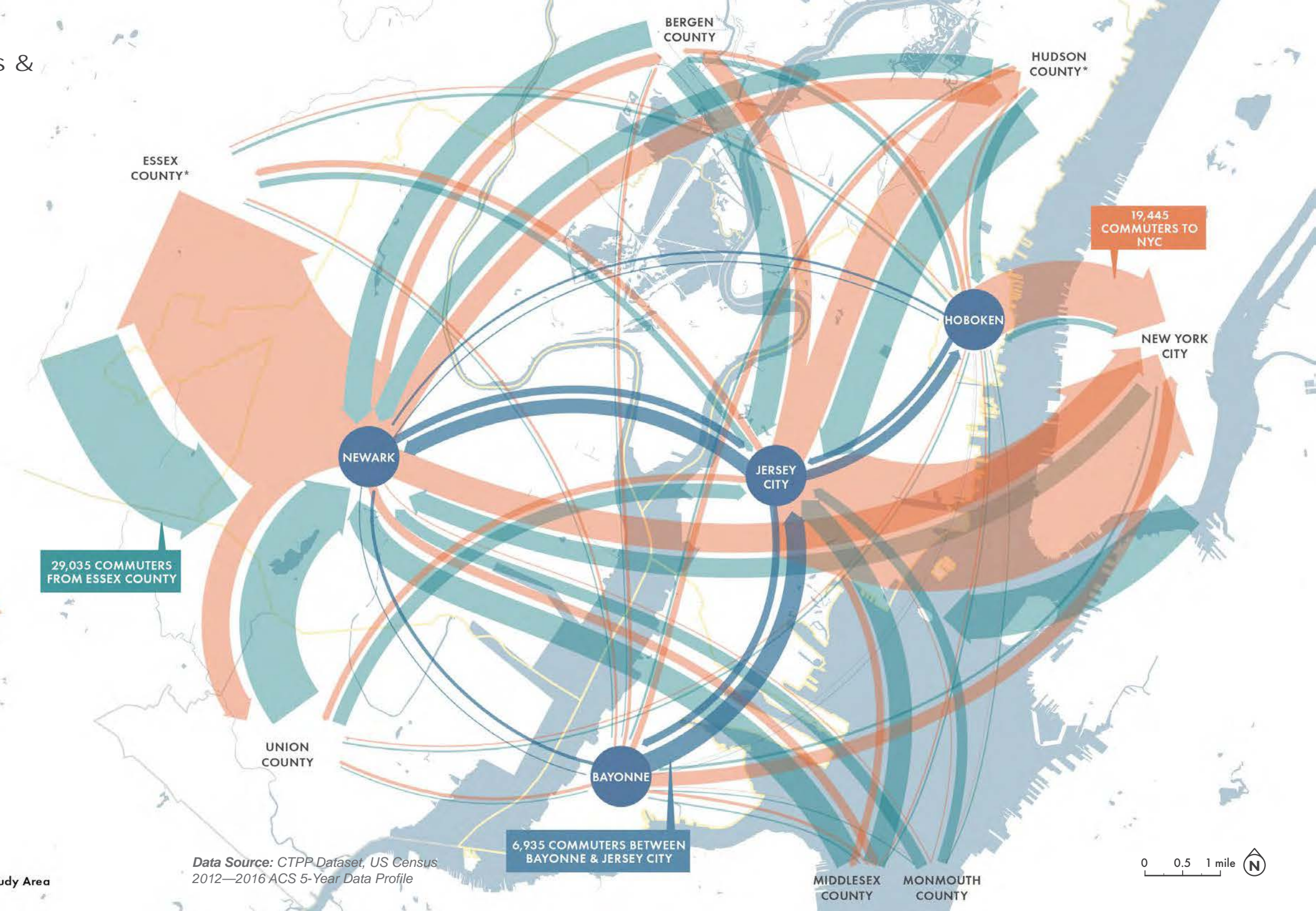


View of Downtown Jersey City from Liberty State Park.
Image Source: Hudson County Division of Planning

Commuter Patterns & Flows



*Remaining Municipalities Outside of Study Area



Data Source: CTPP Dataset, US Census 2012—2016 ACS 5-Year Data Profile

The region is home to over 700,000 incredibly diverse people who feel great pride in their sense of community. Resilient NENJ's residents have persevered through significant climate-related and other challenges, and their knowledge and expertise are valuable in the effort to increase climate resilience as described later in this Action Plan (see primarily **Section 3.3.2** and **3.3.3**). The region has a notable history of racially discriminatory housing practices called redlining that began in the early- to mid-twentieth century, and its effects can still be felt today. Redlining caused most neighborhoods in NENJ to be subject to the most extreme forms of exclusionary planning and zoning practices. In large part due to these practices, today the region contains some of the most socially vulnerable communities in the state and nation.

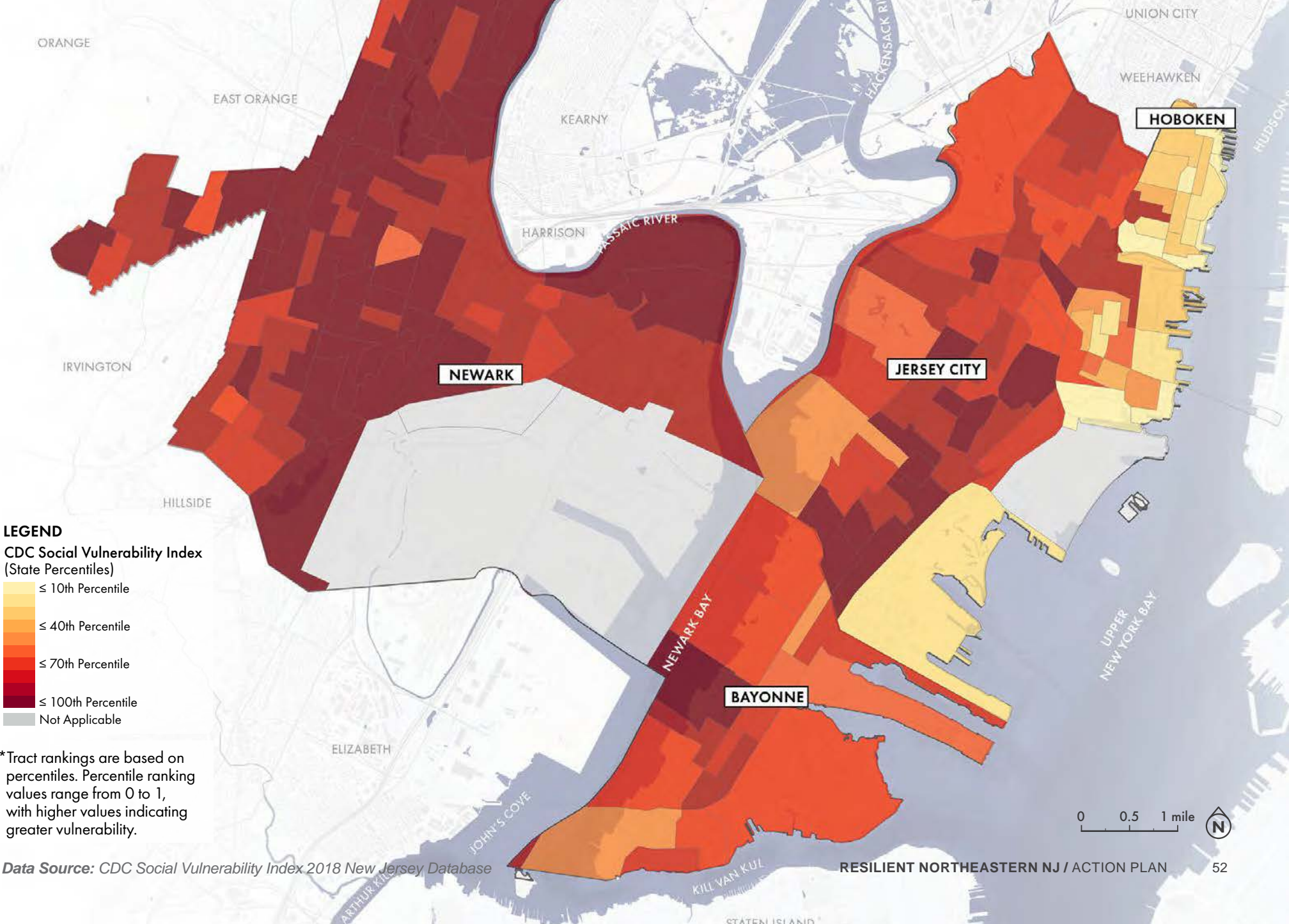
Social vulnerability refers to the degree to which people can expect to be challenged when faced with significant disruptions like those that come from climate hazards. Interconnected factors like income, access to transportation, and language barriers may cause some people to feel disproportionate impacts from flood events or other disasters. Some may need more support to prepare for, respond to, or recover from emergencies. Black and Brown communities (due to a history of exclusionary practices), low-income, non-English speaking, elderly, children, unhoused, or physically disabled people are more likely to face these challenges. About 20-percent of the region's residents live below the poverty line.

There are various metrics, or tools, for measuring social vulnerability. Resilient NENJ primarily uses the Centers for Disease Control and Prevention (CDC) Social Vulnerability Index (SVI). See **Section 3.2.3** for more detail on the CDC SVI. While these metrics are helpful for planning purposes and to identify inequities, they do not speak to people's personal strengths and experiences. Many people have persevered through past challenges and daily inequities despite their limited resources, and there are many groups and individuals that advocate for and work to address environmental justice concerns. It is important to center the experiences of these populations and acknowledge that, without action, they will bear the brunt of the worst and earliest impacts of climate change.



Meeting with Residents in Newark Ivy Hill Neighborhood to discuss repeat flood issues.
Image Source: Resilient NENJ

Social Vulnerability Index (SVI)



LEGEND
CDC Social Vulnerability Index
(State Percentiles)
≤ 10th Percentile
≤ 40th Percentile
≤ 70th Percentile
≤ 100th Percentile
Not Applicable

*Tract rankings are based on percentiles. Percentile ranking values range from 0 to 1, with higher values indicating greater vulnerability.

Data Source: CDC Social Vulnerability Index 2018 New Jersey Database



A flooded home in Newark's Ivy Hill Neighborhood.
Image Source: Janell Richison

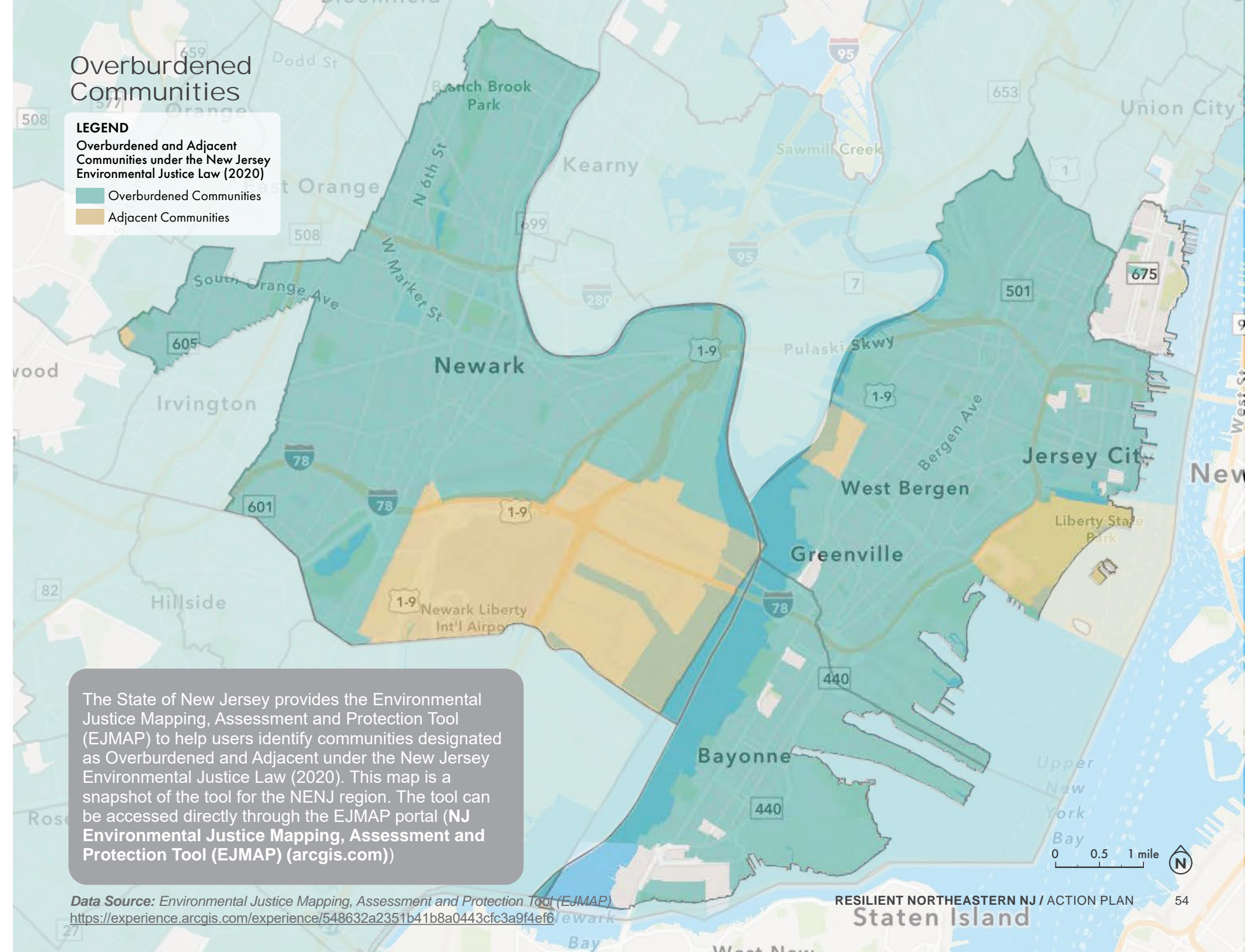
¹ White House's Justice40 initiative: <https://www.whitehouse.gov/environmentaljustice/justice40/>

NENJ is also notable for its history as an industrial epicenter. The region's industrial legacy is reflected in its high concentration of contaminated sites. The presence of contaminated soils is also related to historical use of land for open dumps or landfills, such as the use of the Meadowlands area for garbage disposal that started in the mid-1900s. The presence of contamination has led to health hazards during past flood events as waters mixed with pollutants and inundated residential areas. This 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, communities of color and other marginalized communities face disproportionately high exposure to these hazards, in addition to other hazards like urban heat island effect and poor air quality. Efforts to prevent and reverse impacts of such practices are commonly known as environmental justice (EJ). As part of New Jersey's EJ efforts, the New Jersey Environmental Justice Law requires NJDEP to evaluate the contributions of certain facilities to environmental and public health stressors in overburdened communities when reviewing operational and development-related permit applications.

The Environmental Justice Law defines an overburdened community as a census block group that is at least 35 percent low income, 40 percent minority, or 40 percent limited English proficiency. As shown in the map on the next page, most of NENJ is classified as overburdened communities under this definition. NJDEP is using data on overburdened communities to guide future planning processes, and the federal government is increasingly using such information to guide funding decisions.¹

Northeastern New Jersey is an extraordinary place with a lot to be treasured, celebrated, and preserved. To do this, decision makers must acknowledge the significant challenges and inequities many communities face, now and into the future, and invest in the resilience and positive transformation of our most under-resourced neighbors and their communities.



The State of New Jersey provides the Environmental Justice Mapping, Assessment and Protection Tool (EJMAP) to help users identify communities designated as Overburdened and Adjacent under the New Jersey Environmental Justice Law (2020). This map is a snapshot of the tool for the NENJ region. The tool can be accessed directly through the EJMAP portal (**NJ Environmental Justice Mapping, Assessment and Protection Tool (EJMAP)** (arcgis.com))

Data Source: Environmental Justice Mapping, Assessment and Protection Tool (EJMAP)
<https://experience.arcgis.com/experience/548632a2351b41b8a0443cfc3a9f4ef6>

RESILIENT NENJ’S COMMUNITIES



JERSEY CITY

Jersey City, the county seat of Hudson County, is the second most populous city in New Jersey, with an estimated population of over 292,000.² The city is incredibly diverse and boasts various cultural enclaves, such as Little Manila and Little India. More than 50-percent of Jersey City’s population speaks a language other than English at home,³ and common non-English languages include Spanish (51,000 speakers), Hindi (16,000 speakers), Arabic (11,000 speakers), Chinese (9,000 speakers of Mandarin and Cantonese), and Tagalog (7,000 speakers).⁴ The city is bi-coastal with the Hudson River and New York Bay to the east and the Hackensack River to the west, and the Palisades outcrop is a notable geologic feature that runs through the center of the city, giving the Heights neighborhood its name.

Jersey City’s economic output is significant, totaling \$33.1 billion in 2019. The city had an estimated 150,000 jobs in 2019, primarily in the commercial banking, investment, banking, real estate, and local government industries, with most banking jobs in downtown Jersey City.⁵ Heavy industrial areas have mostly transitioned to other uses, leaving many large contaminated sites undergoing and in need of clean-ups and redevelopment. Public transit is important for mobility in Jersey City, and the transit system includes several PATH stations, ferry terminals, many bus routes, and the Hudson Bergen Light Rail. Bike usage has increased in recent years with the expansion of bike lanes.

NEWARK

Newark is the most populous city in the State, with over 311,000 residents,² and it is the largest city in NENJ by land area. Spanish and Portuguese are the most spoken languages following English, with over 85,000 and 18,000 documented speakers, respectively, as of 2019.⁶ Participants highlighted Newark’s cultural diversity and abundance of cultural events and spaces as some of the city’s best features, and the city is rich in community based organizations and youth engagement opportunities. Newark also has the largest concentration of populations with high social vulnerability scores and the highest poverty rate of the four municipalities in the region. Before the COVID-19 pandemic, more than 30-percent of the population reportedly lived below poverty level.⁷

Port Newark on the Newark Bay is part of the Port of New York and New Jersey, owned by the Port Authority of New York and New Jersey (PANYNJ) and is the largest port on the east coast and the third largest port in the country. Other critical transportation infrastructure in Newark includes Newark Liberty International Airport, Newark Penn Station, Newark Broad Street Station, and a NJ Transit bus complex. The air transportation industry accounts for the largest portion of the 174,000 jobs in Newark, alongside the transit and ground transportation and transportation support industries, contributing to a total of \$37.3 billion in economic output.⁵ Newark is home to the Passaic Valley Sewerage Commission (PVSC) Wastewater Treatment Plant (WWTP), which receives combined sewage from Newark, Jersey City, Bayonne, and other cities outside of NENJ. Though critical to the economy of Newark and the wider region, the dense industrial Doremus Avenue corridor, where the WWTP is located, poses environmental and public health concerns for nearby residents. Residents have expressed worry and advocate for action to reduce pollution. Poor air quality likely contributes to elevated asthma levels in the area and may create higher risk for cancer and other health complications.



HOBOKEN

Hoboken, the “Mile Square City,” is small but densely populated with over 60,000 residents.² The city has the highest median annual household income and property values of the cities in the region. Hoboken is majority white and has lower socially vulnerability than the other cities. Still, over a quarter of the population speak a language other than English at home.⁸ Spanish is the most spoken language after English. Southwest Hoboken, in the Hoboken Housing Authority properties area, has the highest CDC Social Vulnerability Index in the city. Transit, full-service restaurants, real estate, colleges, and other educational services industries were the top industries of the 38,400 jobs in Hoboken as of 2019.⁵ 15-percent of all jobs in Hoboken were in the transit industry, and public transportation systems running through Hoboken include NJ Transit rail and buses, PATH trains, Hudson-Bergen Light Rail, New York Waterway Ferry, and the Hoboken Hop shuttle. Many of these transportation lines enter and exit New Jersey through the Hoboken Transit Terminal, which is the third largest transportation terminal in New Jersey.

Flooding has been a longstanding problem in Hoboken, tied to the city’s natural history. Hoboken formerly had a tidal marsh along the current western boundary of the city. This area was filled in and is lower elevation than eastern areas that are closer to the Hudson River and now has the most significant flooding challenges in the city. Hoboken’s well-documented history of flooding has also led the City to be a leader in flood resilience, taking many proactive measures to resolve its issues.

BAYONNE

Bayonne is a peninsula at the southern end of Hudson County, surrounded by the Newark Bay to the west, the Kill van Kull to the south, and the New York Bay to the east. Many beautiful waterfront parks and walkways border these waterbodies, such as Dennis Collins Park, Gregg Park, and Rutkowski Park. The Bayonne Bridge connects to Staten Island. The city of over 73,000 people⁹ is less densely populated than the other cities of the region, but has been undergoing significant redevelopment in recent years. Participants expressed that they value Bayonne’s growing diversity and sense of community.

Like Jersey City and Newark, Bayonne contains high concentrations of socially vulnerable people based on the CDC SVI. Almost 50-percent of Bayonne’s population speaks a language other than English at home,⁸ and common non-English languages spoken in the city include Spanish, Arabic, and Polish. The city’s industrial Constable Hook, Military Ocean Terminal at Bayonne (MOTBY), and Port Jersey areas contribute to the regional economy while also presenting environmental health concerns for nearby communities based on feedback. There were an estimated 24,200 jobs in Bayonne as of 2019 with the most jobs in the local government, hospitals, and warehousing and storage industries, and the city had a total economic output of over \$4.5 billion in 2019.⁵



² Based on US 2020 Census results
³ <https://www.census.gov/quickfacts/jerseycitycitynewjersey>
⁴ <https://public.tableau.com/app/profile/jersey.city/viz/LanguagesSpokeninJC/Dashboard1>
⁵ Based on 2019 IMPLAN data
⁶ Based on 2019 American Community Survey estimates
⁷ https://www.atsdr.cdc.gov/placeandhealth/svi/data_documentation_download.html
⁸ Based on 2021 US Census Bureau Population Estimates Program data
⁹ <https://worldpopulationreview.com/us-cities/bayonne-nj-population>

VISION

Documenting the region's vision for itself helps ensure this Action Plan is in line with community priorities. During the spring, summer, and early fall of 2021, the team asked about the places and things people love and the changes they want to see, as well as any challenges and issues they would like to see addressed. Community members told the team that they would like to see more green space, better mobility, a diverse economy, green jobs, and more transparency and two-way communication with government, among other changes.

There are five pillars of resilience that also correlate to the five types of infrastructure in every community: environmental, economic, social, physical, and institutional/governance. The team received vision-related feedback across all five pillars of resilience.

Region-wide, community members indicated that they want to see the following changes in the future:

ENVIRONMENTAL



- Increase trees and green space
- Address issues of air quality and urban heat island effect
- Reduce pollution and combined sewer overflows
- Increase use of renewable energy
- Reduce trash in the streets that clogs catch basins and makes its way into public spaces or bodies of water
- Preserve and enhance ecosystems and habitats

ECONOMIC



- Create new jobs, including higher quality technological and green jobs and train residents for those jobs
- Nurture healthier and safer working and living conditions for communities
- Promote economic diversity and thriving local economies
 - For example, by promoting artisans and small businesses
 - Explore and implement creative economic structures for improving resilience
- Reduce financial burdens of flooding to residents
- Avoid long-term property value loss and community disinvestment from repeat flood events

SOCIAL



- Improve cleanliness, safety, health, food access, and basic quality of life
- Focus on resilience and innovation in the community, leveraging community member strengths and experiences
- Increase affordable, quality housing and housing that promotes diversity of residents
- Mitigate impacts of flooding to daily life
- Preserve and enhance neighborhood and waterfront parks, waterfront walkways, gathering places, and recreational and cultural activities
 - Promote access to these spaces
 - Create new and improved recreation centers, spaces for children to play, public health centers, and spaces to cool off from the heat
- Preserve feeling of a sense of home, community, and cultural diversity

PHYSICAL INFRASTRUCTURE



- Improve access to regional transportation. While many people value existing access to regional roads and public transit, people also expressed the need for improved public transportation and access. For example, people asked for improved connectivity between the cities of the region
- Center pedestrian and biker experience. Many community members requested more bike lanes and pedestrian plazas to improve walkability
- Improve current parking conditions while planning for reduced car dependency in the future
 - Many people in the region expressed a desire to see reductions in car usage and impervious parking areas

RELATIONSHIP WITH GOVERNMENT



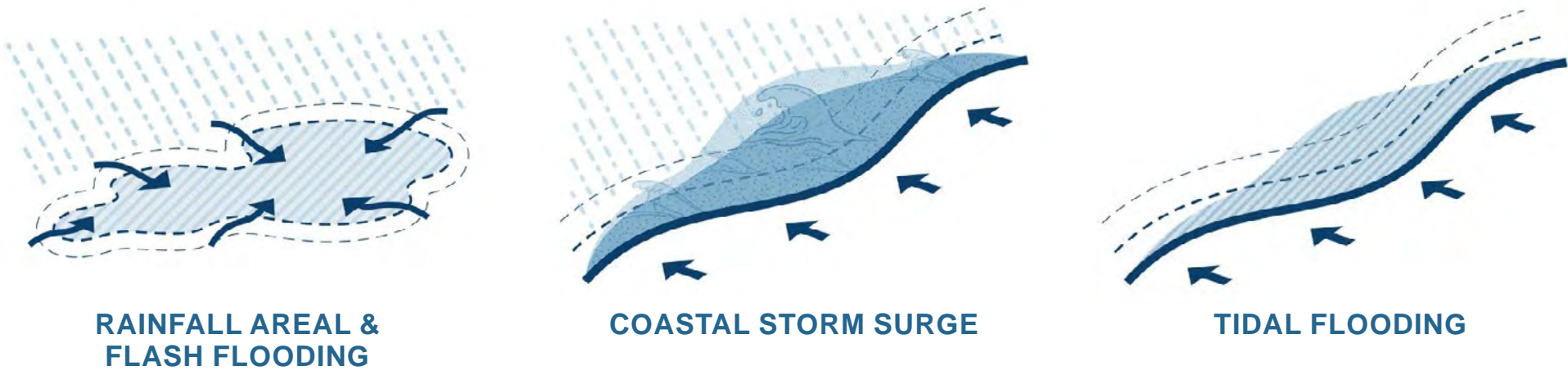
- Communicate more about what actions are being taken to reduce flooding and its impacts
- Increase preparedness and emergency response communication
- Invest in relationship building between government agencies and community members
- Ensure that community needs are met by listening and responding more frequently to residents

FLOOD IMPACT ASSESSMENT

NENJ has had a long and complex relationship with water as a source of both vitality and destruction. NENJ is a coastal region, and the waterfront offers open space, economic opportunity, and sweeping views of the Manhattan skyline. However, the coast also presents risks such as those demonstrated by Hurricane Sandy. Much of NENJ's lands were former wetlands that were drained and filled to allow for urban development, which also contributes to its flood vulnerabilities. Flooding after heavy rainfall is a widespread and worsening issue in the region. The undersized drainage systems and increasing amounts of impervious surfaces, such as concrete and asphalt paving, contribute to flooding from rainfall. Heavy rainfall, coastal storms, and tidal flooding all impact the region today, and this risk is evolving with climate change. Through the Resilient

NENJ process, many residents shared the financial, physical, and emotional burdens that flooding imposes on them. Sea level rise will only exacerbate rainfall, storm surge, and tidal flooding, and warming temperatures are expected to make rainfall more intense over time.

The project team conducted a detailed assessment to understand the region's exposure to flooding and possible impacts if no further action is taken. The results are explained at length in the separate **Flood Impact Assessment** report, with a brief summary of findings included herein.

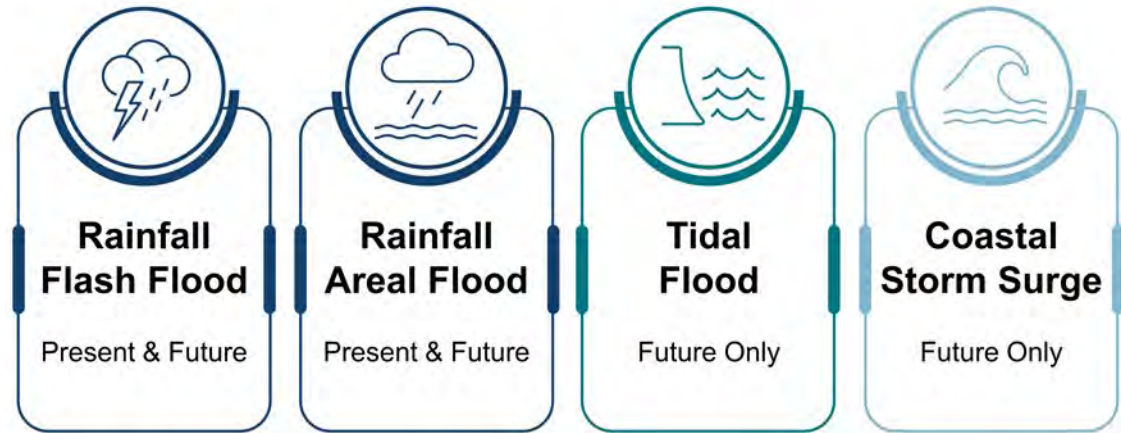


WHAT DID THE FLOOD IMPACT ASSESSMENT INCLUDE?

Specifically, the project team evaluated regional and localized impacts for the four different types of flooding described below. The team used large-scale flood models NJDEP developed for use in this project. Although the flood models are helpful for planning purposes to identify priority flood areas, they must be supplemented with more detailed assessment for more granular understanding of risk or for design purposes.

- 1. Rainfall flash flooding** (present and future): Flash flooding occurs when there is a significant amount of rainfall over a short period of time. Water rises quickly and also often recedes quickly. The NJDEP models account for approximately 3.5 inches over two hours, which is more intense than what the region experienced during Floyd (1999), Irene (2011), and Henri (2021) in most places, but lower than Ida (2021). This short duration, high intensity rain event is likely to temporarily overload storm sewers and cause flooding. It may occur suddenly, providing little time for preparation or evacuation. The model representing future conditions includes 10 percent more rainfall than the one representing present day conditions, and includes 2.4 feet of sea level rise over 2000 sea levels (which is used in the present-day models). Sea level rise can make it more difficult for floodwaters to drain.
- 2. Rainfall areal flooding** (present and future): Areal flooding occurs when flooding develops more gradually, comes from sustained rainfall over a longer period, and may not drain for a longer period. The NJDEP models use around 8 to 9 inches over 24 hours, which is similar to Ida or Irene, depending on the area. In fact, Ida started as a flash flood event, but the duration and expanse of rainfall turned it into an areal flood, as well. Storms of this size are likely to overwhelm drainage networks and the models show where significant damage and disruption likely does and

MODELED FLOOD EVENTS



- could occur. The term areal flooding comes from the National Weather Service (NWS) Hazardous Weather Warning System to represent inland flooding over widespread extents of low-lying areas. As with the flash flooding models, the model representing future conditions includes 10 percent more rainfall and 2.4 feet of sea level rise over 2000 sea levels. The future model is similar to Ida with 10-percent more rainfall and sea level rise.
- 3. Tidal flooding** (future only): Tidal flooding is the temporary inundation of low-lying areas due to high tides, which occur regardless of the weather. Sea level rise will cause tides to be higher than they are today, and some areas will flood daily. Future high tides will likely flood places along the Hudson, Hackensack, and Passaic Rivers, as well as along Newark Bay and Upper New York Bay. The project team simulated tidal peaks at Mean Higher High Water (MHHW), based on elevations reported at nearby tide gauges. MHHW represents the average of the higher of the two daily high tides. The models add 2.4 feet to the spatially varying MHHW for the region.
 - 4. Coastal storm surge** (future only): Tropical storms, hurricanes, and nor'easters can raise water levels along the coast. Storm surge affects areas along all waterbodies in the region, including the Hudson, Hackensack, and Passaic Rivers and the Newark Bay and Upper New York Bay. Hurricane Sandy in 2012 was an example of an event with significant storm surge. The project team modeled an extreme coastal storm surge event developed by taking the observed high-water marks experienced during Hurricane Sandy and projecting them into 2070, assuming 2.4 feet of sea level rise.

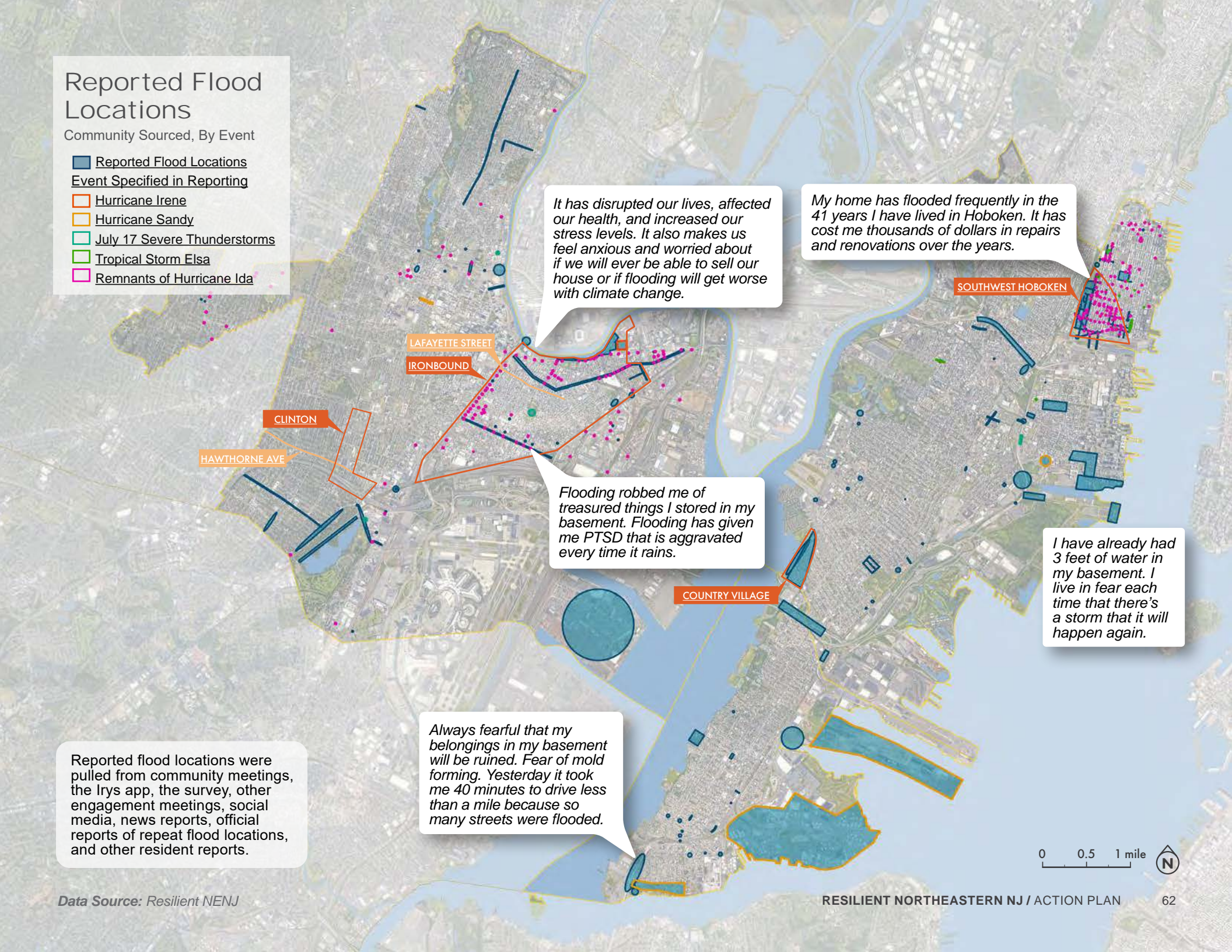
FLOODING EXPERIENCES

Resilient NENJ received feedback throughout the Action Plan development process about flood experiences, concerns, and impacts. People shared photos, stories, and notes on specific locations of flooding. Resilient NENJ also pulled reports of flooding from social media and from municipal tracking systems. These reports are mapped in the graphic on the right, and we used this information to “ground-truth” the flood models that were part of the **Flood Impact Assessment**.

A SUMMER OF FLOODING

Several flood events occurred in the summer of 2021. The remnants of Hurricane Ida, in particular, spurred Resilient NENJ to conduct additional engagement with emergency managers and the development of emergency preparedness and response recommendations in this Action Plan. Resilient NENJ prepared a separate **Ida After Action** report to detail findings and recommendations. The **Flood Impact Assessment** and **Vision & Priorities** reports include more on these storms.

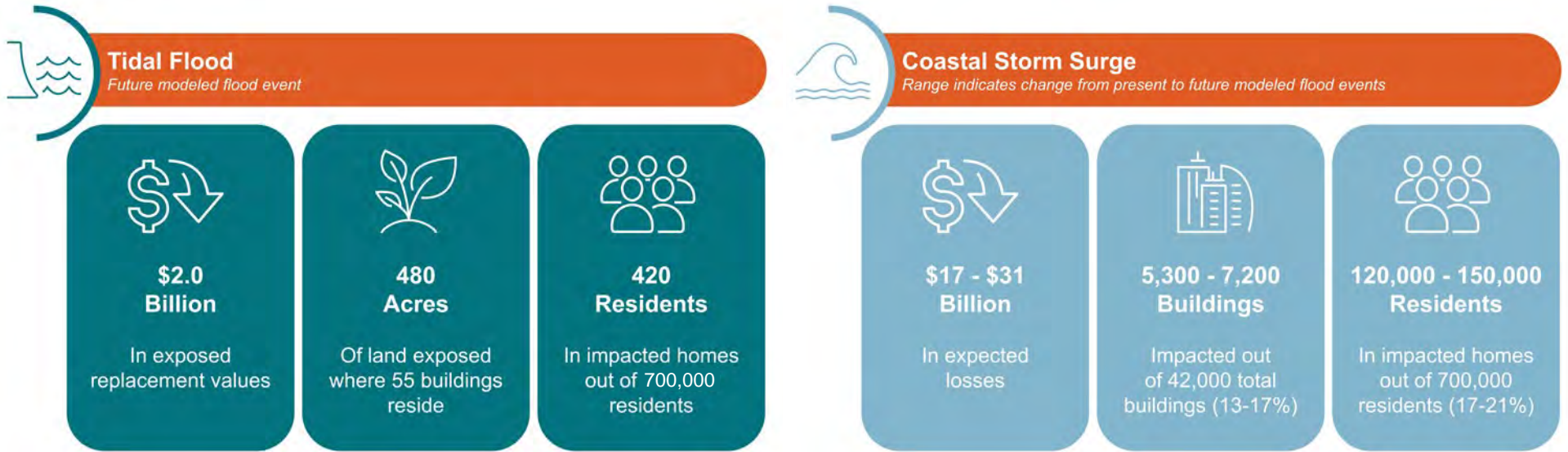
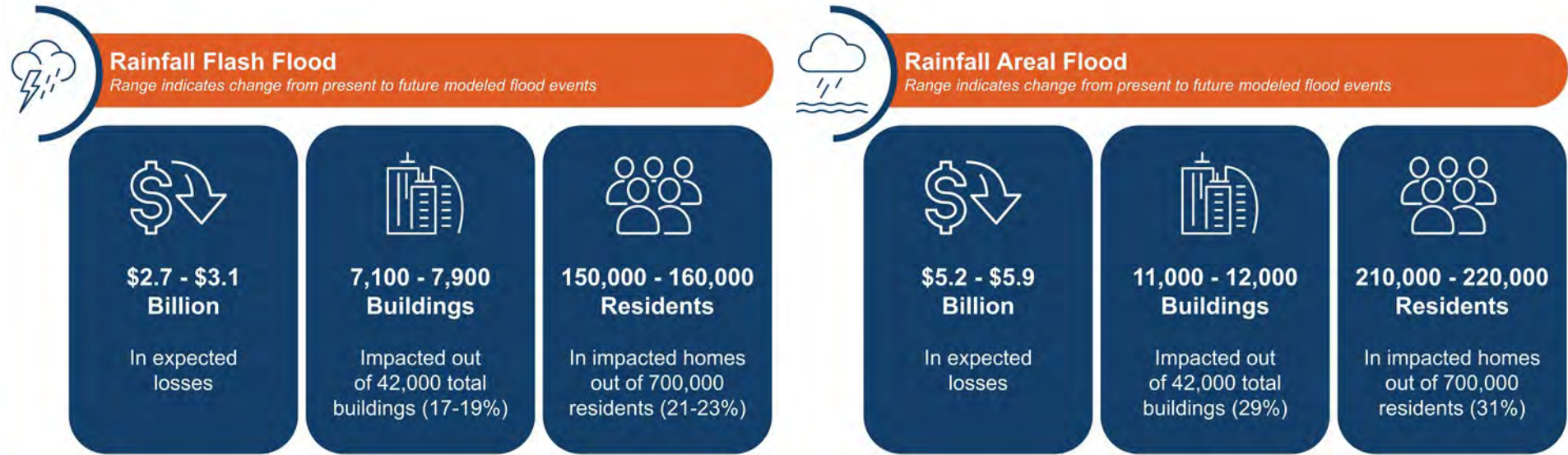
STORM	SUMMARY
Tropical Storm Elsa July 8, 2021	This storm dropped several inches of rain across northeastern New Jersey. Hoboken was especially impacted.
Severe thunderstorms July 17, 2021	Severe thunderstorms affected all New Jersey. The storms caused significant flash floods and street flooding. Newark was especially impacted.
Tropical Storm Henri August 22, 2021	Hoboken and Jersey City were especially impacted by this storm. Reported impacts included flooded basements, sewer collapse, and sinkholes.
Remnants of Hurricane Ida September 1, 2021	These thunderstorms devastated New Jersey and New York. The entire region experienced transportation system impacts and many homes and cars flooded.



WHAT ARE THE POSSIBLE IMPACTS?

In total, this evaluation revealed expected flood impacts to 2 out of every 5 residents in NENJ, 15,000 buildings with a value of \$61 billion, 1,500 acres of total park space, and 70-percent of the region’s daily economic output.

In addition, NENJ can expect to see significant impacts to many of its most critical infrastructure, emergency response, public health, quality of life, and ecosystem health assets. The **Flood Impact Assessment** provides additional detail on the critical assets that are most at risk.



CLIMATE HAZARDS ASSESSMENT

Flooding is not the only climate hazard Northeastern NJ faces. Increasing global temperatures, radical shifts in precipitation and weather patterns, sea level rise, and groundwater table rise will interact in complex ways to threaten the region with various additional hazards, including other (non-flooding) types of severe weather, various direct and indirect risks from groundwater rise, increased drought and threats to water supply, extreme heat, worsening air quality, invasive species and vector-borne illnesses, increased risk of wildfire, and ocean acidification. Prompted by community feedback that requested the team look into issues such as air quality and urban heat island effect, the team conducted an additional assessment to evaluate the risks these and other hazards present to the region, how these risks will evolve as climate change progresses into the future, and the types of impacts expected to people and places. These impacts include those to public health, provision of critical services, or the health and integrity of existing ecosystems and habitats the region's population depend on. The team relied on existing publicly available data and studies to complete this assessment.

The **Climate Hazards Assessment** includes the findings of the assessment, and key insights from the assessment include the following:

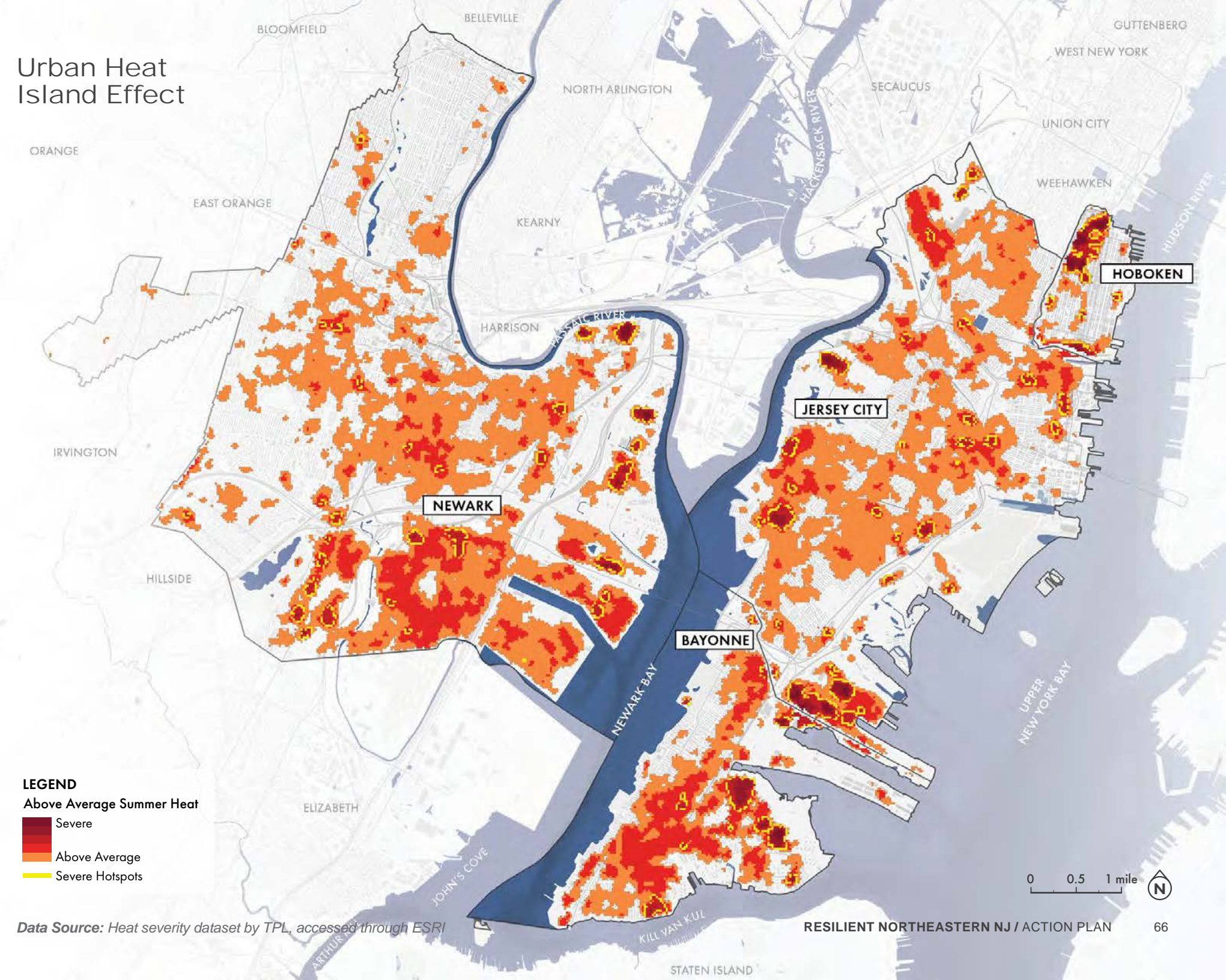
- Social vulnerability.** Some of the most socially vulnerable communities in the state—and in some cases, the country—reside in the region, and Newark and Jersey City in particular, both of which are important regional transportation and economic hubs. These communities also face extremely high urban heat, pollution, and exposure to hazardous waste.
- Urban heat island (UHI) effect.** Localized urban heat island will be especially acute in NENJ compared to neighboring regions, as large expanses of asphalt and concrete and the loss of forests and open space can trap heat and pollution. Many neighborhoods in the region that also rank high in social vulnerability metrics will experience especially acute pockets of summer heat. Approximately 40-percent of NENJ land area experienced above-average summer heat temperatures in 2021 (supplemented by data from 2020, where needed).¹⁰ These areas are likely to expand and experience more severe and prolonged heat in the future.
- Air quality.** The two major sources of climate change-related air pollution—ground-level ozone (haze or smog) and PM2.5 (particulate matter, a category of pollutants)—are already a serious problem in NENJ. They are likely the cause of widespread health conditions, such as asthma. Compared to the rest of the state, NENJ has extremely high ambient PM2.5 concentrations, with census tracts mostly within the 80th to 99th percentile range. Nearly the entire region is currently at the highest level of risk (90th to 99th percentile) for cancer and respiratory health impacts due to air toxics, compared to the rest of the state.
- Wildfire.** Projected higher temperatures and increased frequency of drought are likely to increase the length of the wildfire season in the region in the future. Despite its highly urbanized nature, increasing wildfire risk in NENJ could result in loss of life as well as the destruction of public and private property. To this point, nearly 29-percent of homes in Hoboken and 28-percent of homes in Bayonne could face some risk of wildfire in the next 30 years. Some open spaces, such as Liberty State Park, are at especially high risk. Large-scale fires also have negative implications for air quality and can also increase the incidence of damage from debris from flash floods and mudflows that may follow.

"The entire city of Newark is a heat island."

"I wish there was more tree canopy to combat urban heat."

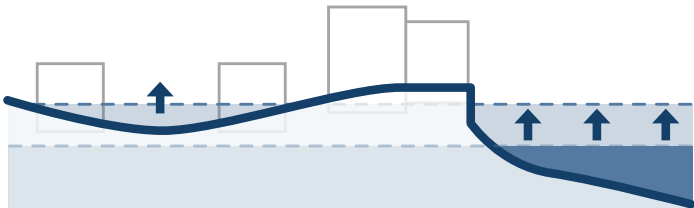
¹⁰ Calculated by land areas using the Trust for Public Land heat severity dataset. <https://www.arcgis.com/home/item.html?id=cdd2ffd5a2fc414ca1a5e676f5fce3e3>

Urban Heat Island Effect



- **Invasive species and vector-borne illness.** As temperatures increase, Lyme disease and West Nile Virus will become even greater threats due to a longer warm season. In addition to creating more favorable environments for species that can cause these vector-borne illnesses, increasing temperatures may also facilitate the introduction of other invasive species that could have long-term implications and threaten habitats in NENJ's parks and open spaces.
- **Drought.** Throughout the Northeast U.S., it is anticipated that droughts lasting 3-6 months or even longer will increase in frequency. Northeastern NJ, being primarily within the Passaic and Hackensack water regions, draws most of its water supply from surface water outside of the region, making it more immediately vulnerable to the effects of drought. Drought affects surface water more quickly than groundwater, though the region may increasingly come to rely on groundwater sources in the future. Combined with anticipated rates of population growth, existing sources of drinking water may become increasingly insufficient.
- **Hazardous waste and contamination.** High concentrations of hazardous materials and wastewater discharge throughout the region can pose a serious risk to public health and safety as groundwater levels rise proportional to sea level rise. Remobilized contaminants due to groundwater rise can lead to contaminant plume spread and decrease water quality where contaminant levels in water had previously been improving.

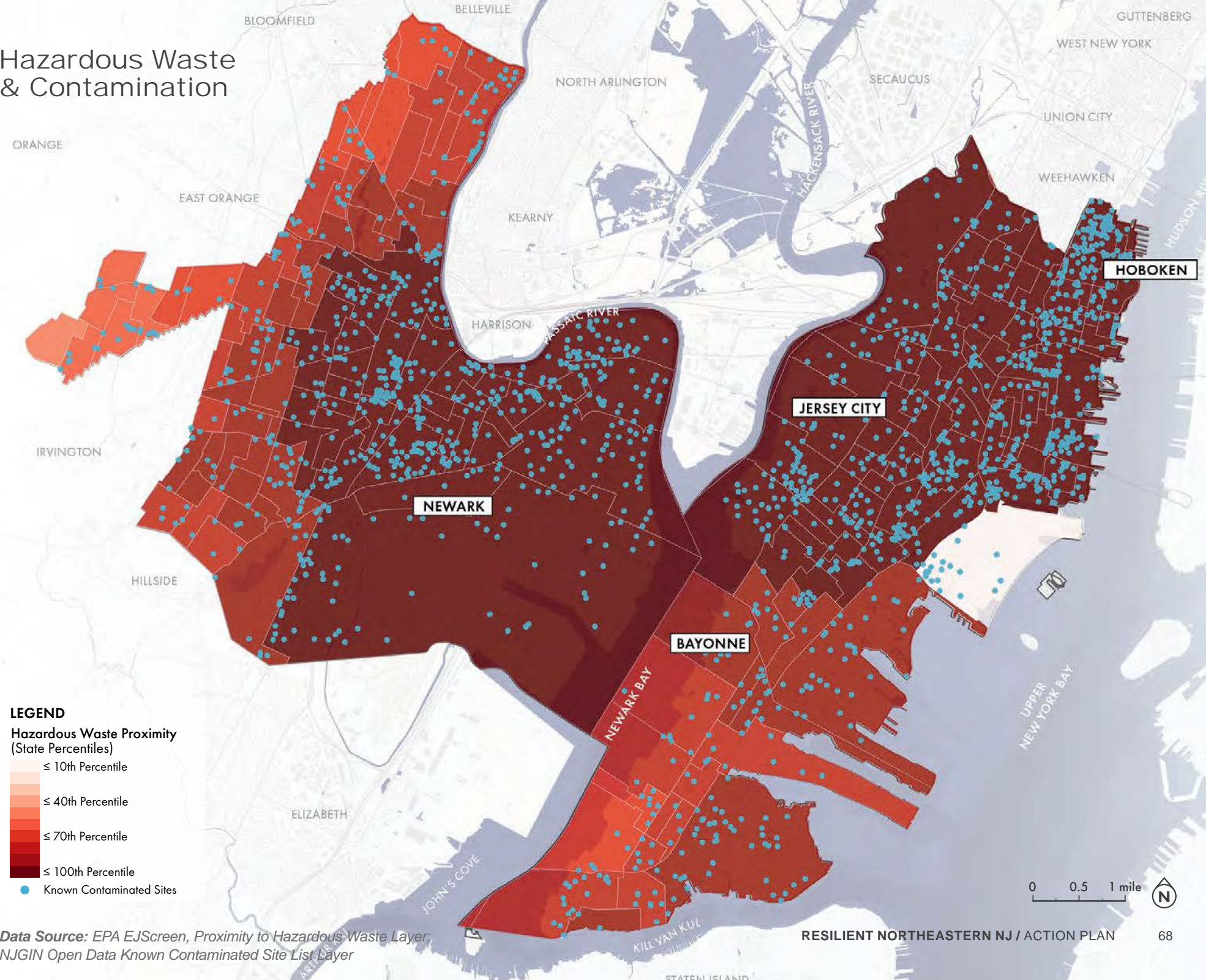
- **Groundwater emergence and basement flooding.** In areas with low depth-to-groundwater, tidal and rainfall conditions combined with sea level rise can lead to risk of groundwater emergence and flooding of basements and underground infrastructure, parks, open spaces, and even streets. If the affected groundwater source is contaminated, this poses an additional risk of sustained exposure to toxic water. Water table data are not readily available for the region.
- **Ocean acidification.** As increasingly acidic ocean pH levels threaten marine life along the coast, NENJ could experience ecological impacts to its estuarine habitats as well as potential longer-term economic stresses. Although most economic impacts affecting commercial fishing-dependent communities will be concentrated in southern New Jersey, parts of NENJ around Newark Bay could still experience impacts of medium economic severity. In the northernmost part of New Jersey, water could start becoming unfavorable to shellfish earlier than the rest of the state—as early as 2071.



GROUNDWATER EMERGENCE

Sea level rise and storm surge cause groundwater table rise and impacts to groundwater quality, in many cases resulting in inland flooding of basements and low-lying areas.

Hazardous Waste & Contamination



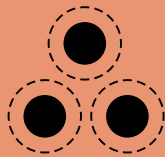
SCENARIOS

The Resilient NENJ team used community and stakeholder feedback, evaluations of risk context, and research on ongoing projects and infrastructure improvements (see Section 2.7) to develop and refine three scenarios consisting of a range of types of actions. To develop scenarios, Resilient NENJ investigated a wide range of possible solutions, leveraging examples from the Flood Resilience Toolbox and Climate Hazard Resilience Toolbox (see **Vision & Priorities** report and **Climate Hazards Assessment** report, respectively). The term “scenario” can have different meaning depending on the context, and for this project it means a suite or package of actions that work together to increase resilience.

Due to the large geographic scale, the team divided the region into study areas for focused evaluation. After initial solution refinement at the study area level, the team mapped solutions at the regional scale to look for gaps and connections and organized them into three scenarios. To advance the final goal of developing an implementable regional Action Plan, the project team grouped the three scenarios by implementation pathway and level of complexity for coordination: Individual Initiative, Shared Responsibility, and Regional Coordination to help guide and communicate the implications of decision making.

Every scenario meets the goals of the Resilient NENJ program, the vision and priorities (see **Section 2.3**), and the threshold evaluation criteria articulated in the **Vision & Priorities** report (also see **Section 3.1**). While each scenario meets these requirements, the scenarios are not alternatives. The preferred scenario presented in this Action Plan is an amalgam of solutions from the three scenarios, developed based on feedback on the scenarios (gathered at Community Meeting #4, city-focused community meetings in March and April of 2022, and other engagement) and deeper technical analyses. The Resilient NENJ website and social media published details and materials about the scenarios and the **Scenario Development** report details the development process and scenario contents.

HIGHLIGHTS OF THE THREE REGIONAL SCENARIOS



SCENARIO 1: INDIVIDUAL INITIATIVE

Scenario 1 included solutions to increase resilience through actions that can be driven at the municipal level or by agencies or stakeholders independently through existing implementation pathways. Actions, such as green infrastructure practices, would primarily focus on individual publicly owned spaces or private sites. Programs and outreach efforts would be led at the municipal scales through existing relationships. Funding would still come through typical funding pathways, such as federal or state grant or loan programs, and state and regional agencies would continue to provide technical assistance and support. This scenario leveraged existing capacities and readiness for implementation. Actions that are already progressing with an ad hoc approach, such as elevation or hardening of individual properties by owners, would also continue as the status quo.



SCENARIO 2: SHARED RESPONSIBILITY

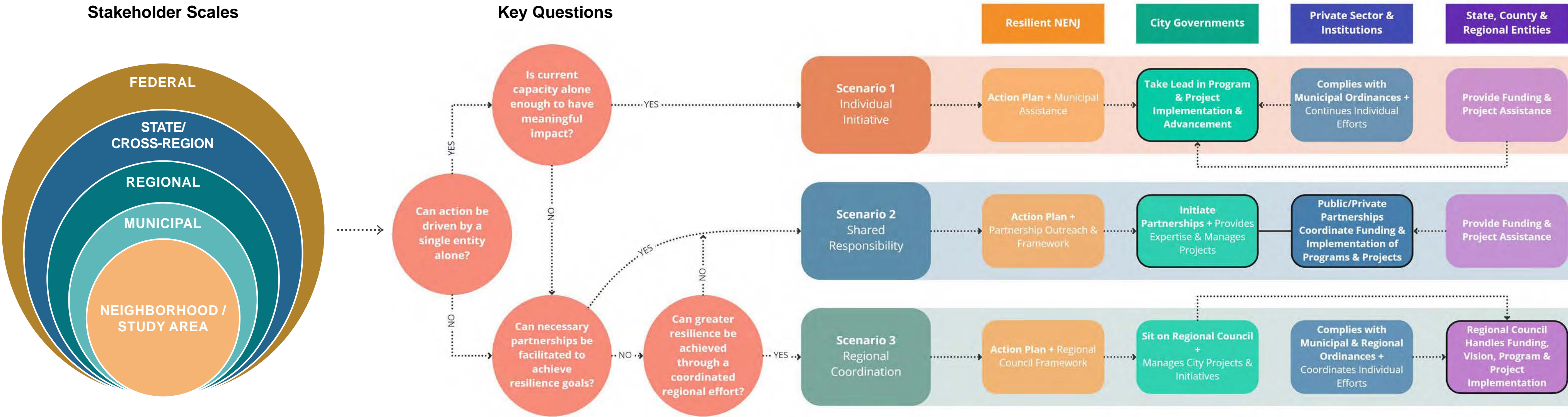
Scenario 2 included solutions that are best implemented through partnerships, such as those between municipalities, community-based organizations, private institutions, developers, and others, or enhancements on Scenario 1 actions through partnerships. Increased partnerships and coordination would allow for implementation of physical solutions beyond individual parcels, which would improve effectiveness and associated benefits. For example, public-private partnerships could be formed for systematic green infrastructure implementation and coastal protections on private property. Solutions in Scenario 2 also included policy measures to incentivize or require increased responsibility from individual property owners to adapt their properties. Programs and outreach efforts would be led through expanded partnerships between municipalities, community-based organizations, academic and educational entities, and/or other partners.



SCENARIO 3: REGIONAL COORDINATION

Scenario 3 included actions that can increase capacity for regional coordination and actions that would be implemented at a regional scale through enhanced coordination structures. By implementing solutions at a regional scale versus locally, resources could be pooled and leveraged to target priority areas and achieve more benefits. Scenario 3 promotes regional interconnectivity of people, ecologies, and economies. For example, regional coordination could facilitate creation of regional greenways incorporating stormwater storage, green infrastructure, and wetland restoration. Outreach programs could improve efficiencies and promote consistent communication across the region.

EXAMPLE STRUCTURES FOR IMPLEMENTATION OF ACTIONS FOR THE THREE SCENARIOS



This visual shows a decision tree to determine how solutions were classified across the three regional scenarios, and roles of different entities in implementation. See more detail in the **Scenario Development** report.

EXISTING INITIATIVES AND “SCENARIO 0” HONORING WHAT IS ALREADY BEING DONE

Resilient Northeastern NJ is not operating in a vacuum. As a regional plan set in the context of ongoing efforts to reduce risk locally, the Action Plan is expected to advance, enhance, or complement initiatives already underway or completed, but never supplant, disrupt, or duplicate what is working.

RELATED POLICIES, STUDIES, AND PLANNING INITIATIVES

Many related initiatives have been led by local, state, federal, regional infrastructure entities, and community-based organizations. This includes actions at the statewide level on policy and governance and planning work to develop recommendations and identify priorities. This section provides summaries of some related initiatives but is not nearly a complete picture of all the ongoing work.

Under the administration of Governor Murphy, New Jersey has taken a proactive approach in preparing for climate change by introducing Executive Orders that create new statewide planning and policy mechanisms and require municipalities to consider climate change and resilience in their state-mandated master planning processes. Existing statewide initiatives are below. The next page includes additional examples of related initiatives at the local and regional levels.

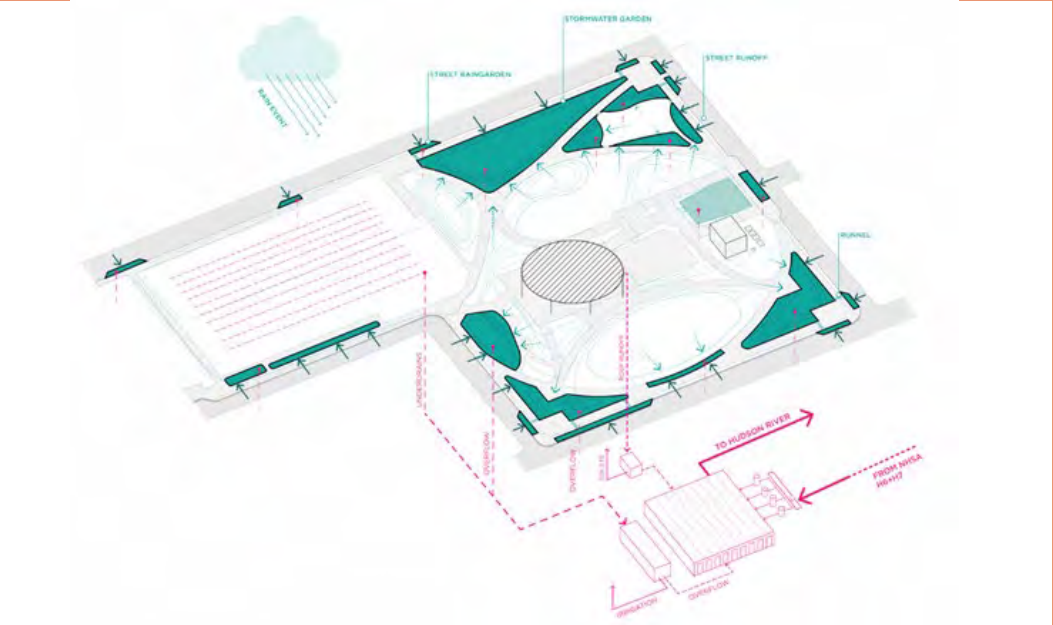
- Executive Order 89, which required the state to develop a **Statewide Climate Change Resilience Strategy** and created an Interagency Council on Climate Resilience.
- Executive Order 100, which launched New Jersey Protecting Against Climate Threats (NJ PACT), an initiative aimed at modernizing land use requirements to incorporate climate change. Administrative Order 2020-01 implements EO 100 and set deadlines for NJDEP rule changes.
- NJDEP initiated a regulatory program in 2015 requiring utilities operating combined sewer systems to develop Long-Term Control Plans (LTCP) that identify projects to be implemented in the coming decades to reduce combined sewer overflows.
- In March 2019, the Stormwater Utility Law, officially known as the “Clean Stormwater and Flood Reduction Act,” was signed into law. This law authorizes local and county governments and certain utilities the ability to create stormwater utilities that can assess fees and use the revenue to maintain stormwater management infrastructure.
- The State has also begun tackling its legacy of pollution and environmental racism through the Environmental Justice Law (S232, September 2020), which requires NJDEP review of new construction, expansions, or permit renewals at facilities causing pollution in overburdened communities.
- New legislation passed in the State Assembly (New Jersey Assembly Bill 2785) requires the land use plan element of municipal master plans to include climate change-related hazard vulnerability assessments. The **Climate Hazards Assessment** completed by Resilient NENJ meets some of these requirements.

RESILIENCE-RELATED PROJECTS

Many ongoing or completed physical actions are already working to increase resilience in the region. Resilient NENJ created an inventory of these examples, dubbed “Scenario 0,” including actions being taken by the four cities, counties, state and federal agencies, regional infrastructure agencies, utilities, and others. Scenario 0 serves as a baseline scenario that imagines what risks would look like with completion of all in-progress projects. The projects address resilience through a variety of approaches including elevation of critical infrastructure, construction of flood barriers or levees around critical infrastructure or vulnerable areas, installation of green infrastructure or large stormwater storage tanks, and wetland restoration or creation. Scenario 0 also includes the Long-Term Control Plan projects that relate to hazard mitigation (see **Appendix G**). **Section 3.0** includes maps of Scenario 0 or summaries of examples, divided by the type of solution or type of hazard the solution addresses. **Appendix A** provides additional detail on Scenario 0 projects.

REBUILD BY DESIGN – HUDSON RIVER IN HOBOKEN

The Rebuild by Design-Hudson River project was awarded funding by the U.S. Department of Housing and Urban Development (HUD) and is currently underway. This project is an example of a project included in “Scenario 0.” Funded by an initial \$230 million allocation from the federal government and supplemented with other funding sources, this project is an example of the scale of investment that can be needed to address flood risk in urban, densely populated areas. The project includes both rainfall and coastal storm surge mitigation components, summarized as Resist, Delay, Store, and Discharge. The Resist, or coastal, portion is managed by NJDEP and involves construction of permanent and deployable flood barriers in the northern and southern portions of the city. This project is expected to reduce storm surge risk for 85-percent of Hoboken’s population that resides within the 100-year FEMA-mapped flood hazard area. The Delay, Store, and Discharge portion is managed by the City of Hoboken along with partner North Hudson Sewerage Authority (NHSA) and focuses on rainfall stormwater management and green infrastructure components that complement Hoboken’s long list of other ongoing and planned projects, such as resiliency parks like Northwest and Southwest Resiliency Park, sewer separation, and pump station improvements. More information on the Rebuild by Design-Hudson River project is available through the City of Hoboken’s **Coastal Flood Mitigation webpage**, the City’s **Rainfall Flood Mitigation webpage**, or NJDEP’s **Rebuild by Design-Hudson River webpage**.



Stormwater system design for Hoboken’s Northwest Resiliency Park.
Image Source: City of Hoboken

NEWARK FLANKING PLAN

Another example of a “Scenario 0” project is the United States Army Corps. of Engineers (USACE) Passaic River Tidal Protection Area Project. The project is in the design phase for the selected alternative, which is referred to as the Newark Flanking Plan, and proposes storm surge protections for the Ironbound area by cutting off flood pathways with a network of flood barrier segments, levee segments, road closure structures, a railroad closure structure, and interior drainage features. When completed, this project may play a significant role in reducing storm surge flood impacts in the Ironbound neighborhood of Newark.



Risk Management Area of Recommended Plan with 14-foot NAVD88 Floodplain.
Image Source: Figure 19 of USACE’s [Final Integrated Hurricane Sandy General Reevaluation Report & Environmental Assessment for the Passaic River Tidal Protection Area](#)

EXAMPLES OF RELATED POLICIES, PLANNING, AND INITIATIVES
(NOT ALL-INCLUSIVE)

HURRICANE SANDY RECOVERY PLANNING

In 2013, Hoboken prepared a **Hoboken Resiliency and Readiness Plan** that proposed actions for Hoboken to take in response to Hurricane Sandy. In 2014, **Jersey City** and **Hudson County** developed Sandy Strategic Recovery Planning reports to document damages from the storm and propose draft Action Plans.

TRANSPORTATION PLANNING AND RESILIENCE

The North Jersey Transportation Planning Authority (NJTPA) is the metropolitan planning organization (MPO) that includes this region. NJTPA has a **climate change initiatives program** and sponsors many projects and studies to understand vulnerabilities and advance resilience actions in coordination with other local, regional, and state entities.

HAZARD MITIGATION PLAN UPDATES

The Resilient NENJ municipalities participated in county-level hazard mitigation plan updates for **Hudson County** and **Essex County** in 2020.

GUIDELINES TO RESIDENTS AND BUSINESSES

Hoboken released **Resilient Building Design Guidelines** in 2015 to summarize construction requirements in flood hazard areas and provide guidance on best practices to residents and businesses. Hoboken’s **2022 addendum** expanded the guidelines to include heavy rainfall. Jersey City prepared a similar **Resilient Design Handbook** in 2018 with information on incorporation of green infrastructure and designing resilient buildings.

See **Appendix A** for a table of existing non-physical initiatives.

MASTER PLAN UPDATES

Municipalities are required to update their master plans at least every ten years. The master plans include many recommendations related to addressing flooding and other climate hazards.

- Under the **Engaging and Strengthening Hudson County** initiative, Hudson County concurrently developed the 2016 Hudson County Master Plan Re-examination, Parks Master Plan, Comprehensive Economic Development Strategy Plan, and County Capital Improvement Plan.
- Hoboken’s 2017 **Green Building and Environmental Sustainability Element** and 2018 **Land Use Element** included numerous sustainability and resilience recommendations.
- Bayonne most recently prepared its **Master Plan Re-examination Report** in 2017 with recommendations focused on growth through mixed-use development, redevelopment of industrial sites, and economic revitalization.
- Jersey City 2021 **Land Use** and **Open Space** elements integrated resilience as one of four key principles.
- Newark is currently undertaking a master plan update process.

VULNERABILITY ASSESSMENTS AND COMPREHENSIVE RESILIENCE PLANNING

There have been numerous resilience-related planning and policy initiatives within the region, and Resilient NENJ has incorporated recommendations from these other initiatives or expanded on efforts as relevant. Jersey City’s comprehensive resilience planning has included a citywide risk and vulnerability assessment, the identification of priority areas, and the recommendation of projects to address resilience in those priority areas, summarized in the Resiliency Master Plan, Adaptation Master Plan, and Urban Environmental Green Infrastructure Plan (summary document **here**). Resilience planning in Newark has been led by a variety of players, including at the federal, municipal, and neighborhood levels, to yield outputs such as a **Coastal Vulnerability Assessment** and **Green Infrastructure Feasibility Study**, and the Ironbound Community Corp. 2015 Newark Resiliency Action Plan and **South Ironbound Resiliency Action Plan**. Meanwhile, in the last decade, Hoboken has been a regional and national leader in coastal and stormwater resilience, having had strong municipal leadership in performing comprehensive resilience planning by incorporating sustainability and resilience principles into existing municipal planning processes.

HIGHER DEVELOPMENT STANDARDS

Jersey City’s Flood Overlay Zone Ordinance, adopted in 2020, applies to all properties located in FEMA-mapped flood areas. 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. In 2022, Hudson County adopted new **Land Development Regulations** that include higher standards for stormwater management with lower thresholds for requirements to be triggered, in alignment with an updated Jersey City stormwater management ordinance. The City of Bayonne incorporates higher standards, such as land elevation and shoreline stabilization, into redevelopment plans to promote resilience.

REGIONAL GREENWAYS

There are proposals for several regional greenways that run through the region, including the **Morris Canal Greenway**, the **Essex-Hudson Greenway**, and the **Hackensack River Greenway**. The proposals generally include bike and pedestrian trails with incorporation of green space, and there are projects underway to complete portions of the greenways. The State of New Jersey recently announced the State purchase of 9 miles of an abandoned rail line to transform into the Essex-Hudson Greenway. The **Hudson River Waterfront Walkway** is a near complete existing waterfront walkway that is greatly valued by the region’s residents. There are also groups advocating for local greenways along the **Embankment** and the **Bergen Arches** in Jersey City.

CLIMATE AND ENERGY ACTION PLANS

Jersey City’s **2021 Climate and Energy Action Plan** and Hoboken’s **2019 Climate Action Plan** focused on reducing greenhouse gas emissions and carbon neutrality.

3.0

PREFERRED SCENARIO AND RECOMMENDATIONS

LOOK OUT for this icon
throughout the report for quotes
and paraphrased feedback we've
heard from around the Region



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



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**

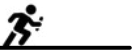


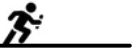


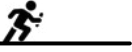


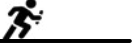


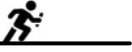


THRESHOLD CRITERIA What a scenario <u>must</u> do		ALTERNATIVES EVALUATION CRITERIA How scenarios weigh against each other	
EQUITY	<ul style="list-style-type: none">The project / scenario should have high probability of long-term effectiveness and be able to adapt to future conditions*	<ul style="list-style-type: none">Phase-ability and time to implementation*Adaptability / flexibility*Design life / useful lifePerformance horizonReplicability	
	<ul style="list-style-type: none">Benefits outweigh costsLegal / permitting requirements considered and engagement has occurredStakeholder support*	<ul style="list-style-type: none">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)*Existing implementation and maintenance capacity*Stakeholder preference*Funding strategyConstructability / how easy it is to completeMaintenance requirementsPermitting and regulatory considerations	
	<ul style="list-style-type: none">Must reduce risk of current and future flooding*Must not increase flooding / risk in other parts of the community*	<ul style="list-style-type: none">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 assetsProject benefits primarily meet the existing needs of vulnerable groups* (benefits those harmed the most, maximize number of residents that benefit)Effectiveness: level of protection, reduction in flood extent, ease of implementation during an emergency	
	<ul style="list-style-type: none">Must not create a net reduction in environmental benefits	<ul style="list-style-type: none">During and post-construction impacts / enhancements to*:<ul style="list-style-type: none">Open space / green space / natural feeling / tree canopyHabitat / ecologyWater quality (e.g. by addressing combined sewer overflows)Air quality and urban heat island effectUse of green infrastructure*Accomplishing remediation of soils, sediments, etc.	
	<ul style="list-style-type: none">Must account for existing resilience-building efforts in the communityMust mitigate any anticipated health and social impactsMust help meet current needs of vulnerable groups	<p>Impacts and benefits to communities during and after construction, including:</p> <ul style="list-style-type: none">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*Community and social fabric: keeping communities intact / potential for displacement*Economic: rates, economic benefit and economic diversity / job creation / investment*, flood insurance rates, affordable housingConnectivity and mobility*Transportation systems / traffic / commutes*Individual resilienceParkingFuture constructionDensity / development trendsEquitable distribution of these impacts and benefits*	
	<ul style="list-style-type: none">Must be clearly aligned with the visionLocal champion must be identified*Must clearly and directly respond to stakeholder input / community-driven plan	<ul style="list-style-type: none">Community partnership*Youth engagement & education*Adaptive capacity building and community value creationA champion and representative partner are identified for each neighborhood involved	

* 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				
SCALE/LOCATION	 REGION	 STATE	 CITY		
ACTIONS TYPE	 Physical and Nature Based Solutions	 Outreach, Education, and Capacity Building	 Policy and Governance	 Service and Program Development	 Emergency Response and Preparedness
TIME REQUIRED TO IMPLEMENT <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
PRIORITY FOR IMPLEMENTATION <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		
COSTS <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		
MAINTENANCE <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
OPERATIONS <small>(used for non-capital actions, only)</small>			
PERMITTING <small>(used for capital projects, 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
COORDINATION <small>(used for non-capital actions, 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
CONSTRUCTABILITY <small>(used for 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
IMPLEMENTABILITY <small>(used for non-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>

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:

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

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.

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.

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.

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

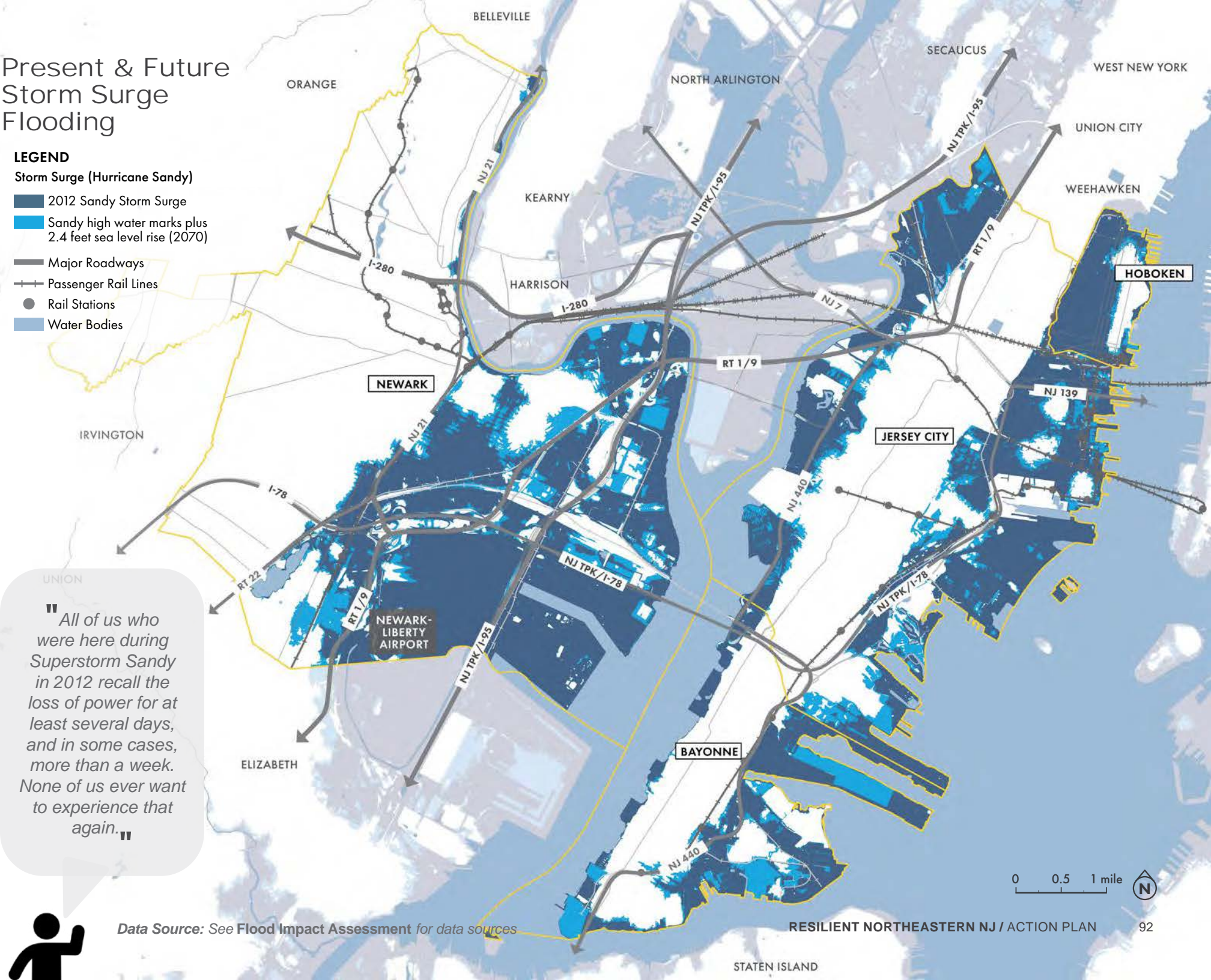
		2030	2050	2070			2100			2150		
				Emissions								
				Low	Mod.	High	Low	Mod.	High	Low	Mod.	High
Low End	> 95% chance	0.3	0.7	0.9	1	1.1	1.0	1.3	1.5	1.3	2.1	2.9
Likely Range	> 83% chance	0.5	0.9	1.3	1.4	1.5	1.7	2.0	2.3	2.4	3.1	3.8
	~50 % chance	0.8	1.4	1.9	2.2	2.4	2.8	3.3	3.9	4.2	5.2	6.2
	<17% chance	1.1	2.1	2.7	3.1	3.5	3.9	5.1	6.3	6.3	8.3	10.3
High End	< 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."

WHY DOES COASTAL FLOODING HAPPEN? THE CHALLENGE.

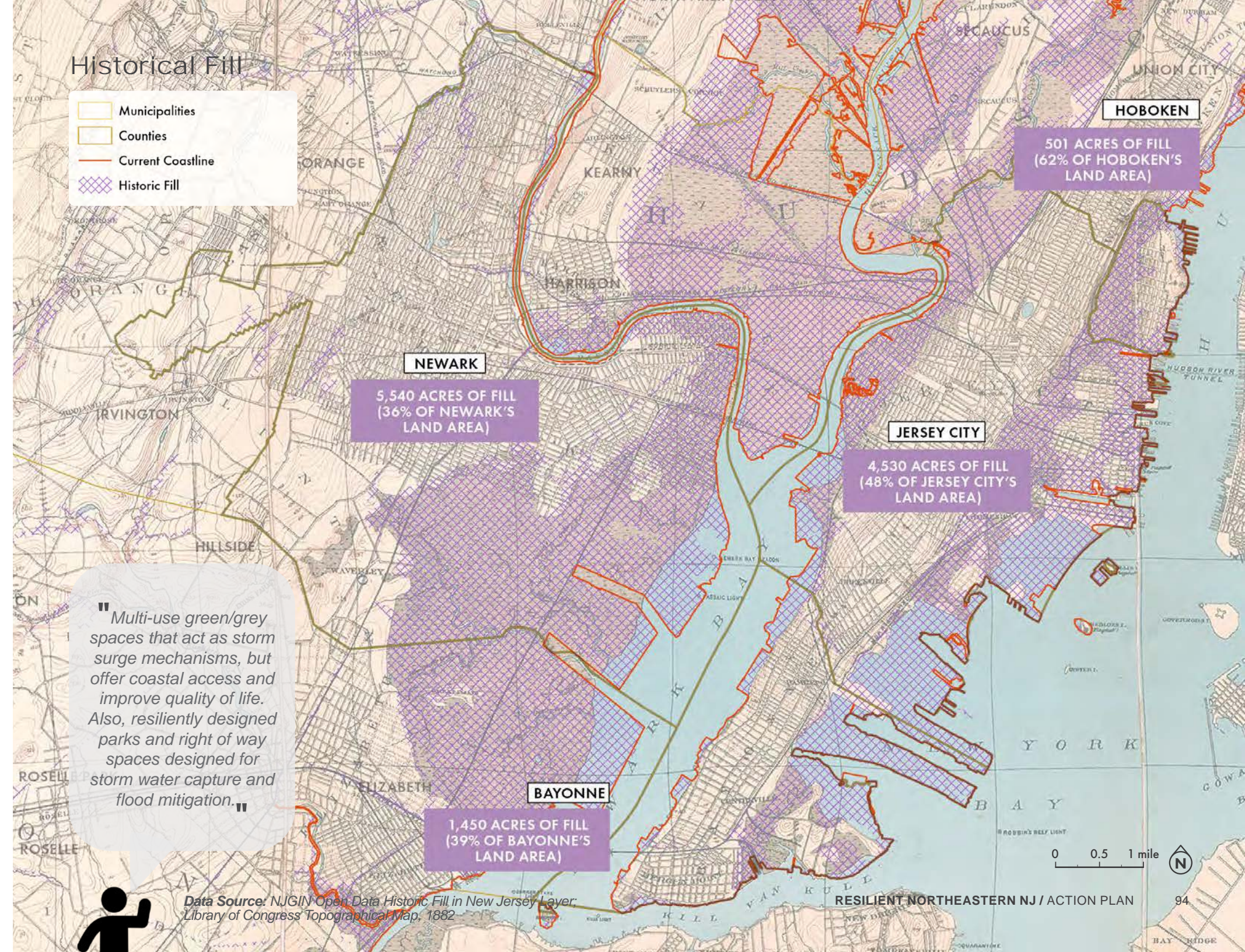
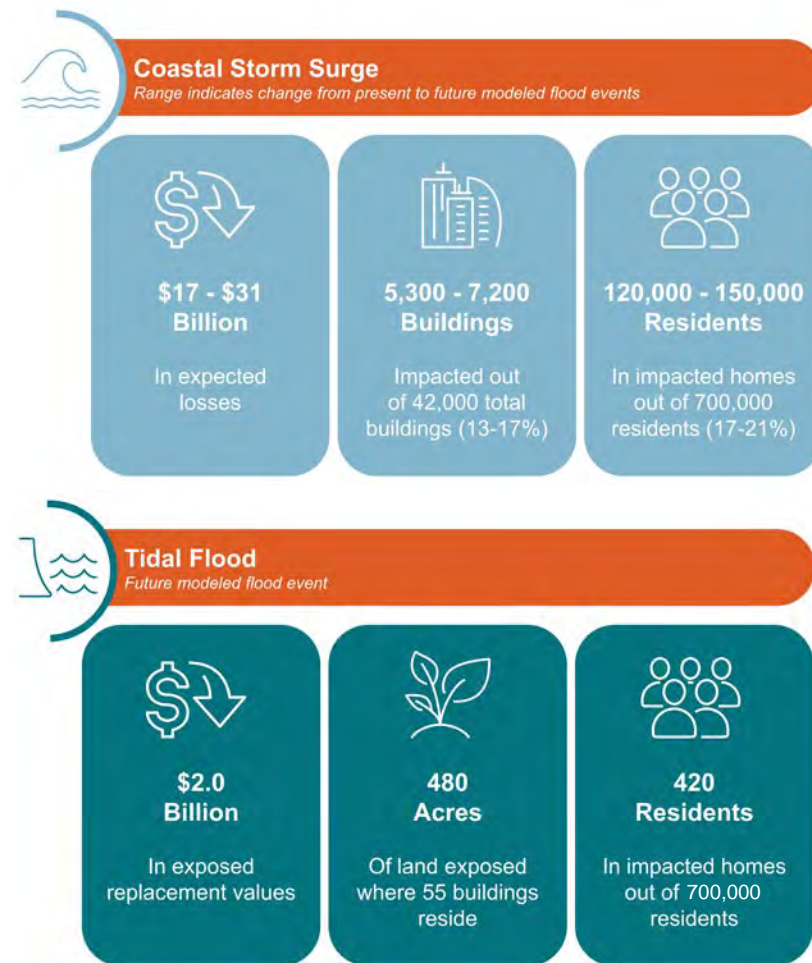
Coastal flooding, whether from storm surge or tidal flows, greatly affects the NENJ region, inundating coastal and low-lying interior areas. Most of these inundated areas are built on fill that has been added over the centuries to increase buildable land area by “reclaiming” wetlands and open water. 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.

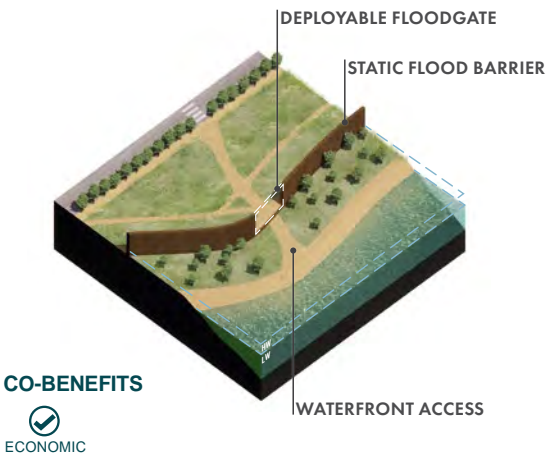
TOOLBOX EXAMPLES >

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."

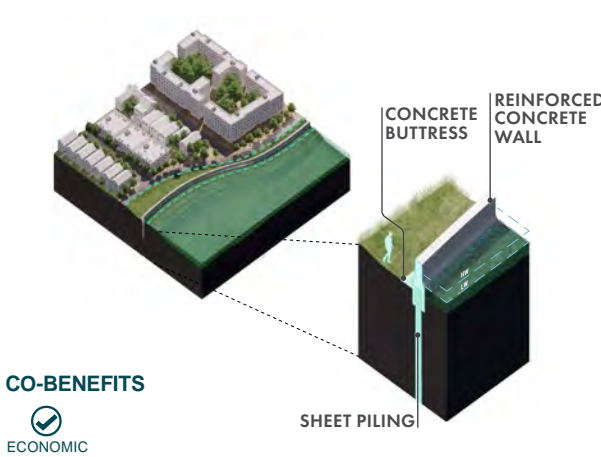
DEPLOYABLE FLOODGATES

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.



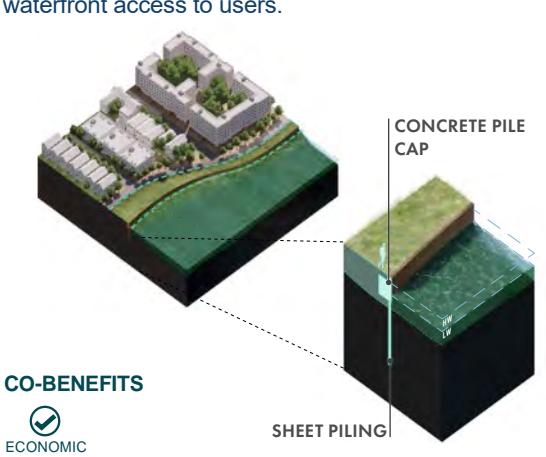
FLOOD BARRIERS

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.



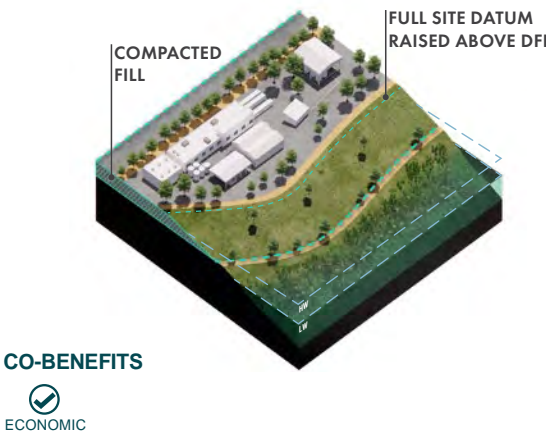
BULKHEADS

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.¹ It will be important for Resilient NENJ and interested stakeholders to review and submit comments on this study. Resilient NENJ recommends that HATS integrate recommendations from this Action Plan, as well as community feedback that contributed to this plan.

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

RECOMMENDED CAPITAL PROJECTS TO ADDRESS COASTAL FLOODING

Recommended capital projects are concept only and, unless otherwise noted or already being advanced by other entities, require feasibility evaluations as next steps.

LEGEND

- Coastal Barriers**

 - Road Raising
 - Flood Barrier
 - Bulkhead Raising
 - Raised Walkway/Boardwalk
 - Raise Existing Walkway/Boardwalk
 - Tie-In to High Ground
 - Approx. Gate Locations
- Site Based Actions**

 - Individual Site Protections
 - Planned Land Raising
 - Areas for Adaptation
 - Wetland Restoration/Living Shoreline

[†]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

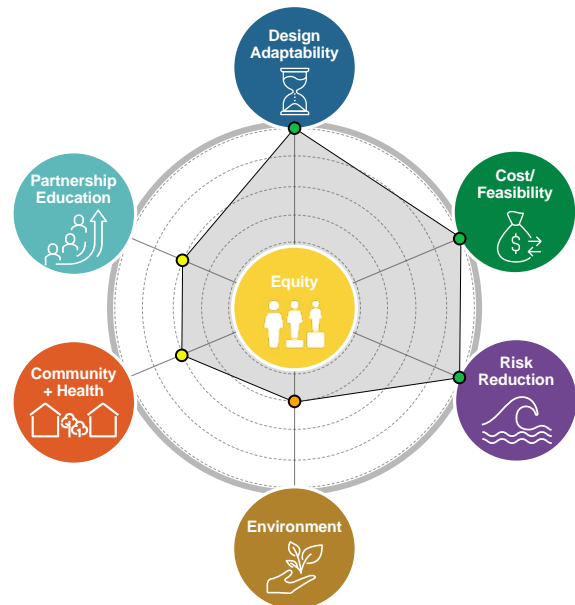
Physical flood barriers are generally single-purpose structures meant to keep floodwaters out of a protected area. These barriers can take several forms, including walls, gates, berms, and bulkheads, which have different spatial constraints and construction methods, and should be selected based on site-specific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



HIGH EFFORT

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



MODERATE EFFORT

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



HIGH EFFORT

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.

EASE
PROTECT
CONNECT

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.



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

Physical

EASE
PROTECT
CONNECT

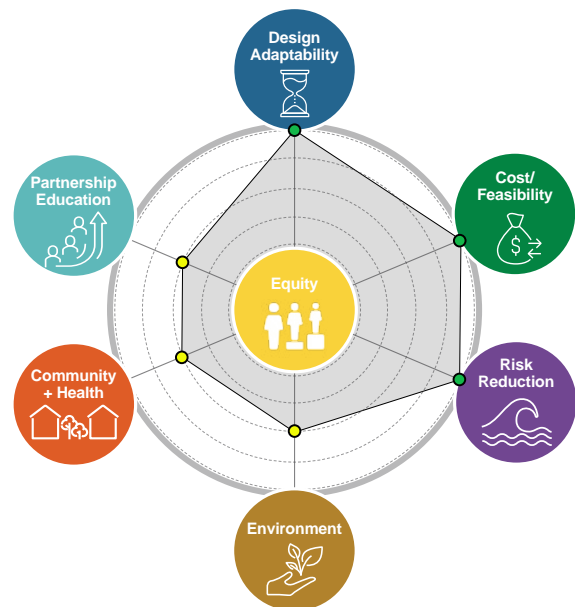
Raising the elevation of existing infrastructure can be a solution where roads, rail, park land or other infrastructure is close to the coast or within an ideal alignment for flood protection. The action involves removing the existing infrastructure component, raising and strengthening the land below, 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



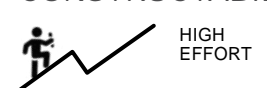
Once the project is complete, it can usually be maintained as it was prior to the improvement.

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

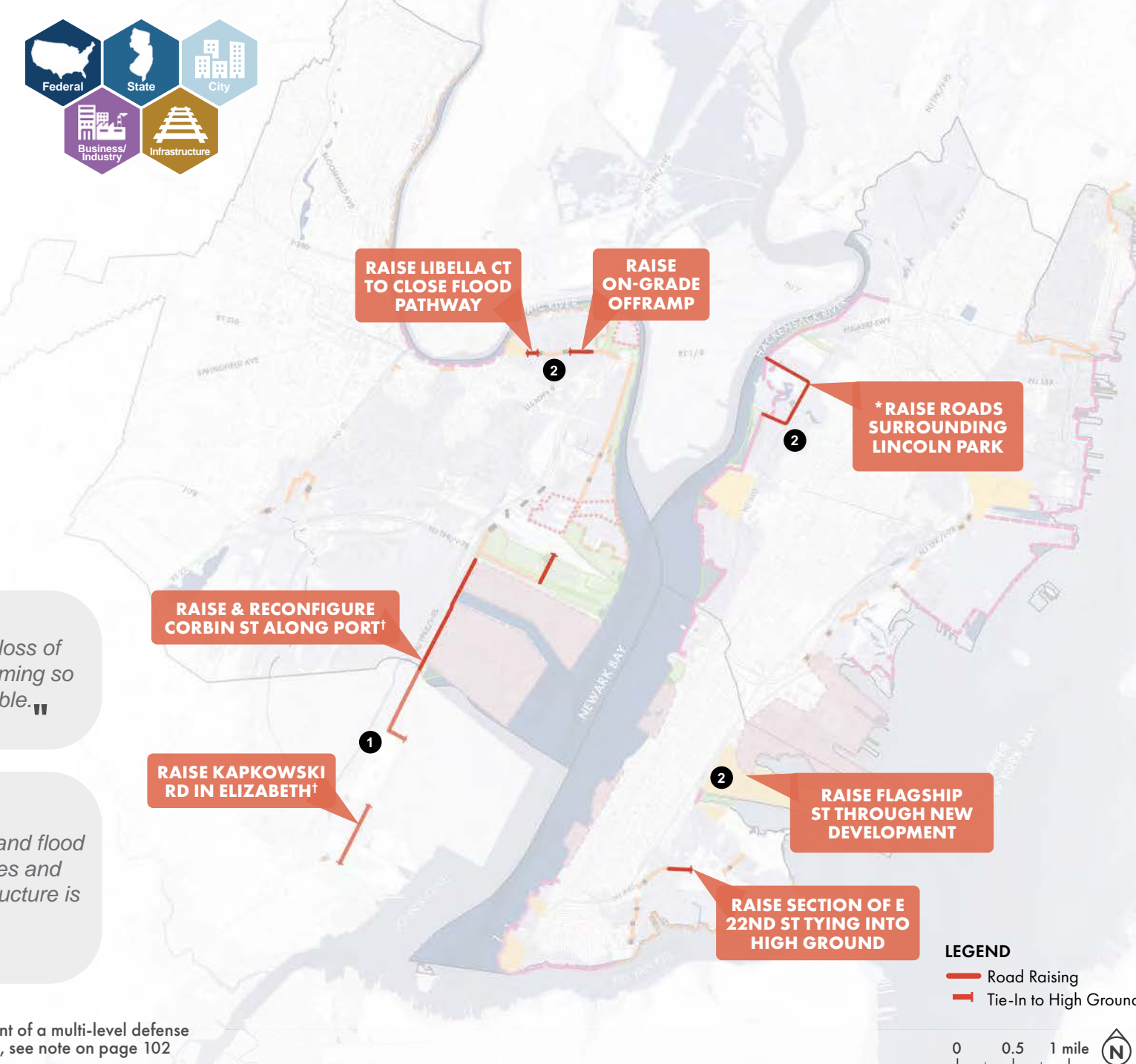


Inland Road Raising
Miami, FL

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 102

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

CONSIDERATIONS FOR IMPLEMENTATION

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.

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

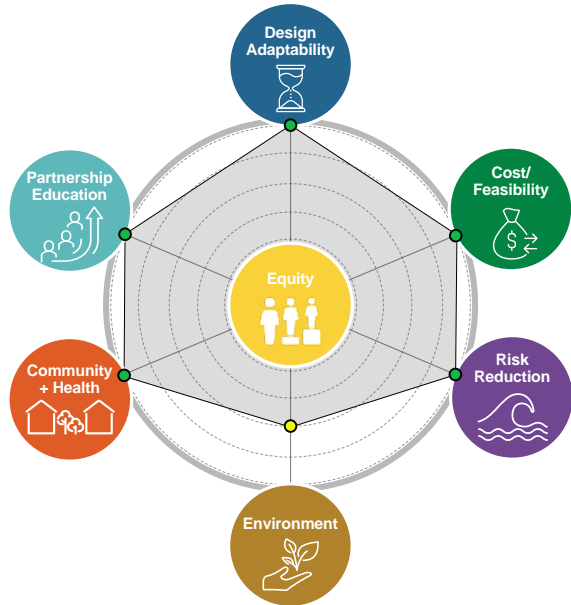
Once the project is complete, it can usually be maintained as it was prior to the improvement.

PERMITTING

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

CONSTRUCTABILITY

Raising existing walkways and parks is disruptive during the construction period.



WHAT THIS COULD LOOK LIKE

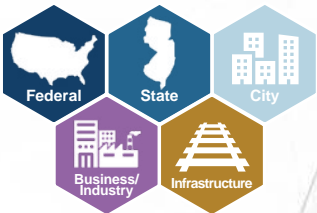


Raised Riverwalk
Queens, NY

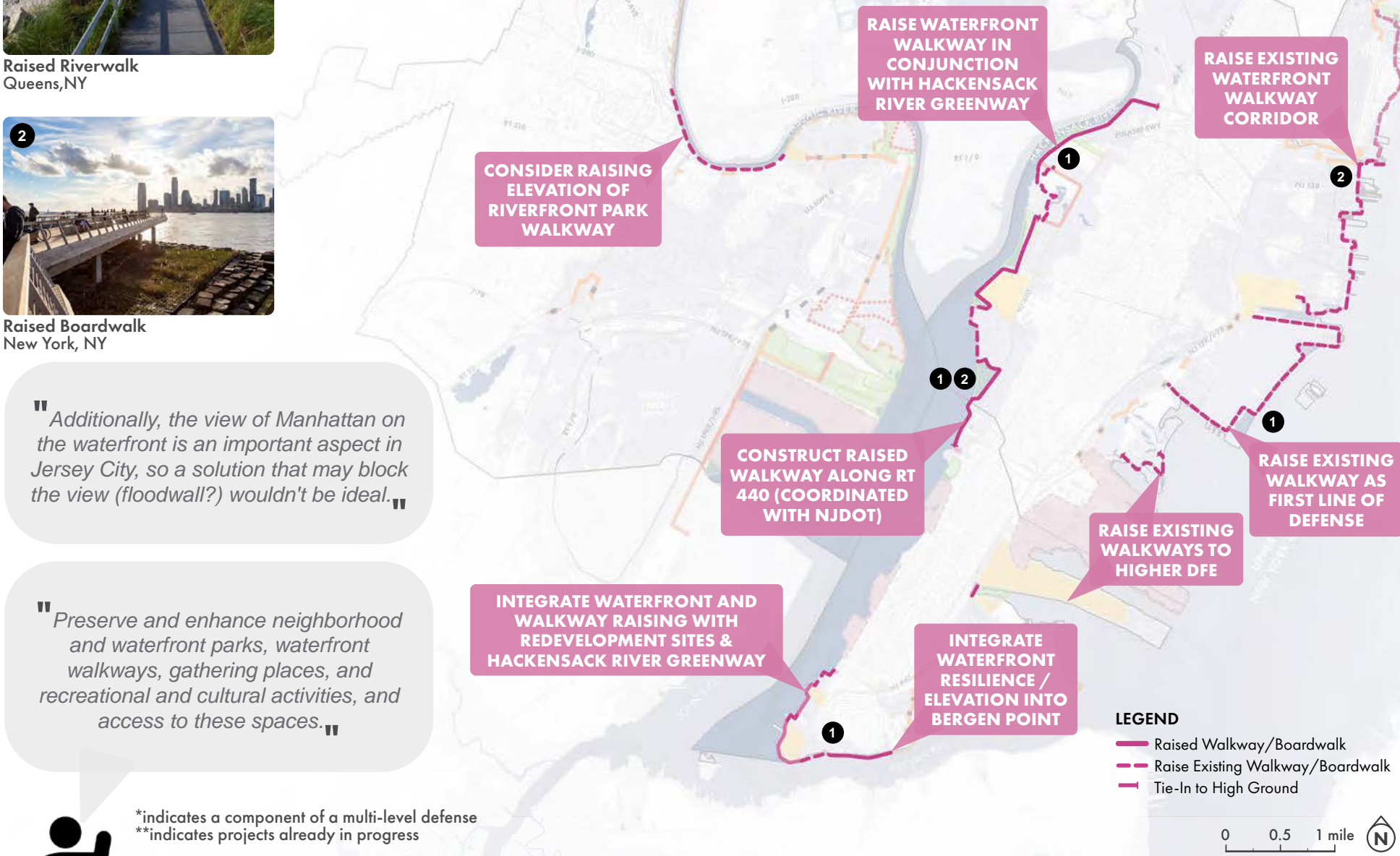


Raised Boardwalk
New York, NY

KEY PLAYERS



PROPOSED ALIGNMENTS



*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



CAPITAL COSTS



MAINTENANCE



PERMITTING



CONSTRUCTABILITY



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 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.

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 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.

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.

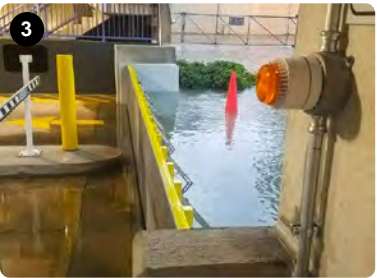
WHAT THIS COULD LOOK LIKE



Flip-Up Flood Barrier
Susquehanna River, PA

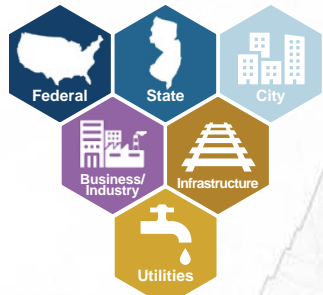


Deployable Flood Barriers
New York, NY

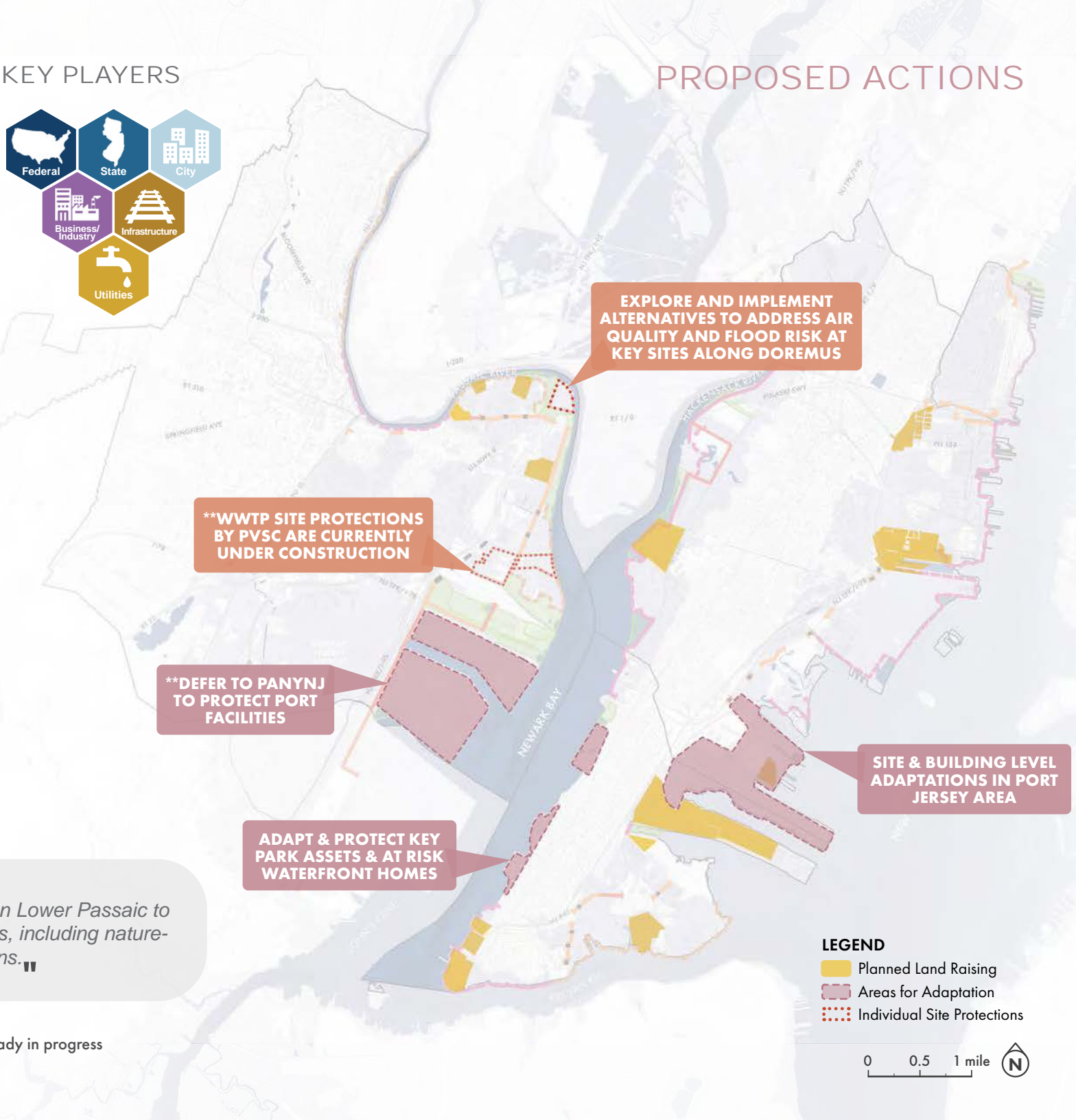


Automatic Flood Gate
Houston, TX

KEY PLAYERS



PROPOSED ACTIONS



"Encouraging landowners on Lower Passaic to enhance shoreline structures, including nature-based solutions."

**indicates projects already in progress

05. TAKE ACTION TO RESTORE THE COASTAL ENVIRONMENT

Physical

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.

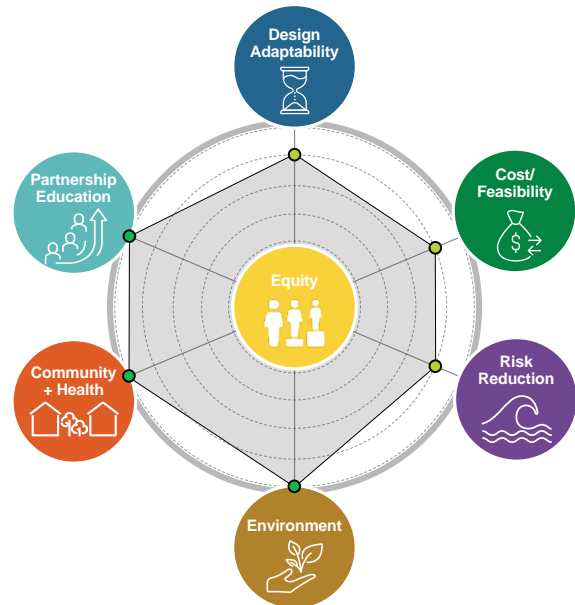
NENJ, a region once dominated by coastal wetland environments, has coastal areas likely suitable for wetland restoration and living shorelines, notably at the convergence of the Passaic and Hackensack Rivers and surrounding Newark Bay, as well as within NJDEP's ongoing Liberty State Park wetland restoration 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.

EASE
PROTECT
CONNECT

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



MAINTENANCE



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



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

CONSTRUCTABILITY



Significant coordination will be needed to advance these recommendations.

WHAT THIS COULD LOOK LIKE



Hunters Point Wetlands
Queens, NY

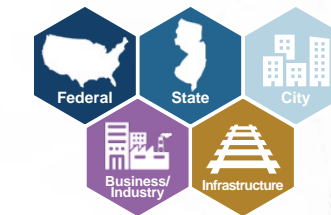


Wetland & Habitat Restoration
Wolf Lake, IN



Living Shoreline
Stump Sound, NC

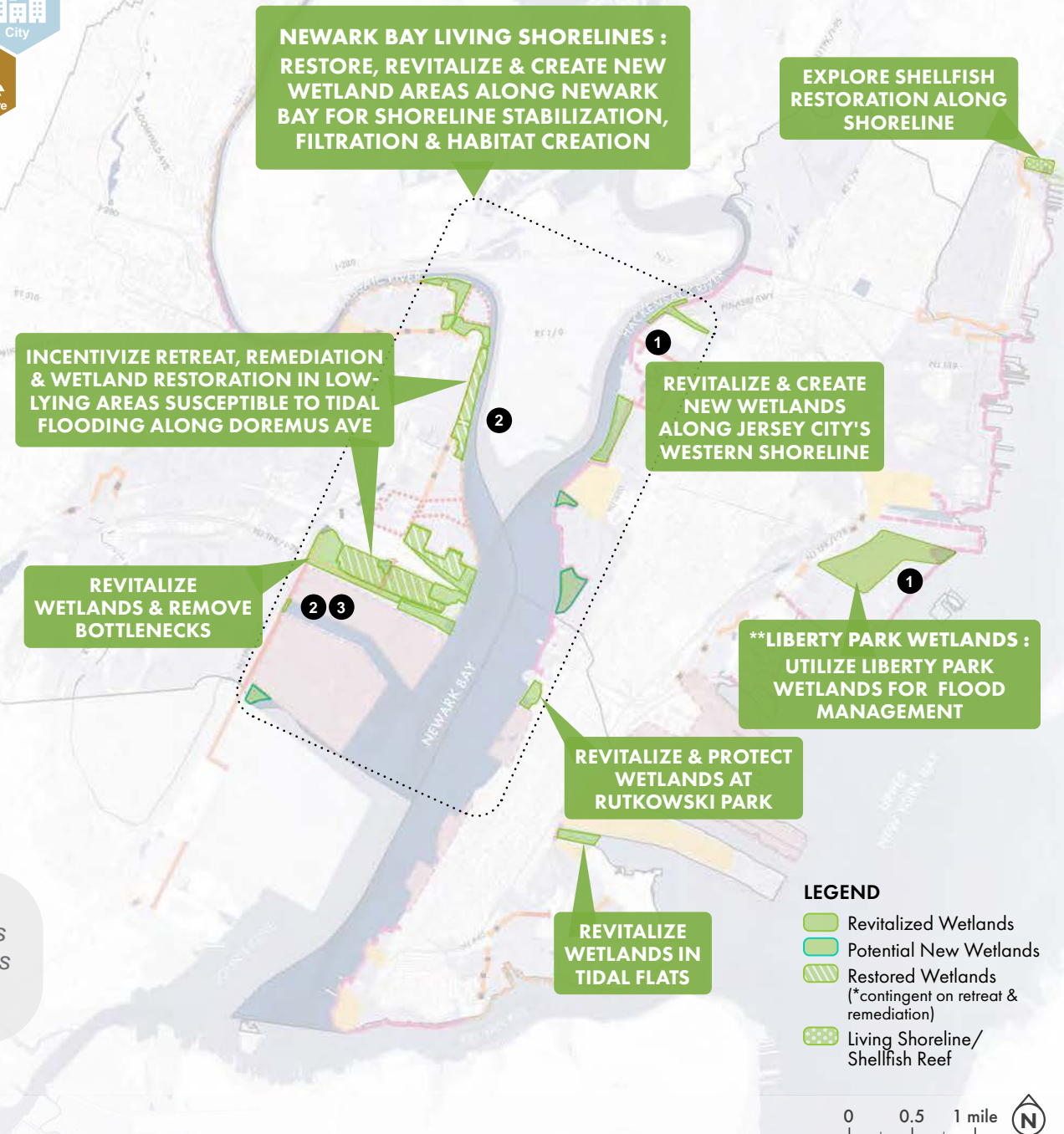
KEY PLAYERS



PROPOSED ACTIONS

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

**indicates projects already in progress



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.

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



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.

KEY PLAYERS



CITY

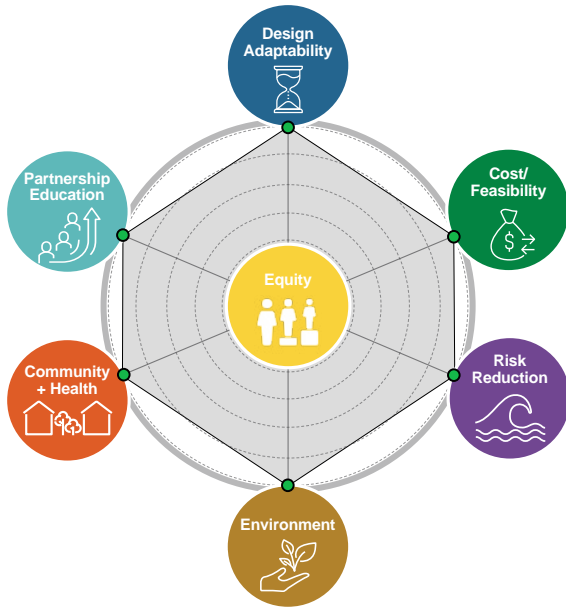
- Prepare ordinance amendments and/or rezoning ordinances. Adopt them through the governing body process with planning board advisory review
- Continue to incorporate higher standards related to resilience in redevelopment plans (e.g. setback requirements, waterfront access requirements, freeboard requirements)
- 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

PRIORITY FOR IMPLEMENTATION

PROJECT TIMELINE



COSTS



MAINTENANCE



LOW EFFORT

PERMITTING



MODERATE EFFORT

IMPLEMENTABILITY



MODERATE EFFORT

ACTION TYPE



Policy and Governance

1

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.

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.

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

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.

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

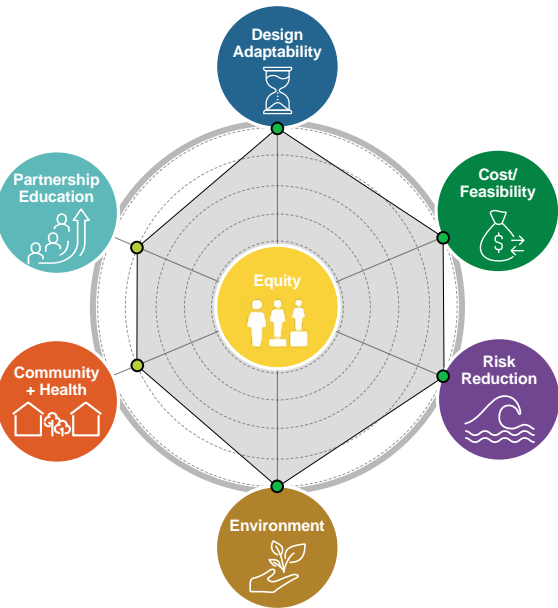
07. UPDATE FLOOD DAMAGE PREVENTION ORDINANCES

Policy

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.

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.

EASE
PROTECT
CONNECT

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



CITY

ACTION TYPE



PRIORITY FOR IMPLEMENTATION

1

PROJECT TIMELINE



The ordinance adoption process typically takes 2 to 3 months from start to finish.

MAINTENANCE



LOW EFFORT

PERMITTING



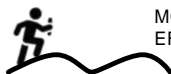
LOW EFFORT

COSTS



The model ordinance should provide a framework, which limits the costs associated with local modification. Nominal professional fees / staff time will be required.

IMPLEMENTABILITY



MODERATE EFFORT

The Ordinance adoption process typically takes 2 to 3 months from start to finish.

Updates will require typical coordination for ordinance amendment process as well as coordination across the region for consistency.

Many of the higher standards for consideration are common measures to promote resilience.

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.

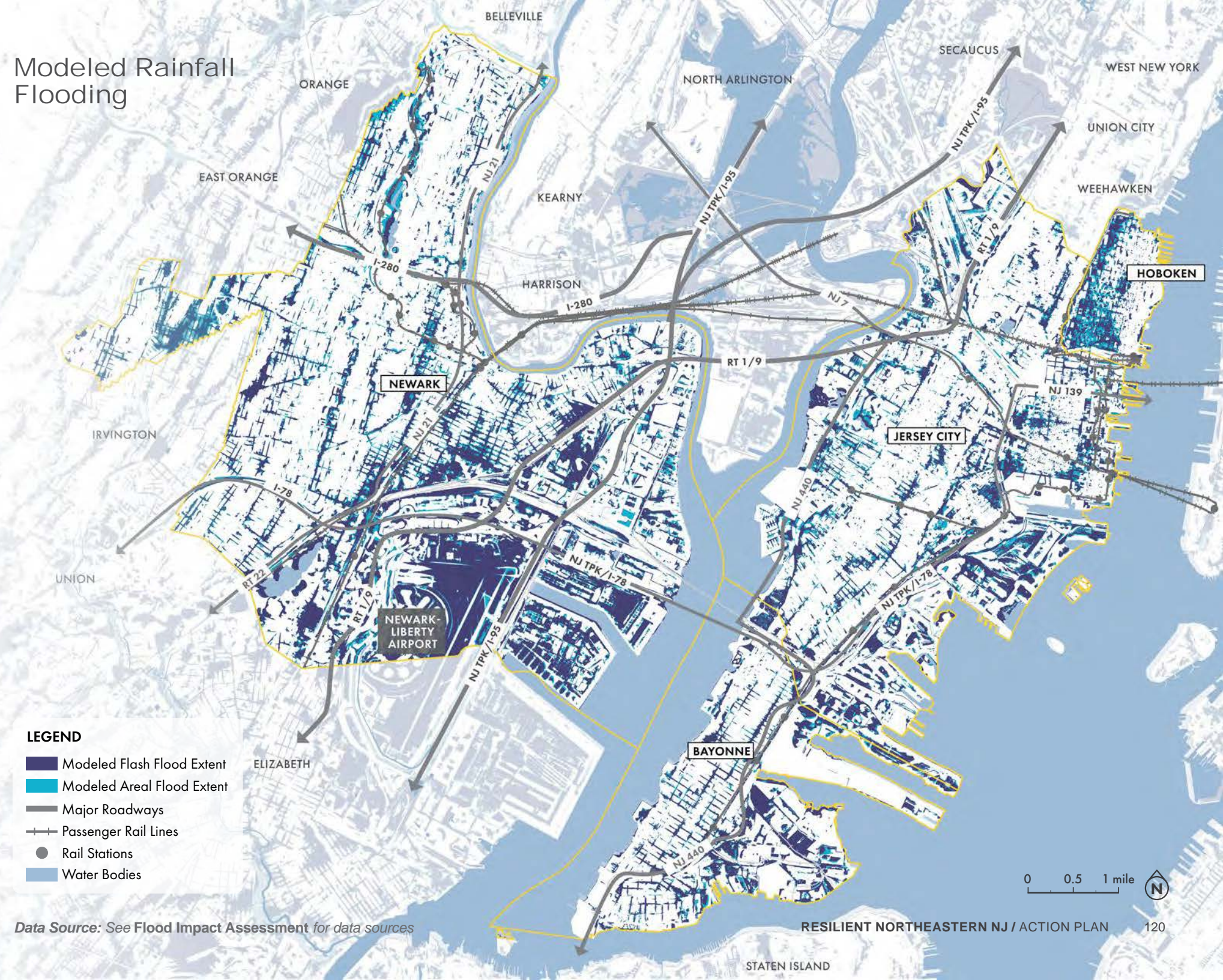
Flooding that impacts roads and public transit restricts mobility, preventing residents from traveling to important activities such as work, school, or medical appointments. Stormwater flooding may also lead to health hazards due to the presence of contaminated sites in these regions. These effects are 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 2021.¹ 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.¹ 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.

¹ 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



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.

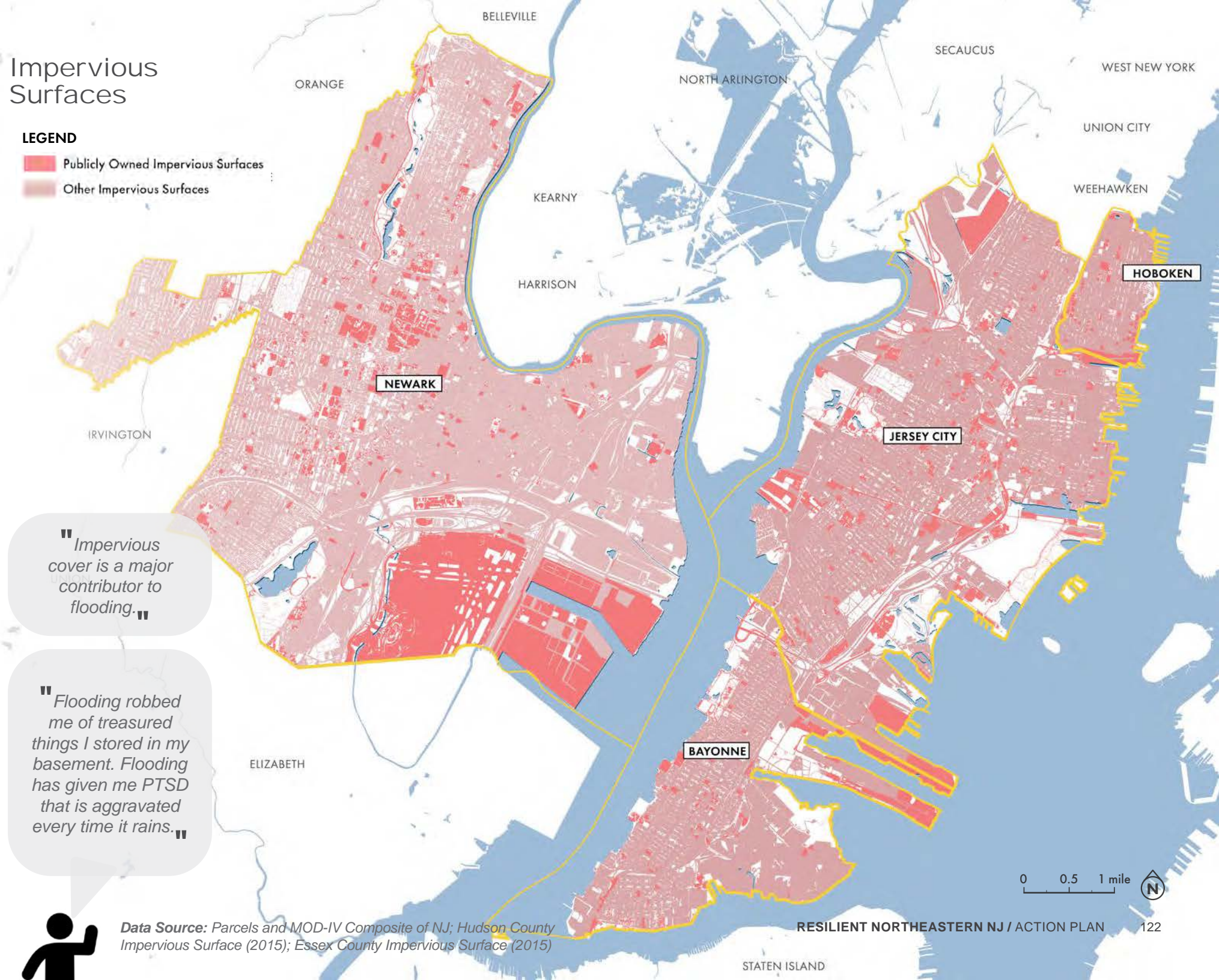
These issues are compounded by climate change. Sea level rise raises high tides and average water levels of water bodies that receive drainage, which means that surrounding water bodies can block drainage outfalls and cause flooding to back up. More frequent, high intensity storms further stress the 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.



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; Hudson County Impervious Surface (2015); Essex County Impervious Surface (2015)

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.”

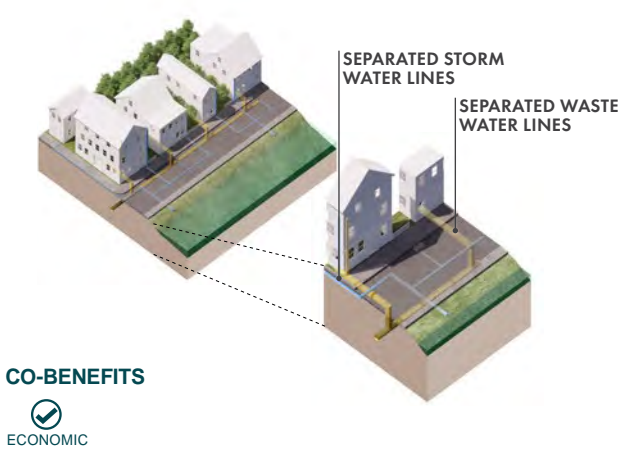
PLANTED BIOSWALES (URBAN)

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.



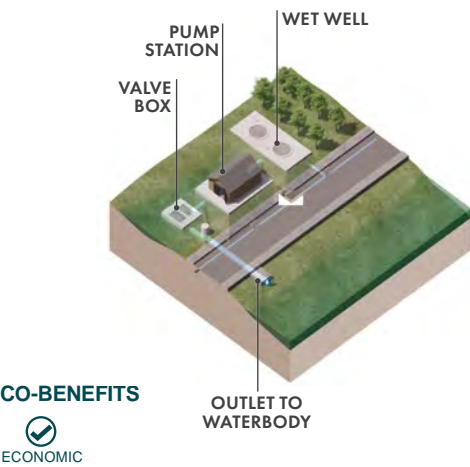
IMPROVE & EXPAND DRAINAGE SYSTEM

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.



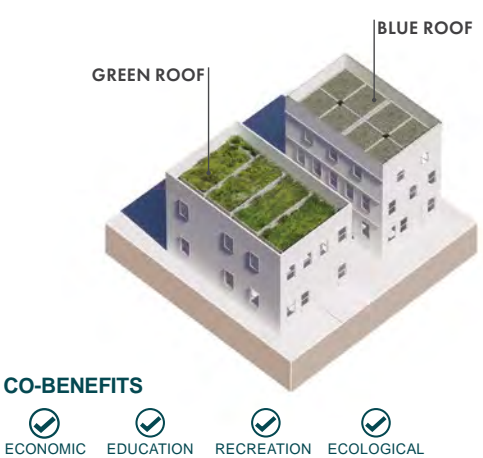
CONSTRUCT PUMPING STATIONS

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.



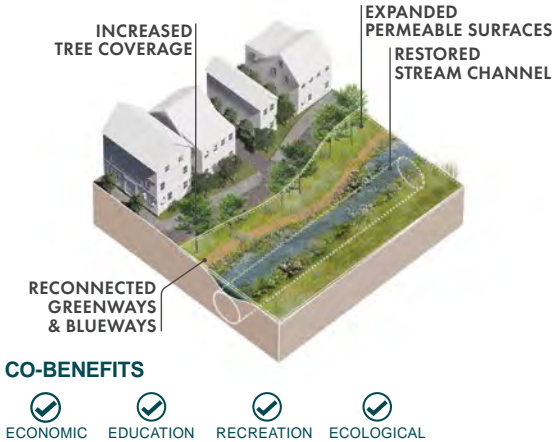
GREEN & BLUE ROOFS

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.



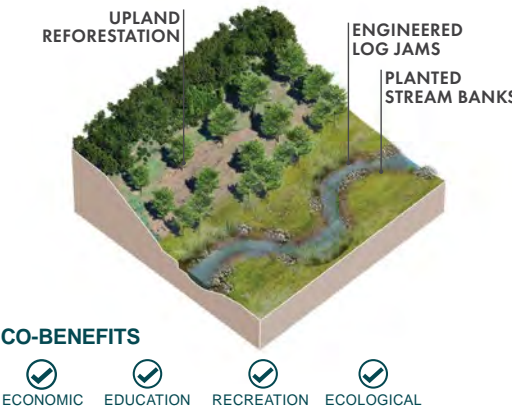
STREAM DAYLIGHTING & RESTORATION

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.



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.



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

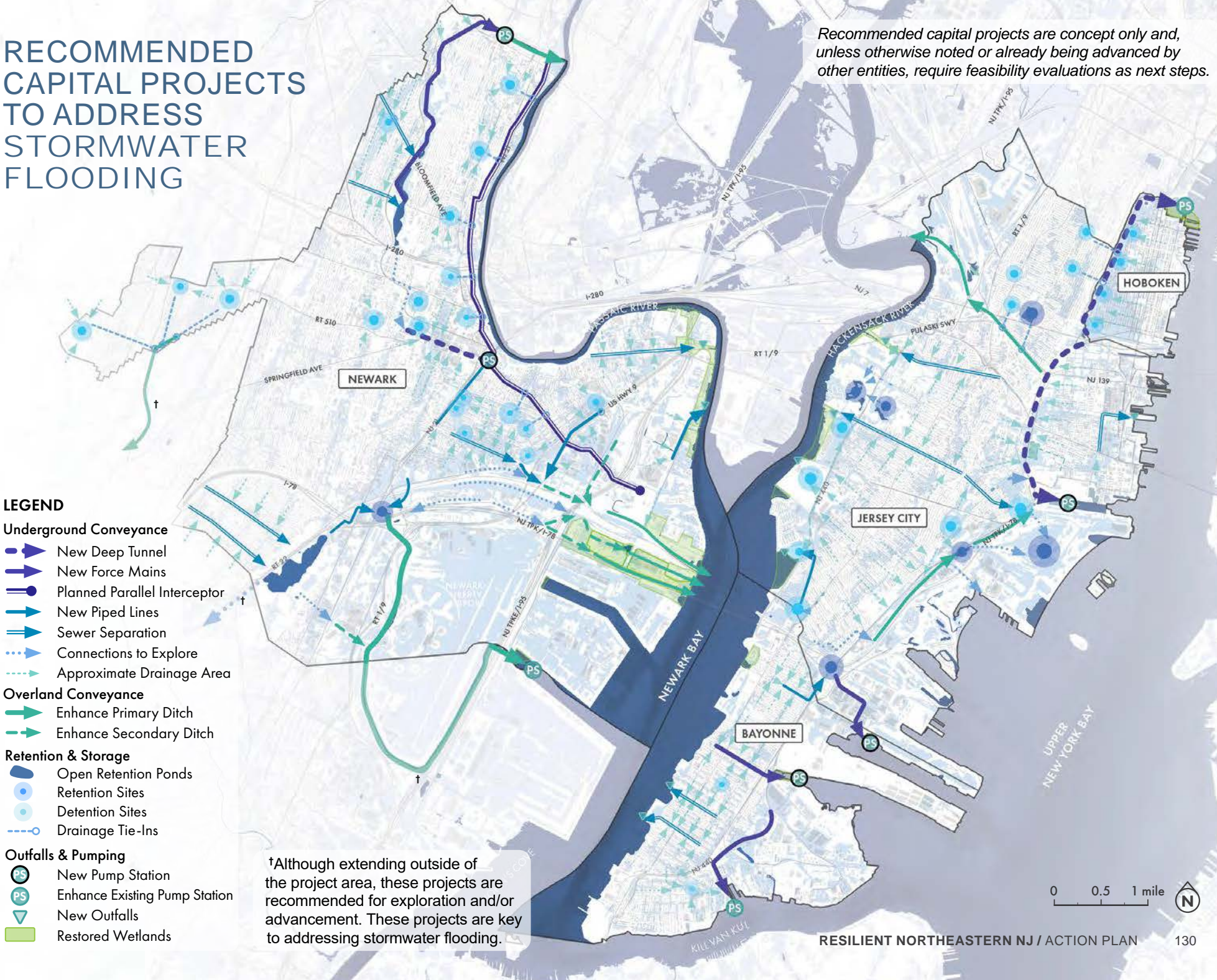
Provide guidance to more quickly integrate stormwater management in open space
- 07

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

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.

Design Adaptability

Partnership Education

Equity

Community + Health

Environment

Risk Reduction

Cost/ Feasibility

CONSIDERATIONS FOR IMPLEMENTATION

PROJECT TIMELINE

CAPITAL COSTS

MAINTENANCE

PERMITTING

CONSTRUCTABILITY

LOW EFFORT

LOW EFFORT

MODERATE EFFORT

Maintenance responsibility and approach is consistent with current conditions.

Sewer infrastructure already has a defined implementation process.

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.

EASE

PROTECT

CONNECT

WHAT THIS COULD LOOK LIKE



Stormwater Median
Paso Robles, CA



Sewer Separation
Cambridge, MA

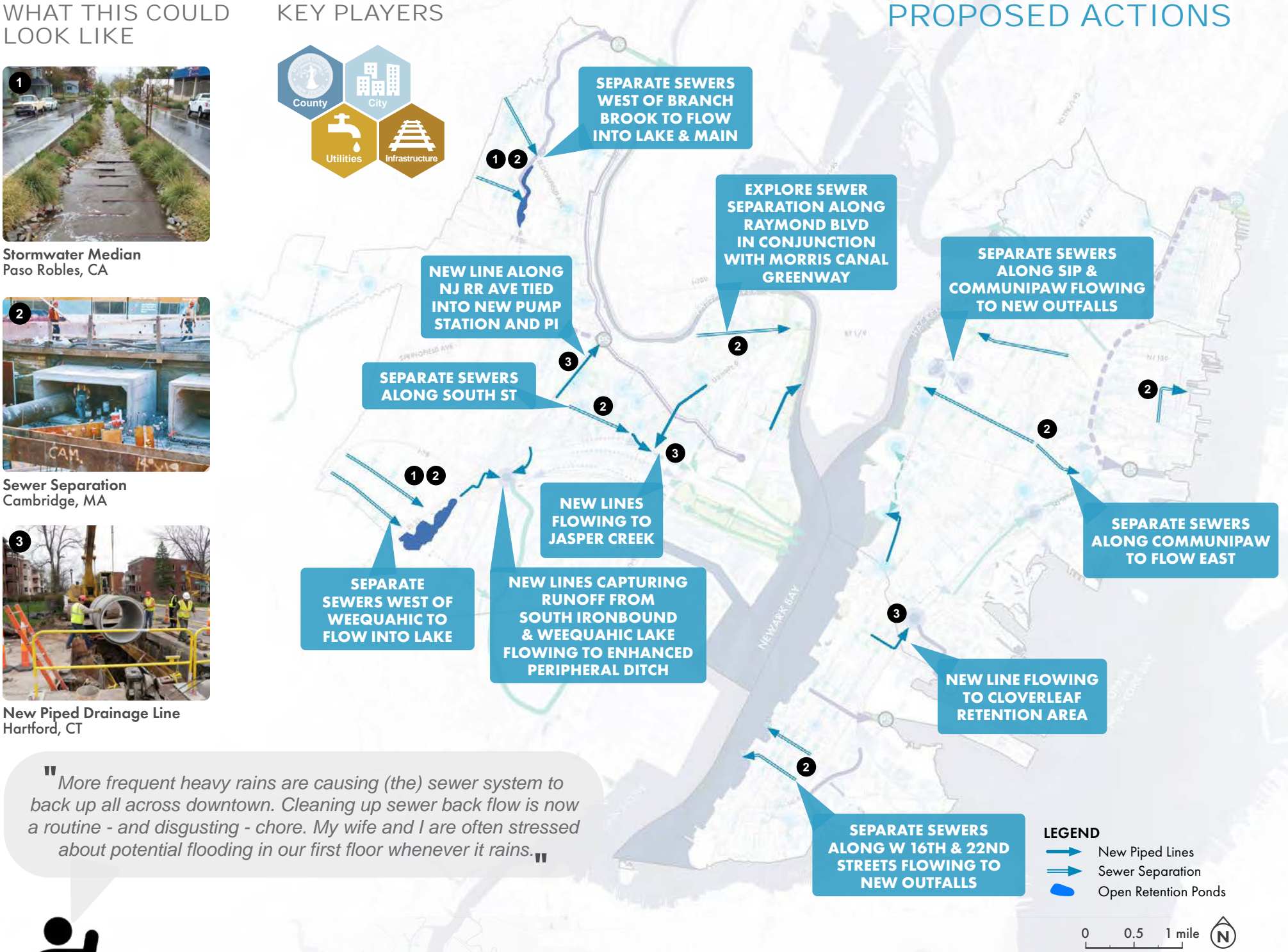


New Piped Drainage Line
Hartford, CT

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.

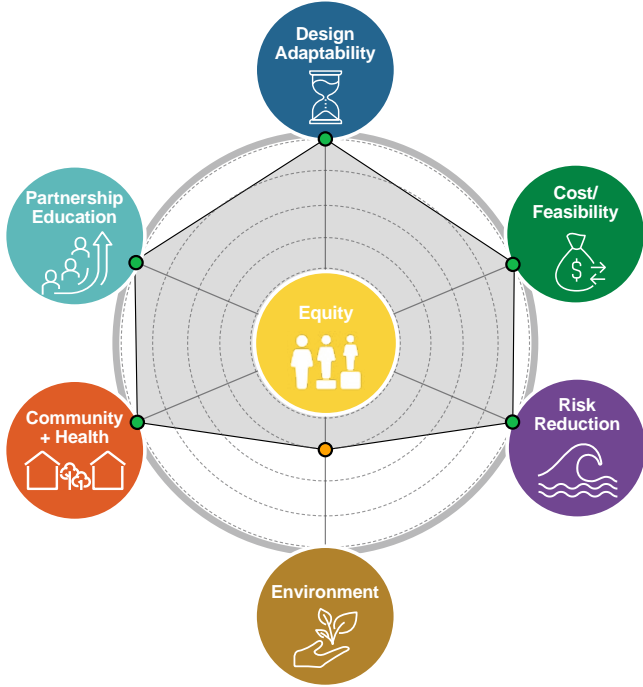
Alternatively, deep tunnel storage can be a useful technique to provide significant storage at a lower depth. Deep tunnels manage stormwater or combined sewage, are 10-foot diameter or larger, and are located far below the ground surface. Deep tunnels involve different construction methods than traditional 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

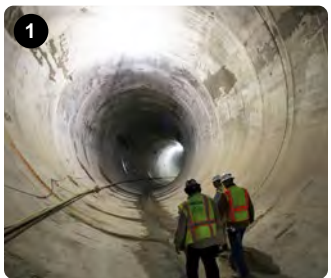
CONSIDERATIONS FOR IMPLEMENTATION

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.



PROJECT TIMELINE	
CAPITAL COSTS	
MAINTENANCE	Deep tunnels generally include screening facilities and other practices to minimize maintenance.
PERMITTING	The depth of these practices helps to avoid impacts with other infrastructure or environmental areas that would require more complicated permitting.
CONSTRUCTABILITY	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



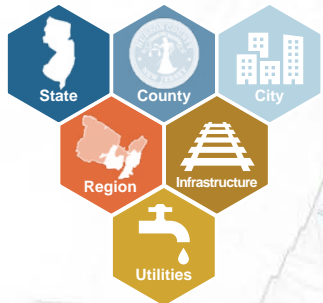
Storage & Conveyance Tunnel
South Boston, MA



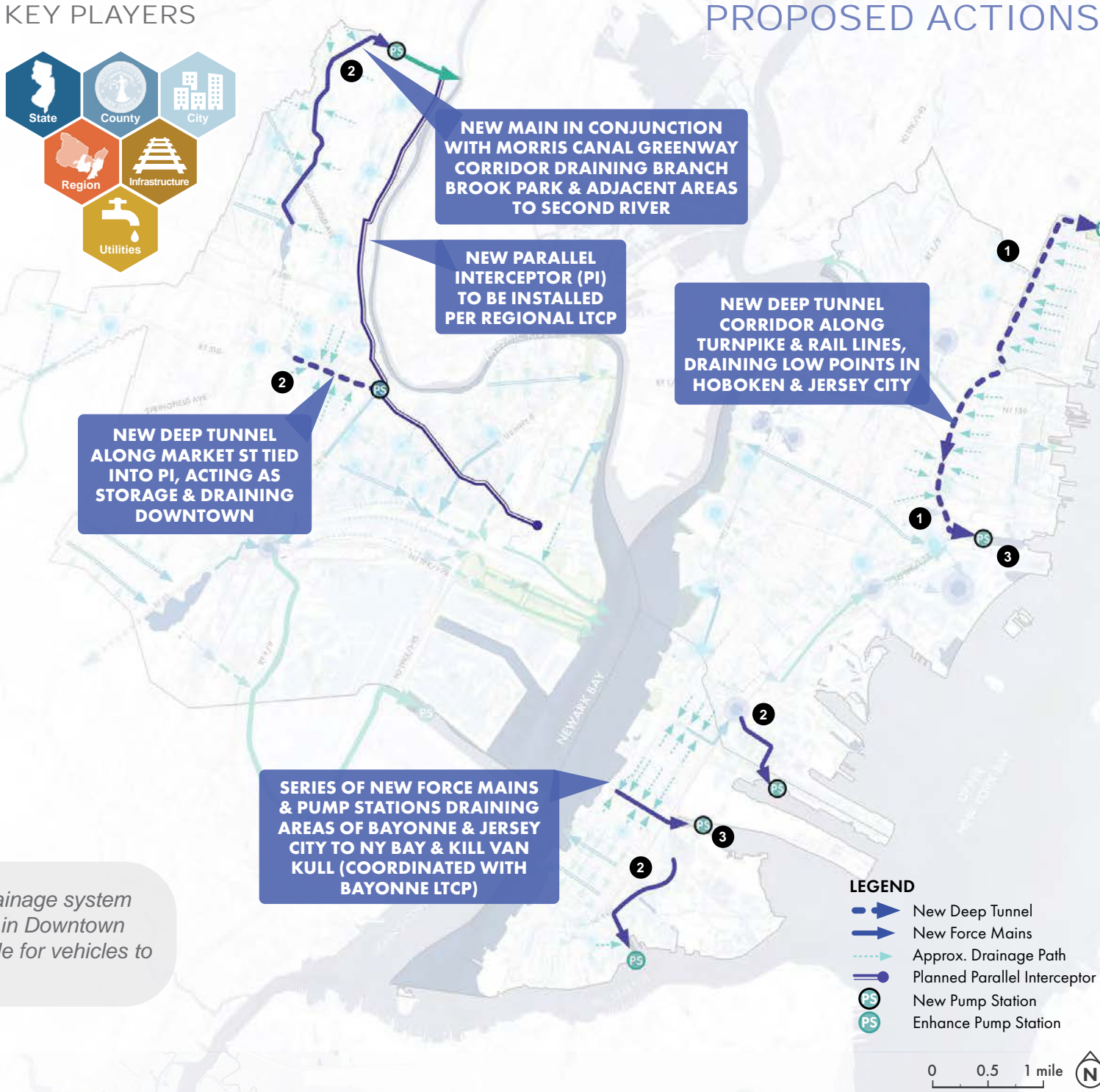
New Pump Station
Ascension Parish, LA

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

KEY PLAYERS



PROPOSED ACTIONS



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.

Design Adaptability

Cost/Feasibility

Risk Reduction

Environment

Community + Health

Partnership Education

Equity

CONSIDERATIONS FOR IMPLEMENTATION

PROJECT TIMELINE

CAPITAL COSTS

MAINTENANCE

PERMITTING

CONSTRUCTABILITY

MODERATE EFFORT

MODERATE EFFORT

MODERATE EFFORT

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

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

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

LEGEND

- Enhance Primary Ditch
- Enhance Secondary Ditch
- Connections to Explore
- Open Retention Ponds
- Restored Wetlands

"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 130

0 0.5 1 mile

N

04. REDUCE STORMWATER VOLUME THROUGH STORMWATER MANAGEMENT SITES

Physical

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.

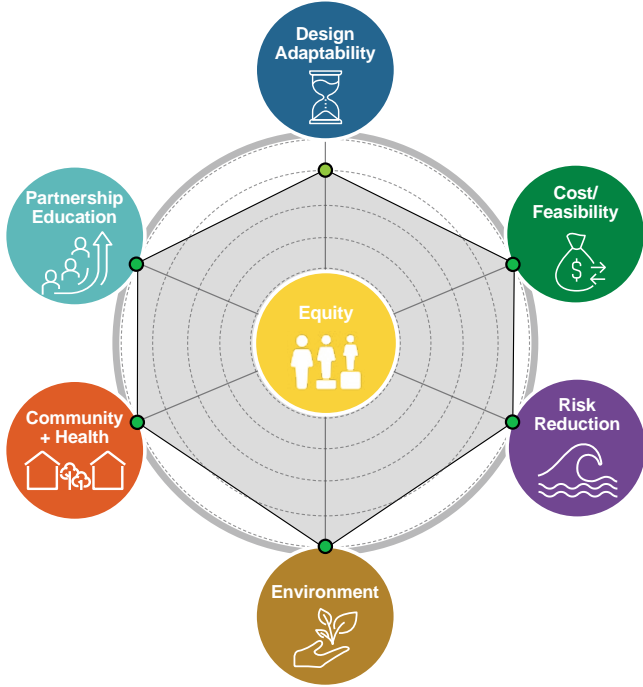
Large retention or detention sites require significant space, making it difficult to integrate these practices within heavily urbanized areas. Even so, larger stormwater management practices can be retrofitted into sites without changing the existing use. Examples include subsurface storage located under 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

CONSIDERATIONS FOR IMPLEMENTATION

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.



PROJECT TIMELINE					
CAPITAL COSTS					
MAINTENANCE		MODERATE EFFORT			
PERMITTING		MODERATE EFFORT			
CONSTRUCTABILITY		LOW 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.			
		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.			
		Construction approaches and materials are widely available with multiple options, and can be implemented by many contractors.			

EASE
PROTECT
CONNECT

WHAT THIS COULD LOOK LIKE



Retention Park
Milwaukee, WI



Water Square (Detention)
Rotterdam, NL



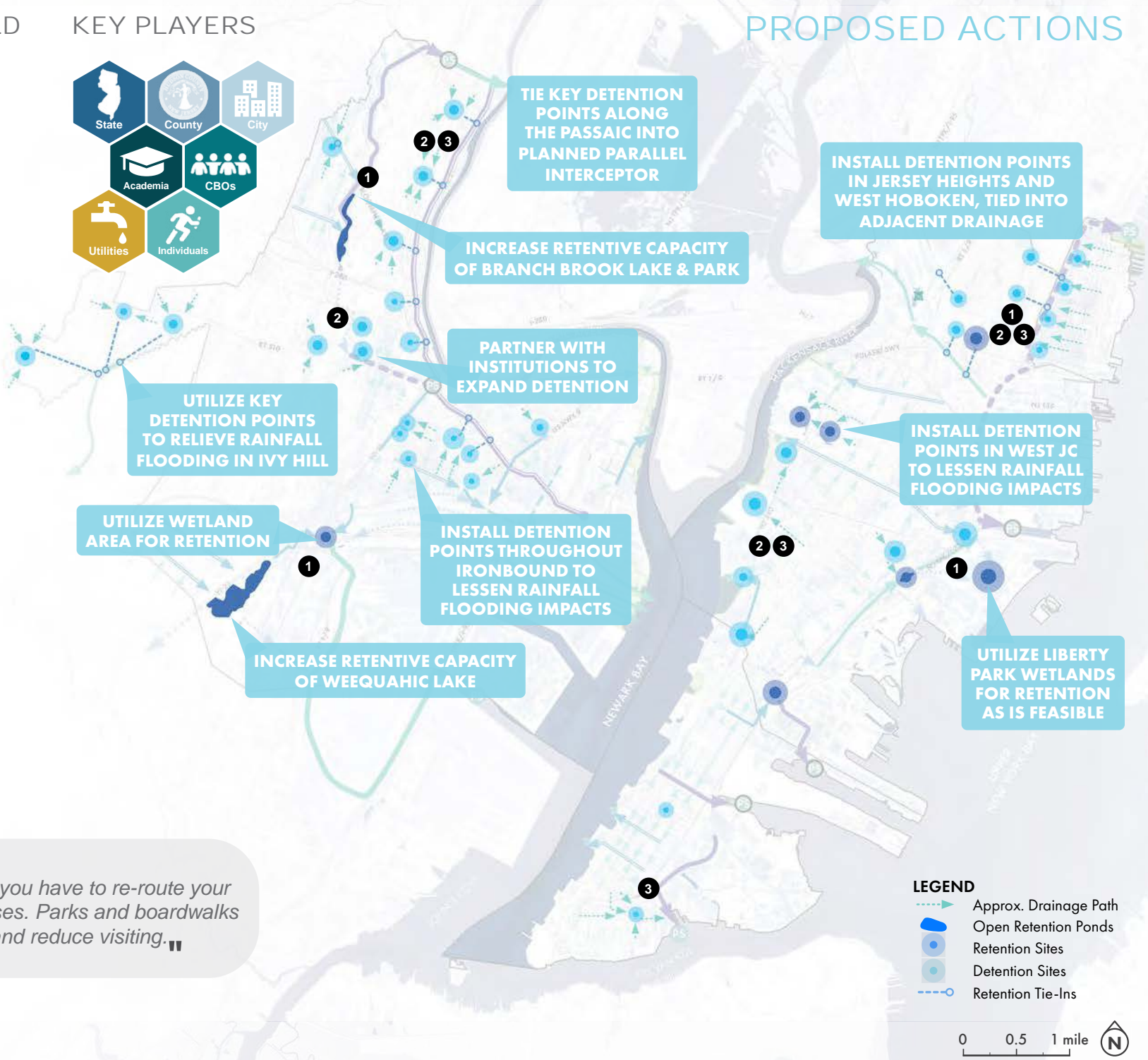
Jefferson Park (Detention)
Seattle, WA

"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

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.

Design Adaptability

Partnership Education

Equity

Community + Health

Environment

Risk Reduction

Cost/ Feasibility

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.				

EASE

PROTECT

CONNECT

WHAT THIS COULD LOOK LIKE



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



Permeable Paving Edison, NJ

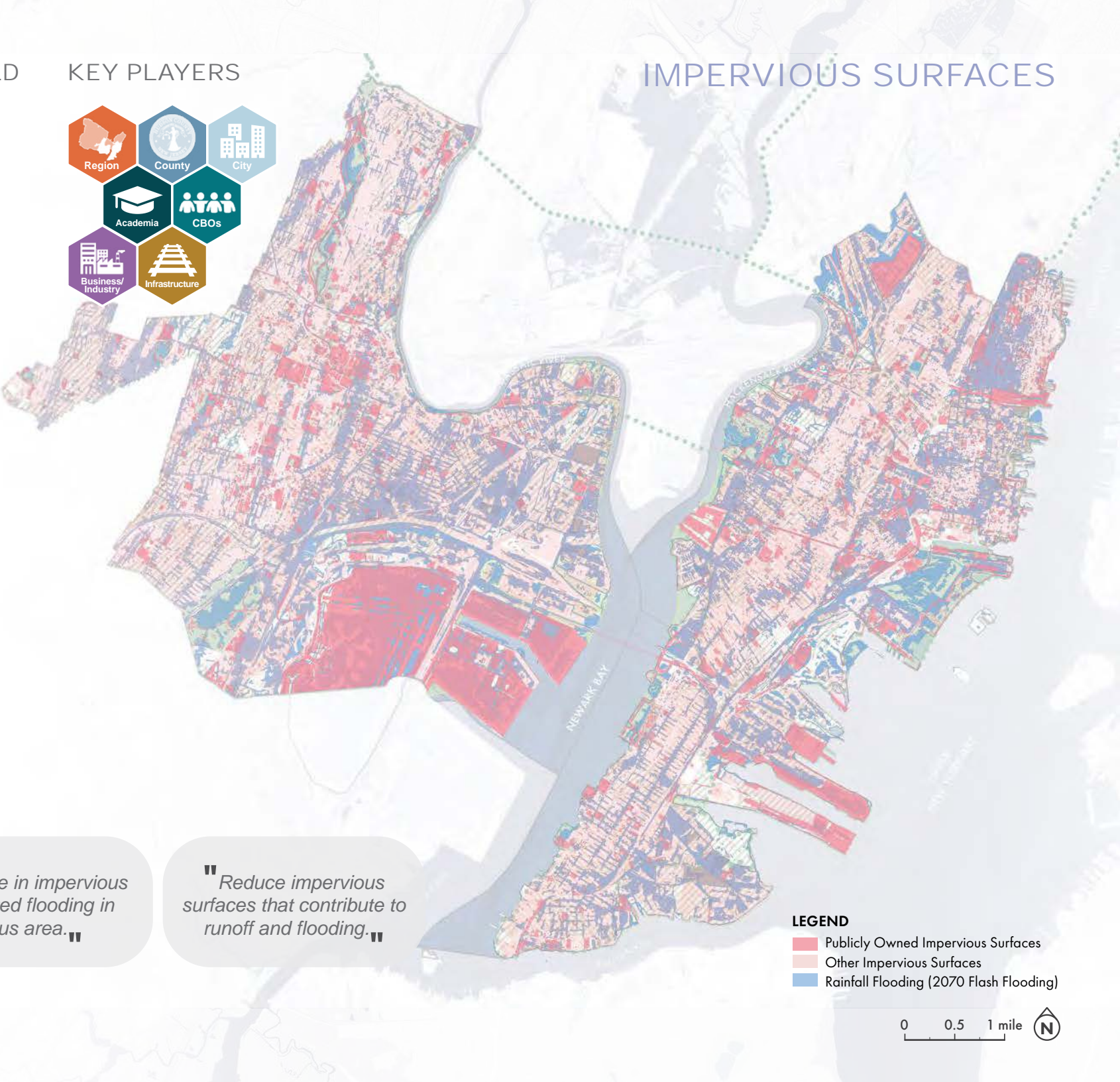


Rain Garden Woodland, CA

KEY PLAYERS



IMPERVIOUS SURFACES



"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

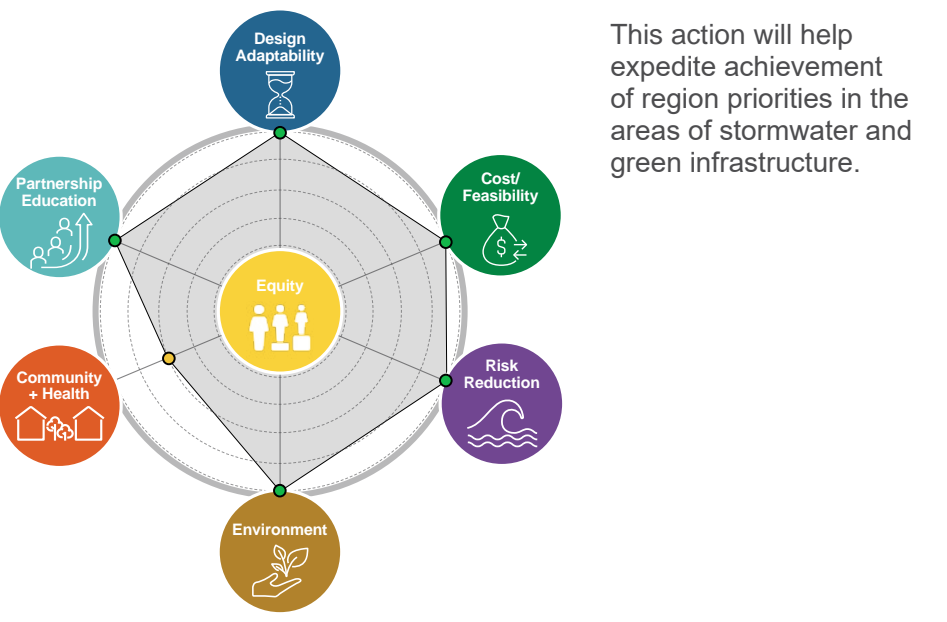
CITY

- 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



CONSIDERATIONS FOR IMPLEMENTATION

SCALE

STATE CITY

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

ACTION TYPE

Policy and Governance

Physical and Nature Based Solutions

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

LOW EFFORT

No new budget or funding streams needed for implementation of the guidelines.

COORDINATION

MODERATE EFFORT

Green Acres guidelines already are largely conducive to these projects but require some coordination between local and state agencies to facilitate advancement.

IMPLEMENTABILITY

MODERATE EFFORT

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

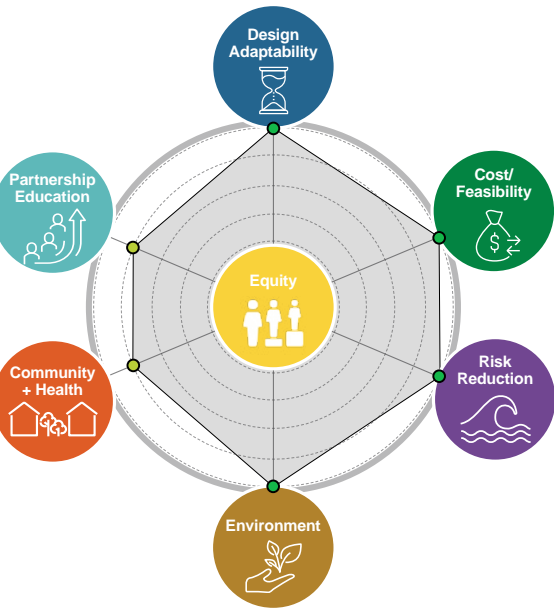
PROTECT

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.

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.

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

SCALE



CITY

Ordinances are adopted at the local level by each municipality.

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.

COSTS

< \$15,000 **per municipality**

Implementation assistance may be provided through the RNJ process, but generally nominal professional fees / staff time are required for implementation.

OPERATIONS



LOW EFFORT

Ordinance updates are part of typical municipal operations.

COORDINATION



LOW EFFORT

Updates will require typical coordination for ordinance amendment process as well as coordination across the region for consistency.

IMPLEMENTABILITY



LOW EFFORT

Many of the higher standards for consideration are common measures to promote resilience.

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.

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

"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."

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.

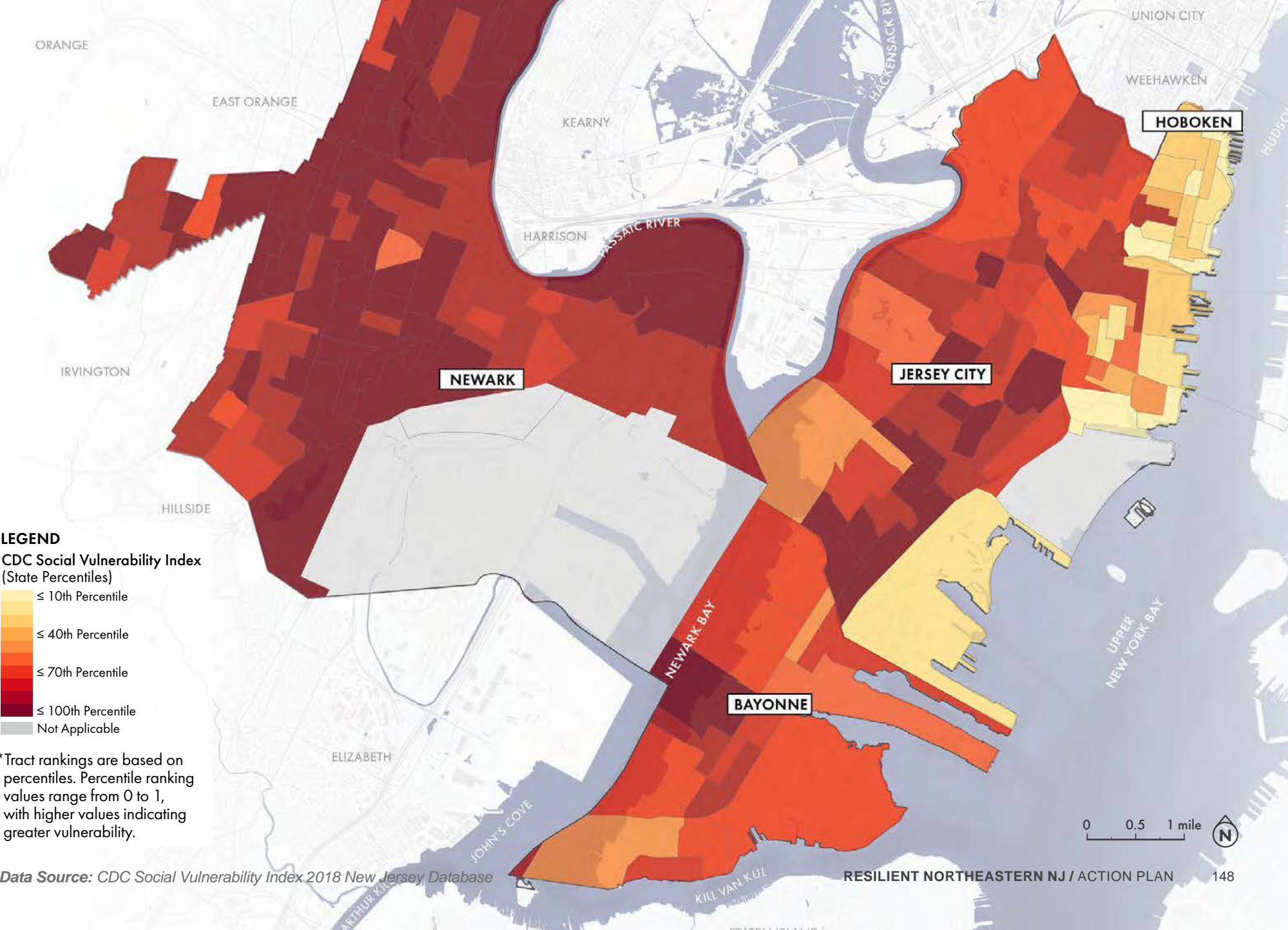
This section provides recommended actions that address a variety of these climate-related issues. Some may be focused on a single hazard, but most of these actions have co-benefits, meaning they can address multiple issues at once. For example, green infrastructure can mitigate flooding, improve air 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 NJ¹—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 PM2.5 (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.² High and increasing levels of PM2.5 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.³ 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.⁴ 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.⁵ 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.⁶ 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.

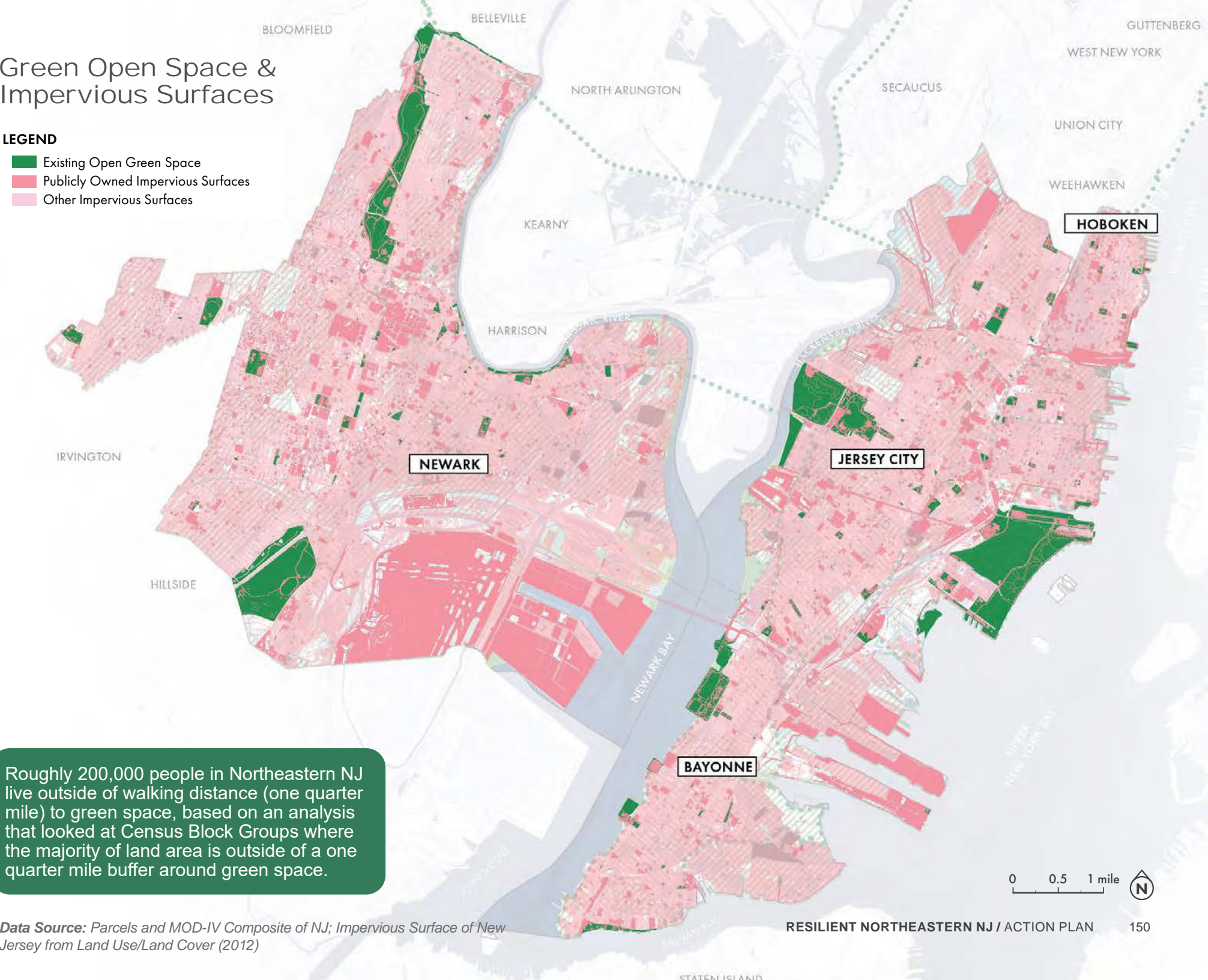
Due to the region’s history of redlining practices, marginalized and minority communities face disproportionately high exposure to these hazards, as these populations were previously forced to settle in areas facing high industrial activity.

¹ U.S. Census Bureau. *QuickFacts. Population Estimates, July 1 2021 (V2021)*.
² US Environmental Protection Agency. (2022, April 1). *EJScreen: Environmental Justice Screening and Mapping Tool*.
³ NJDEP. (2020). *New Jersey Scientific Report on Climate Change*. <https://dspace.njstatelib.org/xmlui/handle/10929/68415>.
⁴ *Ibid*
⁵ 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>.
⁶ 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.

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 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.⁷ 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 space⁸ 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**.

⁷ 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/>.
⁸ 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.



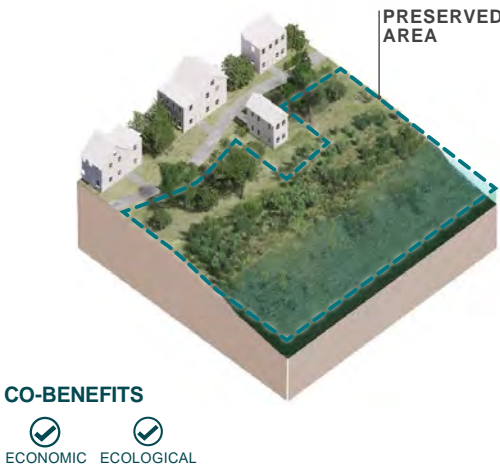
INSTALL GREEN ROOFS

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



ACQUIRE LAND FOR OPEN SPACE PRESERVATION

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



HEAT MITIGATION

Require outdoor heat mitigation on municipal properties (e.g., through measures such as solar panel canopies, cool pavement, water-based cooling stations) and explore incentives to encourage widespread adoption of heat mitigating strategies on private properties.



CONTAMINATED SITE TRANSFORMATION

Identify high-opportunity contaminated sites for green space placement in environmental justice communities on underutilized land or in economic opportunity areas and implement projects that combine site remediation with park/green space construction or resilient redevelopment.



IMPROVE SUSTAINABILITY AND ACCESSIBILITY OF TRANSPORTATION

Establish regional goals around transportation planning for urban heat, air pollution, and carbon emissions reductions and plan for accessible and equitable public, multi-modal transportation infrastructure (e.g., sidewalk improvements, bike infrastructure, better public transit mixed-used zoning, electric/zero-emissions buses, public charging stations).



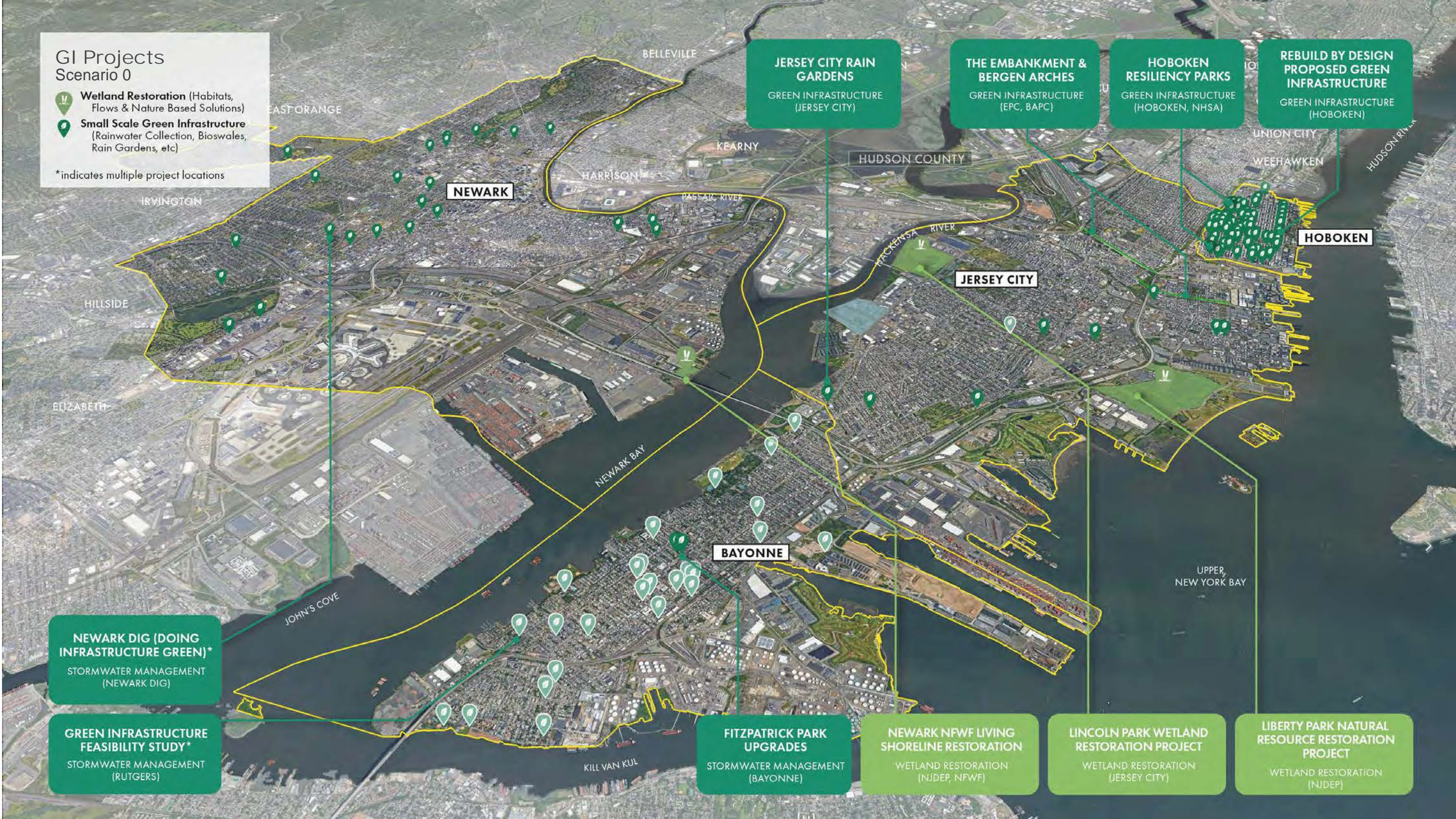
WHAT IS ALREADY BEING DONE? SCENARIO 0.

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

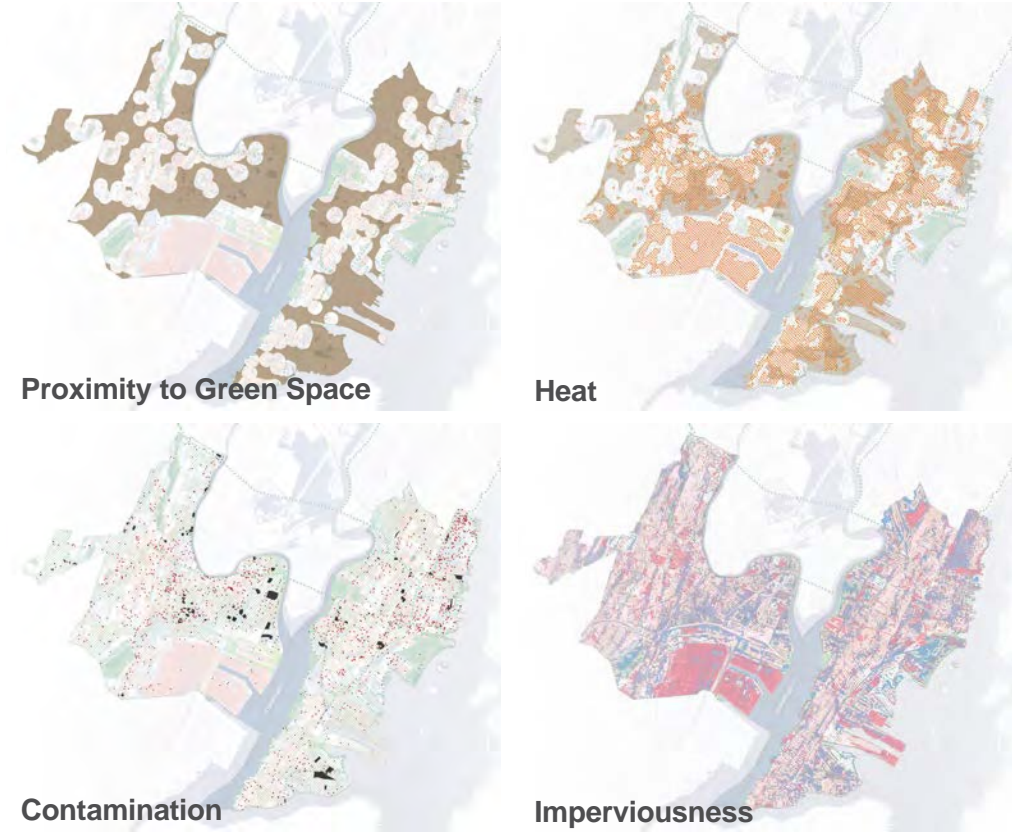
Physical

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.



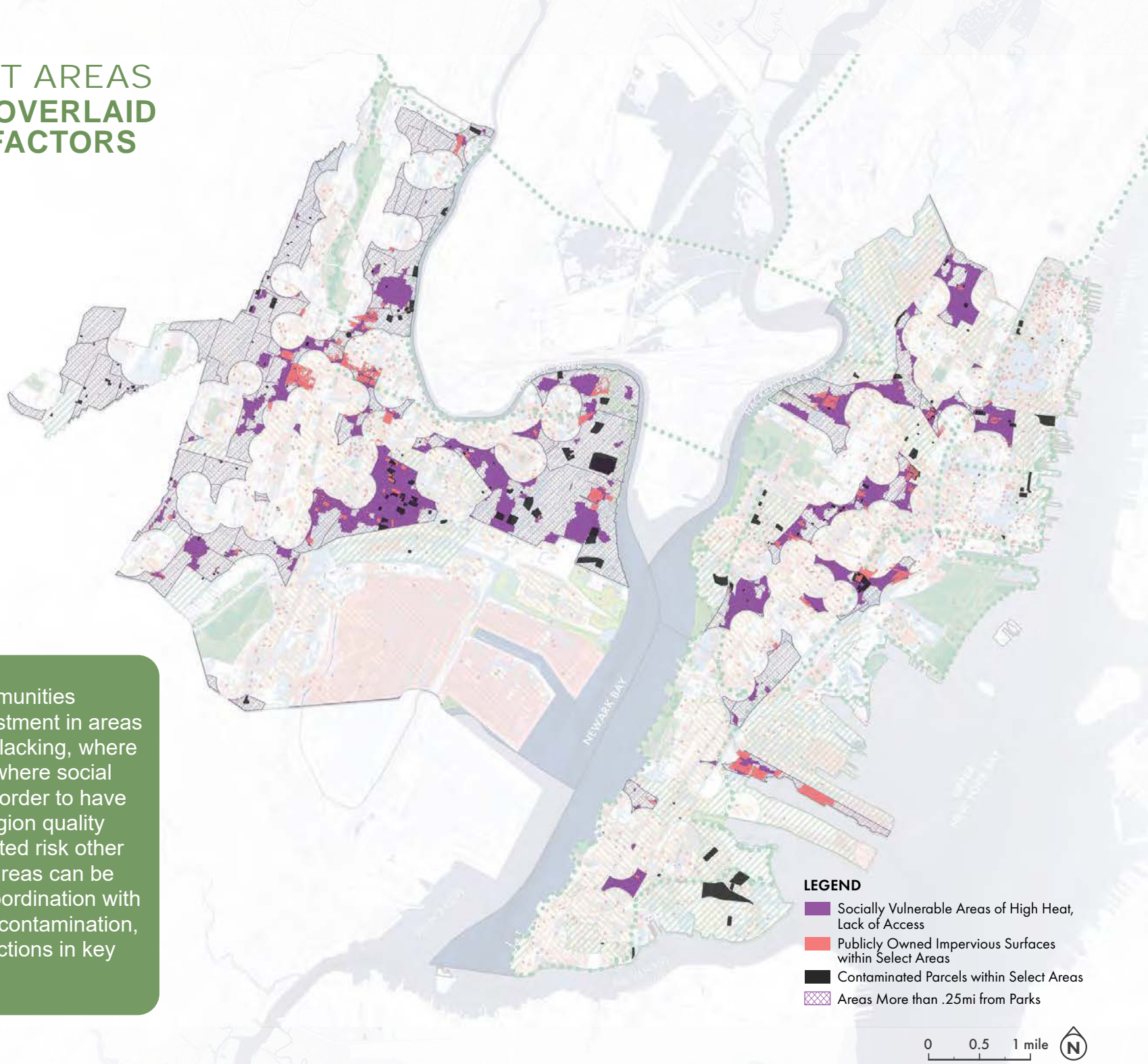
Mapped Resilience factors to be considered when siting Green Infrastructure

"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.

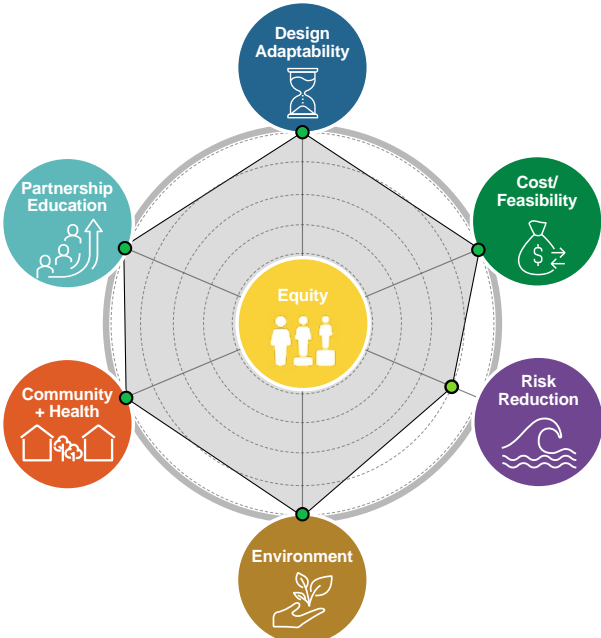


01a. PROVIDE GREEN SPACE WHERE IT IS LACKING

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.

EVALUATION CRITERIA



- 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

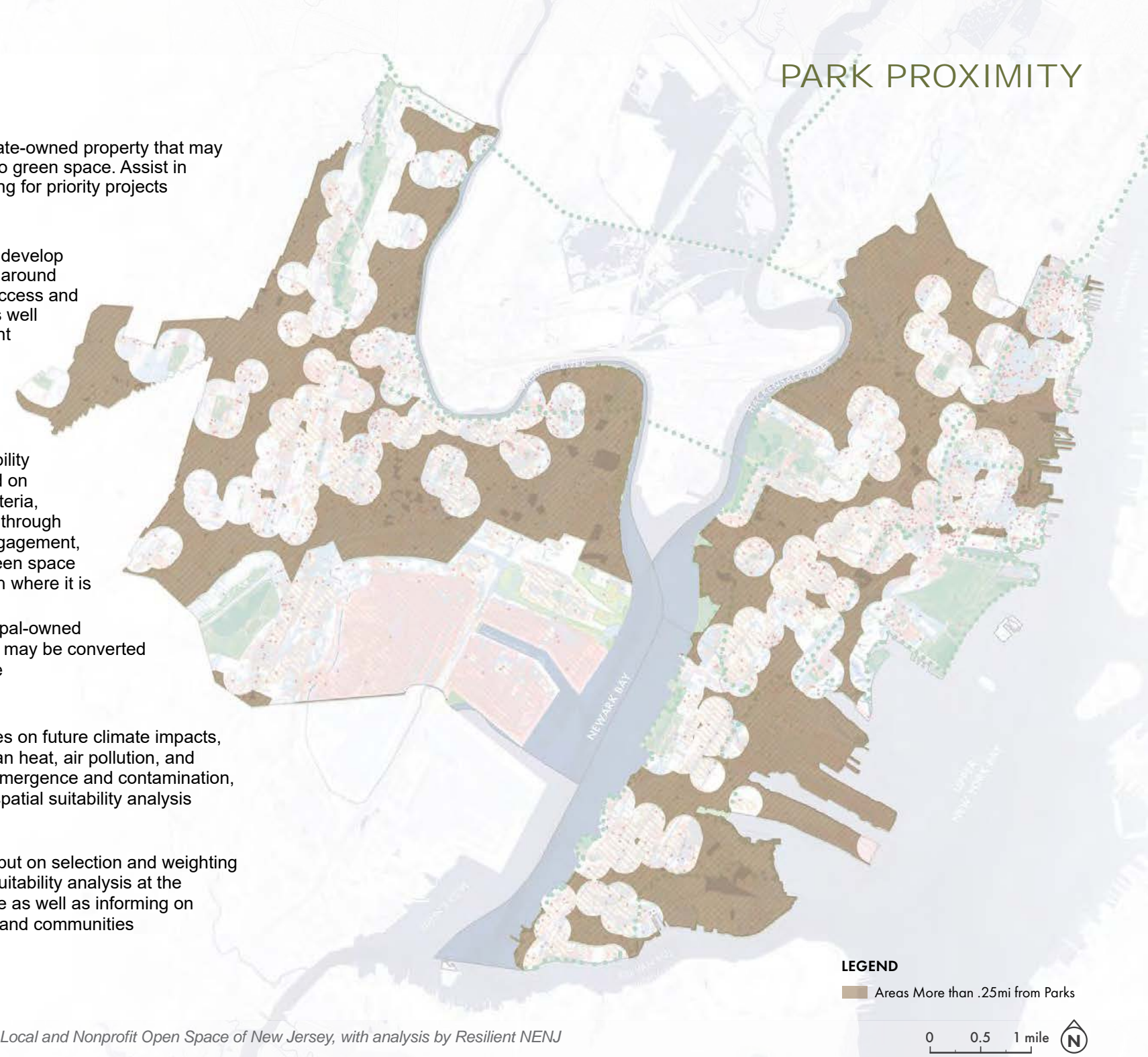
CONSIDERATIONS FOR IMPLEMENTATION

SCALE	ACTION TYPE	PRIORITY FOR IMPLEMENTATION
CITY	Physical and Nature Based Solutions	1
		PROJECT TIMELINE
		CAPITAL COSTS
MAINTENANCE		
PERMITTING & CONSTRUCTABILITY		

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



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

Physical

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.⁹ 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.

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

EVALUATION CRITERIA















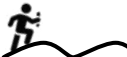

WHAT ISSUES DOES THE ACTION HELP ADDRESS?

- 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
 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.	

EASE
PROTECT
CONNECT

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

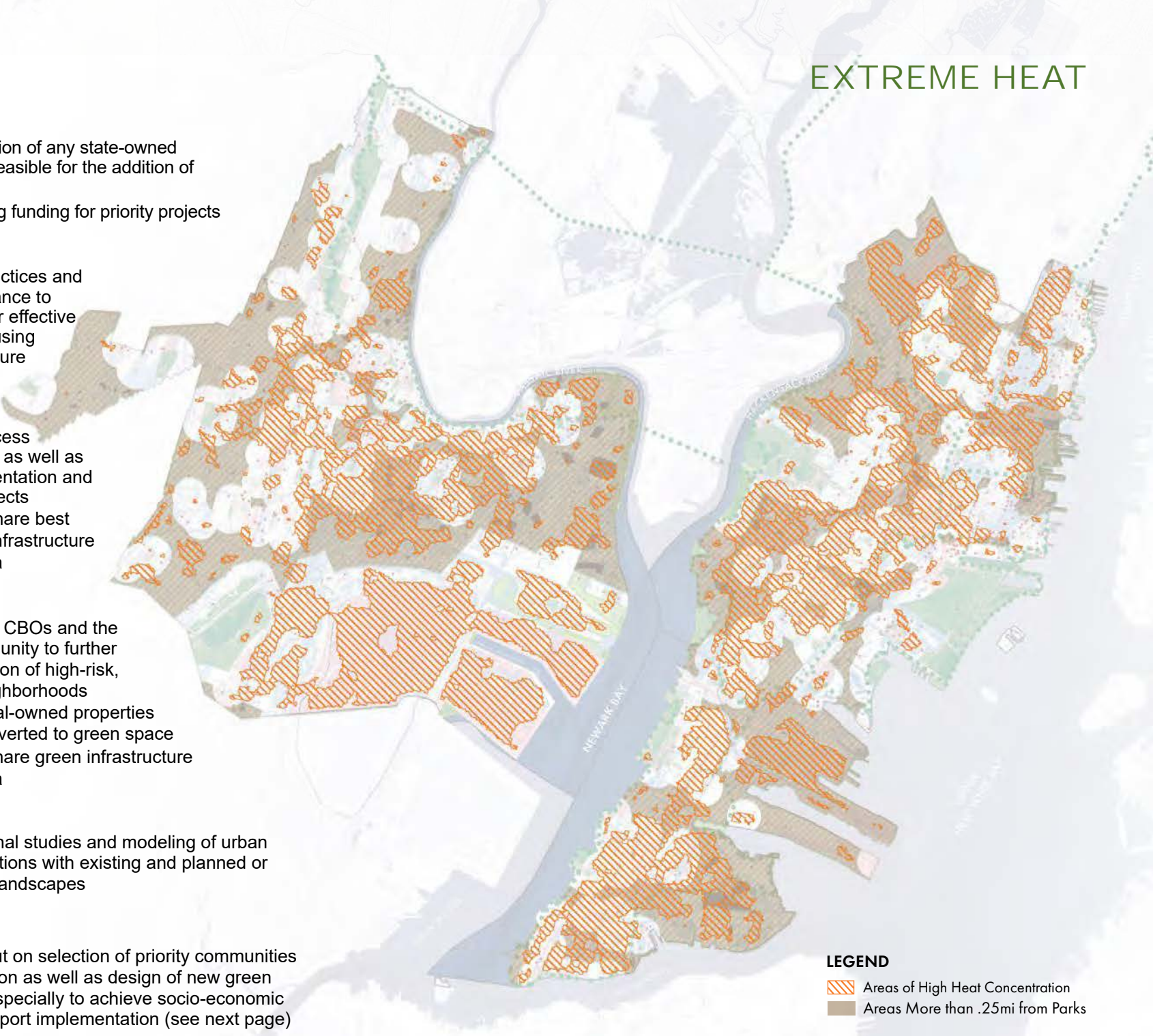


CBOs

- 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)

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

EXTREME HEAT



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

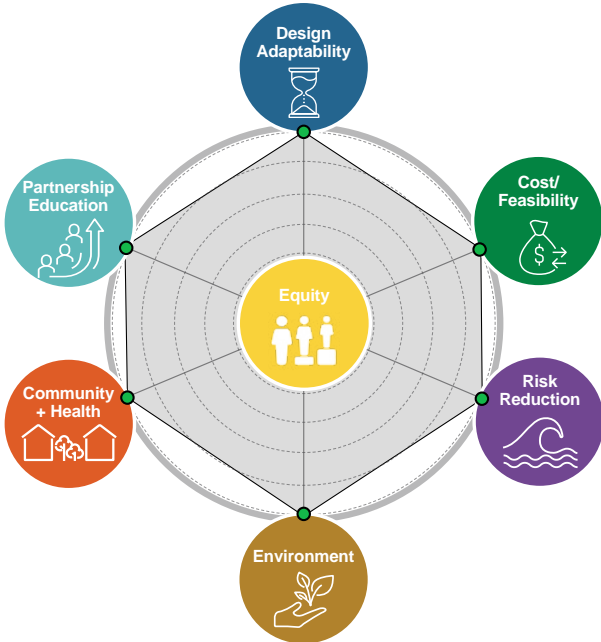
Policy

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 Toolbox¹¹ provides a compendium of opportunities that stakeholders can take advantage of now to help implement small scale green infrastructure programs.

¹⁰ <https://gitoolkit.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 form 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	 Outreach, Education & Capacity Building Service & Program Development	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 HIGH EFFORT	New funding streams and staff required to implement and maintain the program.	
COORDINATION HIGH EFFORT	Significant coordination with residents, businesses, and other agencies needed.	
IMPLEMENTABILITY HIGH EFFORT	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 Guardians¹¹ 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.

¹¹ <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**

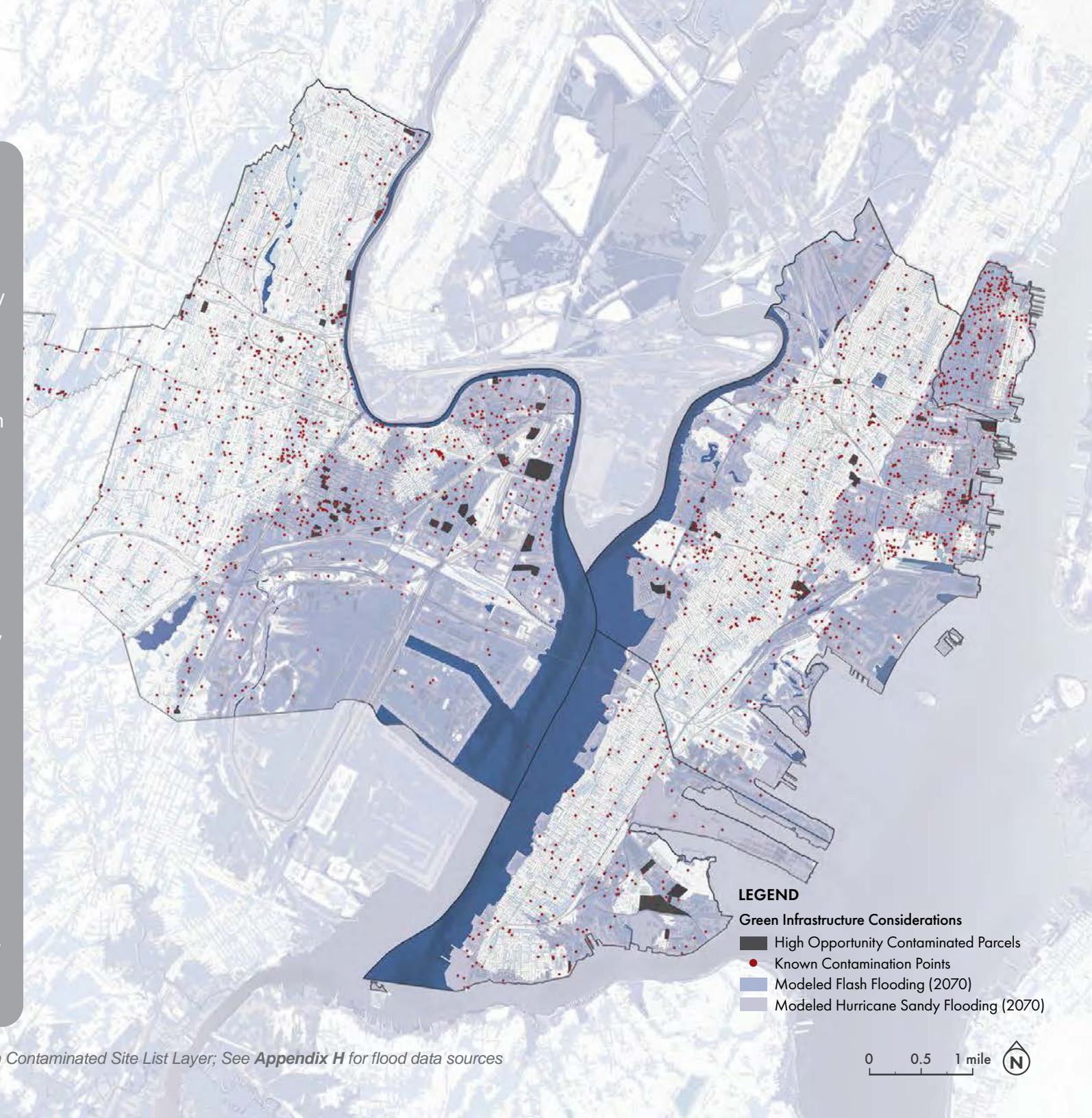
This action integrates community resilience into the process of cleaning up contaminated sites by facilitating the transformation of sites into open space or community assets while incorporating components that reduce risk from climate-related hazards such as flooding.

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.

CONSIDERATIONS FOR IMPLEMENTATION

SCALE


CITY


ACTION TYPE


Policy and Governance


PRIORITY FOR IMPLEMENTATION

1


PROJECT TIMELINE


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


MAINTENANCE


MODERATE EFFORT

CAPITAL COSTS


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

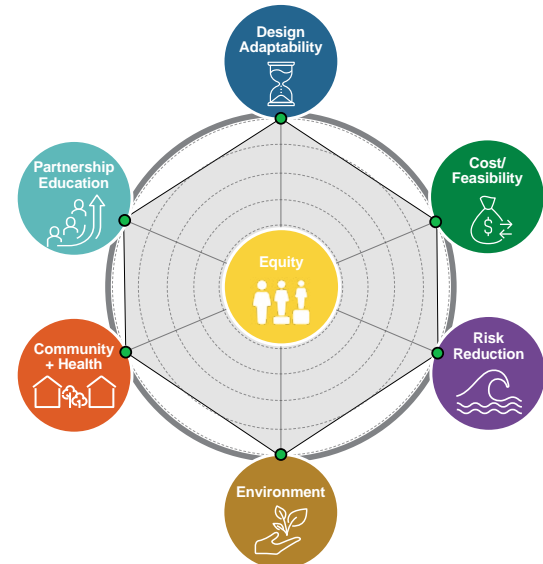
COORDINATION & IMPLEMENTABILITY


MODERATE EFFORT

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

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.

EVALUATION CRITERIA








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

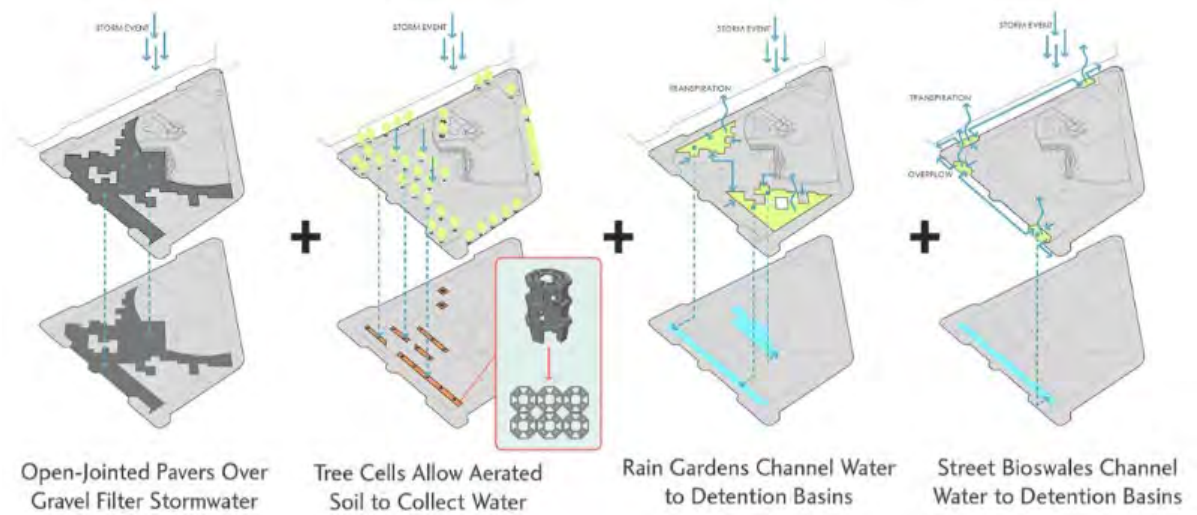
KEY PLAYERS

- **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

CITY

Policy and Governance

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 NENJ

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**.



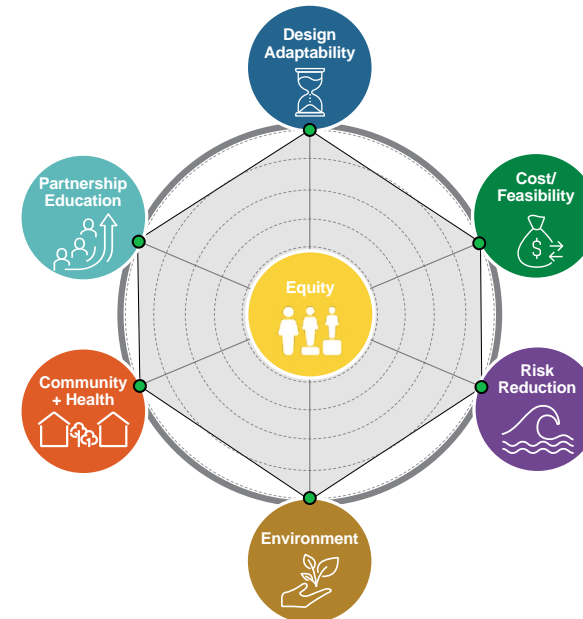
Hoboken prepared a Resilient Buildings Design Guide in 2015 and is in the process of updating it. The updated version could serve as a model that can be used region-wide with local modifications to address different building types and conditions.

EASE

PROTECT

CONNECT

EVALUATION CRITERIA



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

SCALE



REGION

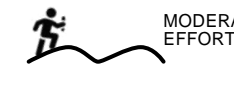
ACTION TYPE



PRIORITY FOR IMPLEMENTATION

1-2

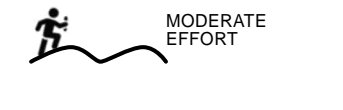
OPERATIONS



MODERATE EFFORT

Concerted engagement will be needed to support and maximize utility, use, and adoption.

IMPLEMENTABILITY



MODERATE EFFORT

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.

PROJECT TIMELINE



CAPITAL COSTS



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.

COORDINATION



LOW EFFORT

The Steering Committee is already set up to share best practices across municipalities and has a platform to engage around key issues.

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



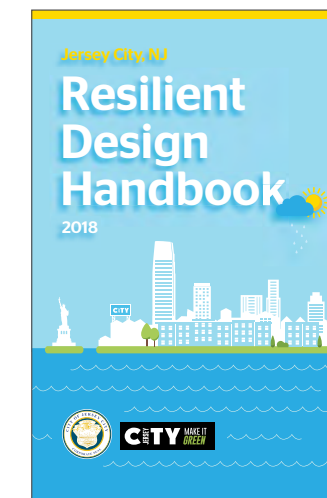
CITY

- 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



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

EASE
PROTECT
CONNECT

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

SCALE

REGION

CITY

STATE

Physical solutions are implemented at the site-specific, or neighborhood, scale. Requirements for public properties would likely be implemented a statewide or municipal scale.

ACTION TYPE

Policy and Governance

OPERATIONS

MODERATE EFFORT

Concerted engagement will be needed to support and maximize utility, use, and adoption.

PRIORITY FOR IMPLEMENTATION

1

COORDINATION & IMPLEMENTABILITY

MODERATE EFFORT

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.

PROJECT TIMELINE

State requirements for heat mitigation on public properties could likely be integrated in the near-term.

CAPITAL COSTS

¹² *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>

¹³ *Calculated by land areas using the Trust for Public Land heat severity dataset*. <https://www.arcgis.com/home/item.html?id=cdd2ffd5a2fc414ca1a5e676f5fce3e3>.

¹⁴ *University of California MERCED. Multivariate Adaptive Constructed Analogs (MACA) Datasets*. 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.”¹⁵ 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.

¹⁵ *2021 Jersey City Climate and Energy Action Plan*: https://us.ftl.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

EASE
PROTECT
CONNECT

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.

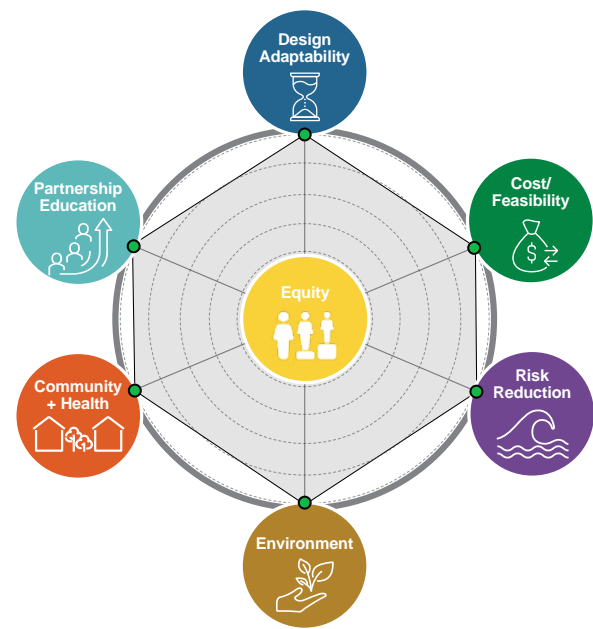
WHAT ISSUES DOES THE ACTION HELP ADDRESS?

- 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

CITY

ACTION TYPE

Physical and Nature Based Solutions

Policy and Governance

PRIORITY FOR IMPLEMENTATION

2

PROJECT TIMELINE

COSTS

OPERATIONS

COORDINATION & IMPLEMENTABILITY

Implementation of the LTCPs will span over decades, although individual projects may have shorter timelines.

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.

Falls within existing processes.

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.

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:

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

Section 3.3.1: Actions that improve policy and governance

Policy-01: Continue 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.

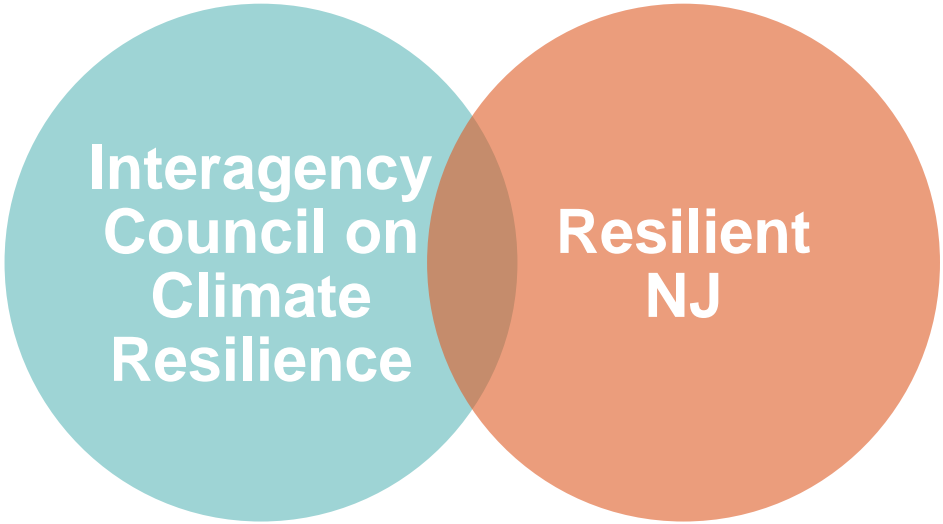
A key value of a regionally coordinated initiative, like Resilient NENJ, is to elevate existing best practices. Because there is so much work happening around policy and governance, Resilient NENJ actions and recommendations in this section focus specifically on what can only be accomplished through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

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.

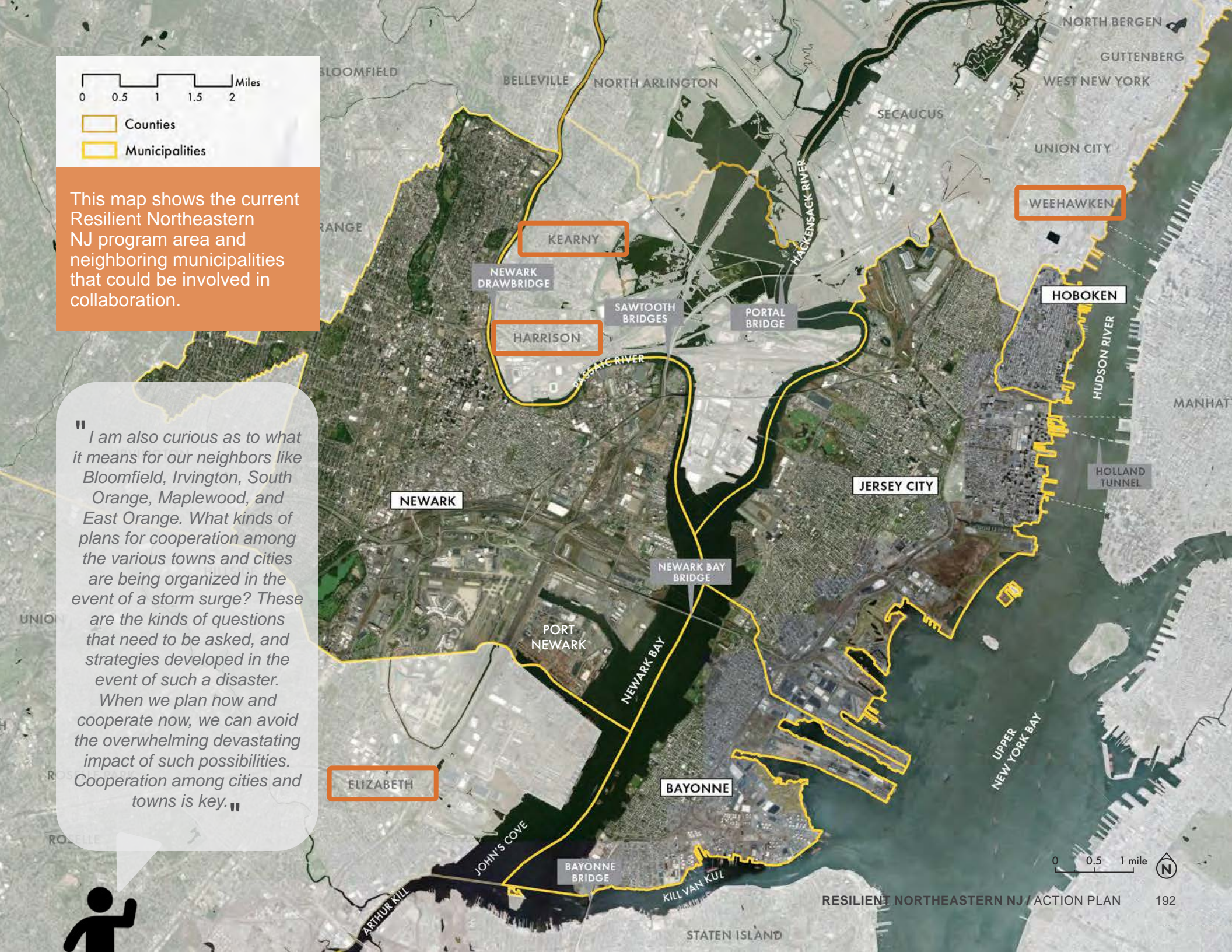
MOST RELEVANT

- 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

EASE
PROTECT
CONNECT



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:

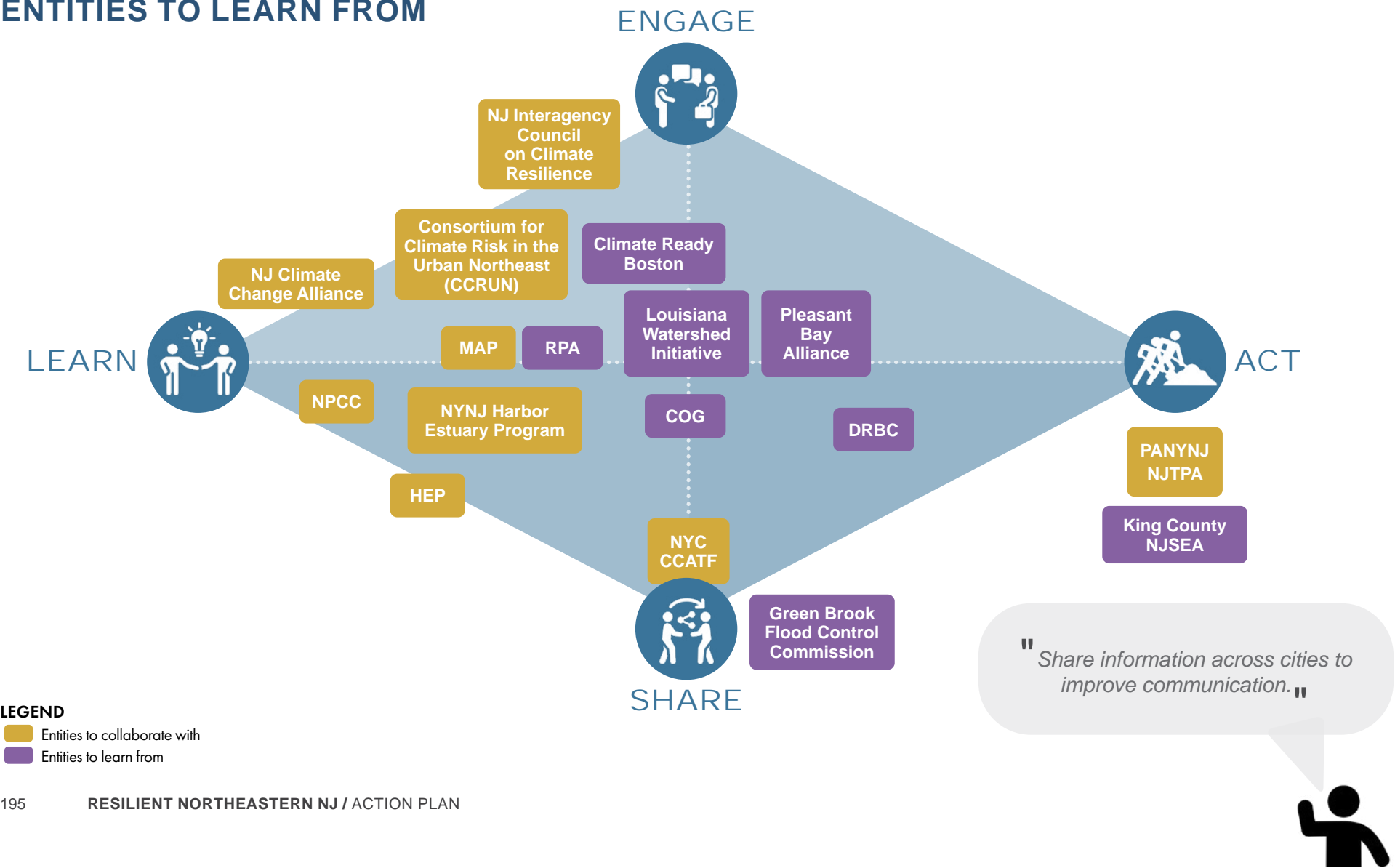
- Collaborate in the consideration and framework for various programs recommended by Resilient NENJ (e.g., urban forestry and habitat program advancement)
- Consider expanding collaboration to include more sustainability-focused goals, such as energy consumption and greenhouse gas emission reductions

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**.

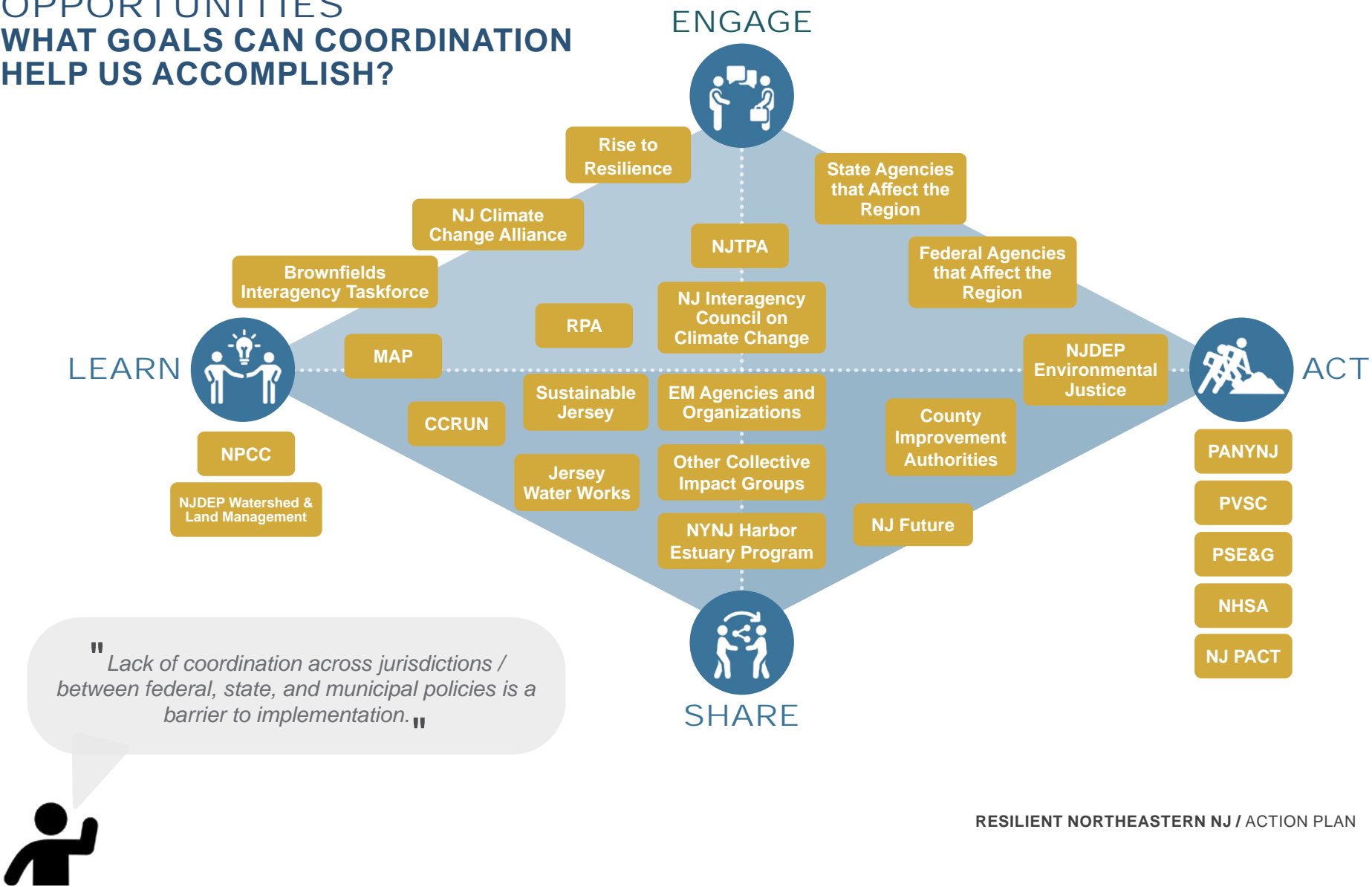
CASE STUDIES ENTITIES TO LEARN FROM



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?



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




REGION

ACTION TYPE



Policy & Governance

PROJECT TIMELINE



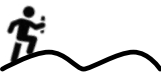
Many of the components of regional coordination already exist between the Resilient NENJ Steering Committee. Additional partnerships with other municipalities could also be forged within the next 2 years.

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.

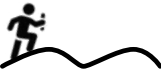
OPERATIONS



MODERATE EFFORT

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.

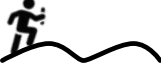
COORDINATION



MODERATE EFFORT

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.

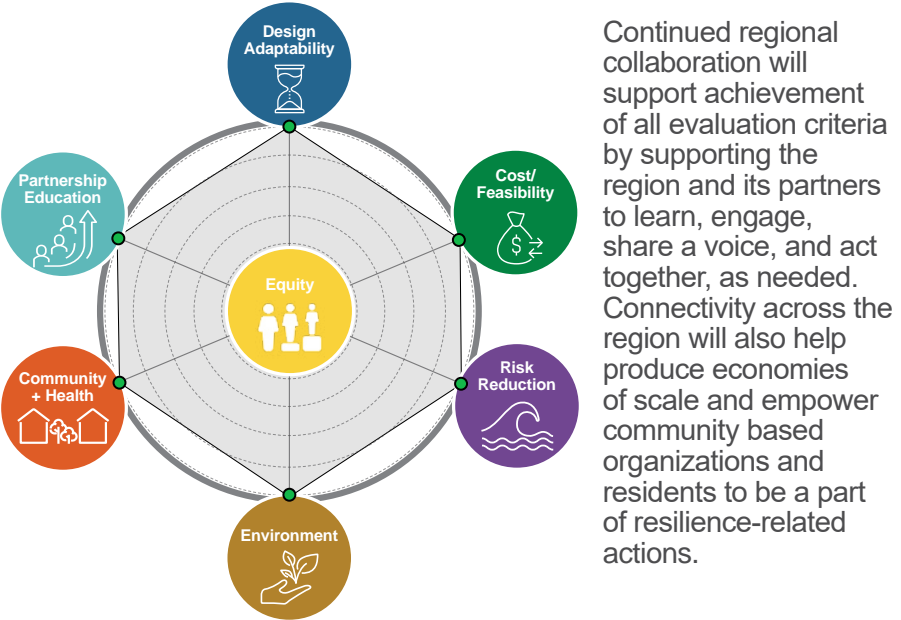
IMPLEMENTABILITY



MODERATE EFFORT

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



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.

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.

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?



Some of these agencies already collaborate through existing platforms. For example, state departments and agencies, including NJDEP, NJ Department of Community Affairs (NJDCa), 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 RICC). The RICC 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.



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



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.”

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

SCALE




REGION

ACTION TYPE




Policy & Governance

PROJECT TIMELINE



OPERATIONS



MODERATE EFFORT


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.

PRIORITY FOR IMPLEMENTATION

1

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.


COORDINATION



MODERATE EFFORT


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.

COSTS



Costs would primarily be needed for creation of and maintenance of a project inventory.

IMPLEMENTABILITY



MODERATE EFFORT

A coordinated regional project inventory that is publicly available would require careful planning to ensure it is clear, informative, and digestible.



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



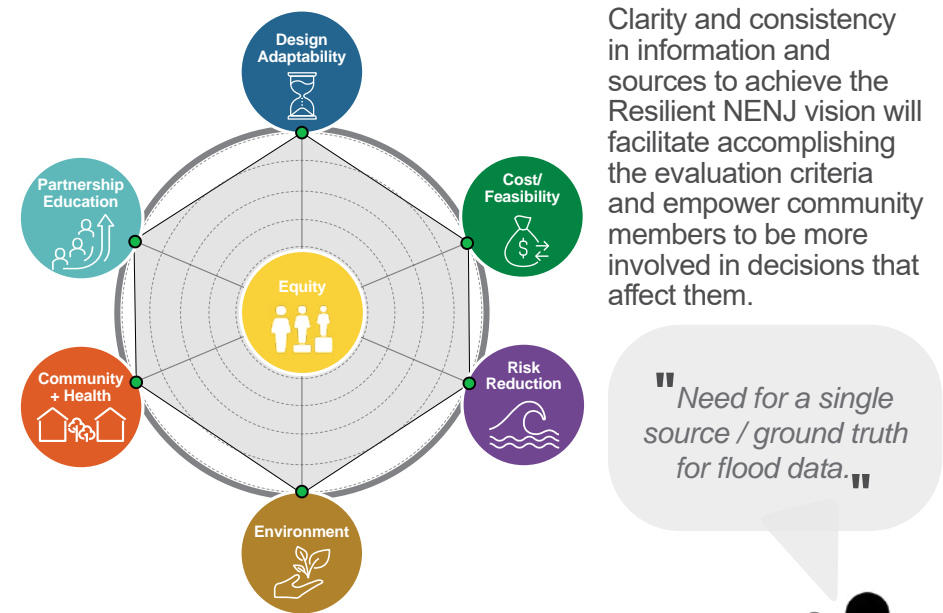
WHAT ISSUES DOES THE ACTION HELP ADDRESS?

- 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




Clarity and consistency in information and sources to achieve the Resilient NENJ vision will facilitate accomplishing the evaluation criteria and empower community members to be more involved in decisions that affect them.

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

SCALE




STATE

This action includes roles at the municipal or regional levels, but primarily aims to increase consistency across the state.

PRIORITY FOR IMPLEMENTATION


1

PROJECT TIMELINE




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.

COSTS



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.


OPERATIONS



MODERATE EFFORT

Budget will need to be allocated to accomplish and maintain this action, but it does not involve an entirely new management structure.


COORDINATION



MODERATE EFFORT

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.

IMPLEMENTABILITY



MODERATE EFFORT

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.

Outreach, Education & Capacity Building

02. EXPAND LEADERSHIP AND CAPACITY TO MANAGE CLIMATE RISK

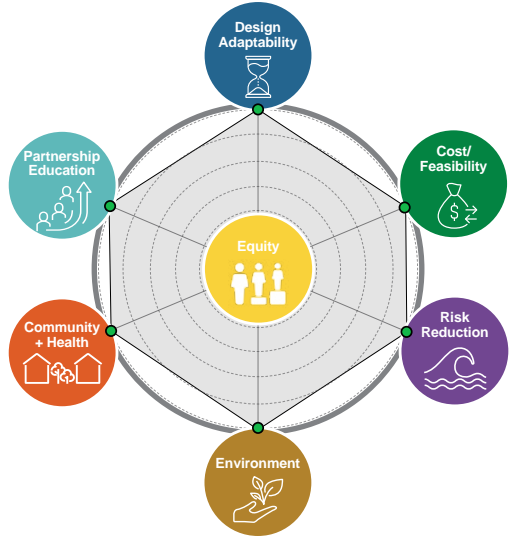
Outreach

EASE
PROTECT
CONNECT

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

CONSIDERATIONS FOR IMPLEMENTATION

SCALE

CITY

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

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.

ACTION TYPE

PRIORITY FOR IMPLEMENTATION

1

Outreach, Education & Capacity Building

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

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.



NENJ WORKSHOP IN NEWARK
Image Source: Resilient NENJ

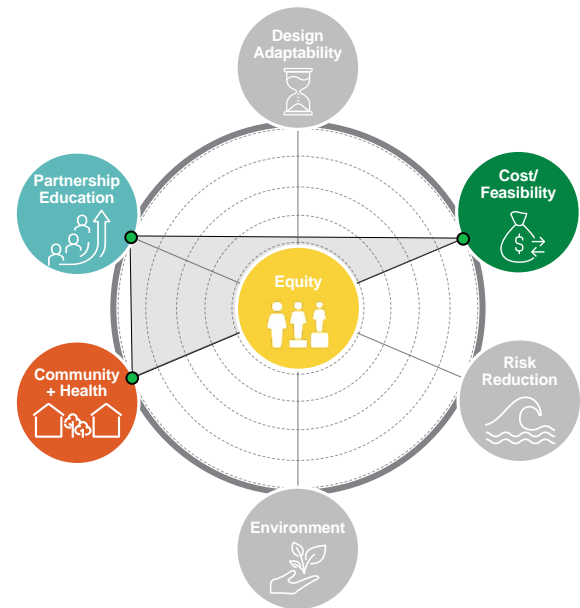
"Limited local capacity: local staff are spread too thin and don't have the capacity to manage complicated projects over the short or long term. Planning or project fatigue."

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.

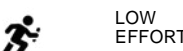
COORDINATION



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).

The image displays four interactive posters from Resilient NENJ, each designed to engage the public in understanding flood risk and resilience.
Poster 1: WHERE DO NEW FLOOD MODELS SAY WE SHOULD EXPECT IT TO FLOOD? This poster features two maps of the New Jersey Department of Environmental Protection (NJDEP) developed new flood models. The top map shows potential flooding from rainfall over a 24-hour period from a major storm (like Ida). The bottom map shows potential flooding that would be expected for current conditions and what we think conditions could look like in 2070. It includes a legend for 'What's the Flood Risk?' and 'What's the Flood Risk in 2070?'.
Poster 2: WHAT MIGHT FLOOD PROTECTION ACTIONS LOOK LIKE? This poster shows a range of physical projects that can help address different sources of flooding. It is organized into three columns: 'GREEN INFRASTRUCTURE' (e.g., Rain Garden, Permeable Pavement), 'DRAINAGE SOLUTIONS' (e.g., Stormwater Detention, Stormwater Detention), and 'COASTAL FLOODING SOLUTIONS' (e.g., Flood Protection Structures, Beach Nourishment). Each column has a 'DROP A POST-IT' box for feedback.
Poster 3: WHAT NON-PHYSICAL OPTIONS ARE AVAILABLE TO HELP US ADDRESS FLOODING? This poster asks the audience to drop a post-it to let them know what they like and don't like about these options. It includes a table for 'WHAT'S MOST IMPORTANT?' and 'WHAT'S NEEDED SOONER RATHER THAN LATER?'.
Poster 4: HOW SHOULD WE EVALUATE DIFFERENT POSSIBLE FLOOD RISK SOLUTIONS? This poster asks the audience to mark their top two evaluation criteria. It includes a table for 'THRESHOLD CRITERIA' and 'ALTERNATIVE EVALUATION CRITERIA'. It also asks 'WHAT ARE WE MISSING? DO YOU HAVE ANY OTHER CRITERIA?' and includes a 'DROP A POST-IT OR USE THE DRY ERASE MARKER' box.

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

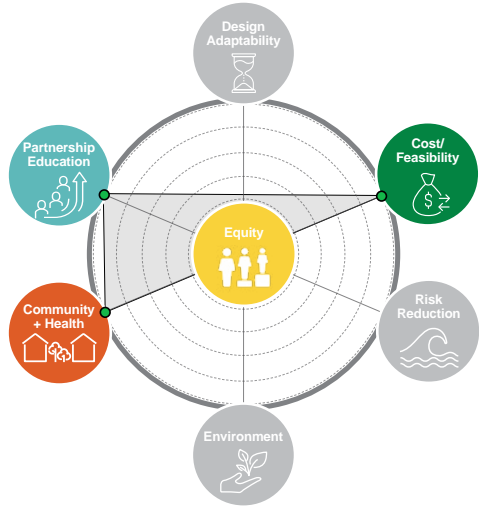
04. INCREASE AVAILABILITY OF PROJECT-RELATED INFORMATION ON MUNICIPAL WEBSITES

Outreach

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.

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.



EASE
PROTECT
CONNECT

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.

CONSIDERATIONS FOR IMPLEMENTATION

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

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**.

ALERTS NEWS SUBMIT A CONCERN SCL PORTAL CALENDAR & EVENTS FORMS COVID TESTING QUICK LINKS

COVID RESOURCES Government Departments Residents Business

Search...

SEARCH

RESILIENT BUILDINGS DESIGN GUIDELINES ADDENDUM

This addendum provides guidance and technical resources on how to mitigate rainfall flooding impacts internal to a property.

HOBOKEN RENEWABLE ENERGY PROGRAM

Offers residents 10% more renewable energy for a lower cost than PSE&G and the opportunity to opt up to 100% green electricity.

10/13 AT 6:30 PM REGISTER FOR THE WORKSHOP AT: www.hobokennj.gov/resilientbuildingsworkshop

RESILIENT BUILDINGS WORKSHOP

Resilient Buildings Workshop on October 13, 2021 to provide information on how residents can protect their buildings from flood damage

HOBOKEN PROJECTS AND INITIATIVES WEBPAGE

Image Source: City of Hoboken

"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.

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

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

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.

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

SCALE

REGION

ACTION TYPE

Outreach, Education & Capacity Building

Emergency Response & Preparedness

Service & Program Development

Improved outreach, engagement, and capacity building is achieved through development of an outreach ambassador program, which could be leveraged for emergency preparedness and response.

PRIORITY FOR IMPLEMENTATION

1

PROJECT TIMELINE

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.

COSTS

Costs include that to support time to develop and start-up the outreach ambassadors program and funds to compensate ambassadors.

OPERATIONS

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.

COORDINATION

This action will require significant coordination at the regional level and between municipal leaders, community-based organizations, and community members.

IMPLEMENTABILITY

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

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.

EASE
PROTECT
CONNECT

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 educators²



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

² 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



REGION

ACTION TYPE



PRIORITY FOR IMPLEMENTATION

1

PROJECT TIMELINE

Ongoing

Materials are already developed that can be used in new settings. Additional materials or activities can take several weeks to draft and finalize.

COSTS



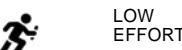
A strategy that includes a range of forms of engagement, from in-person facilitation to materials development, over the course of a year could potentially be partnered with the regional art coordinator position and initiative.

OPERATIONS



Although budget may need to be allocated, youth engagement activities do not involve any unique operations.

COORDINATION



Youth engagement activities are best as collaborative efforts but there are also many groups already leading this work.

IMPLEMENTABILITY



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



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

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?

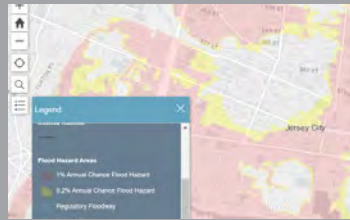
- Community members have first-hand experience about hazards that is important to integrate into planning processes.
- Models are inherently limited. At the hyper-local scale, hazard conditions can be variable depending on the event.
- Much flood related data are out of date, and real-time data can help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

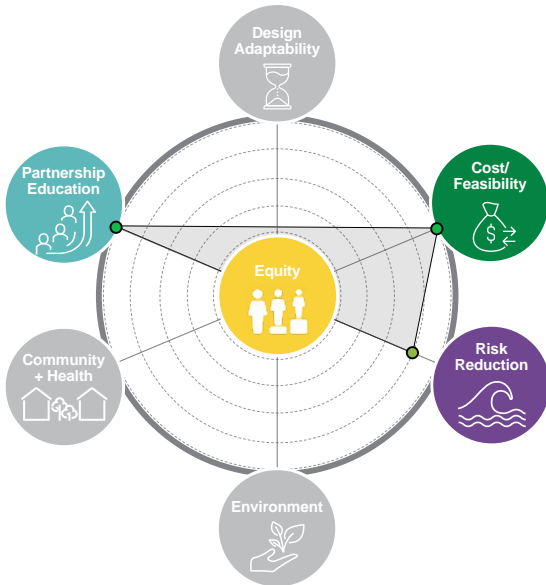


Newark: [nwkfloodmapper](#)

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.

EASE
PROTECT
CONNECT

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

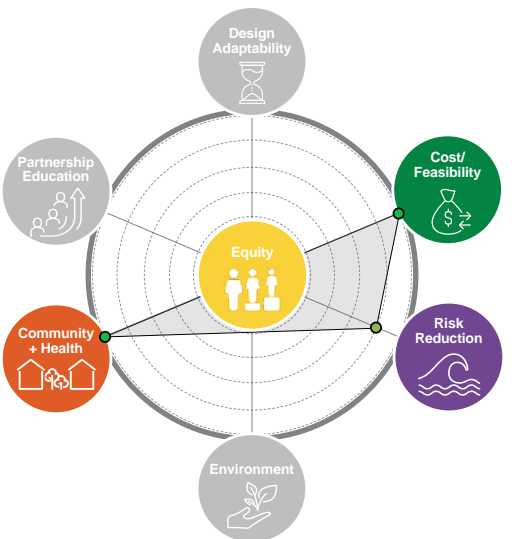
Outreach

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

SCALE



CITY

This action aims to increase cities’ capacities for leadership, although support at the state level will be critical

PROJECT TIMELINE



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.

COSTS



Costs include those for the funding contract and the time to organize systems for positioning.

ACTION TYPE



Outreach, Education & Capacity Building

OPERATIONS



LOW EFFORT

COORDINATION



LOW EFFORT

IMPLEMENTABILITY



MODERATE EFFORT

PRIORITY FOR IMPLEMENTATION

3

Leverage existing governance structures to support funding contracts and improvement of processes.

Limited new coordination is required for this action.

This action includes industry best practices for post-disaster funding, but implementations of new systems and processes may be challenging.

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 requirement¹ 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

¹ 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**).

EASE
PROTECT
CONNECT

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."

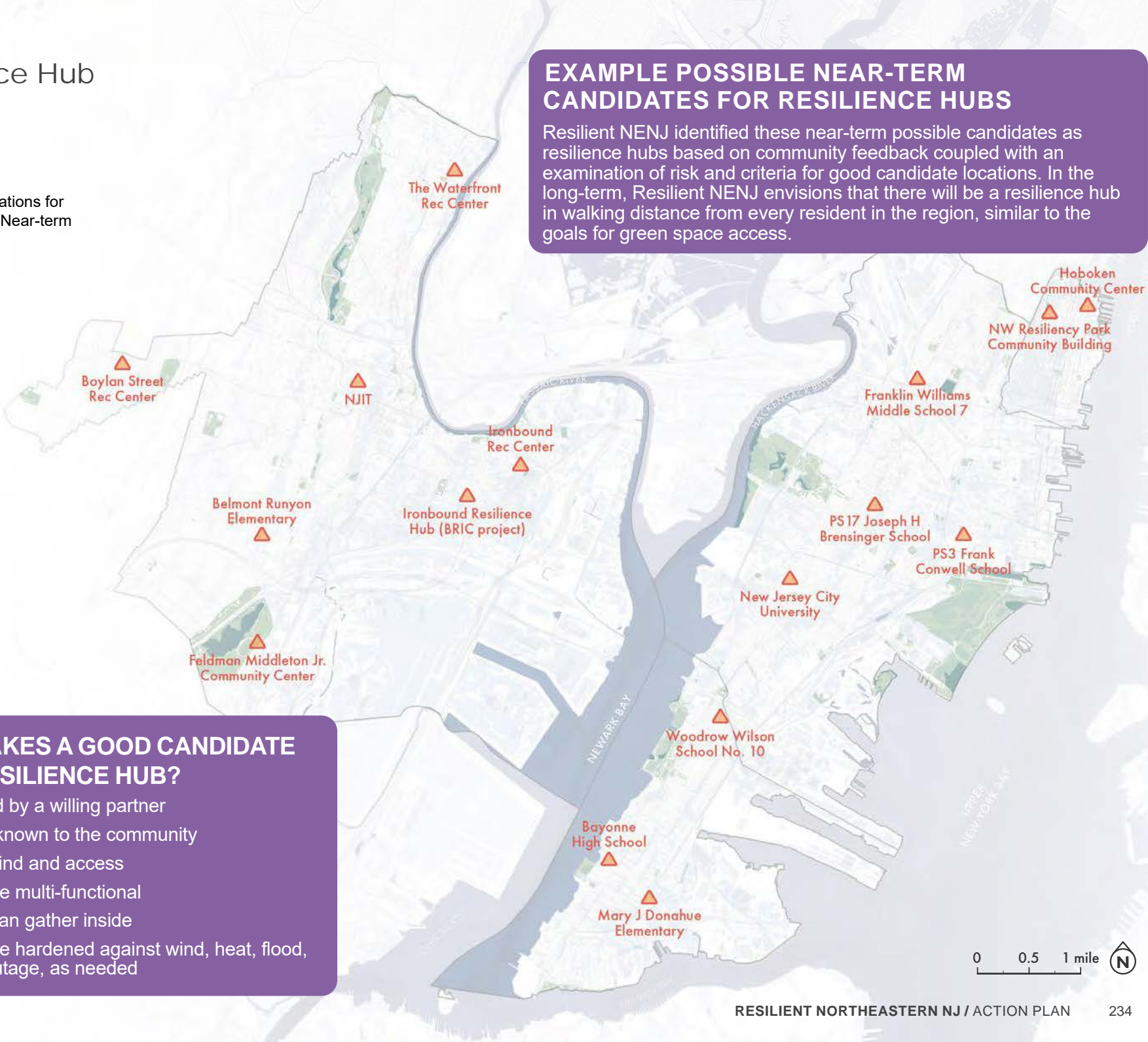
"Would love public food hubs."

"(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

CONTINUED

Service

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.

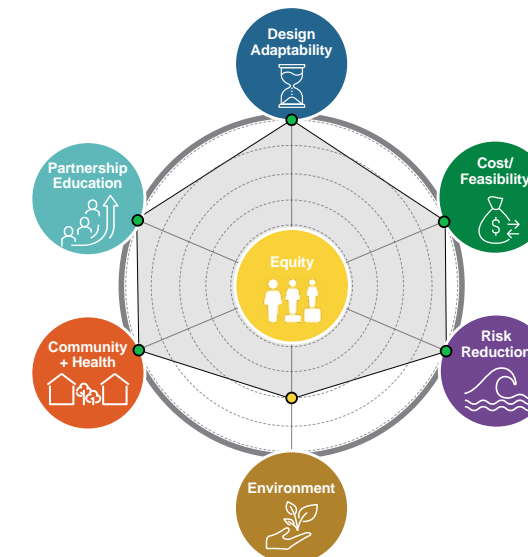
The hub can act both as a place that community members go during extreme heat and flooding while directly addressing flooding, heat, and increasing the capacity for the community to withstand flood or heat events.



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

PRIORITY FOR IMPLEMENTATION

1

PROJECT TIMELINE



Resilience hubs address multiple needs and, can help provide resources to highest-risk people, and tie in with other recommendations in this Action Plan.

SCALE



REGION

ACTION TYPE



COSTS



TO



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.

OPERATIONS



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.

COORDINATION



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.

This action involves significant coordination across multiple scales, but coordination largely already exists across many of these stakeholders.

IMPLEMENTABILITY



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

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.

" 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."

EASE
PROTECT
CONNECT

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



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



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



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

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.

ACTION TYPE



Service & Program Development



Outreach, Education & Capacity Building

PROJECT TIMELINE



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

"Trash in Newark Riverfront Park during rain or high tide - mattresses, baby diapers, plastic cups. Erosion of the river is also visible."

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

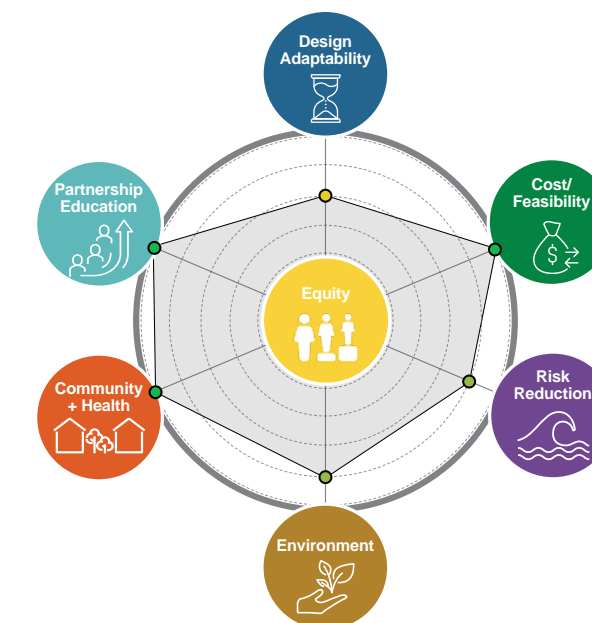
IMPLEMENTABILITY



LOW EFFORT

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

EVALUATION CRITERIA



Reducing waste will help address near-term needs to increase the capacity of the stormwater system, while supporting community health and engagement.

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**.



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.

EASE

PROTECT

CONNECT

WHAT ISSUES DOES THE ACTION HELP ADDRESS?

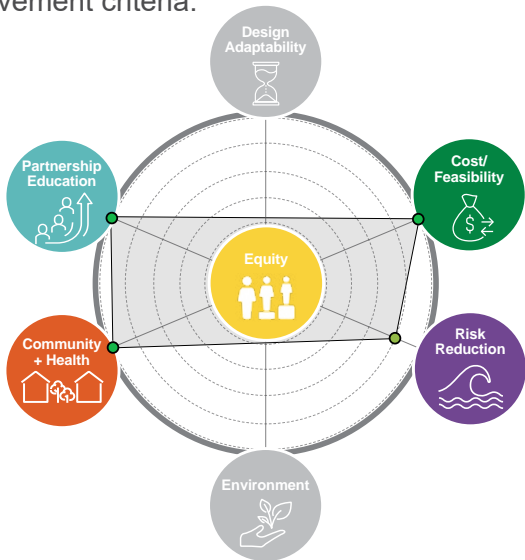
- Depending on the resources included, this action could help improve access to resources that address various hazards such as heat waves, poor water quality / water supply, and vector-borne diseases.

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.



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**.



COUNTY

- Support distribution of resources to residents



INDIVIDUALS & BUSINESS/INDUSTRY

- Obtain and use resources, seek guidance and support as needed



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.



CITY

- Support distribution of resources and provide guidance to residents on use of the resources



ACADEMIA

- Help prioritize hazards and identify potential resources / materials for distribution



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

CONSIDERATIONS FOR IMPLEMENTATION

SCALE



REGION

ACTION TYPE



PRIORITY FOR IMPLEMENTATION

3

This action is largely aimed at "taking the edge off" of impacts from hazards and could complement grant and incentives programs

OPERATIONS



COORDINATION



IMPLEMENTABILITY



This program will require a refinement of existing programs or creation of a new program to support the purchase and distribution of materials

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.

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.”¹ 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.

¹ 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.”¹

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.

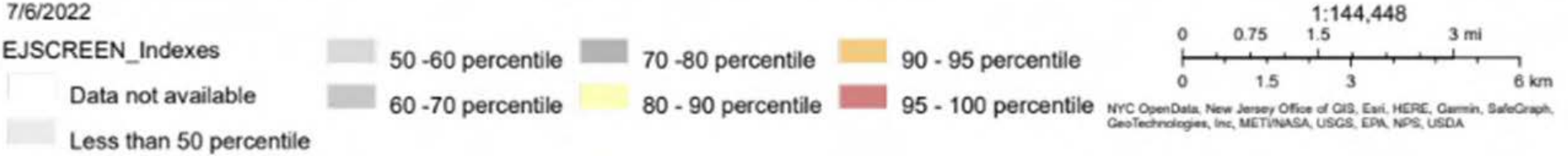
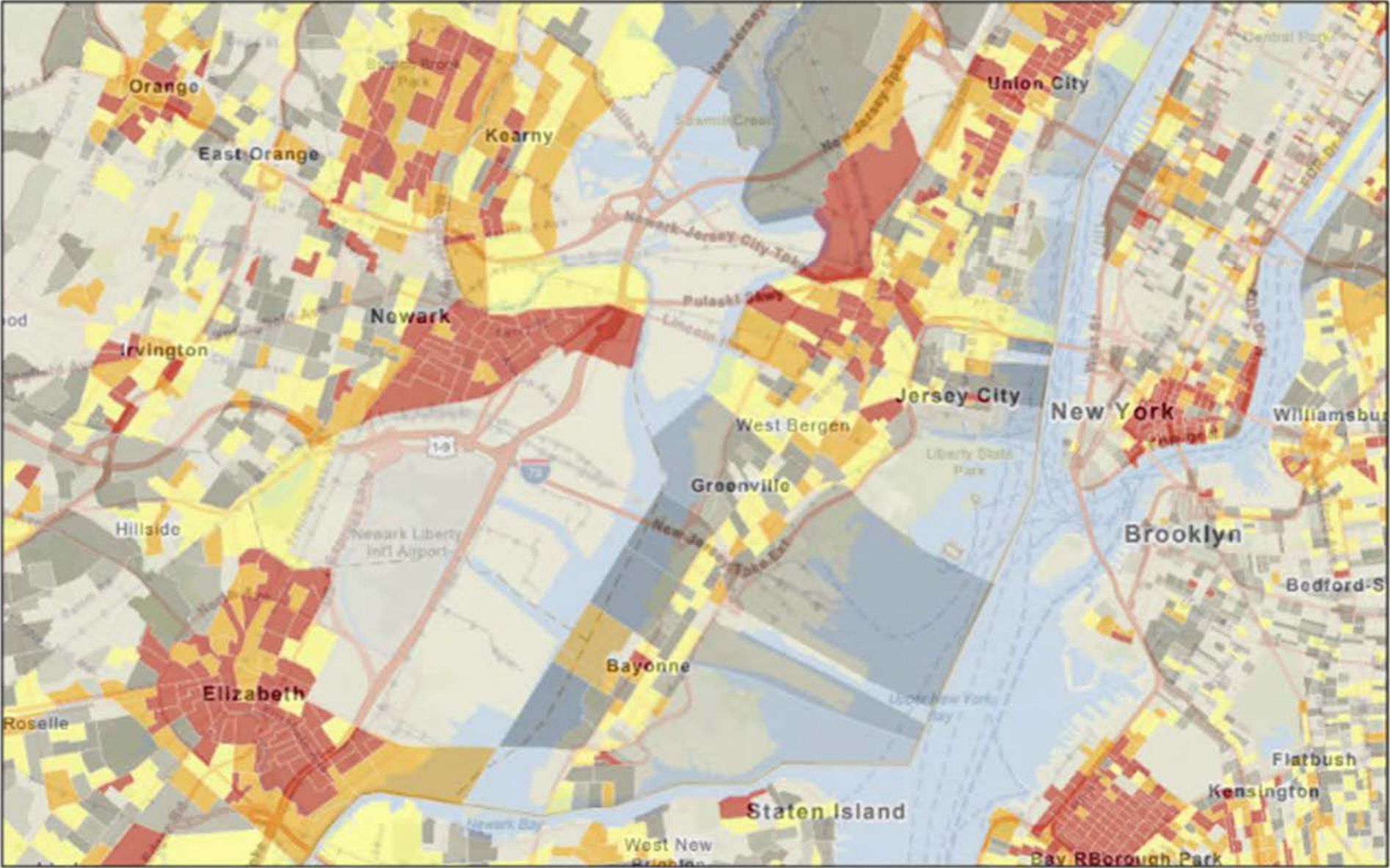
This action intersects with action **Outreach-05** in **Section 3.3.2** (Improve outreach to and emergency planning for vulnerable and at-risk populations). That section describes how outreach, education, and capacity-building actions can increase resilience by empowering people (such as residents or community-based organizations) to get involved and act. This action is more focused on responsibilities of emergency managers, but there is some overlap.

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

Emergency

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

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



REGION

- Continue to share best practices across municipalities
- Support implementation of related actions under **Section 3.3.2** and **3.3.3**



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**)



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

This action includes roles at the municipal level, but primarily aims to increase consistency across the state.

ACTION TYPE



PRIORITY FOR IMPLEMENTATION

1

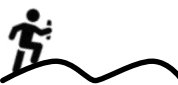
COSTS



PROJECT TIMELINE



OPERATIONS



MODERATE EFFORT

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.

COORDINATION & IMPLEMENTABILITY



MODERATE EFFORT



HIGH EFFORT

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

Emergency

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

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.¹ 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.

¹Waugh, B., Pagano, C., & Visone, L. (2022, April 27). Regional Emergency Management Discussion. Virtual.

EASE

PROTECT

CONNECT

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

CITY

REGION

ACTION TYPE

Emergency Response & Preparedness

COSTS

VARIES

PROJECT TIMELINE

⌚⌚⌚⌚⌚

Actions require development and communication of procedures, as well as acquisition and logistics planning for vehicles and equipment

PRIORITY FOR IMPLEMENTATION

1

EVALUATION CRITERIA



This action will reduce risk to life safety during disasters and increase capacity to address emergency needs.

OPERATIONS

⚙️

MODERATE EFFORT

Varies by best practice

COORDINATION

👥

MODERATE EFFORT

IMPLEMENTABILITY

🚶

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

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. "

EASE

PROTECT

CONNECT

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.

PROJECT TIMELINE

Time to complete these activities may vary, with components related to information and communications being quicker and changes for debris removal and post-disaster recover positioning taking longer.

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

4.0

IMPLEMENTATION PATHWAYS

WHO WILL IMPLEMENT THIS PLAN?

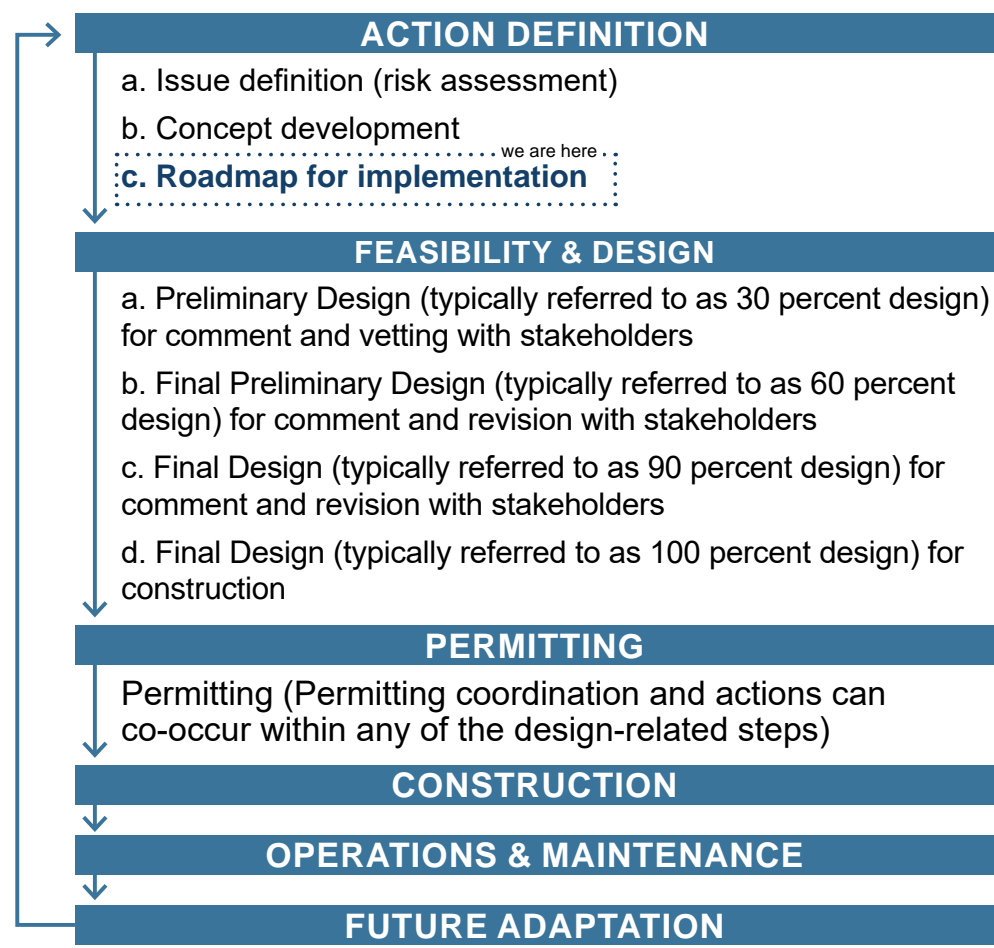
Climate-related risk affects everyone at all scales, whether individuals or state agencies, whether at the scale of the home or business or entire region due to impacts to transportation, for example. Just as climate risk is varied but ubiquitous, implementation requires coordinated action across many different types of actors at multiple scales. Everyone has a part to play, but someone will always need to take the lead on different actions, and who is most closely involved will depend upon the action. For example, individual home or business owners will need to take charge of making improvements to their properties, but they may need support from programs administered by their municipality or the state, such as through action **Service-03** in **Section 3.3.3** (Increase resident access to resilience-related resources). Municipalities, state, or infrastructure entities, depending on the location, will need to raise existing infrastructure to act as barriers and protect communities (action **Coastal-02** in **Section 3.2.1**), but will need to engage with community members that could be affected and coordinate across multiple agencies for approvals, design, and construction. **Section 5.0** identifies key next steps for each of the entities shown below, as applicable.



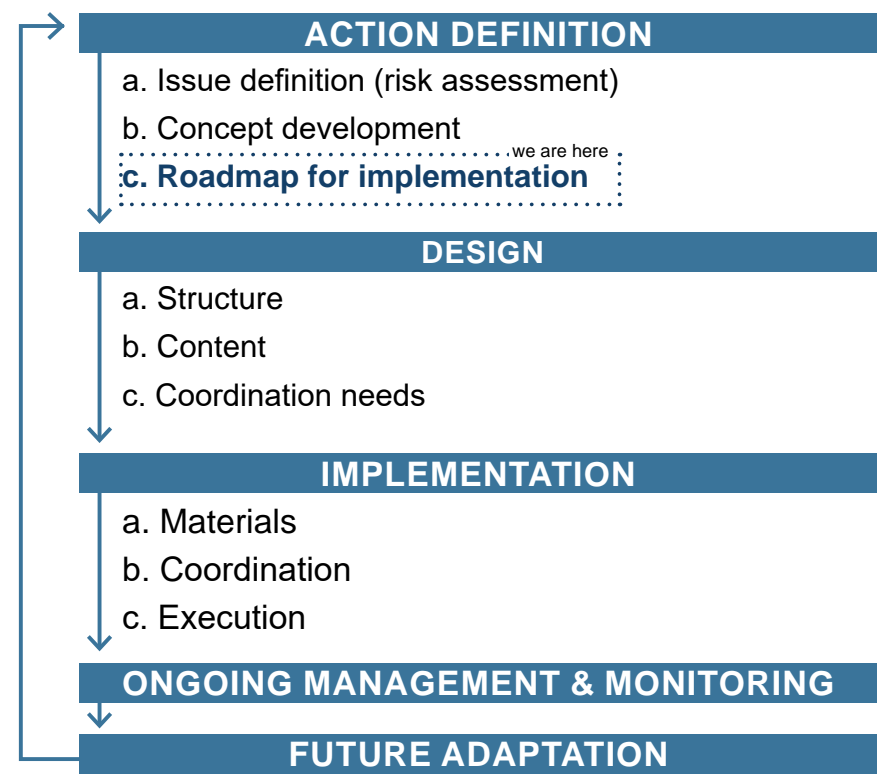
Resilient NENJ recommends actions that will change the built and natural environment and will also change the way we work together to build resilience. Resilient NENJ has directly initiated some of the changes it recommends, but most others will require effort to get off the ground. Further, Northeastern NJ (NENJ) exists within a dynamic urban environment in an ever-evolving risk context. This means that no action will be “one and done,” or that there is no quick fix. All recommendations will need to be monitored for performance following implementation, and periodically adapted to changing needs and circumstances (see **Section 5.0** for more periodic review and update recommendations). This section outlines key questions and implementation considerations that formed the foundation for roadmap recommendations in **Section 5.0**. These considerations will also be relevant for any resilience-related plans and projects into the future.

What are the stages of implementation for...

An action that will change the built or natural environment through construction?

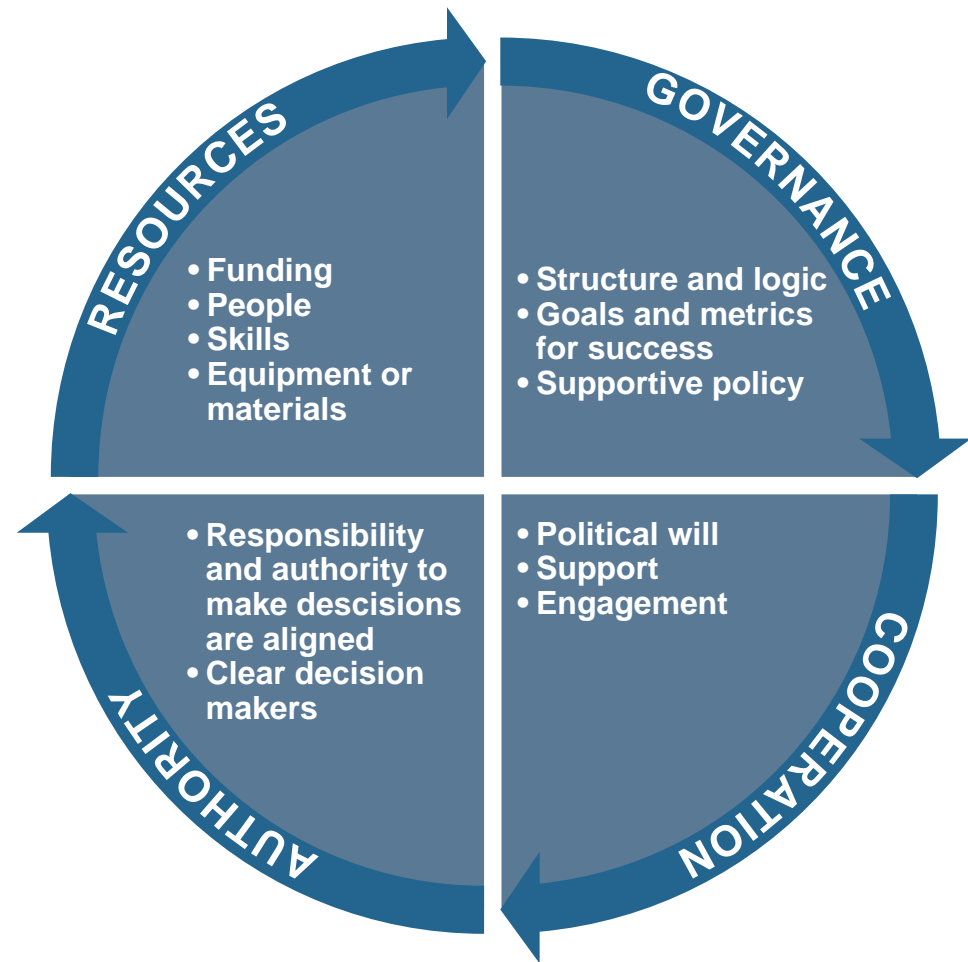


An action that will change the way we work together or a policy or program that will affect the built and natural environment?



WHAT DOES IT TAKE TO ACCOMPLISH ANY STAGE OF AN ACTION?

Implementation needs depend on many factors, including action type, scale, and complexity, as well as the stage of implementation, but all actions will require the same essential components: Resources, Governance, Cooperation, and Authority. **Section 5.0** (The Roadmap) describes these needs for Action Plan implementation, as applicable.



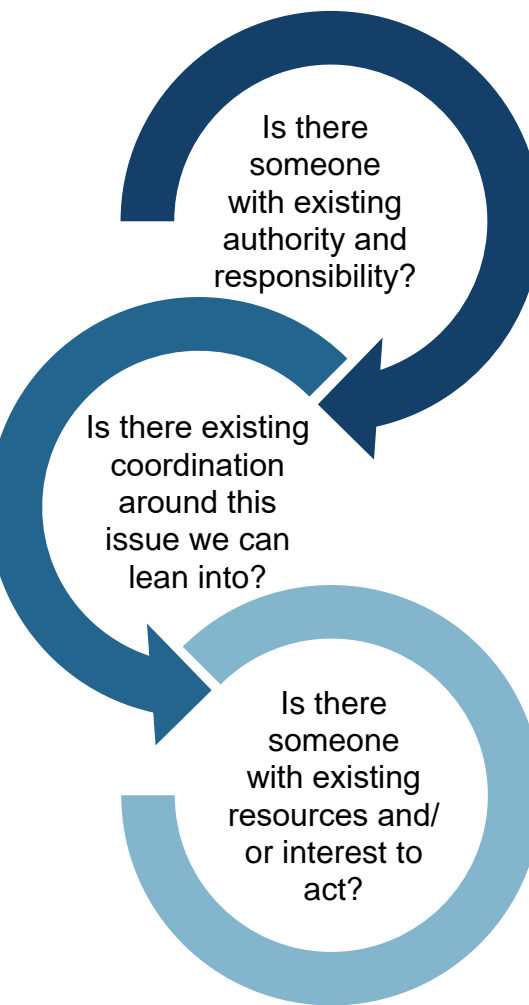
Due to the scale and urgency of risk in the region, multiple (perhaps many) actions should be completed simultaneously. Small scale projects and larger scale projects often differ in complexity and sources of funding, which provides room for different stakeholders with different levels of resources and capacity to contribute. Projects can be implemented in increments, allowing time for funding to be acquired and permitting and design to be finalized. Over the near and medium-term, small scale and large scale projects and initiatives will be implemented across simultaneous implementation pathways.

HOW DO WE IDENTIFY WHO MIGHT TAKE THE LEAD ON IMPLEMENTING...

An action that will change the built and natural environment?



An action that will change the way we work together?



PUBLIC OR PRIVATE FUNDING? OR BOTH?

Resilience actions in NENJ will provide both public and private benefits, and as such, public and private investments for implementation must be coordinated effectively. Residents, business owners, and visitors will experience direct flood risk reduction and benefits to public spaces and infrastructure, such as transportation, as well as the economic and social benefits from reduced risk of disruption. Improved public spaces will benefit residents, workers, and visitors, as well as the businesses around them. Resilience actions in NENJ likely require a combination of coordinated private and public investment, insurance coverage, improved processes for coordinating and entitling or permitting protective measures, updated policies, possible new flood-related public services and outreach, and other cooperative actions designed to provide the greatest protection and quality of life improvements.

HOW MIGHT ACTIONS BE FUNDED?

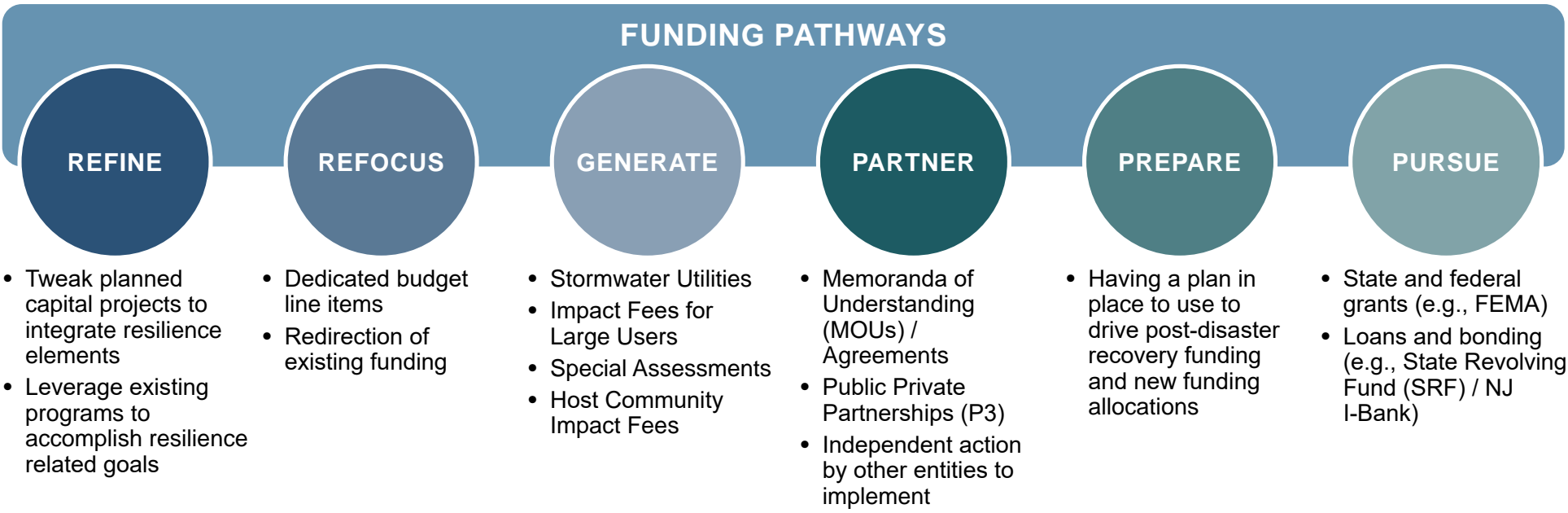
Funding pathways come in two broad categories: 1) those that use or maximize resources available to the person or entity responsible for implementing any stage of an action; 2) those that share the burden with outside sources.

Maximizing local funding available:

- **Refine** – Refining or altering a project or program scope to do more – such as incorporating resilient design measures into a highway improvement to prepare for climate change, or integrating resilience into an energy improvement technical assistance program.
- **Refocus** – Reprioritizing or refocusing funding from an existing project, funding bucket, or program to a different area
- **Generate** – generating revenue or action, often through something like a stormwater fee or incentive.

Sharing the burden:

- **Partner** – partnering with others, such as through a public private partnership or mutual aid agreement, to accomplish an action
- **Prepare** – Preparing for funding that comes through a new congressional allocation (such as the Bipartisan Infrastructure Law or Inflation Reduction Act, both released in 2022 – see **Appendix C**) or is expected post-disaster (such as FEMA’s Public Assistance 406 Mitigation, FEMA’s Hazard Mitigation Grant Program, or HUD’s Community Development Block Grants Mitigation program). This can be done through the development of post-disaster redevelopment plans, as well as the development of project scopes and cost estimates that can be quickly implemented as funding becomes available.
- **Pursue** – pursuing funding from outside sources like philanthropic entities, state agencies, or federal programs (such as FEMA’s annually appropriated Building Resilient Infrastructure and Communities program).



FITZPATRICK PARK
Fitzpatrick Park renovations include upgrades to the neighborhood’s stormwater system, which will reduce stormwater runoff. The project was partially funded by a Hudson County Open Space Trust Fund Grant and funding through the New Jersey Water Bank state revolving fund.
Image Source: Resilient NENJ

MAXIMIZING LOCAL FUNDING AVAILABLE

Resilient NENJ recommends that municipalities, counties, and major infrastructure providers allocate portions of their capital budgets directly to climate resilience effort staffing and implementation. Resilient NENJ recommends that these entities review existing capital improvements plans and master plans for opportunities to **REFINE** or **REFOCUS** projects and programs to increase resilience or contribute to resilience-related goals. Generally, all investments should be evaluated for resilience-related opportunities and risks. A stormwater utility could be a promising method to generate additional local funding. **Appendix C** includes more opportunities for local funding pathways beyond those discussed in this section.

THE CASE FOR DEDICATED FUNDING

Most external funding sources incentivize local “skin in the game” – local commitment to support funding of capital improvements. Private partners and entities are also more likely to contribute to endeavors that are supported in some way through local public investment. In 2019, the City of Boston’s Mayor at the time, Marty Walsh, pledged to allocate a percent of the city’s new capital improvements budget to climate resilience.¹ Municipalities and counties in NENJ could consider the same action to help encourage and leverage additional external funding.

RECOMMENDATION: CONSIDER IMPLEMENTING A STORMWATER UTILITY

In March 2019, the Stormwater Utility Law, officially known as the “Clean Stormwater and Flood Reduction Act,” was signed into law in New Jersey. This law gives local and county governments and certain utilities the ability to create stormwater utilities that can assess fees and use the revenue to maintain stormwater management infrastructure. Jersey City, Newark, and Hoboken all are in the process of assessing the feasibility of stormwater utilities in their municipalities as a mechanism to fund and maintain stormwater infrastructure. Resilient NENJ recommends that the municipalities share lessons learned at the region level and consider collaborating around community engagement and advancement of the opportunities.

WHAT IS A STORMWATER UTILITY?

Typically, residents and property owners in an area pay fees to utility companies for services such as water, sewer, electricity, and gas. A stormwater utility creates the ability to assess fees to fund stormwater management programs, based on the approximate contribution of stormwater runoff from a property. A stormwater utility is like any other utility and can be a valuable tool for implementation of stormwater management practices for new and redeveloped areas. The utility could create incentives for retrofits on private property and provide dedicated funding for beneficial public stormwater projects and maintenance activities.

There are different types of stormwater utilities and varying strategies for calculating stormwater fees that can be explored. Stormwater fees are usually based on the impervious footprint of a property. While property taxes are solely based on the value of a property, the Clean Stormwater and Flood Reduction Act requires stormwater fees to be based on a fair and equitable approximation of proportionate contribution to stormwater runoff. Properties with more impervious area and thus those that contribute the most to stormwater runoff will pay higher fees than properties with minimal impervious area.

Credits can be used to provide incentives to implement best management practices and reduce a property’s stormwater fee. These credits can improve equity during implementation and reward properties that manage stormwater on their own property or minimize impervious areas. Stormwater utility fees could reduce the pressure to raise taxes to fund critical improvements, provide a dedicated funding source for stormwater management, and create a more equitable allocation of costs because higher property values do not necessarily contribute higher amounts of stormwater runoff. Furthermore, tax-exempt properties are also responsible for paying stormwater fees based on their contributing runoff, making stormwater utilities more equitable.

EXAMPLE POSSIBLE LONGER-TERM OPPORTUNITIES TO INVESTIGATE AND CONSIDER

Due to the ubiquitous need for investment in resilience-related infrastructure, municipalities and their stakeholders nationwide are investigating creative options and long-term opportunities for funding.

Examples to GENERATE funding include the following:

- District for Resilience Improvements: Similar to a stormwater utility or special assessment district (see below), a District for Resilience Improvements could be focused on funding all resilience related improvements within a geography or region. A report produced by Boston’s Green Ribbon Commission provides a detailed exploration of this model.²
- Citywide surcharges or fees: Options for a basis of assessment could be sales tax, hospitality fees, parking fees, and more.
- Special Assessments: Special assessments levy a portion of property value needed to make public improvements. Waterfront property owners, and those within the future flood area, could be offered subsidies if the owner contributes resources to project construction. Massachusetts I-Cubed program levees special assessments on developers’ property to pay for economic development projects.

The following are potential longer-term opportunities to explore to support financing of projects:

- Crowdfunding “minibonds”: The City of Denver undertook a successful “minibond” program to permit smaller scale investments by Colorado residents in its Better Denver program. The bonds were offered at amounts as low as \$500 and allowed investors to earn returns several times what was being offered on savings certificates of deposit (CDs), while investing in projects that would benefit the community. Other cities are using new online platforms such as Neighborly or Infrashares to package and sell bonds to smaller scale investors.
- Outcome-Based / Social Impact Bonds: In the infrastructure context, outcome-based bonds can be used to repay investors if infrastructure achieves a desired social goal, such as runoff or emissions reduction. The DC Water Green bond, which will help fund green stormwater infrastructure, is the first example of applying this kind of approach to an infrastructure solution
- Green / Sustainability Bonds: In September 2017, the Massachusetts Bay Transportation Authority (MBTA) issued the first tax-exempt sustainability bond in the nation, valued at \$370 million, certified to the ICMA (International Capital Markets Association) standard, and was able to secure lower interest rates. In the last few years the New York Metropolitan Transportation Authority (MTA) issued several green bonds totaling over \$300 million, certified to the Climate Bonds Initiative standard.
- Community Based Public Private Partnerships (CBP3s)³ – CBP3s involve contracting with a private entity that will fund the implementation of a project up front, maintain a solution, and be paid on a performance basis.

¹ <https://www.boston.gov/news/278-billion-be-invested-boston-neighborhoods-through-fy20-24-capital-budget>
² *Expanding Boston’s Capacity to Build Coastal Resilience Infrastructure Lessons from the Seaport District, April 2020.* <https://greenribboncommission.org/document/expanding-bostons-capacity-to-build-coastal-resilience-infrastructure-lessons-from-the-seaport-district/>
³ <https://www.epa.gov/G3/financing-green-infrastructure-community-based-public-private-partnerships-cbp3-right-you#:~:text=A%20CBP3%20is%20a%20partnership.provide%20flexibility>

SHARING THE BURDEN

PARTNER: PRIVATE PATHWAYS FOR FUNDING CAPITAL PROJECTS

Private property owners have incentive to act to reduce direct (e.g., through damage) and indirect (e.g., through loss of value from repeated flooding or increased insurance costs) climate-related risk to their properties in the near, mid, and long term. Through coordination and refinement of private development and redevelopment plans, private investment could both contribute to a broader district vision and increase the resilience of individual properties. Property owners can take direct action on their properties or integrate improvements through natural repair and replacement cycles, such as for bulkheads. Adjacent property owners with shared risk could consider establishing a sinking fund through a memorandum of agreement for resilience expenditures, which may cover annual operations and maintenance costs, debt repayment, or direct capital investment, depending upon timing of project implementation. Public private partnerships are a possible mechanism to support funding of projects.

THE NEED TO PREPARE

Post-disaster is an intense and urgent time for everyone who has been affected by an event, and crises do not provide the best opportunities for wise decision making. By their very nature, crises require **reactive** as opposed to **proactive** decision making. Nevertheless, post-disaster periods bring a lot of political willpower, funding, and momentum to create change. This energy can yield the most long-term benefit when informed by both urgent needs made apparent from the disaster and existing plans developed through a thorough investigation of best available science and robust engagement strategies. Immediately post-disaster, it could be beneficial to convene a working group through Resilient NENJ to prioritize proposed projects for funding pursuits.

FUNDING SOURCES TO PURSUE

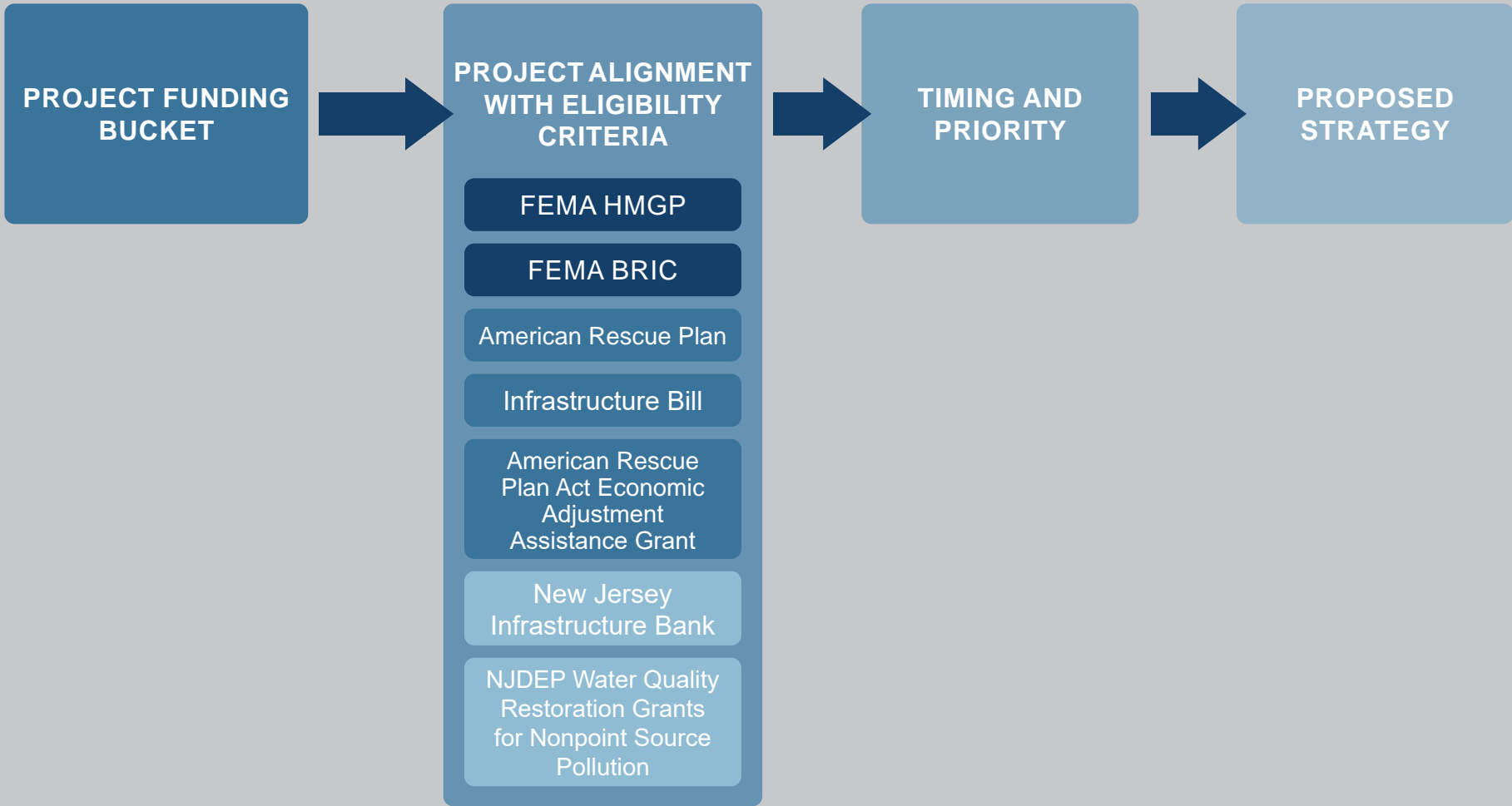
State and federal agencies offer multiple grant and loan programs. Additionally, the Infrastructure and Investment Jobs Act (IIJA), or Bipartisan Infrastructure Law, has made available billions of dollars in funding for resilience focused projects over the next five years. Funding sources have different availability, eligibility criteria, focuses, and timeframes which means that not just any source can be used towards any project. Appendix C contains detailed information on these factors for various funding sources.

WHAT IS A SINKING FUND?

Sinking funds are common methods to fund infrastructure improvements made necessary through development over time. A sinking fund is a fund formed by periodically setting aside money for use over time or at a future date, or an agreement to fund actions once certain criteria are met. The model could apply to redevelopment areas or areas of private ownership and shared risk, in particular.

HOW DO WE DECIDE WHAT FUNDING TO PURSUE FOR A GIVEN ACTION?

SAMPLE PROJECT-FUND MATCHING



FEDERAL GRANTS

Federal grants are a common mechanism for resilience-related improvements. Below are some key examples, divided by category and type of availability. **Appendix C** provides additional details.

- Post-disaster federal funding programs
 - FEMA Public Assistance (specifically 406 and Alternate Procedures)
 - HUD Community Development Block Grants for Disaster Recovery or Mitigation (CDBG-DR or CDBG-MIT)
 - FEMA Hazard Mitigation Grant Program (HMGP)
- Programs funded through recent congressional appropriations
 - American Rescue Plan Act (ARPA) funds
 - US Department of Energy, Energy Efficiency and Renewable Energy funding
 - USDOT PROTECT
- Annual competitive programs
 - FEMA Building Resilient Infrastructure and Communities (BRIC)
 - National Fish and Wildlife Foundation (NFWF) Grants
 - EPA Brownfields funding

FEDERAL ALLOCATIONS

Resilient NENJ recommends that the USACE HAT study⁴ integrate Action Plan recommendations. This could provide another opportunity to help accomplish coastal flood protection goals.

While much of the funding from the Bipartisan Infrastructure Law and Inflation Reduction Act (see **Appendix C**) will be moving through existing state and federal programs, these bills are examples of the type of congressional action needed to support Resilient NENJ recommendations. Congress could also consider direct allocations to fund regionally coordinated and organized efforts like Resilient NENJ, which provide streamlined pathways for implementation and remove resources wasted competing for limited funds.

FEDERAL PROGRAM HIGHLIGHTS

FEMA’s BRIC program and HUD’s CDBG-DR programs have both already supported funding for Resilient NENJ related initiatives. CDBG-DR funds supported the initial Resilient NENJ planning effort, and BRIC funding will support implementation of the Ironbound Resilience Hub, Bayonne’s Cottage Street Park improvements, Bayonne’s 63rd Street Pumping Station, and the expansion of Hoboken’s Southwest Resiliency Park (for more on these efforts, see **Section 2.0**).

⁴ See **Section 2.0** for more on the HAT study, as well as the website: <https://www.nan.usace.army.mil/Missions/Civil-Works/Projects-in-New-York/New-York-New-Jersey-Harbor-Tributaries-Focus-Area-Feasibility-Study/>

STATE GRANTS AND LOANS

The State of New Jersey also has a number of funding opportunities that can be explored. **Appendix C** provides additional details.

- Shore Protection Grants and Loans
- Urban Park Grants
- Green Acres Program
- Blue Acres Buyout Program
- Clean Communities Grant
- Water Quality Restoration Grants, Nonpoint Source Pollution
- Environmental Infrastructure Financing Program
- Shore Protection Grants and Loans
- Natural Climate Solutions Grant
- Infrastructure Bank (I-Bank)

STATE ALLOCATIONS

The State receives federal congressional allocations post-disaster, such as through the American Rescue Plan Act, which responded to the pandemic, as well as through non-disaster allocations, such as through the Bipartisan Infrastructure Law. Balanced against other needs in the state, the urgency of need in the Northeastern NJ region coupled with its history of environmental justice issues necessitates that the area be a focus of the State’s decision making around such funding opportunities.

Further, the process of scraping together federal appropriations and grants, existing state grants, and local funding to accomplish major infrastructure projects is arduous and could delay projects that are urgent, now. The State could consider a state congressional appropriation to fund initial designs and feasibility studies to help catalyze action, as needed.

5.0 THE ROADMAP

INTRODUCTION

The roadmap articulates what could happen when, what it might cost based on current understanding, how it could potentially be funded, what is needed to support implementation, and who will need to take the lead. The roadmap is divided into two sections:

- Roadmap for capital projects (physical and nature-based solutions): The roadmap organizes capital projects **geographically by city**, even though different entities might need to lead different projects.
- Roadmap for non-capital actions (policy and governance; outreach, education, and capacity building; service and program development; and emergency response and preparedness)

Over the next 15 to 20 years, implementation of this roadmap could dramatically increase livability in the face of climate change.

WHAT IS A CAPITAL PROJECT?

A capital project involves construction, usually major construction, to provide, expand, or improve an asset. Capital projects usually include planning, design, permitting, construction, and must typically be operated and / or maintained over their useful life. The useful life is how long an asset can be enjoyed before it likely requires major renovation (usually in the form of a new capital project).

A living plan

Resilient NENJ’s Action Plan should be considered a living document. Resilient NENJ reflects a regional planning effort; as such, the timing, design, and approach to many solutions will be affected by findings of feasibility assessments, the implementation of other capital improvements, political will and public support, and funding availability. Further, Resilient NENJ exists in a dramatically changing risk context that scientists, planners, engineers, and others are all actively working to understand and anticipate. As new data and science emerge, and the people, places, and needs of the region evolve, new and different actions may be needed. The roadmap outlines recommended conceptual implementation schedules for the next 15 years, with 2022 as the base year. Future updates will be needed to chart next steps beyond this timeframe.

Monitoring plan implementation and success

It will be critical for Resilient NENJ and its partners to monitor changing data, conditions, community needs, as well as the implementation and lessons learned from recommended actions, and calibrate approach as needed over time. The Resilient NENJ Steering Committee should convene annually, at a minimum, to discuss goals, progress, resource needs, community feedback, and any necessary adjustments. The plan should be re-evaluated for progress, success, and the roadmap updated every five years or at another regular interval to ensure that the initiative remains current and responsive to the needs of its partner communities, organizations, agencies, and the people who live, work, and play in the region. These re-evaluations will likely result in new and updated initiatives and associated adjustment to the roadmap, as needed.



NEWARK RIVERFRONT PARK

This new and improved park amenity along the Passaic provides both recreation & green space, as well as some protection from coastal inundation.

Image Source: Waterfront Alliance

5.1

ROADMAP FOR CAPITAL PROJECTS - PHYSICAL AND NATURE BASED SOLUTIONS

Some of Resilient NENJ’s recommendations are for capital projects. Most of these revolve around flood risk due to the urgency of that hazard, though the projects also provide other community benefits. This section provides the roadmap for capital projects, which are those projects that will result in physical changes to the environment through direct (typically major) construction activities. This section includes, but does not typically identify, specific smaller scale stormwater and green infrastructure projects that should occur on a rolling basis and wherever feasible.

Regionwide, Resilient NENJ recommends about \$12.7 billion in capital investment to address the current understanding of near- and long-term flood risk. Together, these investments could address \$31 billion in losses predicted by the future Hurricane Sandy model, over \$1 billion in losses from stormwater flood events that can happen as frequently as every five years, and help address a significant portion of the over \$5 billion in predicted losses modeled for areal flooding. These investments will also help address urban heat, air quality, pedestrian mobility, and improve public health.

CAPITAL PROJECTS will directly reduce risk through changes to the built and natural environment, but they will not eliminate it. This roadmap for capital projects must be partnered with the roadmap for other actions (like engagement and policy change) to keep chipping away at risk and make it manageable. The roadmap for capital projects is distinct from other actions because of their scale, complexity, and the common processes required for implementation.



Green street planters, an example of green-infrastructure techniques.
Image Source: EPA

Levels of protection and levels of service

The magnitude of flooding a coastal solution can manage is its level of protection.

Resilient NENJ’s Action Plan looks at coastal strategies that can address flooding from Hurricane Sandy high water marks plus 2.4 feet, or the flood elevation associated with the 0.2-percent annual chance coastal flood plus 2.4 feet for sea level rise, whichever is higher. In areas where the Action Plan recommends bulkhead raising as a first line of defense, the recommended level of protection is more common events, such as high tides, to be defined through feasibility and design. First line of defense solutions could also act to reduce wave heights during a storm surge depending on the elevation that is achieved. As of August 2022, the preliminary preferred solution for the **HAT**¹ study could include a flood gate at the Kill Van Kull (see **Section 3.2.1**). Should that plan proceed, the necessary height and designs to reduce coastal flooding could be reduced in Newark and the west side of Bayonne and Jersey City, and allow for more flexibility in resilience features and project design (see **Section 3.2.1** for more on this topic).

The magnitude of rainfall a stormwater solution can manage is its level of service.

Addressing flooding from rainfall (where water falls from the sky) requires different approaches from addressing flooding from the sea or rivers (where water approaches over land). Coastal flood solutions are limited technically by how high they can go or how much water and force they can endure. Rainfall flooding solutions are often about managing water as it falls and are limited by how much water a system can reasonably manage at any given time. Most drainage systems designed decades ago cannot manage major storms because so much water falls in a short period of time that it overwhelms the capacity of the system.

A 5-year (20-percent annual chance), 1-hour peak rainfall intensity is an industry standard level of service goal for stormwater drainage systems today and is the basis for Resilient NENJ recommendations. Many systems in place today were designed for a smaller level of service. With improvements, the system will continue to provide benefits and reduce flooding even above its target level of service, but it will not be able to manage all water at all times.

Coastal levels of protection, stormwater levels of service, and the equivalent for other hazards are not comparable

There is admittedly a significant difference between a 500-year (0.2-percent annual chance) level of protection for coastal flooding and a 5-year (20-percent annual chance) level of service for stormwater flooding, but the two cannot be compared. Even though both sources cause overland flooding, they must be managed very differently and have different technical limitations.

Resilient NENJ has not defined equivalent levels of protection or service for other climate hazards at this time.

Coastal systems will also require stormwater solutions to avoid flooding inside a coastal barrier from rainfall during a surge event

Any coastal solutions will need to be partnered with stormwater solutions designed to meet the target level of service. Resilient NENJ recommends this also be coupled with system wide analysis for larger rainfall events to ensure there is no stormwater flooding during a coastal storm event. As coastal solutions advance, engineers should analyze the 100-year 24-hour rainfall event for the area to verify that the coastal flood protection system will not increase stormwater flooding. Taking this coupled approach will provide benefits to increase system capacity during non-coastal flooding scenarios and provide increased inland storage during coastal flooding where stormwater outfalls are blocked by high water levels.

¹ See <https://www.nan.usace.army.mil/Missions/Civil-Works/Projects-in-New-York/New-York-New-Jersey-Harbor-Tributaries-Focus-Area-Feasibility-Study/>

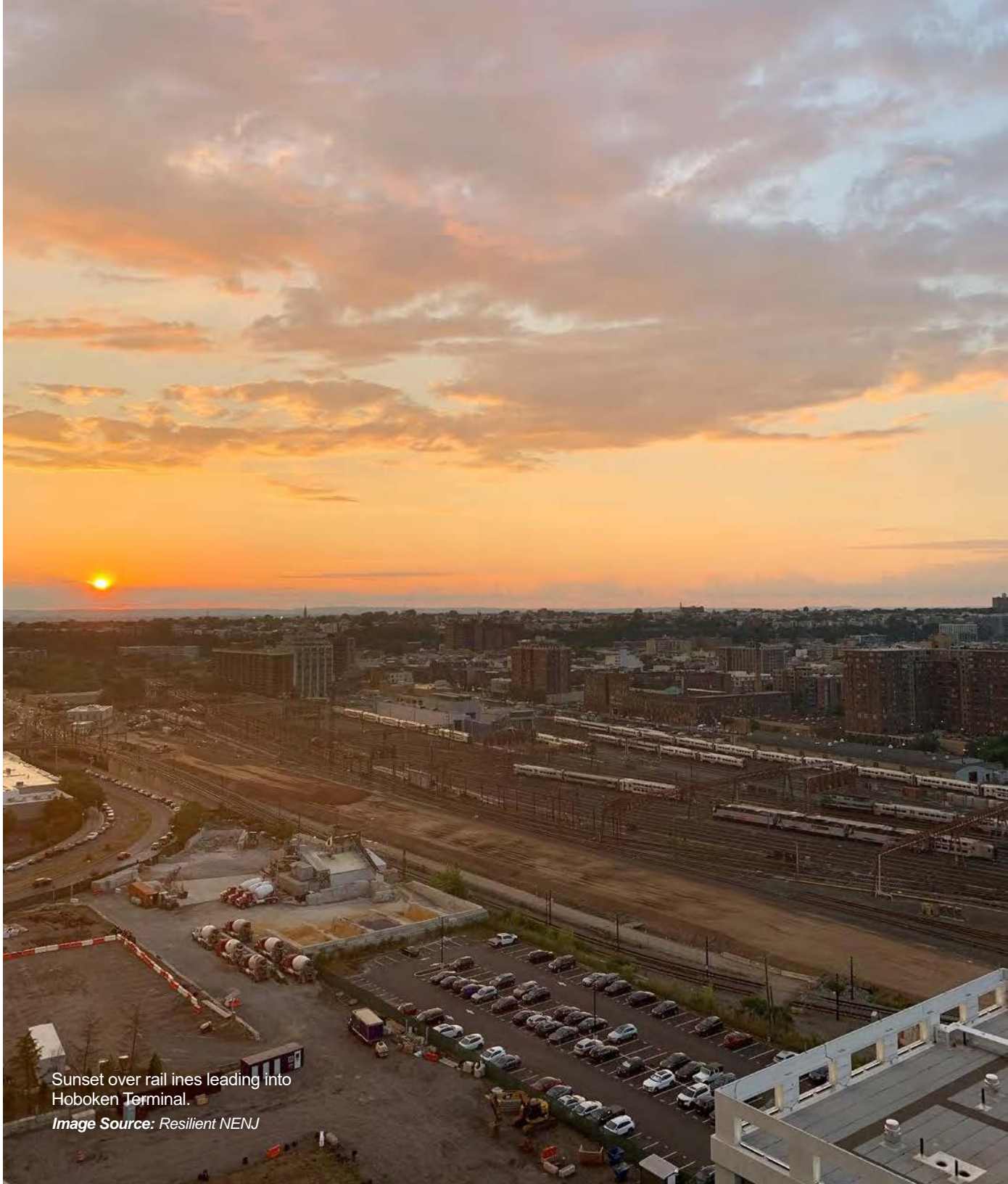
YEAR OVER YEAR EXPECTATIONS

Resilient NENJ provides initial conceptual implementation schedules in this section to help the region and its stakeholders plan for staffing and resource needs, and to articulate funding needs over time. This roadmap provides implementation schedules by geography (municipality / project area), and articulates expected planning and design, capital, and operations and maintenance funding needs year over year. Capital funding needs begin around \$140 million regionwide and climb gradually until around year 10, where the capital projects portion of the plan reaches a peak proposed annual expenditure of about \$1.4 billion and then declines after year 12.²

This investment is significant and necessary. As described in the **Flood Impact Assessment**, models predict flooding from major rainfall and storm surge will mostly get deeper, as opposed to affecting more areas. That means that the risk the region faces is here, now. In a perfect world, all capital projects Resilient NENJ recommends would be completed soon. The region is doing a lot of work to reduce risk already, as evidenced by Scenario 0 (see **Appendix A**), but it cannot keep up. The magnitude of current risk in the region outstrips its current allocations of funding and capacity to address. This Action Plan will empower residents, community-based organizations, city and state agencies, infrastructure providers, elected officials, federal agencies, businesses, and other stakeholders with the knowledge of what it will take to get this critical work done so that they can help plan and advocate appropriately.

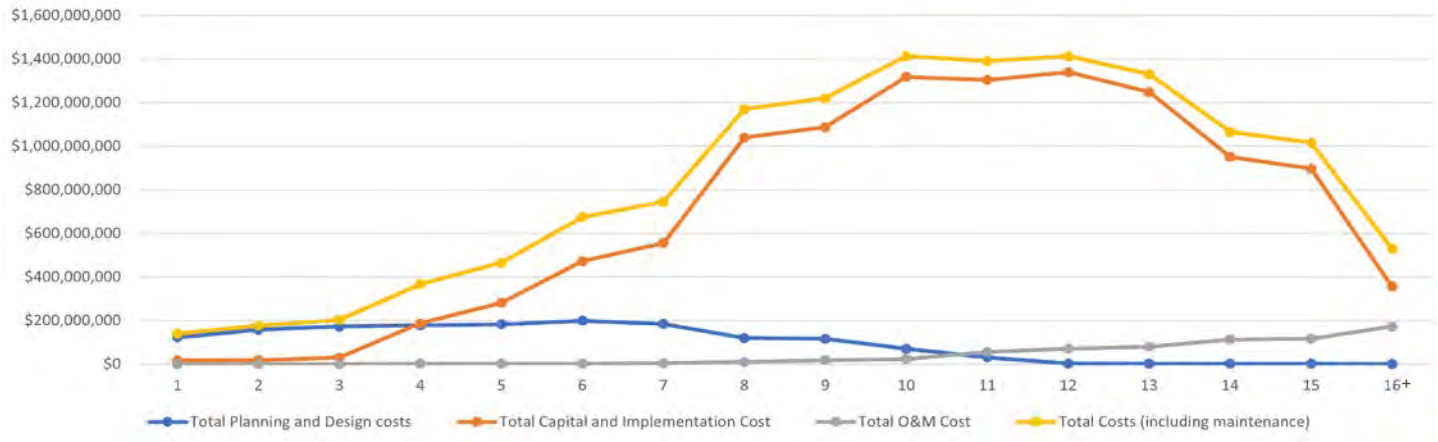
Resilient NENJ developed the proposed implementation schedules based on the following factors and considerations:

- Expected level of effort and required timing to plan, allocate funding, design, and construct improvements
- The schedule demonstrates an escalation of intensity of investment and activity over time to address rising risk while acknowledging that it will take time to build capacity to implement large scale capital improvements
- The need to start with smaller wins with visible improvements to build momentum and catalyze further momentum
- Where possible given the above factors, the schedule prioritizes projects based on risk – including flood depth, social vulnerability, exposed population, and expected losses



Sunset over rail ines leading into Hoboken Terminal.
Image Source: Resilient NENJ

REGIONAL ESTIMATED COST NEEDS (YEAR OVER YEAR)



² Costs include costs to implement the Parallel Interceptor to the Passaic Valley Sewerage Commission Treatment Plant project that is included in the Long-term Control Plan, due to the expected flood risk reduction benefits of the project.

FUNDING PATHWAYS

Section 4.0 provides examples of funding opportunities for the four categories of actions, and **Appendix C** provides additional detail on these funding options. **Appendix A** provides examples of specific funding sources for each action.

Example ways that different entities can contribute to funding Resilient NENJ recommended capital improvements

Federal/State/Municipal	<ul style="list-style-type: none">• Grants• Funding allocations• Capital improvements	Private property owner / Business	<ul style="list-style-type: none">• Special assessments³ with subsidies• Public private partnerships• Fees with a sinking fund• Utility / service fee
Infrastructure entity	<ul style="list-style-type: none">• Capital improvement projects/ budget contributions• Utility / service fee	Visitor	<ul style="list-style-type: none">• Surcharge or fee (e.g., parking, transportation, visitor surcharge at hotels / establishments)

CONSTRUCTION IS ALWAYS DISRUPTIVE

A lot of construction activity will be needed to address risk needs now and over the coming years. This roadmap is a general guide and should be altered in collaboration with the Action Plan’s proposed Infrastructure Coordination Council to coordinate construction activities and ensure that neighborhoods benefit from a “dig once” approach. Further, engagement should continue during project implementation to ensure that community members understand what is happening, when, and how they will be affected. Community members should be part of design and construction planning to maximize benefit to the community and to limit disruptions.

³ Special assessments levy a portion of property value needed to make public improvements.

Where are we at in planning? How confident are we in approach, costing, and scheduling?



All recommendations are at the roadmap stage and will need to progress to feasibility and design, so the costs and concepts will certainly change during that process. The feasibility and design process will define specific sizing and locations of solutions. For example, coastal flood solutions will require special considerations for access, space, and aesthetic needs unique to any given area. Additionally, many factors will affect the actual timing of capital project implementation. Aligning and working with existing capital improvement planning cycles, which are dynamic by nature, will be an important part of the implementation process.

Nevertheless, cost estimates at the roadmap stage are important for two reasons: 1) to make sure that projects will add more value than they cost (which these recommendations do), and 2) to be able to properly plan, allocate, and advocate for the resources needed to drive change. Resilient NENJ developed cost estimates using typical costs for similar projects in the region. See **Appendix B** for more on cost development and benefits calculation.

All costs are order of magnitude for planning purposes only, with some costs for certain capital projects being at the concept level. Key assumptions by action type include the following (see **Appendix B**):

- For capital projects that address coastal flooding:
 - Initial costs based on GIS overlay of linear length or area of proposed improvements by type
 - Unit costs based on recently constructed projects & engineering guidance available from USACE
 - Costs adjusted for the region with allowance and contingency assumptions.
- For capital projects that address stormwater flooding:
 - Engineers calculated the amount of capacity that would need to be managed by city, and based on the types of recommendations and capacity share, developed costs based on recently constructed projects of similar nature in the region
- Citywide program estimates (those related to green and stormwater infrastructure and contaminated site transformation, in particular) should be considered “planning allocations.” Actual costs will vary based on the number and frequency of sites chosen for implementation. There are citywide program estimates for both capital projects by geography and for program implementation at the state level. These costs are not duplicates.
- The roadmap does not include costs for projects already underway or entirely within the purview of a single agency (such as Port Authority of New York and New Jersey’s facility flood protection strategy or the Rebuild by Design project in Hoboken). Costs are included for proposed projects (that are earlier stages of implementation) that align with this Action Plan, such as the Newark Flanking Plan. In this case, costs from plans associated with those projects informed estimates.

REGIONAL PHASING

This section lays out the expected lead for various activities across implementation phases covering the first 15 years. Each phase covers increments of three to four years each. Resilient NENJ recommends re-evaluation every five years. As such, new or different actions will likely emerge and affect actions within and beyond these timeframes.

The following supportive activities are necessary across all phases and across all geographies, and are not repeated in the sections below in the interest of space.



City

- Continue to track, coordinate, and support funding opportunities and pursuits
- Continue to identify key sites and plan for / implement distributed green infrastructure in right-of-way and public parcels
- Pursue smaller scale stormwater improvements in high-risk areas (e.g. Cottage Street Park Flood Mitigation Project and McGovern Park flood resilience project, see **Section 2.0**)
- Continue to target and prioritize / implement sites for resilient redevelopment and site transformation
- Submit projects under available grant funding and plan for future submittals
- Ensure that Local Hazard Mitigation Plans, capital improvement plans, and other plans that can support or drive funding also integrate Resilient NENJ recommendations



Region

- Begin and continue implementation of LTCP projects, led by the respective sewer department or authority of each municipality
- Track, coordinate, and support funding opportunities and pursuits
- Track and engage around the NY & NJ Harbor & Tributaries Focus Area Feasibility Study (HATS)⁴ (see **Section 3.2**)
- Help target and prioritize distributed green infrastructure in right of way and public parcels, as well as opportunities for resilient transformation of contaminated sites
- Provide a forum for engagement around project planning, design, and construction
- Help coordinate investments in areas to facilitate a “dig once” approach to limit disruption during construction



State

- Integrate near-term projects in the Ida CDBG-DR Action Plan for funding and pursue additional congressional allocations
- Allocate funding to support implementation
- Coordinate with the region to support advancement of key projects
- Help coordinate investments in areas to facilitate a “dig once” approach to limit disruption during construction



Federal

- Integrate recommendations from Resilient NENJ into federal appropriations and planning projects, such as HATS⁴ (USACE, FEMA, United States Congress)
- Allocate funding toward implementation of proposed projects



Residents

- Reach out to local, state, & federal elected officials to support relevant project recommendations



Business/ Industry

- Explore opportunities to integrate green infrastructure and other hazard related improvements into property
- Participate in project design and engagement opportunities
- Raise bulkheads as they are replaced (waterfront property owners)



Major Property Owners

- Reach out to local, state, and federal elected officials to support relevant project recommendations
- Integrate green infrastructure and other hazard related improvements into property
- Redevelop contaminated sites in alignment with Action Plan recommendations
- Raise bulkheads as they are replaced (waterfront property owners)
- Participate in project design and engagement opportunities



Academia

- Reach out to local, state, and federal elected officials to support relevant project recommendations

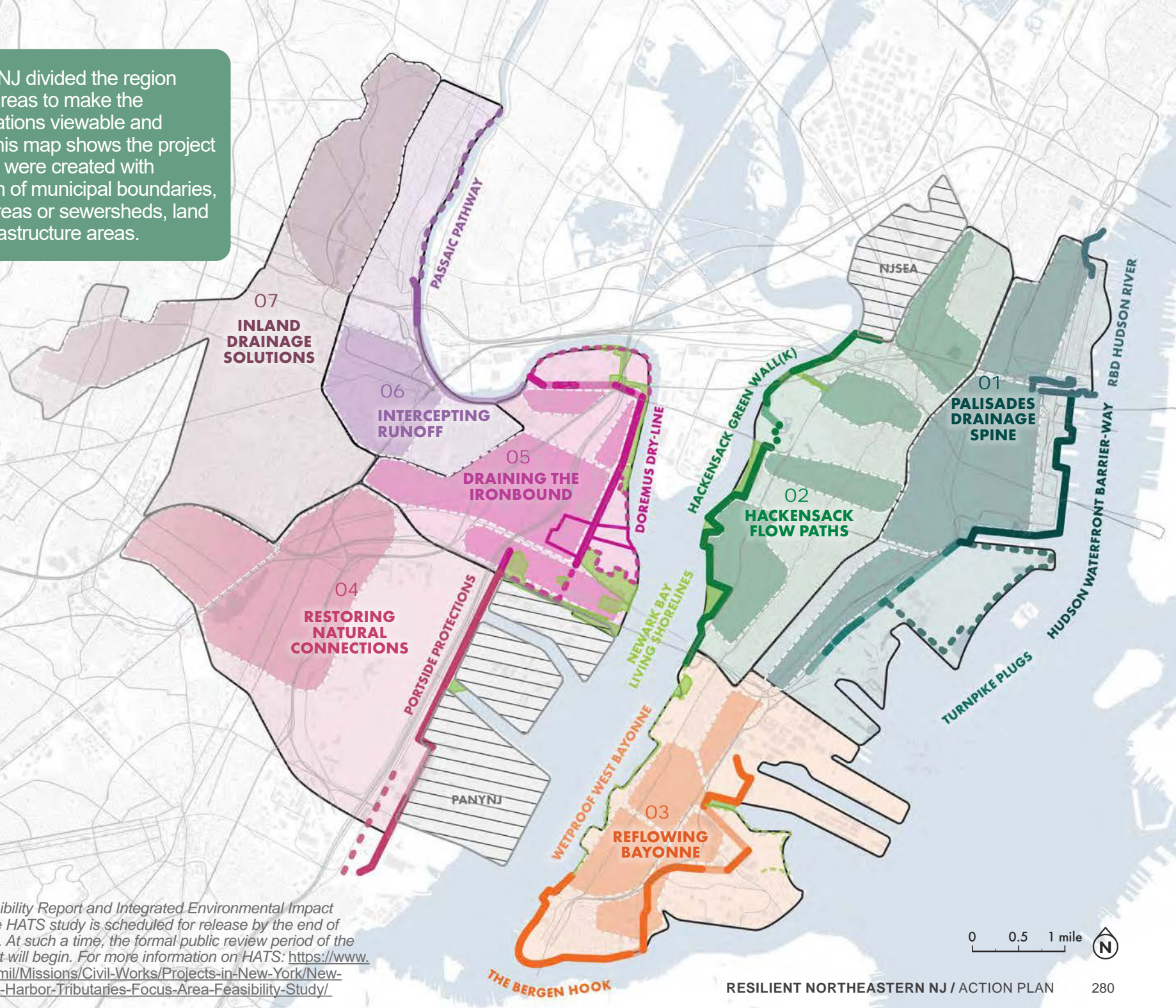


CBOs

- Participate in and support project design and engagement opportunities
- Partner on funding opportunities, where appropriate

Resilient NENJ divided the region into project areas to make the recommendations viewable and digestible. This map shows the project areas, which were created with consideration of municipal boundaries, hydrologic areas or sewersheds, land use, and infrastructure areas.

⁴ The Draft Feasibility Report and Integrated Environmental Impact Statement for the HATS study is scheduled for release by the end of September 2022. At such a time, the formal public review period of the HATS draft report will begin. For more information on HATS: <https://www.nan.usace.army.mil/Missions/Civil-Works/Projects-in-New-York-New-York-New-Jersey-Harbor-Tributaries-Focus-Area-Feasibility-Study/>



CAPITAL PROJECTS FOR CONSIDERATION IN JERSEY CITY

Key technical considerations

- There is a large elevation difference between neighborhoods in Jersey, such as The Heights and Downtown. This places extra stormwater pressure in low-lying areas. Nonetheless, higher elevation areas like the Heights are also susceptible to rainfall flooding due to capacity limitations of the drainage systems, increasing impervious surface, and hyper-local topography.
- Portions of Jersey City are comprised of a hard bedrock layer located only a few feet below the ground surface, making it difficult for rain to infiltrate and complicating the inclusion of drainage infrastructure.
- Large areas of Downtown Jersey City are built on historical fill. This complicates coastal measures because of variable underground conditions but also presents challenges to drainage due to low-lying areas that don't have a natural flow path to the New York Bay.
- Several major transportation corridors within the New York City Metropolitan Area pass through Jersey City. These require unique resiliency considerations and require careful coordination with NJ Transit, NJ Turnpike Authority, NJDOT, Port Authority of New York and New Jersey, as well as other key agencies.

Environmental benefits and considerations

- A Long-Term Control Plan has been developed to reduce combined sewer overflows from Jersey City. Ecosystem restoration projects along the coast can increase resiliency while providing additional water quality benefits in conjunction with the LTCP – and can create improved habitats for people and wildlife alike.
- Liberty State Park is a critical habitat area in Jersey City and is home to various migratory birds and other wildlife. Creating additional green space through greenways, open space, and green infrastructure and restoring wetlands will enhance ecosystems and habitat connectivity. These projects will also mitigate urban heat island effect by increasing use of less heat-absorptive materials.

Social and economic benefits and considerations

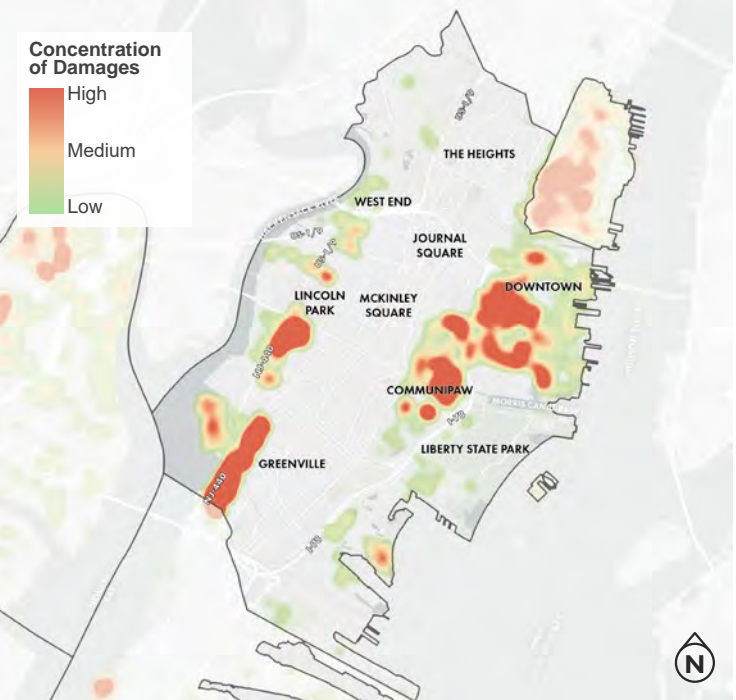
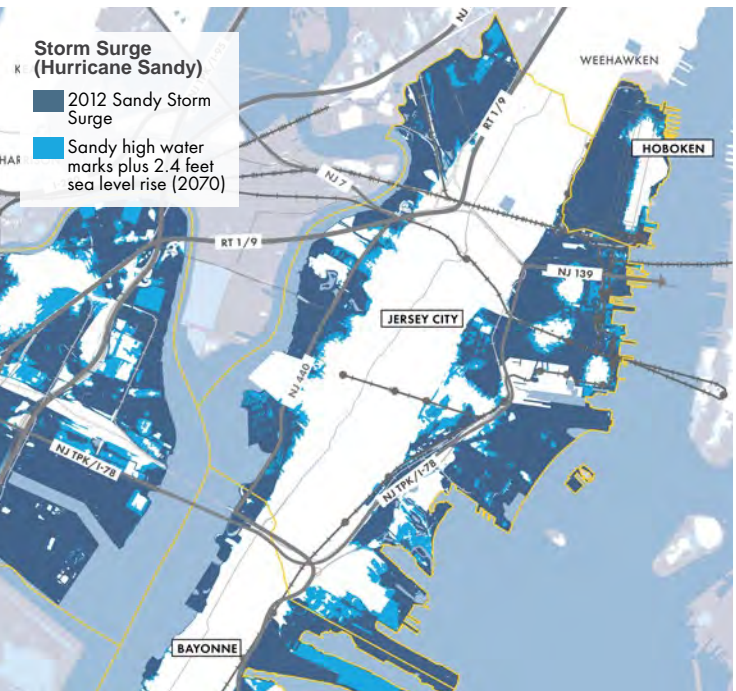
- Jersey City is already home to some large and well-loved park spaces. Connecting these spaces and other neighborhoods through greenways and walkways that can double as resiliency features improves waterfront access and recreational opportunities, which has other benefits for public health and well-being. However, access to existing spaces that are being reconstructed to incorporate resiliency measures, such as the Hudson River Waterfront Walkway or existing parks, could be temporarily limited during the construction period.
- Jersey City is a transit-rich community that is very accessible to local amenities and the region. Resiliency measures that encourage sustainable and affordable development will help support continued growth.
- Several projects protect roadways and flood-prone intersections, which will preserve mobility and reduce economic impacts associated with disruptions to travel. Roadway projects could incorporate green infrastructure in the right-of-way and bike lane creation for improved mobility.

CAPITAL PROJECTS TO ADDRESS COASTAL STORM SURGE AND TIDAL FLOODING

Storm surge flooding on both coasts can impact a variety of types of land uses and assets. The Flood Impact Assessment estimated that the highest expected damages from a future Sandy-like storm surge event could occur in Downtown, Communipaw, Country Village and Society Hill, and the West Side neighborhood including Hudson Mall. Coastal storm surge flooding enters on the east through the Morris Canal Basin and floods the Communipaw neighborhood, including public housing complexes that are at risk, one of the areas of highest social vulnerability in the city. The coastal strategy builds on recommendations from the Jersey City Adaptation Master Plan and proposes multiple lines of defense. These include raising existing segments of the Hudson River Waterfront Walkway to provide an outer shell of coastal protection, constructing the proposed Hackensack River Greenway at a higher elevation for protection, and raising additional roadway segments to create a full line of protection where needed. This component will preserve the valued walkways that provide waterfront access and recreational value, while advancing additional walkways construction and integrating resiliency. The Action Plan also recommends providing site level adaptation to protect critical infrastructure at Port Jersey and cutting off key flood pathways with deployable gates that will be integrated with NJTA's Newark Bay-Hudson Corridor Extension program. These gates would be a second line of defense behind the raised walkways, and their use limited because of the importance of waterfront access.

What does that mean in terms of costs and losses avoided?

Resilient NENJ's coastal flood protection project recommendations in Jersey City may cost about \$3.4 billion (about one third of which is associated with the Hackensack River Greenway project) and may have about \$66 million in annual operating costs. The solutions may be designed to meet or exceed the flood heights expected from the modeled future Sandy event. This means \$11 Billion in expected losses avoided to 2,900 buildings and 58,000 residents from a future Sandy event.



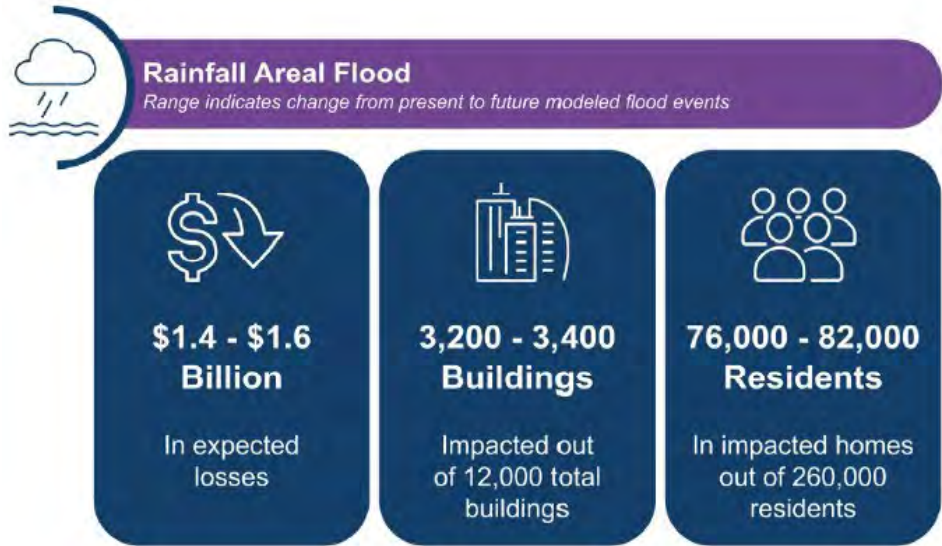
CAPITAL PROJECTS TO ADDRESS RAINFALL AND OTHER CLIMATE HAZARDS

The strategy to address rainfall flooding and other climate hazards includes various tactics for reducing impervious surfaces and improving stormwater management. The Action Plan recommends distributed green infrastructure, in alignment with the Jersey City Municipal Utilities Authority (JCMUA) LTCP, which set a goal to capture runoff from 7-percent of the city’s impervious surface with green infrastructure. The JCMUA is already advancing feasibility studies for distributed green infrastructure at over 40 sites, and is planning multiple sewer separation projects, which involve redirecting sanitary (domestic and business) sewage. One sewer separation project involves constructing a new facility with a pump station to address flow needs during high tide.

The strategy also includes stormwater management and retention at publicly owned, impervious, and vacant sites, including converting contaminated sites to open space and integrating stormwater management. McGovern Park is an example of a project that is already being designed and pursued for funding, and Bayfront is an example of a formerly contaminated site that is being redeveloped to include open space alongside mixed use spaces, while also being elevated. These actions are complemented by stormwater retention projects run by NJDOT that use available right-of-way space along highways.

Another tactic to reduce rainfall flooding impacts involves sewer separation in key rainfall hotspots such as Communipaw and Sip Avenues, which are also priority areas for combined sewer overflow reduction. The Action Plan also recommends integration with NJTA’s Newark Bay-Hudson Corridor Extension Program to use space beneath the NJ Turnpike for a deep tunnel to alleviate flooding problems at problem intersections beneath the elevated aqueduct, and use of space along the turnpike in some areas for stormwater retention.

The plan’s final recommendation to reduce rainfall flooding impacts involves ditch enhancement and creation to alleviate flooding in the Jersey City Heights area.



What does that mean in terms of costs and losses avoided?

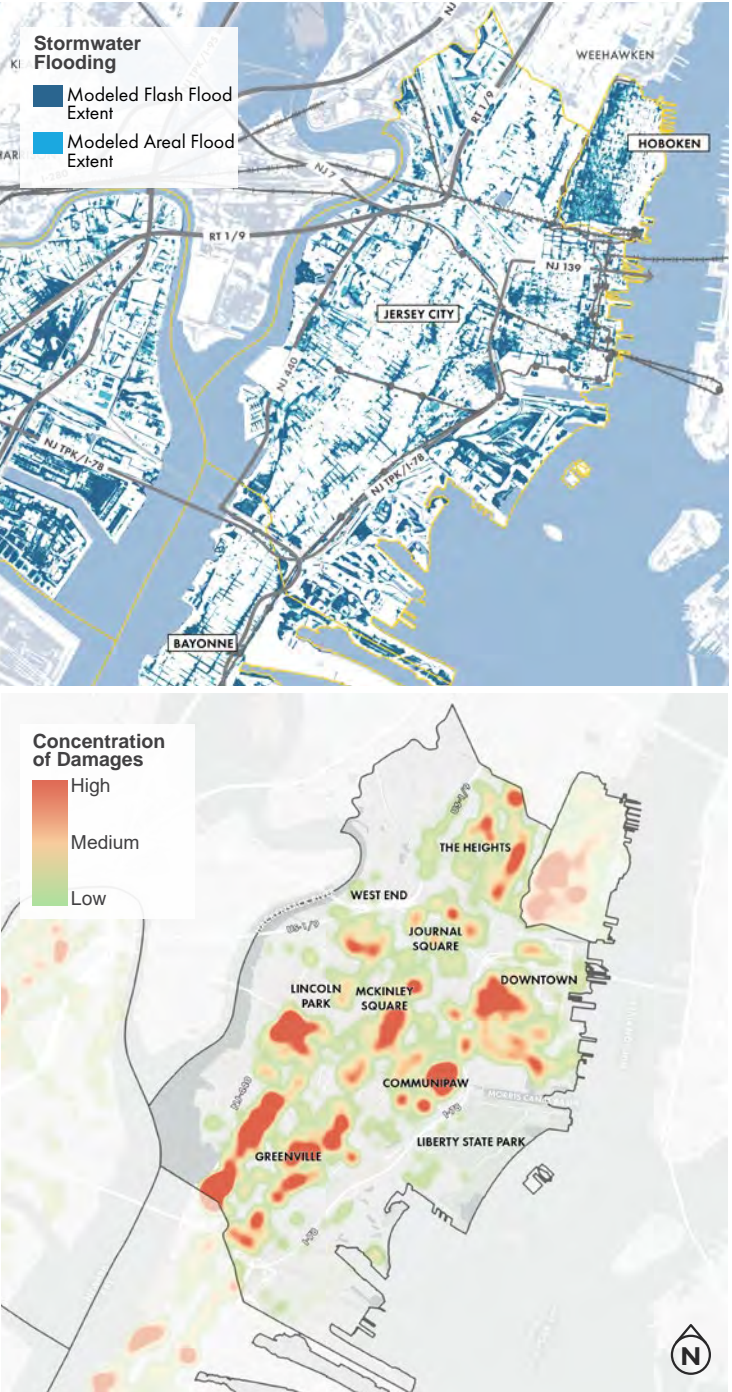
Resilient NENJ estimates it will cost about \$1.1 billion to bring the city’s drainage system to a 5-year level of service over time (not including Long-term Control Plan costs) and will add about \$16 million in increased annual operating costs once all efforts are complete. All recommendations are at the roadmap stage and will need to progress to feasibility and design, so the costs are likely to change during that process. That may sound like a lot of money, and it is, but Resilient NENJ models for areal flooding (about 8 to 9 inches of rainfall over a 24-hour period) show \$1.4 billion to \$1.6 billion in expected losses if such an event occurred citywide. While the recommended improvements will not eliminate this magnitude of rainfall flood hazard, they could significantly reduce impacts, and major rainfall events are happening more and more frequently. Further, losses from flooding due to a much more frequent, 5-year event (about 4 inches of rainfall over a 24-hour period) could be \$383 million in the city, and the proposed actions would largely eliminate these losses. Over time, as rain falls and fewer losses and disruptions occur, these benefits will add up and more than make up for the investment.



3,200 – 3,400 out of 12,000 total buildings in Jersey City are at risk of flooding from a major areal flood event and stand to benefit from the proposed improvements.

76,000 to 82,000 residents out of a total of 260,000 residents could directly benefit from flood risk reduction to their homes. The entire community could benefit from reduced roadway and community impacts.

Resilience is not just about reducing the hazard itself. Changing the way we work together, as outlined later in this roadmap, will also increase the benefits of these projects.



CAPITAL PROJECTS FOR CONSIDERATION IN HOBOKEN

Key technical considerations

- Hoboken is densely populated with overlapping needs for public right-of-way space. Balancing these needs will be important for leveraging the right-of-way for resiliency measures.
- Elevations in Hoboken are higher on the east and west sides of the city, creating difficult conditions for natural drainage and increasing flooding on the western edge of the city.
- The Hoboken Terminal is a key transportation hub within the region. This area is vulnerable flooding but is also a key pathway for coastal flooding into the city and potential drainage out of the city.

Environmental benefits and considerations

- With the Rebuild by Design – Hudson River project and Southwest Resiliency Park, Hoboken currently serves as a model for how the rest of the region can successfully adapt to climate change and increase public green space within the city.
- Ecosystem restoration projects along Hoboken's coastline will help to soften the edge and provide additional water quality benefits to the Hudson River.

Social and economic benefits and considerations

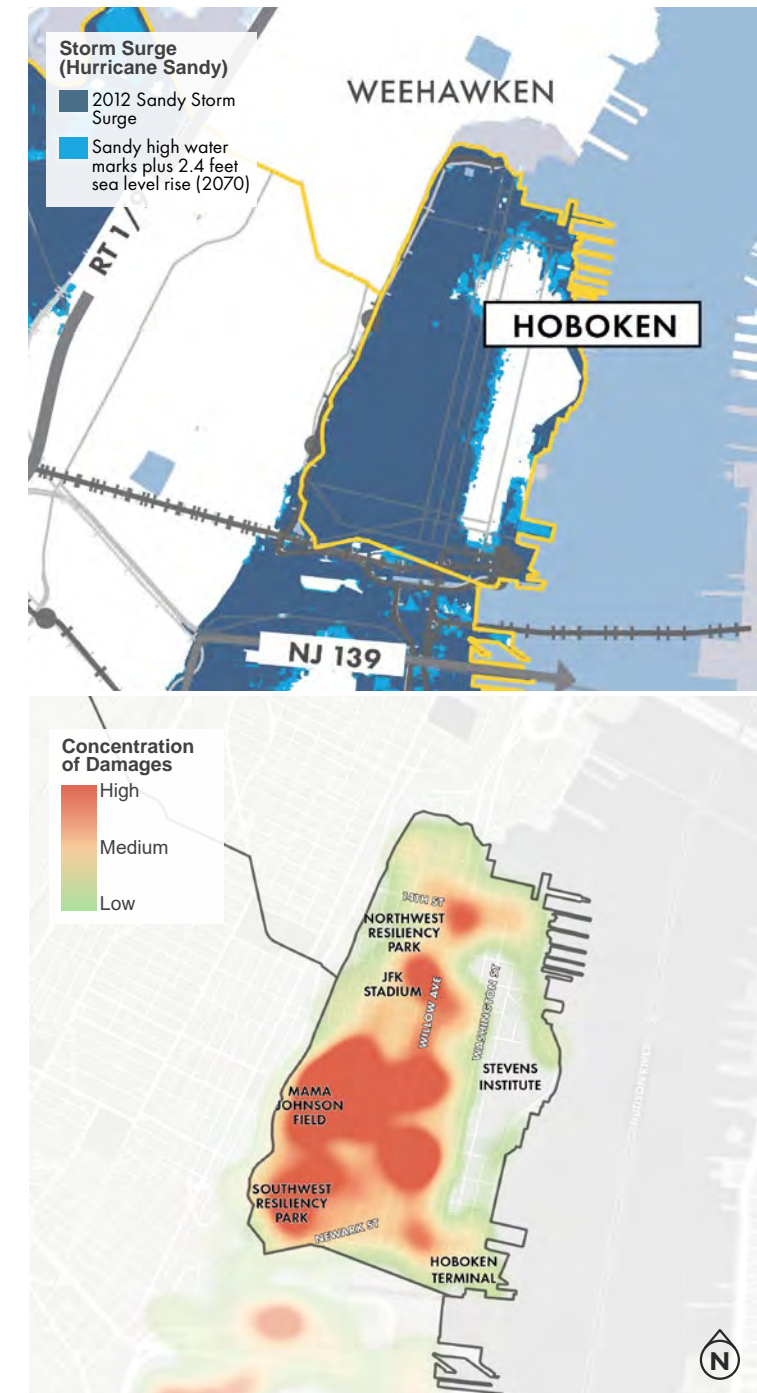
- The recommended deep tunnel spine along western Hoboken would alleviate flooding in low-lying southwest Hoboken, which has the highest concentration of low income and BIPOC people in the city.
- In addition to resiliency benefits, green infrastructure in the public right-of-way improves roadway safety and pedestrian accessibility throughout the city.
- The Hudson River Waterfront Walkway in Hoboken, that connects various pier parks, is a critical asset in Hoboken and strengthening this amenity to sea level rise and storm surge will be critical to preserving Hoboken's character.

CAPITAL PROJECTS TO ADDRESS COASTAL STORM SURGE AND TIDAL FLOODING

Hurricane Sandy demonstrated Hoboken's high vulnerability to storm surge flooding. The city incurred the highest damages per capita of the four cities in the region.^{5,6} Flood pathways for storm surge include the northern border at Weehawken Cove and southern border from the Long Slip Canal and area of Hoboken Terminal. As described in **Section 2.7**, the Rebuild by Design-Hudson River project is a partnership between NJDEP, the City of Hoboken, North Hudson Sewerage Authority, and other partners to address both coastal and rainfall flooding. The coastal storm surge component, dubbed "Resist," includes flood protection structures to cut-off the flood pathways. In addition to being expected to protect 85-percent of Hoboken's population that resides within the FEMA-mapped special flood hazard area, the structure will provide community benefits through integration of public amenities and green spaces where possible. To complement the coastal protection that will be provided by the Rebuild by Design project, the City of Hoboken is also exploring a pilot project for shellfish restoration near Weehawken Cove as well as possible road raising in southern Hoboken. Road raising would also improve mobility during rainfall flooding events. In addition, the City could explore other projects to provide protection to areas that are seaward of the Resist structure, such as a living shoreline along the Hudson River or strengthening or raising of the existing Hudson River Waterfront Walkway that lines the river.

What does that mean in terms of costs and losses avoided?

Complementing the \$230 million Rebuild by Design project and should Hoboken decide to leverage the board walk in the future to further reduce coastal flood risk, the living shoreline recommendation will add about \$48 million in capital costs and about \$717,000 in operating costs to contribute to reduced coastal flood risk. The models estimate \$7.2 billion in expected losses avoided to 700 buildings and 43,000 residents from a future Sandy event alone from these efforts.



⁵ NJ Office of the State Comptroller: <https://nj.gov/comptroller/sandytransparency/funds/tracker/>

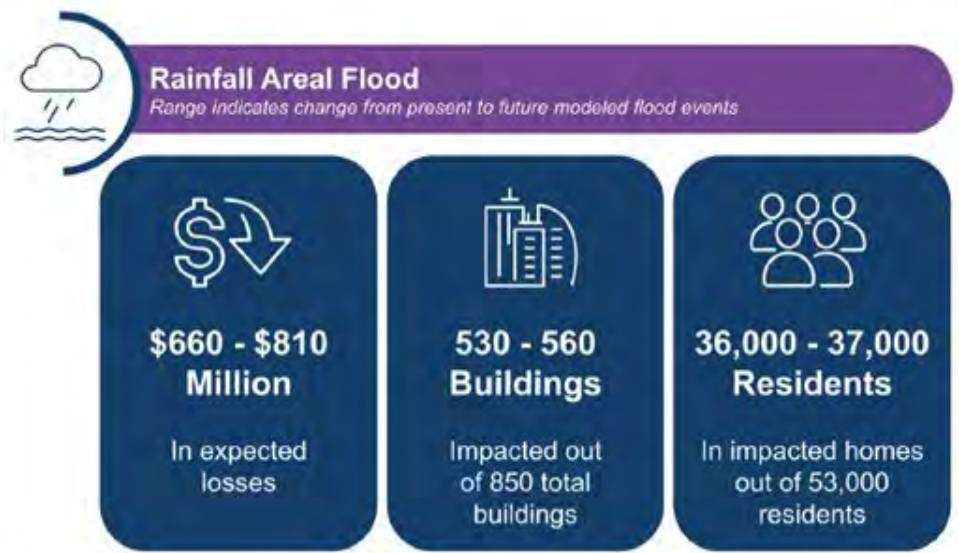
⁶ NJOIT Open Data Center: <https://data.nj.gov/Government-Finance/Sandy-PA-Master-Data/j356-d76p/data>

CAPITAL PROJECTS TO ADDRESS RAINFALL AND OTHER CLIMATE HAZARDS

The City of Hoboken is advancing various projects to address rainfall flooding through the Rebuild by Design-Hudson River project, as well as several other projects that are not under the Rebuild by Design umbrella. Hoboken’s strategy relies heavily on subsurface stormwater management in parks, integrating green infrastructure in the designs as well as in roadway right-of-way areas. Southwest Park, 7th and Jackson Street Park, and Northwest Resiliency Park are complete or near complete parks that follow this model. The City also hopes to expand Southwest Park and is undertaking several storm sewer separation projects in northern Hoboken. To continue to address rainfall flooding, particularly in the hotspot area of southwest Hoboken, the City could revisit a previously raised concept to create a drainage corridor along its western border. A deep tunnel spine could carry large volumes of stormwater from the low-lying western area while avoiding disruption to this densely developed area.



Green infrastructure demonstration projects at Hoboken's City Hall.
Image Source: Mayor of Hoboken Facebook Page



What does that mean in terms of costs and losses avoided?

Resilient NENJ estimates close to \$800 million for stormwater projects in and immediately adjacent to Hoboken. About \$700 million of that total cost is currently estimated to complete the Deep Tunnel Spine along West Hoboken, and this project is expected to provide significant benefit to Jersey City, as well. Based on share of benefits, about \$522 million (of the total \$800 million) is needed to bring Hoboken’s level of service to the 5-year, 1 hour peak amount of rainfall.

Resilient NENJ models for areal flooding (about 8 to 9 inches of rainfall over a 24-hour period) show \$660 million to \$810 million in expected losses for such an event in Hoboken. While the recommended improvements will not eliminate this magnitude of rainfall flood hazard, they could significantly reduce impacts, and major rainfall events are happening more and more frequently. Further, losses from flooding due to a much more frequent, 5-year event (about 4 inches of rainfall over a 24-hour period) could be \$119 million in the city, and the proposed actions would largely eliminate these losses. Over time, as rain falls and fewer losses and disruptions occur, these benefits will add up and more than make up for the investment.



530 to 560 out of 850 total buildings in Hoboken are at risk of flooding from a major areal flood event and stand to benefit from the proposed improvements

36,000 to 37,000 residents out of a total of 53,000 residents could directly benefit from flood risk reduction to their homes. The entire community could benefit from reduced roadway and community impacts.

Resilience is not just about reducing the hazard itself. Changing the way we work together, as outlined further in the roadmap, will also increase the benefits of these projects.

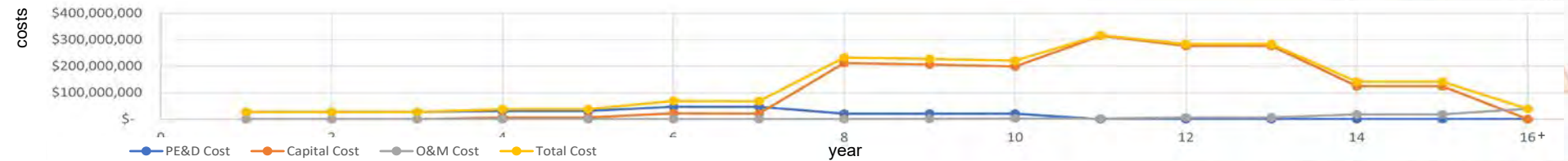


TIMELINE & COSTS

PROJECTS TIMELINE (GANTT CHART) JERSEY CITY (EAST)

PROJECTS TIMELINE (GANTT CHART) JERSEY CITY (EAST)					Phase 1			Phase 2				Phase 3				Phase 4						
Start Phase	Project/Action		Lead Entity	Total Costs	Yearly O&M	year 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16+	
Phase 1	A	Distributed Green Infrastructure in Right-of-Way and Public Parcels (All Hazards-01)	City	\$45 M	\$675 K	Planning			Implementation													
	-	Explore opportunities for distributed GI projects in non-public properties (All Hazards-01)	Private	\$5 M	\$75 K								O&M									
	B	Raise and strengthen Hudson River Waterfront Walkway - Port Liberte (Coastal-03)	City	\$112 M	\$1.68 M																	
	C	Sewer Separation along Communipaw flow east (Stormwater-01)	City	\$30 M	\$450 K																	
	D	Deep Tunnel Spine along NJ Turnpike (Stormwater-02)	Regional	\$700 M	\$10.5 M																	
	E	Expand Stormwater Management in Liberty State Park Wetlands (Stormwater-04)	NJDEP	\$5 M	\$75 K																	
Phase 2	-	Remediation / resilience projects at contaminated sites (All Hazards-02)	City or Region	\$10 M	\$150 K																	
	F	Raise and strengthen Hudson River Waterfront Walkway - Downtown (Coastal-03)	City/State	\$555 M	\$8.32 M																	
	G	Liberty Park walkway raising as first line of defense (Coastal-03)	NJDEP	\$811 M	\$12.2 M																	
	H	Increase Surface Flows and Retention between Turnpike and Rail (Stormwater-03)	NJTA	\$35 M	\$525 K																	
	I	NJ Turnpike Flood Barriers and Gates (Coastal-01)	NJTA	\$245 M	\$3.7 M																	
				\$2.55 B	\$38.3 M																	
ESTIMATED COST NEEDS (YEAR OVER YEAR)																						

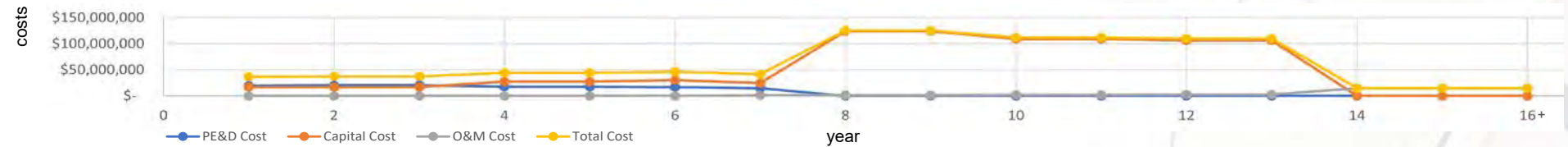
ESTIMATED COST NEEDS (YEAR OVER YEAR)



PROJECTS TIMELINE (GANTT CHART) HOBOKEN

Start Phase	Project/Action		Lead Entity	Total Costs	Yearly O&M	year 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16+	
Phase 1	J	Rebuild by Design Resist Structure (Coastal-01)	NJDEP	\$ -	\$ -	Implementation			O&M													
	K	Continue to plan and implement resiliency parks (Stormwater-04)	City	\$100 M	\$1.5 M																	
	L	Deep Tunnel Spine along West Hoboken (Stormwater-02)	Region	\$700 M	\$10.5 M	Planning																
	-	Explore opportunities for distributed GI projects in non-public properties (All Hazards-01)	Private/City	\$10 M	\$150 K																	
	M	Distributed Green Infrastructure in Right-of-Way and Public Parcels (All Hazards-01)	City	\$90 M	\$1.3 M																	
	-	Remediation / resilience projects at contaminated sites (All Hazards-02)	City/Region	\$42.3 M	\$634 K																	
	N	Hoboken Living Shoreline (Coastal-05)	City	\$47.8 M	\$717 K																	
	O	Evaluate need to raise / strengthen existing Hoboken HRWW (Coastal-03)	City	\$ -	\$ -																	
				\$990 M	\$14.8 M																	

ESTIMATED COST NEEDS (YEAR OVER YEAR)



PROJECT AREA #01 PALISADES DRAINAGE SPINE + HUDSON RIVER BARRIERS

The Palisades outcrop is a defining feature that runs through the center of Jersey City, west of Hoboken. Recommended actions seek to relieve pressure for low-lying areas at the base of the outcrop through a deep tunnel “spine”, while managing flooding at higher elevations through stormwater management sites. These recommended stormwater actions are paired with coastal protections such as RBD Hudson River and protections along the waterfront and NJ Turnpike.

LEGEND

COASTAL ALIGNMENTS

- Coastal Barriers
 - Flood Barrier
 - Raised Walkway/Boardwalk
 - Raised Roads
- Planned Land Raising Areas for Adaptation
- Flood Gates
- Tie-Ins to High Ground

DRAINAGE SOLUTIONS

Underground Conveyance

- Deep Tunnel
- Sewer Separation
- Connections to Explore

Overland Conveyance

- Secondary Ditch

Retention & Storage

- Retention Sites
- Detention Sites

Outfalls & Pumping

- New Pump Station
- Enhance Existing Pump Station
- New Outfalls

GREEN INFRASTRUCTURE

- Pilot Resiliency Hub
- Potential Resiliency Hubs

Wetland Actions

- Living Shoreline (new seeding)

Green Infrastructure Corridors

- Primary Green Street
- Secondary Green Street

Greenways

- Proposed New Greenway Stretches
- Existing Greenways, Walkways & Boardwalks
- Greenway Corridors Proposed by Others

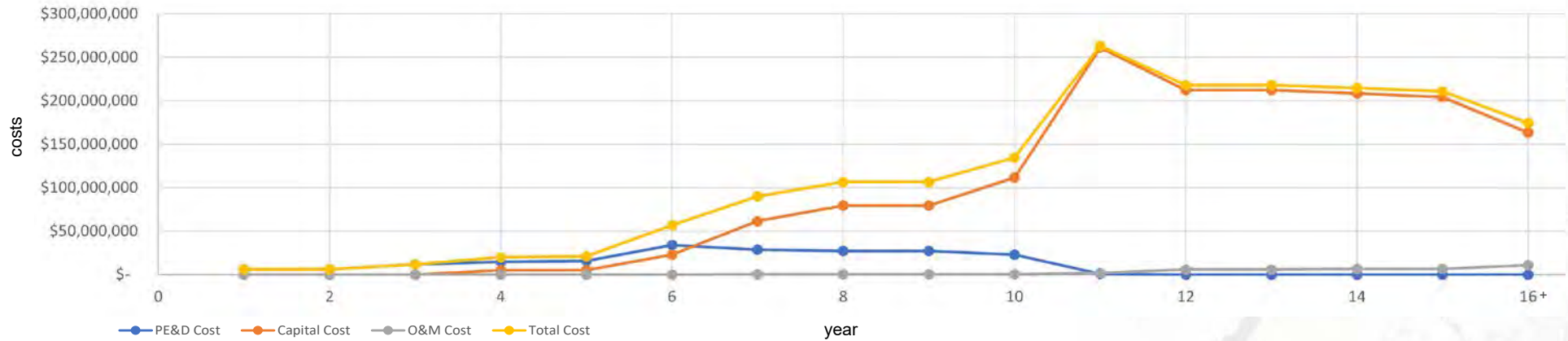


TIMELINE & COSTS

JERSEY CITY (WEST)

PROJECTS TIMELINE (GANTT CHART)

PROJECTS TIMELINE (GANTT CHART)					Phase 1			Phase 2				Phase 3				Phase 4					
Start Phase	Project/Action		Lead Entity	Total Costs	Yearly O&M	year 1 2 3			4 5 6 7				8 9 10 11				12 13 14 15				16+
Phase 1	A	Distributed Green Infrastructure in Right-of-Way and Public Parcels (All Hazards-01)	City	\$45 M	\$675 K	Planning			Implementation												
	-	Explore opportunities for distributed GI projects in non-public properties (All Hazards-01)	Private	\$5 M	\$75 K								O&M								
	B	Install Stormwater Management Sites in The Heights & West Jersey City (Stormwater-04)	City	\$30 M	\$450 K																
	C	Sewer Separation along Communipaw and Sip Avenues (Stormwater-01)	City	\$80 M	\$1.2 M																
	-	Remediation / resilience projects at contaminated sites (All Hazards-02)	City or Region	\$10 M	\$150 K																
D	Road Raising around Lincoln Park (Coastal-02)	City	\$222 M	\$3.3 M																	
Phase 2	E	Construct Raised Walkway along Route 440 (Coastal-03)	NJDOT	\$256 M	\$3.8 M																
	F	Jersey City Wetland Restoration (Coastal-05)	NJDEP	\$52.2 M	\$783 K																
	G	Re-direct Stormwater to ROW Retention Areas (Stormwater-04)	NJDOT	\$15 M	\$225 K																
	H	Raise Hackensack River Greenway (Coastal-03)	City	\$1.1 B	\$16.4 M																
	I	Enhance Existing Ditches and Leverage Space with Bergen Arches (Stormwater-03)	City	\$15 M	\$225 K																
				\$1.82 B	\$27.3 M																



PROJECT AREA #02

HACKENSACK FLOW PATHS + GREEN WALL(K) + NEWARK BAY LIVING SHORELINES (EAST)

Sewer capacity limitations in western Jersey City lead to sewer back-ups and flooding. Recommendations in this project area focus on separating sewers, increasing stormwater storage and flow to the Hackensack River. This is paired with coastal protections, and new and enhanced wetlands and living shorelines along the river.

LEGEND

COASTAL ALIGNMENTS

Coastal Barriers

- Flood Barrier
- Raised Walkway/Boardwalk
- Raised Roads
- Planned Land Raising
- Tie-Ins to High Ground

DRAINAGE SOLUTIONS

Underground Conveyance

- Piped Lines
- Sewer Separation
- New Outfalls

Retention & Storage

- Retention Sites
- Detention Sites

GREEN INFRASTRUCTURE

- Pilot Resilience Hub
- Potential Resilience Hubs

Wetland Actions

- Enhance Existing Wetland
- Restore Existing Wetland Functions
- Living Shoreline (new seeding)

Green Infrastructure Corridors

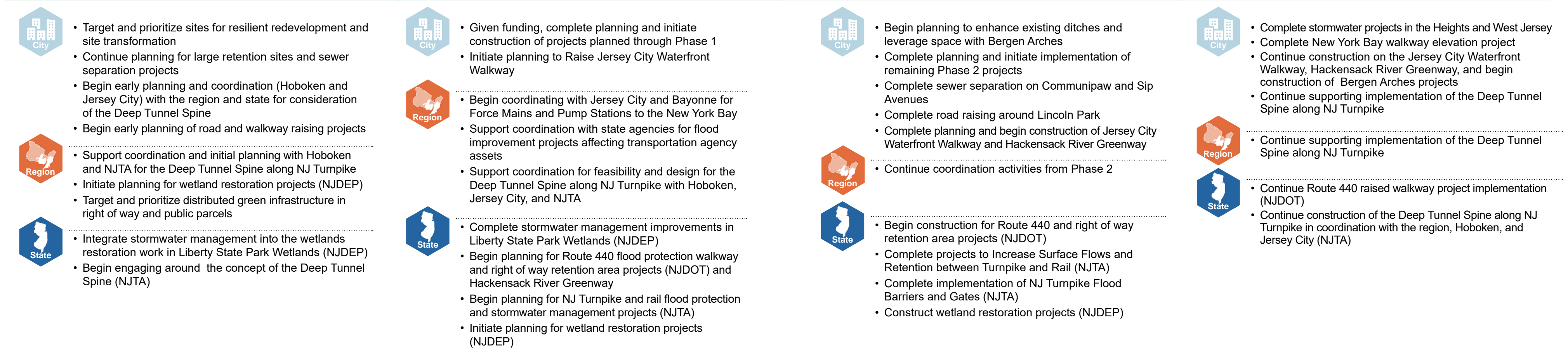
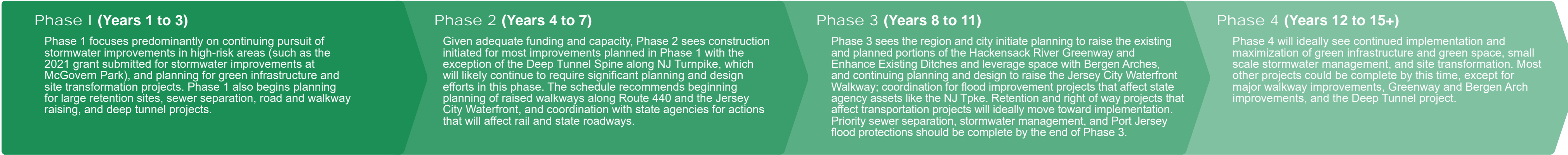
- Primary Green Street
- Secondary Green Street

Greenways

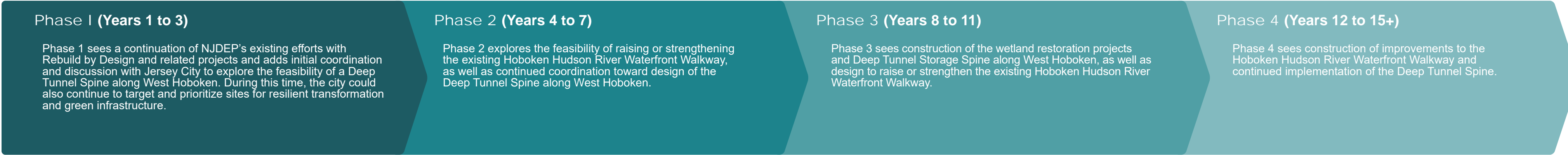
- Proposed New Greenway Stretches
- Existing Greenways, Walkways & Boardwalks
- Greenway Corridors Proposed by Others



JERSEY CITY PHASING



HOBOKEN PHASING



- Coordinate with NJDEP on Rebuild by Design implementation and the City of Hoboken’s portions of the project
- Coordinate across jurisdictions to explore planning and feasibility study for the Deep Tunnel Spine along West Hoboken (Jersey City, Hoboken, Region, State)
- Construct Northwest Resiliency Park and Southwest Park Expansion at Block 10



- Begin coordinating with the State, Jersey City, and Hoboken to explore planning and feasibility of the Deep Tunnel Spine along West Hoboken
- Target, prioritize, and begin construction of distributed green infrastructure in right of way and public parcels



- Begin construction of the Rebuild by Design project
- Support initial feasibility study, planning, and coordination for the Deep Tunnel Spine along West Hoboken (agency engagement will be dependent on locations explored)



- Continue Rebuild by Design project construction and begin to close out the project
- Explore feasibility of raising or strengthening the Existing Hoboken Hudson River Waterfront Walkway
- Construct 800 Monroe Resiliency Park, Hoboken Housing Authority Resiliency Park
- Continue NHTSA Long Term Control Plan implementation
- Construct Distributed Green Infrastructure in Right-of-Way and Public Parcels



- Continue coordinating with Jersey City and Hoboken to design the Deep Tunnel Spine along West Hoboken



- Continue coordinating with the region toward design of the Deep Tunnel Spine along West Hoboken
- Initiate planning for living shoreline projects (NJDEP)



- Rebuild by Design likely to be complete by this time
- Design raising or strengthening the Existing Hoboken Hudson River Waterfront Walkway
- Construct Distributed Green Infrastructure in Right-of-Way and Public Parcels
- If confirmed through feasibility assessment and funding, begin construction of the Deep Tunnel Spine along West Hoboken in coordination with appropriate stakeholders depending on final selected location



- Support implementation of the Deep Tunnel Spine along West Hoboken (agency engagement will be dependent on final location)
- Construct living shoreline projects (NJDEP)



- Construct improvements to the Existing Hoboken Hudson River Waterfront Walkway• Complete implementation of the Deep Tunnel Spine along West Hoboken
- Complete Distributed Green Infrastructure in Right-of-Way and Public Parcels
- Complete implementation of the Deep Tunnel Spine along West Hoboken
- Complete implementation of the Deep Tunnel Spine along West Hoboken



CAPITAL PROJECTS FOR CONSIDERATION IN BAYONNE

Key technical considerations

- Portions of East Bayonne are built on historical fill or piers, complicating coastal protection actions and requiring pumping to address drainage challenges.
- Current industrial areas, such as Constable Hook, require careful consideration for preservation of industrial water-dependent uses.
- Redevelopment along the waterfront provides opportunities to work with the private sector on coastal protection measures but the lack of consistent public land for alignments potential raises challenges.

Environmental benefits and considerations

- Bayonne, as a combined sewer community, can achieve significant benefits to water quality and public health by implementing projects that keep stormwater out of the combined sewer system.
- Large areas of Bayonne’s waterfront are currently or were historically industrial. Protecting these areas is important to the regional economy and to preventing environmental impacts to Bayonne residents but actions need to be sensitive to the challenges of developing infrastructure on contaminated sites.
- Re-direction of stormwater to separate outfalls along Newark Bay can alleviate pressure on Bayonne’s existing sewer system. These projects can be effectively integrated with projects designed for coastal storm surge protection of parks and homes along the waterfront but will require coordination to achieve regulatory approvals and protect water quality.
- The opportunity to combine public access with coastal protection actions expands Bayonne’s existing efforts to re-connect the community with the waterfront.

Social and economic benefits and considerations

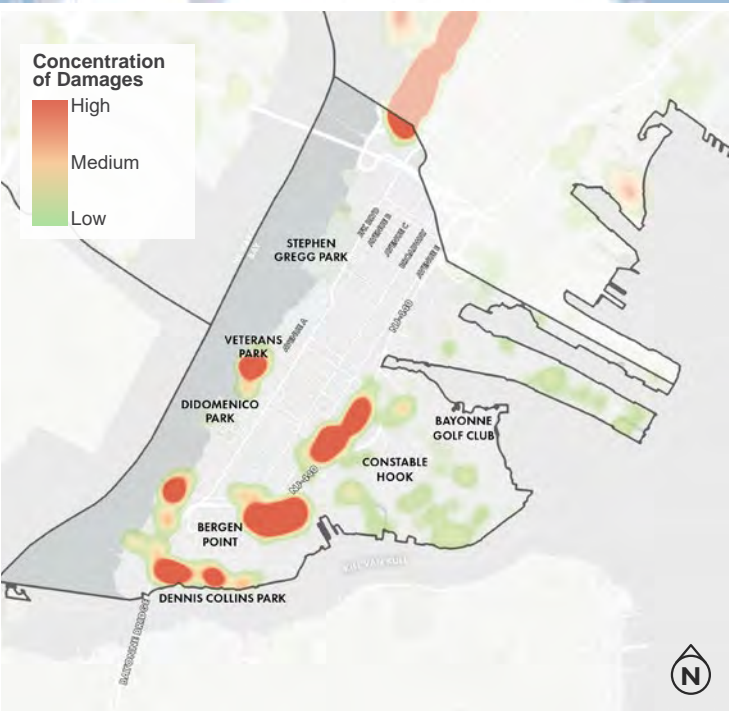
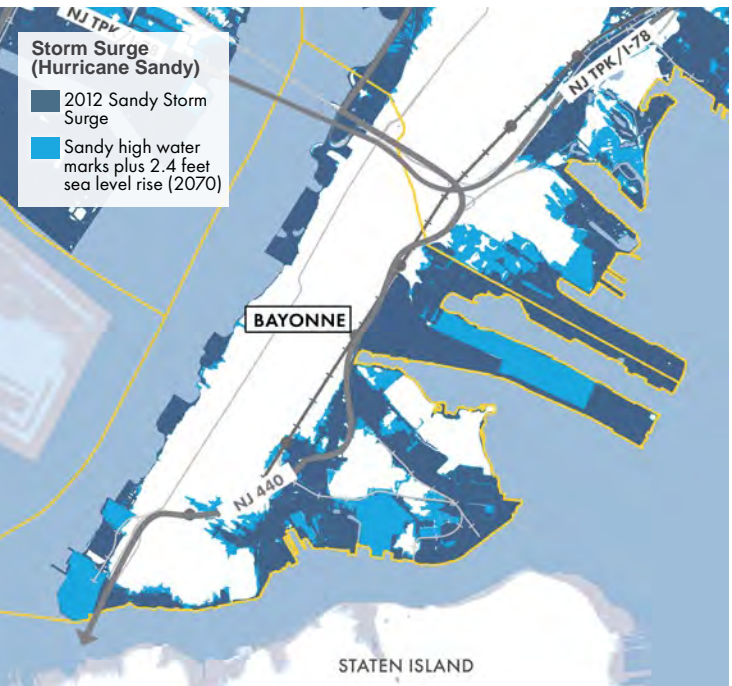
- Redevelopment is thriving in Bayonne. Protecting these investments will safeguard the economy.
- Reducing the frequency of flooding from rainfall in Bayonne will reduce risk of community downturn. In particular, a force main project to increase stormwater pumping to New York Bay and sewer separation projects will address rainfall flooding in the highest social vulnerability areas of Bayonne.
- Including walkability and green space through capital projects will improve quality of life and social connectivity across the community.
- Continuing to transform contaminated sites into community assets improves public health while providing a host of other economic, environmental, and social benefits, depending on the final use of the site and the extent to which the design integrates stormwater and other climate-hazard related improvements.

CAPITAL PROJECTS TO ADDRESS COASTAL STORM SURGE AND TIDAL FLOODING

Storm surge flooding will likely impact Bayonne’s current or formerly industrial areas and waterfront parks along the western and southern shorelines. The **Flood Impact Assessment** estimates that 1,000 of nearly 6,000 buildings in Bayonne could be impacted from a future Sandy-like event, with 70-percent of losses coming from industrial buildings. Continuation and expansion of the City of Bayonne’s strategy to incorporate higher resilience-related standards into redevelopment plans will be key for addressing flood risk in industrial areas important to protect due to their value for the regional economy and possible presence of toxic substances. Constable Hook is an example of such an area that could be prime for a resilient redevelopment plan. The Action Plan also recommends flood barriers and road raising to protect residential and commercial areas. Coastal storm surge protection could also involve a series of projects to raise segments of existing walkway and park waterfronts or construct a new elevated walkway along with park waterfront, integrated with the proposed Hackensack River Greenway and redevelopment projects. Other opportunities include projects to provide individual or site-level protection to waterfront parks and homes along the Newark Bay. These solutions should provide at or above the future Sandy level or 0.2-percent annual chance flood elevation plus sea level rise protection level, whichever is higher.

What does that mean in terms of costs and losses avoided?

Not including actions that Port Jersey may take to mitigate losses to their assets, Resilient NENJ’s coastal flood protection project recommendations may cost about \$1.1 billion and may have about \$16.2 million in annual operating costs,⁷ 10 percent of the city’s annual operating budget. The solutions may be designed to meet or exceed the flood heights expected from the modeled future Sandy event. This means \$1.9 billion in expected losses avoided⁸ to 1,000 buildings and 7,300 residents during a single future Sandy-like event.



⁷ This includes capital costs for site level protection of waterfront homes along Newark Bay, but does not include maintenance costs for those homes (estimated at \$3 million distributed across all property owners should protections be implemented).

⁸ Costs and losses avoided do not include Port Jersey assets

CAPITAL PROJECTS TO ADDRESS RAINFALL AND OTHER CLIMATE HAZARDS

As seen in the other municipalities in the region, Bayonne’s aging combined sewer system is an important contributor to rainfall flooding challenges in the city. Limited sewer capacity in high intensity rain events like the remnants of Hurricane Ida leads to rainfall flooding across the city, including along the Broadway commercial corridor, residential areas along Avenue A, and problem underpasses along the Hudson Bergen Light Rail corridor. Implementation of the strategies recommended in this Action Plan will reduce recurrent rainfall flooding by expanding capacity of the sewer system through new force mains and expanded pump stations, while taking stormwater out of the system through targeted sewer separation and stormwater management and green infrastructure at distributed public and private sites.

The presence of contaminated sites presents challenges for potential stormwater management projects such as retention sites because of the possible disruption or spread of contaminants, but also presents opportunities for contaminated sites to be remediated and transformed while incorporating stormwater management, green infrastructure, and open space. Parks and existing open space provide another possible opportunity for stormwater integration, particularly with implementation of the recommendation to advance Green Acres guidance for such projects, as outlined in **Section 3.2**. Bayonne submitted a successful FEMA grant application in 2021 to advance subsurface stormwater management and associated sewer capacity improvements at Cottage Street Park, for example. This project mirrors the recently completed project at Fitzpatrick Park, a formerly contaminated site.

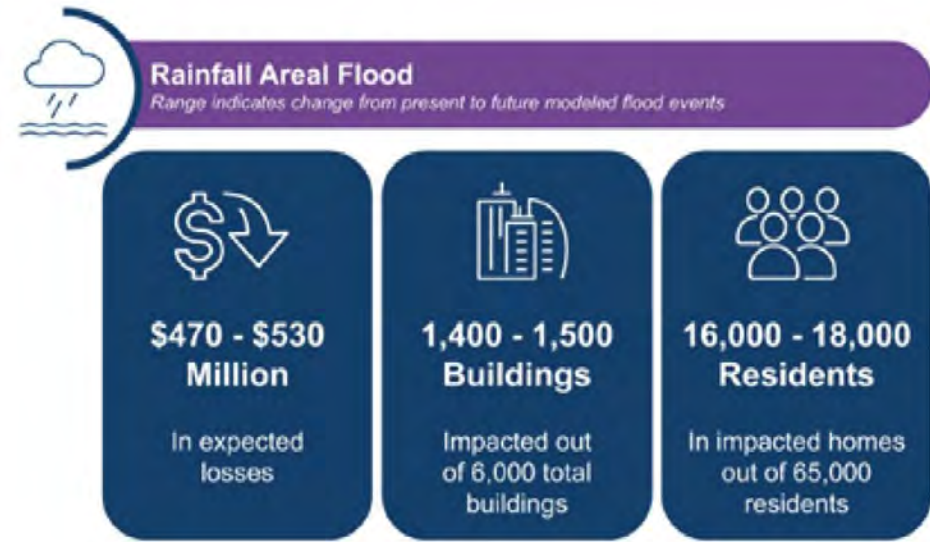
The recommended sewer system projects to improve drainage will be integrated with components of the city’s Long-Term Control Plan (LTCP), which is undergoing review by NJDEP and is estimated to cost upwards of \$347 million.⁹ Both the recommended actions in this Action Plan and the LTCP will yield benefits for water quality and public health by reducing combined sewer overflows and sewer back-ups. The green infrastructure recommendations in this Action Plan will also support advancement of the LTCP goal to manage 3-5-percent of Bayonne’s CSO volume with green infrastructure, which will have additional air quality, urban heat island effect mitigation, and quality of life benefits.

As described in the Flood Impact Assessment, Resilient NENJ modeled major flash flooding and areal rainfall events that would exceed design capacities of any drainage system. Resilient NENJ also modeled potential losses from a 5-year rainfall event given a) current conditions¹⁰ and b) if the capacity of the system increased to handle this level of rainfall. The Resilient NENJ technical team expects the Action Plan recommendations to bring the stormwater system to an industry standard 5-year level of service citywide.

A 5-year rainfall event is one with a 1 in 5, or 20-percent, annual chance of being met or exceeded, based on historical data.

Level of service is the expected magnitude event a drainage system can be expected to manage.

A 5-year, 1-hour peak rainfall intensity is an industry standard level of service goal for stormwater drainage systems.



What does that mean in terms of costs and losses avoided?

Resilient NENJ estimates it will cost about \$428 million to bring the city’s drainage system to a 5-year level of service over time,¹¹ and it could cost about \$6.5 million in increased annual operating costs once all efforts are complete. All recommendations are at the roadmap stage and will need to progress to feasibility and design, so the costs are likely to change during that process. That may sound like a lot of money, and it is, but Resilient NENJ models for areal flooding (about 8 to 9 inches of rainfall over a 24-hour period) show \$470 million to \$530 million in expected losses if such an event occurred citywide. While the recommended improvements will not eliminate this magnitude of rainfall flood hazard, they could significantly reduce impacts, and major rainfall events are happening more and more frequently. Further, losses from flooding due to a much more frequent, 5-year event (about 4 inches of rainfall over a 24-hour period) could be \$85 million in the city, and the proposed actions would largely eliminate these losses. Over time, as rain falls and fewer losses and disruptions occur, these benefits will add up and more than make up for the investment.

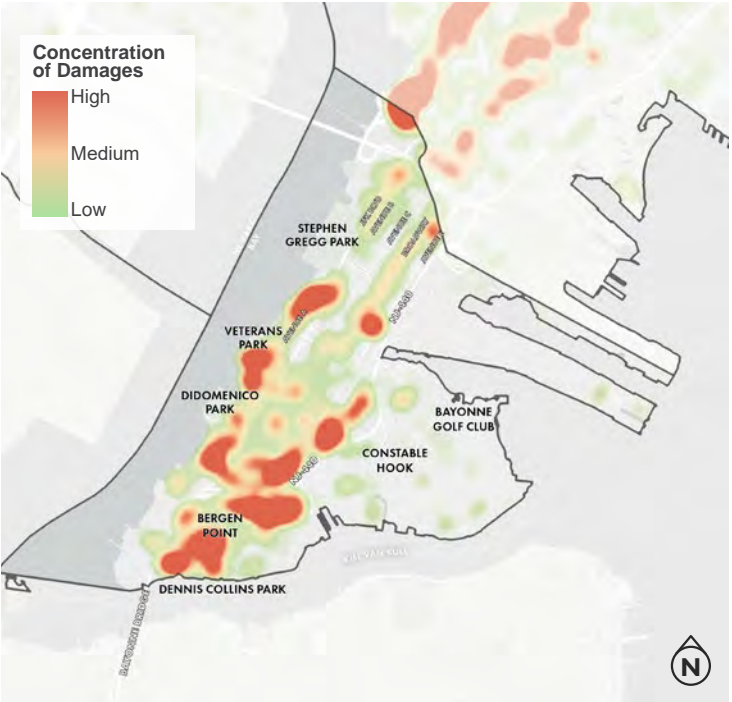


1,400 – 1,500 out of 6,000 total buildings in Bayonne are at risk of flooding from a major areal flood event and stand to benefit from the proposed improvements

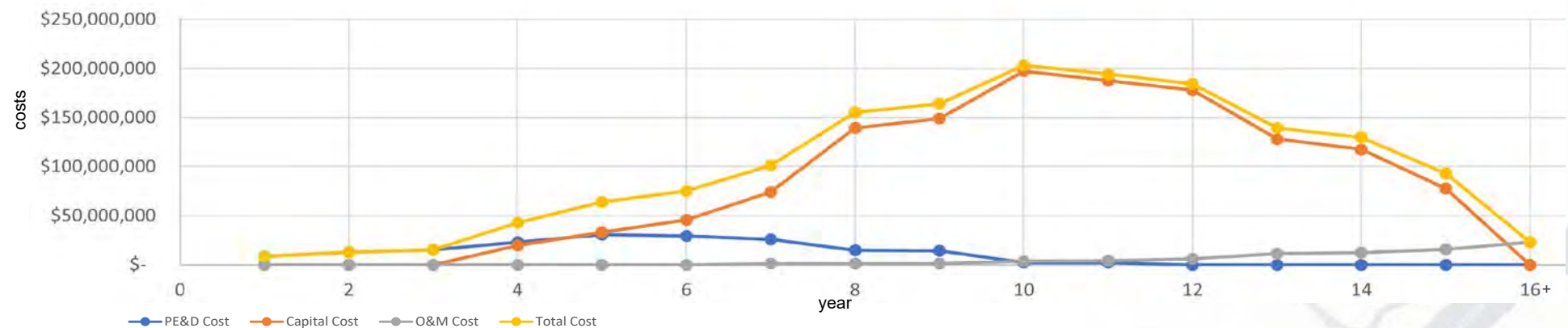
16,000 – 18,000 residents out of a total of 65,000 residents could directly benefit from flood risk reduction to their homes. The entire community could benefit from reduced roadway and community impacts.

Resilience is not just about reducing the hazard itself. Changing the way we work together, as outlined later in this roadmap, will also increase the benefits of these projects.

⁹ Based on the 2020 Bayonne Selection and Implementation of Alternatives Report, 27.8 MGD conveyance alternative
¹⁰ Current conditions vary across the region, but Resilient NENJ assumed current levels of service to be generally around 1-year 1-hour peak intensity based on technical expert and stakeholder review
¹¹ Costs would be in addition to the Long-term Control Plan estimates



ESTIMATED COST NEEDS (YEAR OVER YEAR)



Recommended capital projects are concept only and, unless otherwise noted or already being advanced by other entities, require feasibility evaluations as next steps.

REFLOWING BAYONNE + THE BERGEN HOOK

Bayonne's drainage is limited by pump station capacity, so recommended actions focus on increasing sewer and pumping capacity and separating sewers to support conveyance. These recommendations are complemented by individual site protections, integration of resilience into waterfront parks, and coastal protections at Constable Hook.

LEGEND


COASTAL ALIGNMENTS

- ### Coastal Barriers
- Flood Barrier
 - Raised Walkway/Boardwalk
 - Raised Roads
 - Bulkhead Enhancement
 - Planned Land Raising
 - Areas for Adaptation
 - Flood Gates
 - Tie-Ins to High Ground

DRAINAGE SOLUTIONS

- Underground Conveyance**
-  New Mains
 -  Piped Lines
 -  Sewer Separation
- Retention & Storage**
-  Retention Sites
 -  Detention Sites
- Outfalls & Pumping**
-  New Pump Station
 -  Enhance Existing Pump Station
 -  New Outfalls

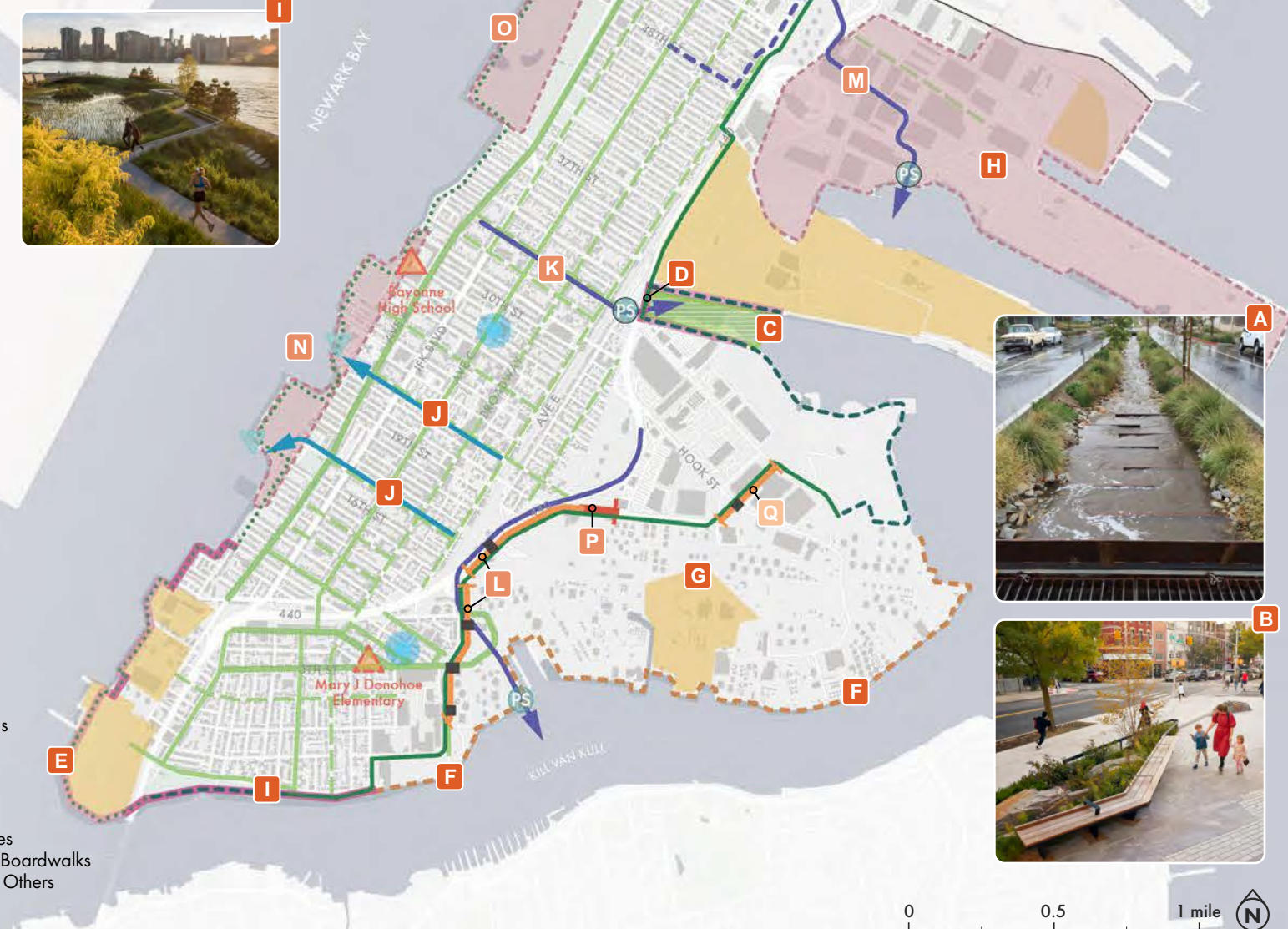
GREEN INFRASTRUCTURE

- 
- Pilot Resilience Hub
Potential Resilience Hubs

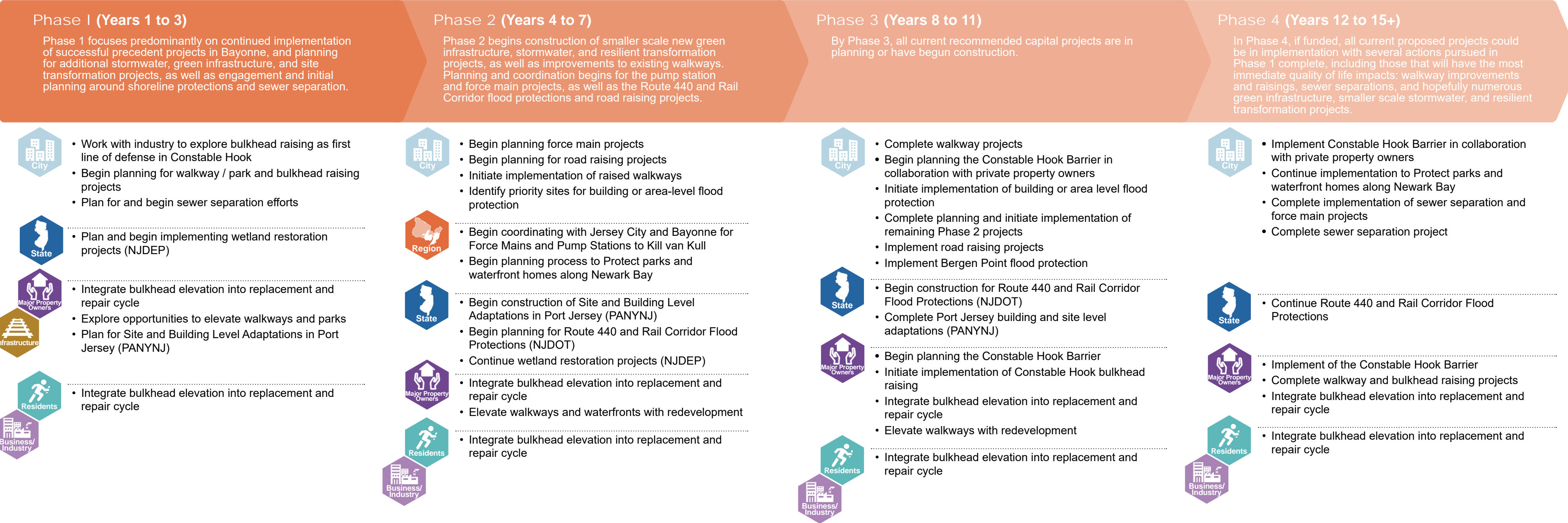
- ### Wetland Actions
- Restore Existing Wetland Functions

- Green Infrastructure Corridors**
- Primary Green Street
 - - - Secondary Green Street

- Greenways**
- Proposed New Greenway Stretches
 - - Existing Greenways, Walkways & Boardwalks
 - Greenway Corridors Proposed by Others



BAYONNE PHASING



CAPITAL PROJECTS FOR CONSIDERATION IN NEWARK

Key technical considerations

- Newark’s sewer system dates to the mid nineteenth century, resulting in variability throughout the city on the capacity and condition of the drainage infrastructure.
- Historical drainage paths to Newark Bay have been filled in as the area has developed, and industrial and transportation properties have created barriers to drainage for neighborhoods like the Ironbound.
- Hundreds of contaminated sites are located throughout Newark, complicating the ability to manage stormwater locally and optimize the location of protection systems.
- Large properties owned and operated by the Port Authority of New York and New Jersey are located on the southern side of Newark. Careful coordination with the Port Authority is required to meet their needs while improving resiliency for the city.

Environmental benefits and considerations

- Newark is highly susceptible to heat impacts, which are only expected to become worse in the future. Adding distributed green infrastructure practices through the city will provide resiliency benefits in addition to reducing heat island impacts.
- Residents have reported instances of sewer back-ups into streets, which have possible health impacts due to exposure to raw sewage. Measures to remove bottlenecks and improve sewer system capacity will ensure proper functioning of the system.
- Residents have also reported exposure to toxic floodwaters, where water has mixed with toxic substances in industrial areas. Resilience projects that clean-up contaminated sites will address this issue while removing environmental stressors.

Social and economic benefits and considerations

- Flood risks in Newark are unevenly carried by low-income populations. Improving resiliency throughout the city makes it safer and more affordable for the entire community.
- Large public properties within the city can be leveraged to provide regional stormwater management, while also adding public improvements and amenities for Newark residents.
- Newark’s industrial areas contribute to the local and regional economy by providing jobs and ensuring the movement of goods. Nevertheless, several people who participated in the Resilient NENJ process raised environmental justice and public health concerns about potential impacts from those uses to nearby communities and residents. It is therefore important to both protect those assets from climate hazards that could disrupt their function and exacerbate public health concerns, and also to find ways to reduce emissions, incorporate green space, and mitigate urban heat island effect. Such solutions could both improve quality of life and protect the regional economy.

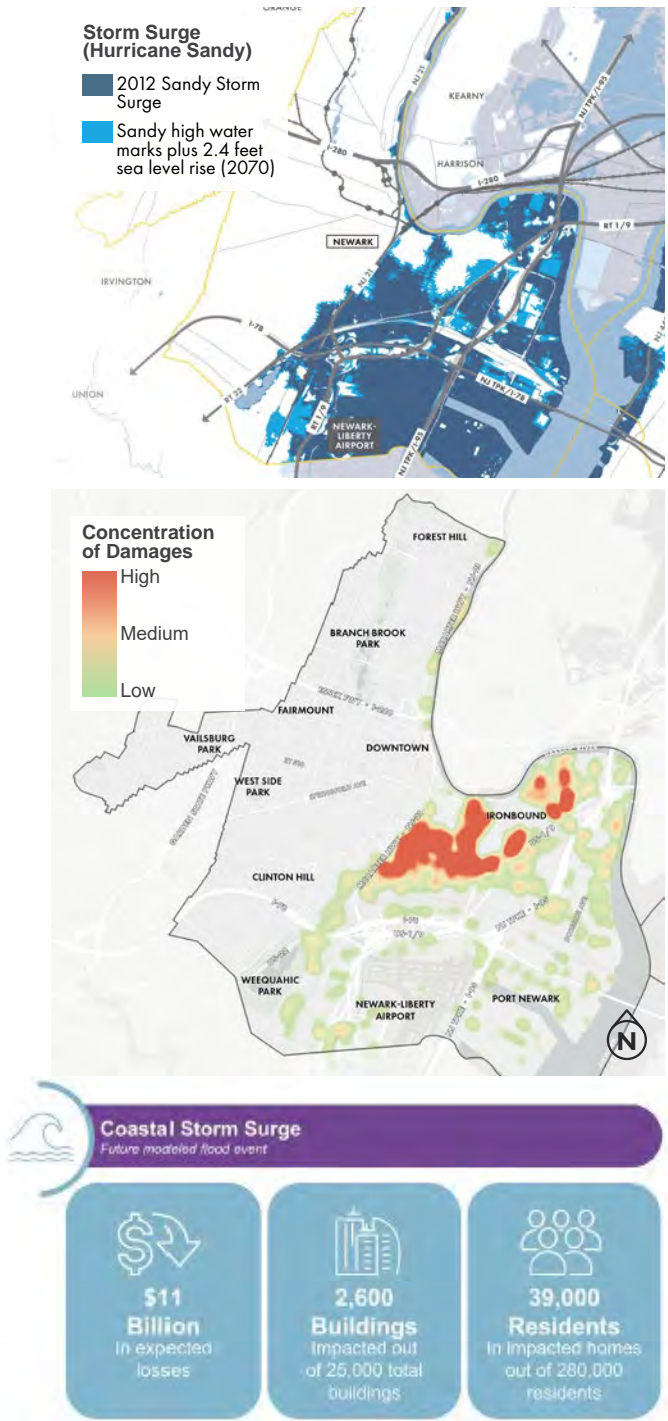
CAPITAL PROJECTS TO ADDRESS COASTAL STORM SURGE AND TIDAL FLOODING

In Newark, coastal storm surge is expected to primarily impact the areas of the Ironbound neighborhood, Doremus Avenue, Newark Liberty International Airport, and Port Newark. Most of the land area that is currently east of Doremus Avenue and comprising the airport and port were formerly wetlands that were filled in. Based on the Flood Impact Assessment, the most significant damages from storm surge in Newark are expected to be incurred in the Ironbound neighborhood. The Newark Flanking Plan project, which is the preferred alternative recommended by the USACE Passaic River Tidal Area project, is expected to address a large portion of storm surge flooding for the Ironbound Neighborhood, which is one of the most densely populated neighborhoods within Newark. Resilient NENJ recommends advancement of this project, and the other recommended projects focus on the remaining areas of storm surge flood risk, primarily the Doremus area and portions of the Passaic River waterfront. Protection of PANYNJ’s port and airport areas is also critical to the functioning of Newark and the wider region, and PANYNJ is advancing planning separately for mitigation of flooding at their assets.

The recommended strategy to address storm surge flooding relies on a series of physical barriers to block flood pathways, including both structures such as flood barriers and raised roadways. Raised roads along Corbin Street and several other segments could both protect transportation access while protecting inland areas from storm surge. These projects could integrate green infrastructure in their design for additional co-benefits. Areas that are east and north of the road raising and flood barrier alignment would be protected through phased bulkhead raising during repair and replacement, as well as through individual site protection. Bulkhead raising would also mitigate tidal or more frequent flooding over the longer-term. Resilient NENJ also recommends wetland restoration in the Newark Bay to create habitat, improve water quality, and provide wave attenuation.

What does that mean in terms of costs and losses avoided?

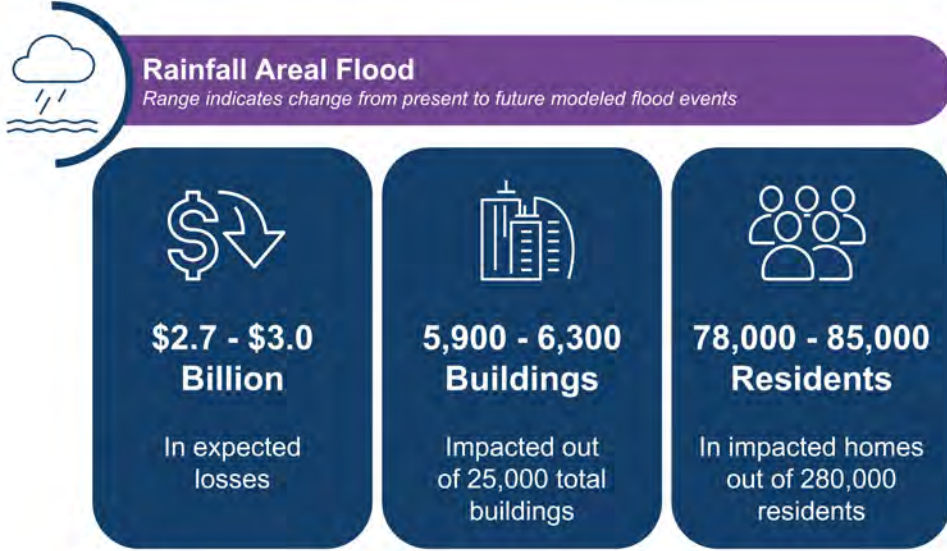
Resilient NENJ recommends about \$3.1 billion in coastal flood protection projects in Newark over time that could cost \$46 million annually for operations and maintenance. A high-level estimate for wetlands restoration accounts for about half of the costs due to the fact that removal of infrastructure would be required. Other significant shares of costs come from road raising, flood protection in the Doremus area, and protection of key energy assets. Costs don’t incorporate on-site protection of PANYNJ and PVSC assets because those projects are underway following independent planning initiatives, but do include the Newark Flanking Plan current cost estimate. Investment in the Resilient NENJ Action Plan could address \$11 billion in estimated losses from a single future Sandy event.



CAPITAL PROJECTS TO ADDRESS RAINFALL AND OTHER CLIMATE HAZARDS

Rainfall flooding impacts are already felt widely across Newark, especially in areas such as the Ironbound neighborhood, Ivy Hill, Vailsburg, and areas around Weequahic Park. Residents in these neighborhoods have reported experiencing flooding to varying extents almost every time that there is heavy rainfall, which impacts their mental health and quality of life. The Resilient NENJ Flood Impact Assessment estimates that, in addition to these areas, the most significant impacts from rainfall flooding could be in Roseville, West Side, Clinton Hill, and Upper Clinton Hill. As in other cities within the region, limited sewer capacity and increasing amounts of impervious surface exacerbate rainfall flooding.

The recommended approach to address rainfall flooding and other climate-related hazards includes a variety of strategies to reduce bottlenecks in the combined sewer system and improve its capacity through sewer separation, redirection, and distributed green infrastructure and stormwater management. The recommendations include improvements to the surface-level drainage ditch system in areas around Newark Airport to improve drainage in the Ironbound neighborhood. A regional parallel interceptor to convey additional flow to the PVSC Wastewater Treatment Plant, which is one of the alternatives under consideration for the PVSC LTCP, is key to the strategy for increasing sewer system capacity. The Ironbound, Downtown, Ivy Hill, Vailsburg, Mount Pleasant, and Broadway are neighborhoods where stormwater management through retention and detention sites will be key to addressing rainfall flooding. This can involve partnerships with universities, integration of stormwater management in existing public spaces, or integration of stormwater management into remediation projects for contaminated sites. Recommendations also include improvements to drainage associated with the lakes at Branch Brook Park and Weequahic Park, which are interconnected with the Newark sewer system, and exploration of sewer separation and deep tunnel opportunities.



What does that mean in terms of costs and losses avoided?

Resilient NENJ currently recommends about \$2.7 billion in capital improvements to bring the city’s stormwater system to a 5-year, 1 hour peak rainfall level of service and address other climate hazard related needs at the same time. These improvements could add about \$40.4 million a year in annual maintenance costs once complete.

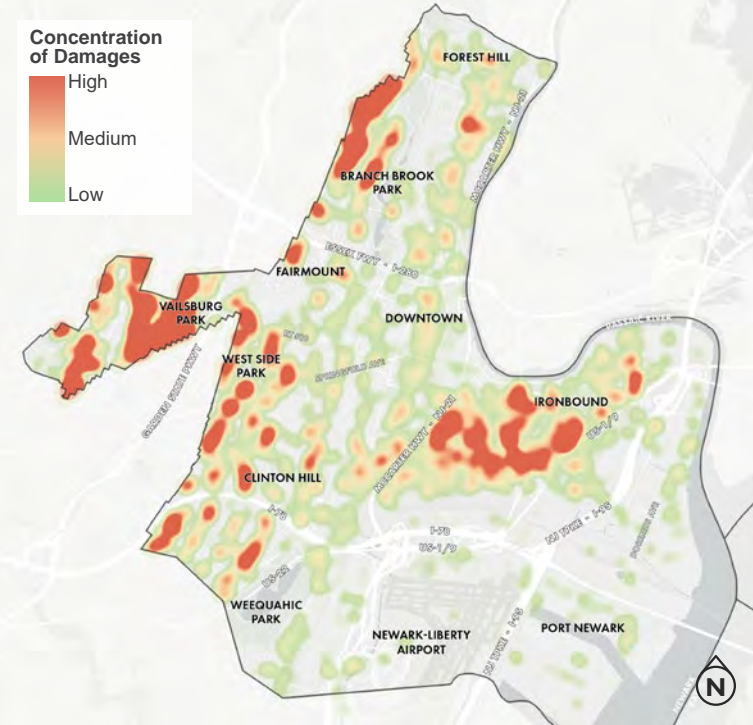
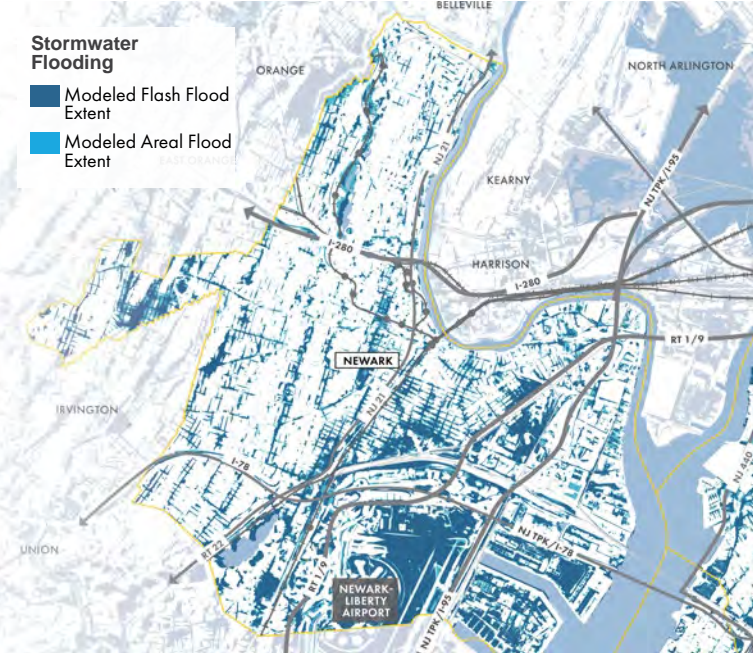
Resilient NENJ models for areal flooding (about 8 to 9 inches of rainfall over a 24-hour period) show \$2.7 to \$3 billion in expected losses for such an event (if it occurred citywide) in Newark. While the recommended improvements will not eliminate this magnitude of rainfall flood hazard, they could significantly reduce impacts, and major rainfall events are happening more and more frequently. Further, losses from flooding due to a much more frequent, 5-year event (about 4 inches of rainfall over a 24-hour period) could be about \$510 million in the city, and the proposed actions would largely eliminate these losses. Over time, as rain falls and fewer losses and disruptions occur, these benefits will add up and more than make up for the investment.



5,900 to 6,300 out of 25,000 total buildings in Newark are at risk of flooding from a major areal flood event and stand to benefit from the proposed improvements

75,000 to 85,000 residents out of a total of 280,000 residents could directly benefit from flood risk reduction to their homes. The entire community could benefit from reduced roadway and community impacts.

Resilience is not just about reducing the hazard itself. Changing the way we work together, as outlined in **Section 3.3** of the roadmap, will also increase the benefits of these projects.

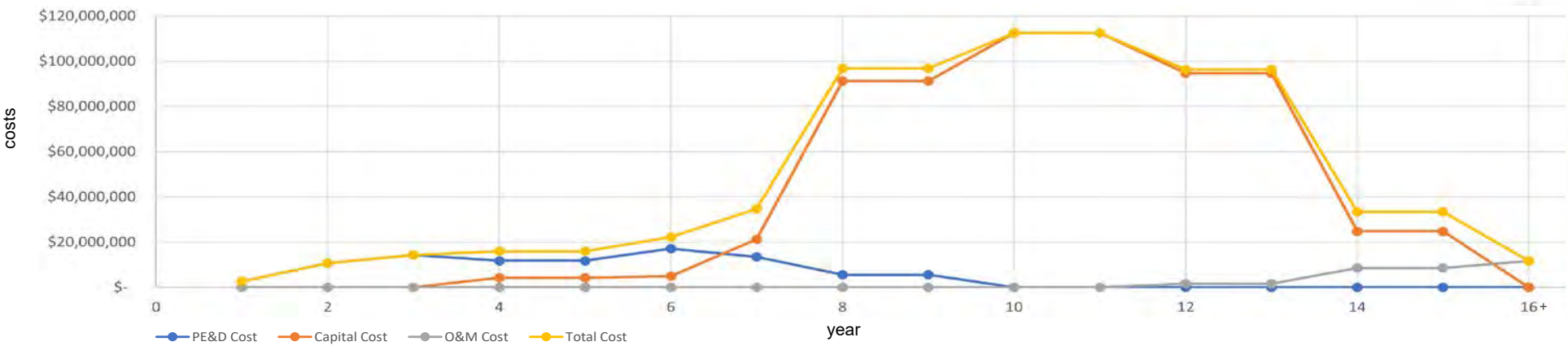


TIMELINE & COSTS

PROJECTS TIMELINE (GANTT CHART)

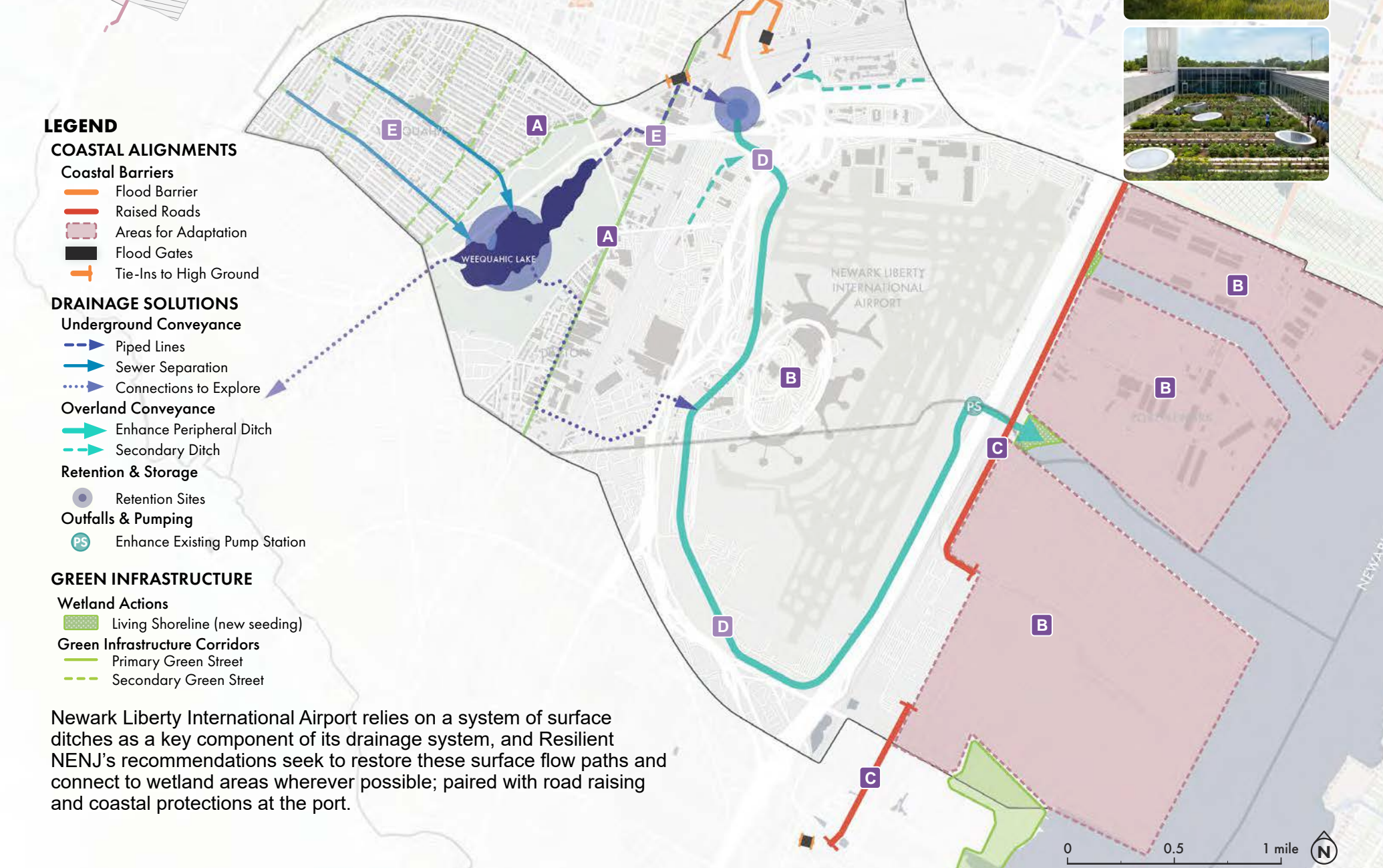
Start Phase	Project/Action	Lead Entity	Total Costs	Yearly O&M	Phase 1			Phase 2				Phase 3				Phase 4				16+
					year 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
Phase 1	A	Distributed Green Infrastructure in Right-of-Way and Public Parcels (All Hazards-01)	City	\$50 M	\$750 K	Planning			Implementation											
	-	Explore opportunities for distributed GI projects in non-public properties (All Hazards-01)	Private/City	\$2.5 M	\$37.5 K								O&M							
	B	Protect Critical PANYNJ Properties (Coastal-04)	PANYNJ	\$ -	\$ -															
	-	Remediation / resilience projects at contaminated sites (All Hazards-02)	City or Region	\$5 M	\$75 K															
	C	Road Raising around Ports (Coastal-02)	PANYNJ	\$467 M	\$7 M															
	D	Increase Flows and Upgrade Pump Station for Peripheral Ditch (Stormwater-03)	PANYNJ	\$100 M	\$1.5 M															
	E	Separate Stormwater into Weequahic Lake and Peripheral Ditch (Stormwater-01)	City	\$150 M	\$2.5 M															
			\$775 M	\$11.6 M																

ESTIMATED COST NEEDS (YEAR OVER YEAR)



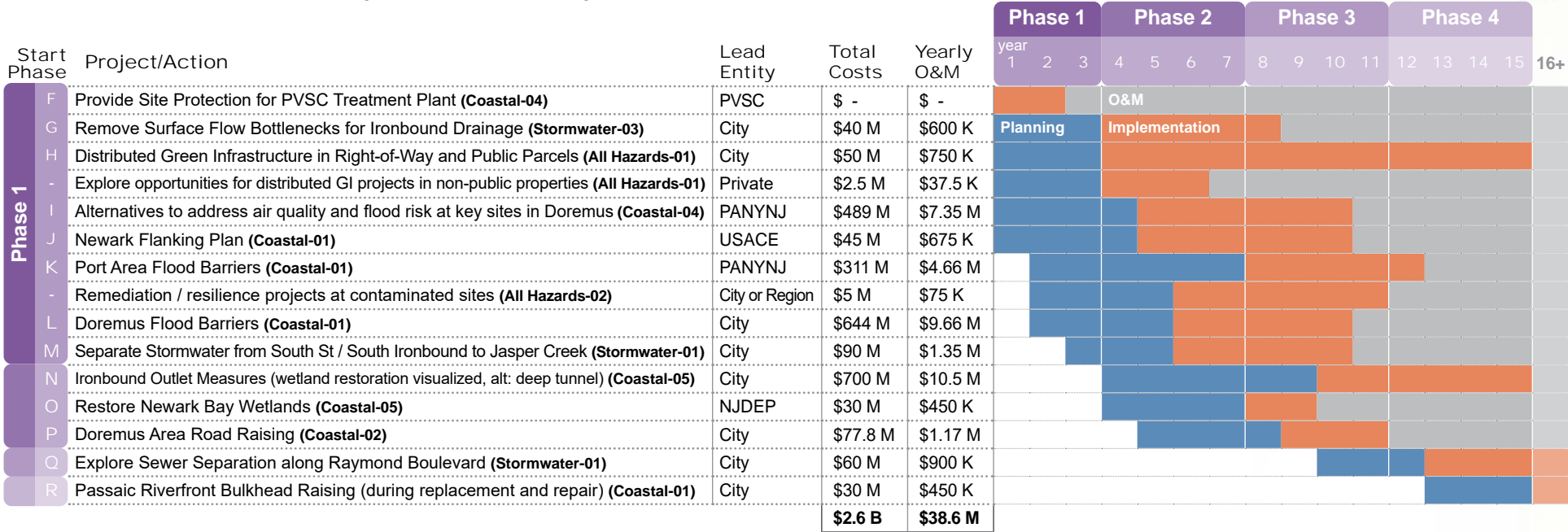
Recommended capital projects are concept only and, unless otherwise noted or already being advanced by other entities, require feasibility evaluations as next steps.

PROJECT AREA #04 RESTORING NATURAL CONNECTIONS + PORTSIDE PROTECTIONS

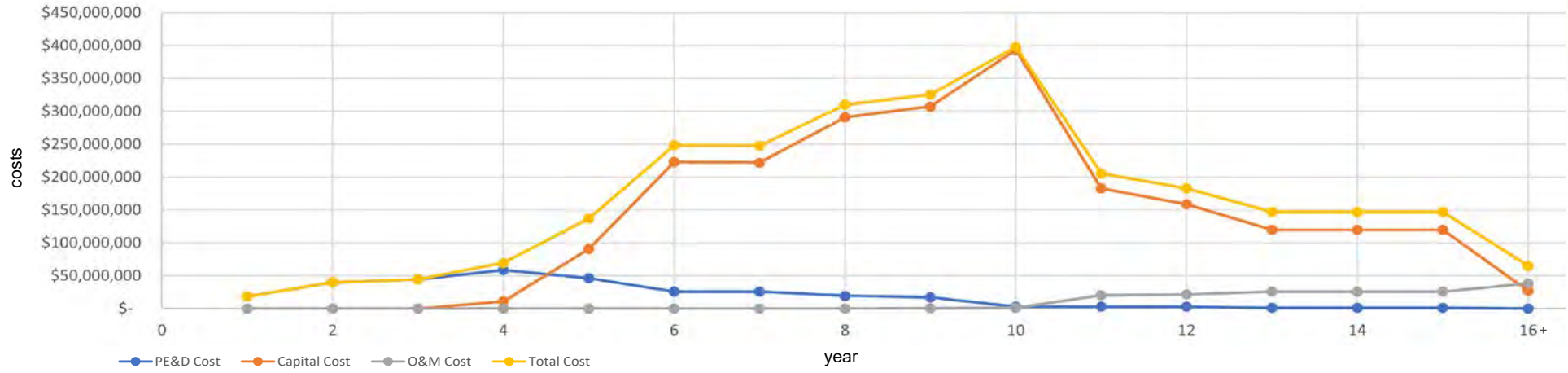


TIMELINE & COSTS

PROJECTS TIMELINE (GANTT CHART)



ESTIMATED COST NEEDS (YEAR OVER YEAR)



Recommended capital projects are concept only and, unless otherwise noted or already being advanced by other entities, require feasibility evaluations as next steps.

PROJECT AREA #05 DRAINING THE IRONBOUND + DOREMUS DRY-LINE + NEWARK BAY LIVING SHORELINES (WEST)

The Ironbound neighborhood is lower in elevation than its surroundings and acts as a bowl that collects stormwater from surrounding areas during rain AND coastal events. The recommended actions drain the bowl and convey stormwater to living shorelines along Newark Bay. This in conjunction with the planned USACE Newark Flanking Plan, strengthened bulkheads, and inland coastal protections will create a more resilient Ironbound.

LEGEND

COASTAL ALIGNMENTS

- Coastal Barriers
 - Flood Barrier
 - Raised Roads
 - Bulkhead Enhancement
- Planned Land Raising
- Flood Gates
- Tie-Ins to High Ground

DRAINAGE SOLUTIONS

Underground Conveyance

- Planned Parallel Interceptor
- Piped Lines
- Sewer Separation
- Connections to Explore
- New Outfalls

Retention & Storage

- Retention Sites
- Detention Sites

GREEN INFRASTRUCTURE

Wetland Actions

- Potential Resilience Hubs
- Enhance Existing Wetland
- Restore Existing Wetland Functions
- Living Shoreline (new seeding)
- Restored Wetlands (post retreat)

Green Infrastructure Corridors

- Primary Green Street
- Secondary Green Street

Greenways

- Proposed New Greenway Stretches
- Existing Greenways, Walkways & Boardwalks
- Greenway Corridors Proposed by Others

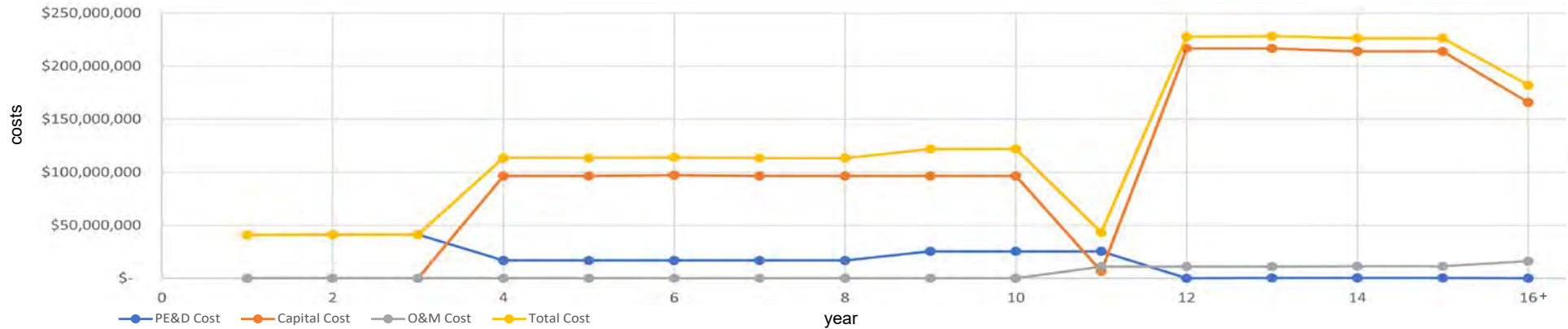


TIMELINE & COSTS

PROJECTS TIMELINE (GANTT CHART)

Start Phase		Project/Action	Lead Entity	Total Costs	Yearly O&M	Phase 1			Phase 2				Phase 3				Phase 4				
						year 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16+
Phase 1	S	Distributed Green Infrastructure in Right-of-Way and Public Parcels (All Hazards-01)	City	\$50 M	\$750 K	Planning			Implementation												
	T	Parallel Interceptor to PVSC Treatment Plant (LTCP) (Stormwater-02)	PVSC	\$714 M	\$10.7 M										O&M						
	U	Partner with Universities for Retention Projects (Stormwater-04)	Institutions	\$25 M	\$375 K																
	V	Expand Regional Retention Opportunities in the Ironbound (Stormwater-04)	City	\$30 M	\$450 K																
	-	Explore opportunities for distributed GI projects in non-public properties (All Hazards-01)	Private/City	\$2.5 M	\$37.5 K																
	-	Remediation / resilience projects at contaminated sites (All Hazards-02)	City or Region	\$5 M	\$75 K																
	W	Downtown Deep Tunnel (Stormwater-02)	City	\$900 M	\$13.5 M																
	X	Evaluate & Strengthen Riverfront Park Walkway (Coastal-03)	City	\$256 M	\$3.8 M																
	Y	Passaic Riverfront Bulkhead Raising (during replacement and repair) (Coastal-01)	City	\$14.5 M	\$218 K																
				\$1.99 B	\$29.9 M																

ESTIMATED COST NEEDS (YEAR OVER YEAR)



PROJECT AREA #06 INTERCEPTING RUNOFF + PASSAIC PATHWAY

Solutions in this project area lean on the proposed parallel interceptor under consideration by PVSC to increase stormwater collection capacity, while addressing coastal flooding through bulkhead enhancement and connecting and greening downtown with drainage and green infrastructure improvements.

LEGEND

COASTAL ALIGNMENTS

- Coastal Barriers
 - Reassess Existing Walkway (over time)
 - Raised Roads
 - Bulkhead Enhancement
 - Tie-Ins to High Ground

DRAINAGE SOLUTIONS

- Underground Conveyance
 - Planned Parallel Interceptor
 - Deep Tunnel
 - Piped Lines
 - Sewer Separation
 - Connections to Explore

Retention & Storage

- Detention Sites
- Tie-Ins

Outfalls & Pumping

- New Pump Station

GREEN INFRASTRUCTURE

- Pilot Resilience Hub
- Potential Resilience Hubs
- Green Infrastructure Corridors
 - Primary Green Street
 - Secondary Green Street
- Greenways
 - Proposed New Greenway Stretches
 - Existing Greenways, Walkways & Boardwalks
 - Greenway Corridors Proposed by Others

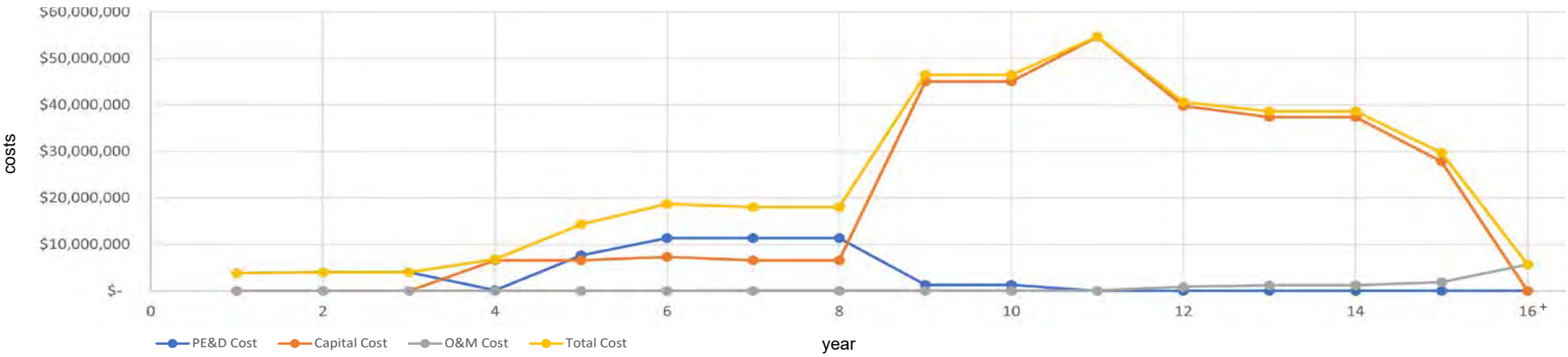


TIMELINE & COSTS

PROJECTS TIMELINE (GANTT CHART)

Start Phase		Project/Action	Lead Entity	Total Costs	Yearly O&M	Phase 1			Phase 2				Phase 3				Phase 4				16+
						year 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
Phase 1	Z	Distributed Green Infrastructure in Right-of-Way and Public Parcels (All Hazards-01)	City	\$50 M	\$750 K	Planning			Implementation												
	a	Expand Regional Retention Opportunities in Ivy Hill (Stormwater-04)	City	\$25 M	\$375 K																
	-	Explore opportunities for distributed GI projects in non-public properties (All Hazards-01)	Private/City	\$2.5 M	\$37.5 K																
	-	Remediation / resilience projects at contaminated sites (All Hazards-02)	City or Region	\$5 M	\$75 K																
	b	Branch Brook Park and Neighborhood Improvements (Stormwater-01)	City	\$200 M	\$3 M																
	c	Re-direct Branch Brook Park Overflows to Second River (Stormwater-03)	City	\$50 M	\$750 K																
	d	Expand Capacity of Elizabeth River Tributary through Vailsburg (Stormwater-03)	City	\$45 M	\$675 K																
				\$377 M	\$5.66 M																

ESTIMATED COST NEEDS (YEAR OVER YEAR)



Recommended capital projects are concept only and, unless otherwise noted or already being advanced by other entities, require feasibility evaluations as next steps.

PROJECT AREA #07 INLAND DRAINAGE SOLUTIONS

Newark's western neighborhoods have limited waterbodies for discharge of stormwater, presenting challenges for stormwater management. Recommended actions seek to provide sites for storage, including leveraging Branch Brook Park Lake, and to explore opportunities for increasing outflow to the Elizabeth River through neighboring municipalities.

LEGEND

DRAINAGE SOLUTIONS

Underground Conveyance

- New Mains
- Sewer Separation
- Connections to Explore

Retention & Storage

- Retention Sites
- Detention Tie-Ins

Outfalls & Pumping

- New Pump Station

Overland Conveyance

- Enhance Second River Outflow
- Enhance Outflow to Elizabeth River

GREEN INFRASTRUCTURE

- Potential Resilience Hubs

Green Infrastructure Corridors

- Primary Green Street
- Secondary Green Street

Greenways

- Proposed New Greenway Stretches
- Existing Greenways, Walkways & Boardwalks
- Greenway Corridors Proposed by Others



NEWARK PHASING

Phase 1 (Years 1 to 3)

Phase 1 actions in Newark require significant interagency collaboration toward key stormwater projects, as well as the initiation of planning for stormwater projects within the City’s purview in high-risk areas. Newark Flanking Plan continues to proceed and planning begins for Doremus Flood Barriers.



- Begin key initial collaboration efforts, as follow:
 - Begin to engage with the region and Seton Hall University and NJIT toward planning of stormwater management efforts to benefit Ivy Hill and Downtown, respectively
 - Engage with the Passaic Valley Sewerage Commission (PVSC) to begin planning for the parallel interceptor to the PVSC treatment plant as outlined in the Long-term Control Plan (LTCP)
 - Initiate planning to Increase Flows and Upgrade the Pump Station for the Peripheral Ditch in collaboration with PANYNJ
- Initiate planning to Remove Flow Bottlenecks for Ironbound Drainage
- Explore regional retention opportunities in Ivy Hill and Ironbound
- Initiate planning for Doremus Flood Barriers
- Begin considerations around separating stormwater from South Street and other areas in the Ironbound to Jasper Creek
- Target and prioritize Distributed green infrastructure in right of way and public parcels
- Support engagement around Port Area Flood Barriers and Road Raising around Ports in collaboration with the State, PANYNJ, and city of Newark



- Support engagement toward partnerships with Seton Hall University and NJIT toward planning of stormwater management efforts to benefit Ivy Hill and Downtown, respectively
- Initiate engagement to plan to Increase Flows and Upgrade the Pump Station for the Peripheral Ditch in collaboration with the City of Newark and PANYNJ
- Support engagement around Port Area Flood Barriers and Road Raising around Ports in collaboration with the State, PANYNJ, & city of Newark



- Partner with the City of Newark and the region to begin to explore the retention project recommendations in Ivy Hill and Downtown (Seton Hall University and NJIT)
- Continue planning to protect key energy, airport, and port assets (PANYNJ)
- Begin planning for Port Area Flood Barriers and Road Raising around Ports in collaboration with the State, region, and PANYNJ
- Complete flood protection solutions underway at PVSC (Sewer Authority)
- Initiate planning for the parallel interceptor to the PVSC treatment plant as outlined in the LTCP (PVSC)
- Initiate planning to Increase Flows and Upgrade the Pump Station for the Peripheral Ditch in collaboration with the City of Newark



- Plan and engage around the Newark Flanking Plan initiative (USACE)

Phase 2 (Years 4 to 7)

Phase 2 sees several early projects move toward construction, assuming necessary funding and coordination occurs during the Phase 1 period. Phase 2 requires significant capacity from the city and key stakeholders to initiate and continue collaboration and bring new key projects into design while transitioning existing projects to construction.



- In collaboration with Seton Hall, begin construction of the retention projects to benefit Ivy Hill (Stevens)
- Work with PVSC to initiate planning for the Downtown Deep Tunnel (Sewer Authority)
- Initiate construction of the following Phase 1 planning & design projects:
 - Remove Surface Flow Bottlenecks for Ironbound Drainage
 - Regional retention opportunities in Ivy Hill and Ironbound
 - Doremus Flood Barriers
 - Separating stormwater from South Street and other areas in the Ironbound to Jasper Creek
- Initiate planning for the following projects:
 - Doremus Area Road Raising
 - Branch Brook Park and Neighborhood Improvements
 - Re-direct Branch Brook Park Overflows to Second River
 - Separate Stormwater into Weequahic Lake and Peripheral Ditch
 - Expand Capacity of Elizabeth River Tributary through Vailsburg
- Support engagement around Port Area Flood Barriers and Road Raising around Ports in collaboration with the State, PANYNJ, and city of Newark



- As needed, support engagement with the City of Newark and PVSC toward the Downtown Deep Tunnel project
- Support engagement around Port Area Flood Barriers and Road Raising around Ports in collaboration with the State, PANYNJ, and city of Newark



- Begin construction of the retention projects to benefit Ivy Hill (Seton Hall)
- Initiate construction for key projects protecting critical energy, airport, and port assets (PANYNJ)
- Continue planning for road raising and flood barriers around ports (PANYNJ)
- Develop design and move Peripheral Ditch project toward implementation
- Initiate construction for the parallel interceptor to the PVSC treatment plant as outlined in the LTCP (PVSC)
- Initiate planning for the Downtown Deep Tunnel (PVSC)



- Initiate planning for wetland restoration projects (NJDEP)
- Restore Newark Bay Wetlands (NJDEP)









- Initiate construction of the Newark Flanking Plan (USACE)

NEWARK PHASING CONTINUED







Phase 3 (Years 8 to 11)

Like Phase 2, Phase 3 requires significant capacity from the city to move major initiatives through planning and construction. Regional and state support in navigating interagency coordination needs during this time could be supportive. This is a time of significant construction activity in various areas across the city and car will be needed to manage impacts to residents.

- 
 - Continue to coordinate with PVSC toward the planning and design for the Downtown Deep Tunnel project
 - Finalize planning & design and begin to move projects toward construction:
 - Doremus Area Road Raising
 - Separate Stormwater into Weequahic Lake and Peripheral Ditch
 - Expand Capacity of Elizabeth River Tributary through Vailsburg
 - Complete the existing sewer separation projects and Doremus Area Road Raising
 - Begin construction of Branch Brook Park and Neighborhood Improvements
 - Complete re-direction of Branch Brook Park Overflows to Second River
 - Complete the following projects that began construction in Phase 2:
 - Remove Surface Flow Bottlenecks for Ironbound Drainage
 - Doremus Flood Barriers
 - Separate Stormwater from South Street and other areas in the Ironbound to Jasper Creek
 - Initiate planning to:
 - Strengthen Riverfront Park Walkway
 - Explore Sewer Separation along Raymond Boulevard
- 
 - As needed, continue to support engagement with the City of Newark and PVSC toward the Downtown Deep Tunnel project
 - Support engagement around Port Area Flood Barriers and Road Raising around Ports in collaboration with the State, PANYNJ, and city of Newark
- 
 - Continue planning and design for the Downtown Deep Tunnel (PVSC)
 - Complete construction and move toward closeout of the Parallel Interceptor project as outlined in the LTCP (PVSC)
 - Complete the Peripheral Ditch project (PANYNJ)
 - Begin construction of Port Area Flood Barriers Barriers and Road Raising around Ports in collaboration with the State, region, and city of Newark (PANYNJ)
- 
 - Construct wetland restoration projects projects and other Ironbound outlet measures (NJDEP)
 - Complete construction and begin closeout of key projects to protect critical energy, airport, and port assets
- 
 - Continue construction of the Newark Flanking Plan and begin to close out the project (USACE)
- 

Phase 4 (Years 12 to 15+)

The Newark Flanking Plan should be completed by this time, as well as several other major projects in coordination with multiple agencies. Bulkheads along the waterfront should be replaced at a higher elevation to address high tides during their repair and replacement cycles. Work in wetlands restoration, as well as coastal and stormwater projects, continue.

- 
 - Complete:
 - Regional Retention Opportunities in the Ironbound
 - Regional Retention Opportunities in Ivy Hill
 - Distributed Green Infrastructure in Right-of-Way and Public Parcels
 - Begin to construct sewer separation along Raymond Boulevard
 - Ensure that the Passaic Riverfront is raised during the natural replacement and repair cycle
 - Construct and complete Riverfront Park Walkway Improvements
- 
 - Continue to support engagement around Port Area Flood Barriers in collaboration with the State, the City, and PANYNJ
- 
 - Closeout retention projects in partnership with Newark that will benefit Ivy hill residents (Seton Hall)
 - Initiate construction of the Downtown Deep Tunnel project (PVSC)
 - Move to complete the Port Area Flood Barriers and Road Raising around Ports (PANYNJ)
 - Raise bulkheads during repair and replacement cycle
- 
 - Complete Newark Wetland Restoration project and other Ironbound Outlet Measures (NJDEP)
- 
 - Closeout the Newark Flanking Plan project (USACE)
- 

5.2 ROADMAP FOR NON-CAPITAL ACTIONS - POLICY AND GOVERNANCE, OUTREACH, SERVICE AND PROGRAM DEVELOPMENT, & EMERGENCY PREPAREDNESS SOLUTIONS

The recommended strategy unites a series of capacity building measures, outreach campaigns, new or enhanced programs, policy changes, and governance structures to increase resilience. These actions complement capital projects (and vice versa). With the exception of ordinance improvements, most of these actions do not focus on reducing hazards directly. Instead, they reduce risk by improving community preparedness and **adaptive capacity** to dealing with the presence of hazards.

Since the risk from hazards like flooding and heat are already significant in the region today, and because many capital projects to physically reduce risk have longer timelines for implementation, measures that increase adaptive capacity are important to implement in the near-term. They fill the gap between now and when physical changes can happen and also can help reduce risk that will remain once those physical changes are in place (it is impossible to eliminate risk). Policy measures can also make sure that risk is not added due to business-as-usual decision making. Some of the recommendations will also help leaders make more effective use of time and funds, or will provide community members with resources to mitigate their own risks. Resilient NENJ has already begun implementing some of the recommendations during development of this Action Plan, and examples of these efforts are included in **Section 3.3**.

WHAT IS ADAPTIVE CAPACITY?

Adaptive capacity is the ability of communities, institutions, or people to adjust to potential hazards, to take advantage of opportunities, or to respond to consequences. Having strong adaptive capacity contributes to resilience—the ability to prepare and plan for, absorb, recover from, and more successfully adapt to adverse events. In the context of extreme events, people with low adaptive capacity have difficulty responding, evacuating, or relocating when necessary, and recovering from event-related health impacts.

HOW DO WE DETERMINE WHO TO TARGET IN OUTREACH?

As the Action Plan moves deeper into implementation, this tool and others described in **Appendix I**, will continue to be critical to improving Resilient NENJ engagement processes and outcomes. For example, this tool should be used at the beginning process for any major decision or milestone to determine who must be brought to the table.

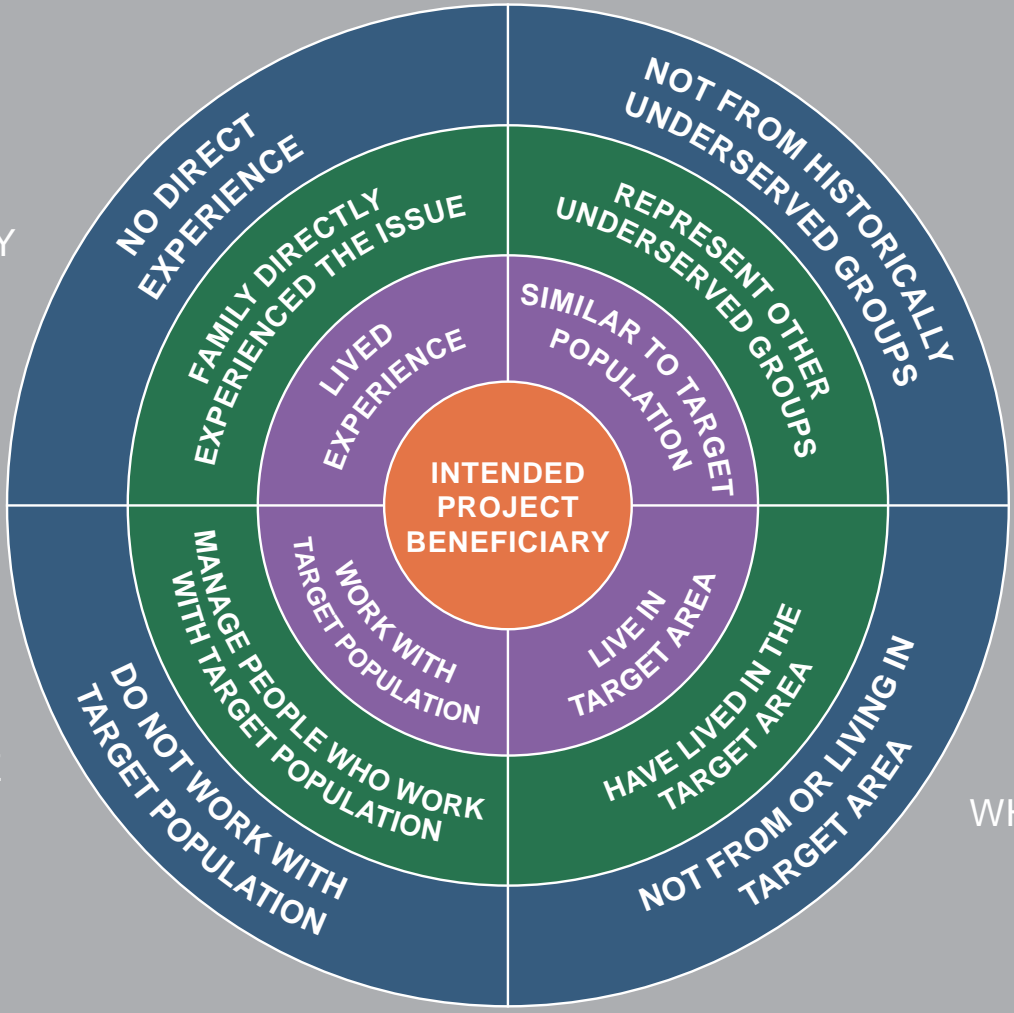
Other good questions to ask:

- Who could be affected by the outcome or process of making this decision?
- Who could affect the outcome or process of making this decision?

ISSUE EXPERIENCE

WHO HAS BEEN DIRECTLY IMPACTED BY FLOODING?

DIRECT ENGAGEMENT
WHO WORKS WITH THE TARGET POPULATION?



DEMOGRAPHIC RELEVANCE

WHO HAS BEEN HURT, UNDERSERVED, OR NOT REPRESENTED BY SIMILAR EFFORTS IN THE PAST?

GEOGRAPHIC RELEVANCE

WHO LIVES IN THE AREAS MOST AFFECTED?

What is the strategy?

COORDINATE

Central to many of the recommendations in this plan is continued regional coordination by the Resilient NENJ Region Team / Steering Committee. There are many benefits to regional coordination, such as pooling of shared resources, sharing of best practices, and more effective advocacy for funding. Many actions could most effectively be led at a regional scale (although they could still be implemented at local scales), such as the Resilience 101 campaign, the outreach ambassador program, programs to provide resilience-related resources to residents, and coordination with infrastructure entities. Although each of the four cities has a unique character, there are many shared qualities across the region, and many residents work and play in other cities within the region. Therefore, while other actions might make more sense at local scales because there are already existing processes in place for implementation, coordination to ensure consistency across the region could be beneficial.

Significant coordination will be needed between the municipalities, utilities, and infrastructure entities to implement the physical and nature-based capital project recommendations of this Action Plan. The recommendations seek to leverage opportunities for integration of projects that advance multiple goals into a single program, or a “dig once” approach. One example is integrating stormwater improvements, such as a deep tunnel spine or other drainage corridor, with the New Jersey Turnpike Authority’s (NJTA) Newark Bay-Hudson Corridor Extension Program, which would require coordination between NJTA, municipalities, and sewer utilities. The Long-Term Control Plans for combined sewer utilities are another area where coordination will maximize flood mitigation and water quality benefits from the LTCP projects and resilience actions. The Action Plan recommends creation of a Regional Infrastructure Coordination Council to serve as the platform for this coordination and to proactively identify other opportunities for integration.

CLARIFY

Availability of clear, concise information is critical to successful decision-making at all levels. Many of the recommendations in this plan contribute to creation of a “single source of truth” related to resilience information. State agencies, such as NJDEP, can play a role by reviewing information, reviewing duplication, improving consistency and linkages to other resources, and using consistent branding on authoritative information. Stakeholders at all scales can take similar measures to improve their own information, increase transparency by ensuring websites are kept up to date and reflect ongoing efforts, and connect to other ongoing initiatives.

These information improvements will help leaders do their jobs more effectively by providing guidance on the tools, data, and models to use. Capacity at the local level can also be expanded by increasing staff dedicated to resilience and providing staff trainings (including trainings and exercises for emergency management teams), and this Action Plan recommends additional state funding to advance these goals.

The “single source of truth” will also support community members in making decisions by providing authoritative information about risks and how they are changing, how to prepare for and mitigate risks, and how to access resources after disasters. The information can be reflected in a Resilience 101 campaign that could use a range of engagement strategies and platforms to reach residents.

COMMUNICATE

Measures such as the outreach ambassador program and resilience hubs will support the sharing of the Resilience 101 campaign and other information throughout communities, so that people have access to useful information. These efforts will target and improve outreach to the most at-risk people. An outreach ambassador program will create paid positions for community members to serve as local leaders and liaisons for their neighbors. Outreach ambassadors will guide people in using the Resilience 101 campaign resources and could help alert people through door-knocking or other communications in advance of climate-related disasters. Due to the funding needs to create paid positions for the outreach ambassador program, Resilient NENJ could seek funding to advance the program at a regional scale. Resilience hubs could serve as central spaces for outreach ambassadors and could have printed copies of Resilience 101 campaign materials for sharing with residents. This plan recommends that resilience hubs are created as opportunities arise at places such as community centers, schools, public housing, or places of worship, and that they integrate risk mitigation components such as green infrastructure, stormwater management, or heating and cooling features. Pilot projects could be led by each city, using a consistent model across the region and integrating resources from the Resilience 101 campaign.

EMPOWER

While many of the actions included in this Action Plan are the responsibility of state agencies, local or county government, utilities, or infrastructure entities, all community members can play an important role in preparing for and adapting to climate change. Several recommendations are for creation of programs, guidelines, resources, or requirements by Resilient NENJ or the municipalities that empower community members to be part of the solution.

One way that community members can contribute is through waste reduction efforts, which improve water quality and prevents clogged catch basins that contribute to flooding. Adopt-a-catch-basin programs can be advanced or created to give community members responsibility for adopting and cleaning a catch basin. Other programs could provide residents with low-cost or free resources to mitigate risk, such as rain barrels (could be part of a small-scale green infrastructure program) or air conditioners.

Municipalities have ordinances, zoning resolutions, and building codes that set requirements for development and construction. Updating these requirements is an effective way for the municipalities to guide resilient actions by individual property owners, such as by requiring green infrastructure, reduced impervious surface, and higher construction elevations, as well as requiring new developments to separate stormwater from the CSO system wherever appropriate and to resolve existing stormwater flooding issues on adjoining public streets. Updates to these requirements can be completed within several months, and therefore are low-hanging fruit actions that could be advanced quickly. Two ordinances that are especially relevant for resilience are Flood Damage Prevention ordinances and Stormwater Management Ordinances, and Resilient NENJ recommends that each municipality adopts higher standards in these ordinances, in a coordinated manner for consistency across cities. At the state level, requirements associated with the contaminated site remediation process, managed by NJDEP, could be updated to ensure that remedial designs integrate climate change considerations so that cleaned up sites do not have lasting risks.

Although the Resilience 101 campaign could provide high-level information for residents to mitigate risk, more detailed resources such as Resilient Building Design Guidelines could support residents in retro-fitting their properties to protect them from flooding and other climate-related hazards. Hoboken and Jersey City already have some form of Resilient Building Design Guidelines, so Newark and Bayonne could use these examples as models, and the region could coordinate to ensure consistency. The guidelines should align with local requirements and help residents stay or become compliant. Some residents have the means to make improvements to their homes but are seeking guidance on how to cost-effectively do this. Other residents may need additional support to be able to implement changes, which could be provided through tax incentives or rebates, grant programs that fund projects, or low-interest loans. These elements could be part of a small-scale green infrastructure program, for example, to increase distributed green infrastructure practices on private properties.

EXPEDITE

Vacant, underutilized, or contaminated sites, if remediated and redeveloped, are prime opportunities to integrate stormwater management, open space, or other economic benefits. Existing park space can also be upgraded to incorporate stormwater management or other resilience components. These strategies are important components of this Action Plan because there are widespread opportunities for these projects across the region, and because they could create multiple benefits such as creating or enhancing open space, mitigating hazards such as flooding or urban heat island effect, and providing recreational value. This Action Plan (see **Section 3.2.3**) provides recommendations for prioritizing sites for transformation based on factors such as how much risk a project could eliminate, how many people would benefit, and how feasible a project might be. By prioritizing sites, the region could create a “pipeline” of projects to advance into feasibility studies, design, and construction. The NJDEP Green Acres Program could be a key part in implementing projects that transform sites, because they provide funding for open space projects. These types of site transformation projects are allowable within existing Green Acres requirements, but part of the Resilient NENJ recommendations is for the Green Acres Program to develop guidelines that clarify the approvals process to expedite projects.

HOW WILL THIS CHANGE OUR COMMUNITY?

SOCIAL AND RECREATIONAL BENEFITS AND IMPACTS

- Decision-making related to resilience and development will be streamlined and simplified with the availability of clear, concise information associated with the “single source of truth”
- Repeated disruption from construction will be minimized through coordinated construction timelines from multiple projects utilizing the “dig-once approach,” which will also translate to more effective use of tax dollars
- Efforts such as the Resilience 101 campaign, youth engagement, outreach ambassador program, adopt-a-catch-basin program, community gardens, clean-up days, and small-scale green infrastructure program will engage, involve, and educate community members about issues related to resilience and addressing the challenges. These programs will empower community members to take action and be part of the solution, while advocating for dedicated attention to resilience from higher scales of leadership.
- The Resilience 101 campaign, which will increase knowledge and connect community members to more detailed information, combined with capacity-building around flood insurance, will better position people to avoid impacts from climate-related disasters, reducing economic, physical health, and mental health impacts. Combined with Resilient Building Guidelines and increased access to resilient-related resources, community members will have more tools to directly mitigate their risks.
- Resilience hubs can provide enhanced community spaces for gathering, education, and creativity. Green infrastructure projects, which also can be integrated into the design of resilience hubs, can create educational opportunities for students to learn about nature, stormwater, and design.
- The recommended actions can have economic benefits through creation of green jobs. A small-scale green infrastructure program can incorporate a job training component that creates positions for people to support implementation of green infrastructure projects. The recommended outreach ambassador program will create paid positions for local community members to serve their neighborhoods.knowledge of what it will take to get this critical work done so that they can help plan and advocate appropriately.

ENVIRONMENTAL BENEFITS AND IMPACTS

- Although incremental and distributed, the small-scale green infrastructure program could contribute to mitigation of urban heat island effect through reduced impervious surface and use of green materials.
- The waste reduction campaign, along with other actions such as composting programs, and adopt-a-catch basin programs, can reduce trash in streets that can make its way into waterbodies and affect water quality and aquatic life. These efforts will create cleaner streets to improve quality of life in communities while reducing a contributor to flooding.

BENEFITS AND IMPACTS TO SOCIALLY VULNERABLE POPULATIONS

- The proposed outreach ambassador program will increase resilience of the most at-risk and historically excluded people by empowering leaders from these communities and leveraging existing relationships to reach people.
- The proposed strategy includes a variety of actions that improve outreach with and warnings to people who may be more difficult to reach, such as people who are blind, Deaf, hard of hearing, elderly, non-English speaking, or people with physical disabilities. Outreach that uses multiple types of engagement channels in multiple languages, warning systems through sirens, and use of the NJ Register Ready system are examples of recommendations that could improve inclusivity of these people and thereby reduce their risk.
- Higher standards in ordinances, such as requirements to incorporate green infrastructure or construct or re-construct buildings at higher elevations, often mean higher costs for construction. These impacts could be felt most by people who are lower income, and therefore it is important for these standards to be accompanied by incentives and grant programs for funding.

FEEDBACK THAT HAS CONTRIBUTED TO THE RECOMMENDATIONS

Many of the recommendations in this Action Plan were derived directly from community feedback pointing to the need for a focus on outreach, education, capacity building, and community programs. Feedback has highlighted:

- **That local government has limited capacity to focus on resilience, with competing time interests and a need for additional training and resources.** This points to the need for capacity building and greater allocation of resources and staff at the local scale, as well as greater support from the county and state levels. Local leaders also provided feedback about “portal proliferation syndrome” or the phenomenon of there being an overwhelming number of tools, applications, and resources. Creation of a “single source of truth” will support capacity building and guide leaders and decision-makers.
- **The importance of community outreach being led by local community-based organizations and individuals.** These grass-roots groups already have strong relationships and are trusted by community members and leaning on them for outreach related to resilience can both be more effective and empower them to become more involved. Community-based organizations are key to reaching vulnerable populations and those who have historically been excluded. This feedback contributed to development of the outreach ambassador program recommendation.
- **That it is difficult to know where to go for information and resources before, during, and after disasters.** People expressed not understanding their risks, not knowing who to contact, and needing to be better informed about preparedness, recovery, and actions that local governments are taking to address issues. Recommendations such as the Resilience 101 campaign, improved availability of information on websites, and creation of resilience hubs came out of this feedback. People also provided feedback about education being an important part of the solution, especially education of youth, as they will be the leaders of tomorrow. If people know the possible consequences of actions or inaction, they will more likely be driven to advocate for change.



Community tree planting event.
Image Source: City of Jersey City

FUNDING PATHWAYS

Although there are lower costs associated with many of the recommended non-physical actions compared to the capital projects, the majority will still require some level of funding allocation or new funding sources. **Section 4.0 Implementation Pathways** provides examples of funding opportunities for the four categories of actions, and **Appendix C Funding Sources** provides additional detail on these funding options. **Appendix A Actions and Implementation Table** provides examples of specific funding sources for each action type.

Example ways that different entities can contribute to resourcing Resilient NENJ recommendations for actions that are not capital improvements

- | | |
|---------------------------------------|---|
| Federal/State/County/Municipal | <ul style="list-style-type: none">• Grants• Funding allocations• Provide staff support |
| Community-based organizations | <ul style="list-style-type: none">• Contribute time and energy to the initiatives |
| Residents and Business owners | <ul style="list-style-type: none">• Donate to local community-based organizations• Contribute time and energy to the initiatives |



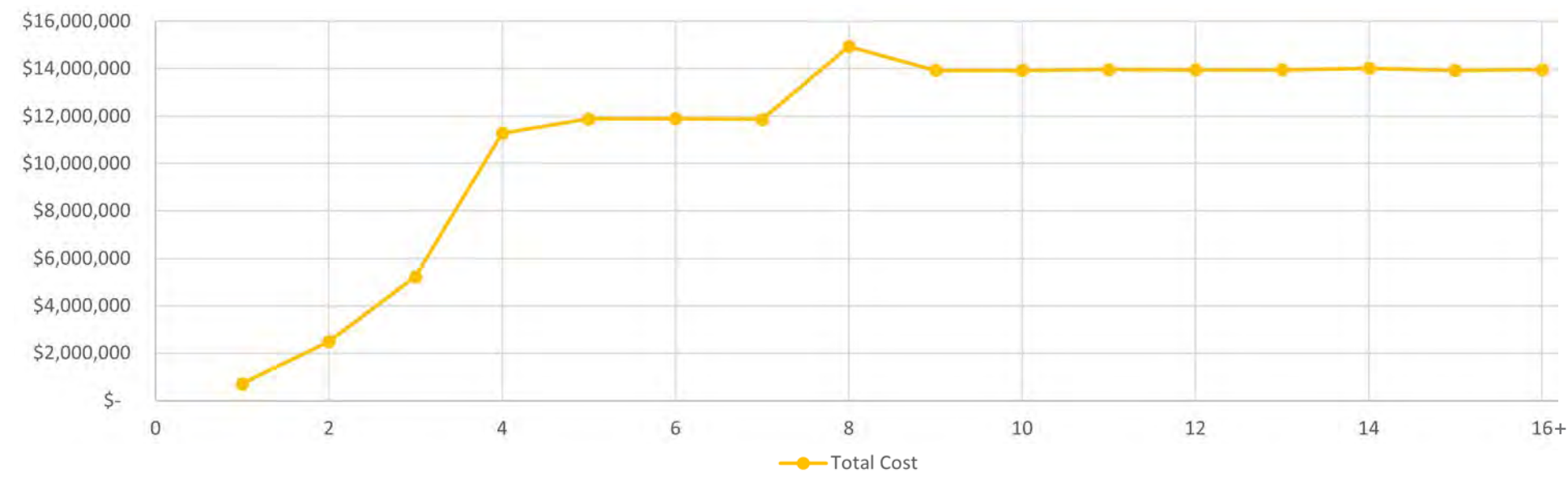
View across the Newark Bay from the boardwalk of Bayonne's Rutkowski Park.
Image Source: Hudson County Division of Planning

YEAR OVER YEAR EXPECTATIONS

Where are we at in planning? How confident are we in costing and scheduling?

Cost expectations for the non-physical actions are highly variable because these actions are scalable. As such, costs can be thought of as estimates for budgeting purposes. The team developed costs and schedules based on expected level of coordination and timeframes informed by the project team's experience with similar projects.

REGIONAL ESTIMATED COST NEEDS (YEAR OVER YEAR)



PHASING

The phasing on the following pages summarizes actions by entity by timeframe in order to accomplish recommendations for outreach, education, and capacity building, policy and governance, service and program development, and emergency response and preparedness. Most actions are front-loaded, meaning Resilient NENJ recommends early action to maximize and begin building on benefits immediately. See **Appendix A** for additional detail on estimated costs and phasing of non-physical actions.

The following supportive activities are necessary across all phases, and so are not repeated in the sections below in the interest of space. Readers can find additional detail by action in **Section 3.0**.



City

- Continue to track, coordinate, and support funding opportunities and pursuits
- Allocate staff and budget to advance recommendations
- Share information across available channels
- Advance local policy and land use recommendations




County




Region

- Monitor and drive implementation of regional initiatives identified in the Roadmap in **Section 5.0** and recommendations in **Section 3.0**.
- Continue to track, coordinate, and support funding opportunities and pursuits
- Provide a forum for engagement and coordination around recommendations, including with emergency management community
- Help connect stakeholders to empower coordinated action
- Continue to share resources and best practices across the region
- Continue to publish information about what is happening in the region
- Continue to develop and share engagement materials and collaborate on engagement activities where applicable
- Continue to explore the development of program frameworks based on best practices (e.g., to support composting), as applicable
- Continue regional art coordinator position to help drive inclusive engagement and elevate local voices in resilience



State

- Integrate near-term projects in federal Action Plans (e.g., CDBG-DR and HMGP) for funding and pursue additional congressional allocations
- Allocate state funding to support implementation activities
- Coordinate with the region to support advancement of key projects
- Allocate staff to help advance Resilient NENJ recommendations to State agencies
- Ensure connectivity and alignment between various state initiatives to provide clarity and streamline action at state, regional, and local scales
- Offer training to municipalities to incorporate resilience into planning & policy
- Continue to publish state-level guidance for municipalities on tools, data, and models to use for decision-making



Federal

- Allocate funding toward implementation of proposed projects
- Continue 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.
- Continue to improve communications related to federal programs
- Continue to improve the efficiency and effectiveness of federal post-disaster programs
- Continue and expand engagement around activities of federal agencies that are resilience-related or affect resilience in the region



Residents



Business/ Industry

- Reach out to local, state, and federal elected officials to support relevant project recommendations
- Participate in project action and engagement opportunities (join Resilient NENJ mailing list or follow Resilient NENJ on social media to stay up to date on opportunities)
- Support funding of local community-based organizations to help drive implementation
- Take photos of hazard impacts and incorporate experiences into reporting systems / communicate experiences to local municipalities, utilities, and the region




Major Property Owners




Infrastructure

- Reach out to local, state, and federal elected officials to support relevant project recommendations
- Support funding of local community-based organizations to help drive implementation
- Participate in project action and engagement opportunities
- Encourage / reward staff volunteer hours associated with engagement in resilience and waste reduction programs to promote involvement in these programs and support implementation



Academia



CBOs

- Reach out to local, state, and federal elected officials to support relevant project recommendations
- Stay deeply engaged to help drive implementation and engagement around actions
- Partner on funding opportunities, where appropriate
- Participate directly in the goals, development, and implementation of Resilient NENJ initiatives
- Provide consultation to municipal leaders on what is working and not working, of people who are being left out, and of adjustments needed
- Encourage student volunteer hours and credits associated with engagement in resilience and waste reduction programs to promote involvement in these programs and support implementation

WHAT'S HAPPENING NOW

The following actions related to non-capital recommendations are already underway. For more on recommendations for policy-related updates, please see **Appendix E**.

KEY

Resilient NENJ maps roadmap steps to action descriptions for clarity. In the interest of space, this section makes use of abbreviations, as follows:

Policy

Policy and Governance (3.3.1)

All Hazards

Policy and governance actions under section 3.2.3 (Actions that address other climate-related and environmental justice needs)

Outreach

Outreach, education, and capacity building (3.3.2)

Service

Service and program development or enhancement (3.3.3)

EM

Emergency management and preparedness (3.3.4)

The numbering references the number of the action in that section. For example, **Outreach-02** refers to action number 2 in the section on Outreach, education, and capacity building (**Section 3.3.2**), which happens to be “Expand municipal leadership and capacity to manage climate risk.”



- Update stormwater management ordinances (**Stormwater-07**). Jersey City and Hoboken has updated their ordinance with higher standards for stormwater management in redevelopment or new construction projects. Bayonne and Newark updates are in progress as of the writing of this Action Plan.
- Update flood damage prevention ordinances (**Coastal-07**)
- Adopt-a-catch-basin programs already exist in Jersey City in Newark. Municipal composting programs are already underway in Jersey City¹ and Hoboken² (**Service-02**), which involve free drop-off locations for composting, low-cost composting pick-up, and/or low-cost materials to support backyard composting, depending on the program
- The City of Hoboken has a Chief Resilience Officer who manages the City’s resilience strategy. Newark and Jersey City have Chief Sustainability Officers; these positions and staffing could potentially be expanded to increase resilience-related capacity (**Outreach-02**).
- Hoboken has an active Community Emergency Response Team (CERT) that trains residents in disaster preparedness (**Outreach-05** and **Emergency-01**)
- Hoboken has webpages to provide information on their ongoing work related to Stormwater Flood Mitigation and Coastal Flood Mitigation (**Outreach-04**). All four cities provide updates about projects through social media and the news media.
- Newark and Hoboken developed interactive flood reporters where community members can report flood locations. Jersey City and Bayonne’s interactive reporters are underway (**Outreach-07**).
- The cities have begun to incorporate resilience-related higher standards into redevelopment projects. For example, Bayonne requires redevelopers to incorporate considerations related to stormwater retention, sewer separation (where feasible), and compliance with or exceedance of building code and NJDEP elevation standards. Hoboken has integrated green building design standards in redevelopment plans (**Coastal-06**).
- Hoboken, Newark, and Jersey City have stormwater utility feasibility studies underway or beginning as of September 2022.
- Hoboken has developed Resilient Building Design Guidelines and Jersey City has developed a Resilient Design Handbook (**All Hazards-03**).



- Youth engagement and Resilience 101 campaign
- Identify candidate locations for pilot resilience hubs (**Service-01**). Through the Resilient Northeastern NJ program, the City of Newark submitted an application for FEMA’s BRIC grant program for creation of an Ironbound Resilience Hub, which would serve as a central location for information about resilience and climate disasters, a cooling center, and incorporates green infrastructure.
- Develop bylaws for decision making, to include voting procedures to identify which initiatives the Steering Committee or subgroups will pursue (**Policy-01**). The Steering Committee is currently advancing near and long-term planning for continuation of Resilient NENJ regional coordination.



- Provide guidance to more quickly integrate stormwater management in open space (**Stormwater-06**). Resilient NENJ and NJDEP Green Acres have been coordinating to develop guidelines.
- The State’s Interagency Council on Climate Resilience was established with the task of implementing the New Jersey State Climate Change Resilience Strategy. The Council brings together various State and infrastructure entities for coordination (**Policy-01**). Under Strategy 3.1 of the strategy, the Council will serve as a forum for data and information sharing that can contribute to development of a “single source of truth” (**Outreach-01**).
- NJ MyCoast is a statewide app to collect reports of flooding, high tide, and community assets (**Outreach-07**)



- The federal government is taking steps to improve funding for resilience-related improvements (such as through the Bipartisan Infrastructure Law) and also increasing opportunities to improve equity in the distribution of that funding through the Justice 40³ and other similar initiatives, like FEMA’s BRIC program prioritization criteria.



- Residents and businesses have already become involved in various ways including participating in community clean-up days, adopt-a-catch-basin programs, participating in the Faces of Resilience campaign, by reporting flooding, and by providing feedback through Resilient NENJ.



- Various infrastructure entities, utilities, and other stakeholders came together for a Resilient NJ Cross-Region Stakeholder Meeting in May of 2021 to coordinate on the regional planning projects .



- Ironbound Community Corp. has hired a public art administrator to implement projects that integrate themes of resilience into public art projects
- Researchers at Stevens Institute of Technology are developing low-cost sensors that could be used to gather real-time data on flooding (**Outreach-07**).
- In the aftermath of the remnants of Hurricane Ida, community-based organizations partnered with the cities and FEMA to host community forums and provide residents with recovery resources (**Emergency-03**)

¹ <https://www.jerseycitynj.gov/cityhall/DPW/recycle/compostyourfoodscraps>
² <https://www.hobokennj.gov/resources/compost>
³ <https://www.whitehouse.gov/environmentaljustice/justice40/>
RESILIENT NORTHEASTERN NJ / ACTION PLAN 332

PHASE 1 (YEARS 1 TO 3)

Phase 1 includes significant activity to frontload key actions that will support regional capacity to build resilience into the future, as well as to implement recommended major capital improvements.

OUTREACH, EDUCATION, AND CAPACITY BUILDING



City



County



Region

- Increase staff dedicated to resilience, as needed (**Outreach-02**)
- Dedicate a portion of budget specifically to address resilience-related needs (**Outreach-02**)
- If not already, publish project-related information on municipal and county web pages (**Outreach-04**)
- Promote NJ Register Ready with community members and use database in emergency planning (**Outreach-05, EM-01**)
- Continue to promote existing community flood mappers for wide use through websites and social media (**Outreach-07**)
- Continue development of “shelf-ready” projects that can be rolled into emergent funding pursuits (**Outreach-08**)
- Evaluate existing and create new, where applicable, 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) (**Outreach-08, EM-01**)



State



Federal



Residents



Business/ Industry



Major Property Owners



Academia



CBOs

- Initiate planning to advance the “single source of truth” (**Outreach-01**)
- Create a single unified brand around all things resilience-related (consider using Resilient NJ for these purposes) (**Outreach-01**)
- Initiate the statewide data gap analysis to help advance the single source of truth (**Outreach-01**)
- Explore development of (and implement by Year 3) a grant program to support hiring of resilience staff and capacity building (**Outreach-02**)
- Support compilation of community flood data reporting into the single source of truth datasets (**Outreach-07**)
- Leverage the Resilient NENJ Action Plan as a guide for allocation of post-disaster and other emergent funding (**Outreach-08**)
- Explore and consider incentivizing post-disaster redevelopment operations and plans (**Outreach-08**)



State



Federal



Residents



Business/ Industry



Major Property Owners



Academia




CBOs


- Support friends and family in registering for NJ Register Ready, as applicable (**Outreach-05**)
- Participate in the outreach ambassador programs by becoming ambassadors or leveraging resources and information shared (**Outreach-05**)
- Consider completing resilience assessments for major assets (**Outreach-02**)
- Collaborate on creation of outreach ambassador program and recommend potential ambassadors (**Outreach-05**)
- 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 (Academia) (**Outreach-07**)

As such, Phase 1 delineates actions based on activity type. All steps below reference their counterpart actions in **Section 3.0**. See that section for more detail on any recommendations.


SERVICE AND PROGRAM DEVELOPMENT OR ENHANCEMENT




City




County




Region




State



Federal




Residents




Business/ Industry



Major Property Owners




Academia




CBOs

- Establish at least one pilot resilience hub in each municipality (**Service-01**)
- Continue, expand, or create adopt-a catch basin program, in partnership with the sewer utility, if applicable. Partner with CBOs and the region to advance other recommendations related to waste management (**Service-02**)
- Develop framework, network, platform, and information to be shared for a regional network of resilience hubs in collaboration with regional stakeholders (**Service-01**)
- Partner with CBOs to plan a regional waste reduction outreach campaign, tailored to the needs of each municipality as appropriate (**Service-02**)
- Explore development of a program and dedicated funding toward resilience hubs (**Service-01**)
- Explore dedicated funding to incentivize formation of resilience hub programs in collaboration with local community-based organizations (**Service-01**)
- Express needs that could be addressed through resilience hubs and support implementation as applicable (**Service-01**)
- Support program implementation as needed. For example, the electric utility may partner to support design of solar power or a microgrid, and the sewer utility or major property owners may partner for integration of subsurface stormwater storage.
- Collaborate with municipalities to identify priority locations for pilot and network of resilience hubs (**Service-01**)
- Support establishment of at least one pilot resilience hub in each municipality (**Service-01**)
- Partner with the region to plan a regional waste reduction outreach campaign (**Service-02**)


EMERGENCY RESPONSE AND PREPAREDNESS




City




County




Region




State




Federal




Residents




Business/ Industry



Major Property Owners



Academia



CBOs

- Promote use of NJ Register Ready on city and county websites (**EM-01**)
- Evaluate use of best practices outlined in **Section 3.3.4 (EM-01 & 02)**
- Consider creation or enhancement of Community Emergency Response Teams where not currently active. Consider leveraging region support to advance, as needed.
- Establish post-disaster funding support contracts and develop processes to position for post-disaster public funding (**Section 3.3.2**)
- Explore opportunities to expand bulk debris removal following storms
- Consider leveraging existing CERTs and framework toward creation of an emergency management coordination sub-group to support resource and best practice sharing across the region, include local community based organizations and a community advisory council, as appropriate
- Establish single source of truth on information related to post-disaster recovery and funding (see **Section 3.3.2**)
- Establish single source of truth on information related to post-disaster recovery and funding (see **Section 3.3.2**)
- Continue to improve post-disaster program equity and clarity (**EM-03**)
- Consider purchasing flood insurance even if not in a FEMA designated flood zone
- Harden or raise critical infrastructure out of the flood zone, which would help residents shelter in place and/or vertically evacuate
- Partner with municipalities, state, and federal agencies to provide recovery support post-disaster

PHASE 1 (YEARS 1 TO 3) CONTINUED

POLICY AND GOVERNANCE



- Advance and share results of feasibility studies for municipal stormwater utilities with Resilient NENJ (**Policy-01**)
- Consider creating a “resilience committee” within each municipality and at the county level comprised of staff from various departments to ensure that Resilient NENJ initiative is providing the most value and service to the needs of communities within each city (and that all departments are coordinated around resilience-related needs) (**Policy-01**)
- Construct a memorandum of understanding for partner entities to sign onto that includes the goals and structure for continued collaboration (**Policy-01**)
- Establish an updated meeting schedule and develop subgroups that will collaborate and advance various initiatives (**Policy-01**)
- Collaborate on key commenting opportunities that affect the region (e.g., USACE HAT Study and NJ PACT) (**Policy-01**)
- Identify a coordination lead and develop subgroups with regional stakeholders to support collaboration on advancing recommendations related to the following:
 - Coordination with industry and major property owners to advance resilience (applicable to most recommendations)
 - Infrastructure coordination council (**Policy-02**)
 - Open space and green space access (**All Hazards-01**)
 - Resilient transformation pipeline (**All Hazards-01**)
 - Flood related policy improvements
 - Climate hazard related policy improvements (**All Hazards-01, 02, and 03**)
 - Funding and implementation
 - Community engagement (**Outreach**)
 - Resilience hubs (**Service-01**)
- Explore the creation of a subgroup to advance regional emergency response and preparedness coordination (determine whether this might be more appropriate facilitated at state or regional level)



- Collaborate with Resilient NENJ, the State Council on Climate Resilience, and Silver Jackets federal agencies to develop an Infrastructure Coordination Council formed of representatives from each of these and infrastructure entities
- Identify a coordination lead and develop subgroups with regional and state stakeholders to support collaboration on advancing recommendations related to the following:
 - Data storage, maintenance, gaps, and improvements
 - Creation and maintenance of a “Single source of truth”
 - Long-term control plans
 - Climate hazard policy improvements (e.g., for contaminated sites)
 - Contaminated sites and climate hazards
- Conduct studies on future climate impacts, especially urban heat, air pollution, and groundwater emergence and contamination, to help guide planning (**All Hazards-01a and 01b**)
- Participate in subgroups to advance recommendations



Resilient NENJ as a regional coordinating and connecting body

The resilience needs in the region outstrip the capacity for any given group of people to manage at any given point in time. There is just not enough time in the day. There is also a significant amount of momentum and capacity within the region and its stakeholders that could help advance implementation if coordinated under the leadership of Resilient NENJ and its Steering Committee and Community Advisory Council. The power of Resilient NENJ lies in its ability to connect, coordinate, and leverage, and this power should be leaned into to implement its recommendations. Resilient NENJ has also already proven itself as a platform to support coordination between residents, municipalities, agencies, utilities, and more.

The following list is subgroups that could support Resilient NENJ recommendations at each scale.

Local	Resilient NENJ	State
Local coordination bodies can collaborate with and provide representation to regional coordinating bodies. <ul style="list-style-type: none">• Resilience committees (may vary by municipality – JC START, for example, is an existing sub-group focused on advancing green infrastructure goals in Jersey City)• CERTs	Resilient NENJ Steering Committee and Community Advisory Council would create and connect regional subgroups responsible for the following: <ul style="list-style-type: none">• Coordination with industry and major property owners to advance resilience (applicable to most recommendations)• Infrastructure coordination council (Policy-02)• Open space and green space access (All Hazards-01)• Resilient transformation pipeline (All Hazards-01)• Flood related policy & land use improvements• Climate hazard related policy & land use improvements (All Hazards-01, 02, and 03)• Funding and implementation• Continued community engagement to priority groups through implementation (Outreach)• Resilience hubs (Service-01)• Waste reduction and sustainability (Service 02)• Data gathering, maintenance, and coordination (e.g., pilot sensor program, public health data gathering, etc.)	Resilient NENJ’s subgroups can provide representation on the following state subgroups Resilient NENJ recommends to be developed or identified. State level subgroups could bring together and coordinate across broad stakeholder groups to address issues requiring state-level alignment. These subgroups could be managed under the State’s Interagency Council on Climate Resilience with an agency lead for each: <ul style="list-style-type: none">• Data storage, maintenance, gaps, and improvements• Creation and maintenance of a “Single source of truth”• *Long-term control plans• *Climate hazard policy improvements• *Contaminated sites and climate hazards• Regional emergency response and preparedness coordination *Formal or informal coordination in these areas exists. Such existing coordination pathways could therefore be leveraged to help achieve the goals outlined in this Action Plan.

How might this work?


Different subgroups could provide a report out to the Steering Committee with updates and support needs each quarter. Representatives of these groups could participate in State-level sub-groups coordinated through the State’s Interagency Council, which could provide updates on a similar schedule. The State’s Interagency Council on Climate Resilience could consider providing an audience to the Steering Committee once per year to elevate progress, concerns, and support needs.

Who should be welcome in a subgroup?

The current Resilient NENJ model that includes representation from and coordination with agencies and organizations operating at various scales, community-based organizations, and a Community Advisory Council should continue.


PHASE 2 (YEARS 4 TO 7)

Phase 2 sees the continuation of programs implemented under Phase 1 and movement of remaining efforts planned under Phase 1 toward implementation.




City

- Consider expanding community hazard mapping tools to include additional hazards (e.g. extreme heat) and tie this to community alert systems (**Outreach-07**)




County




Region

- Based on lessons learned from Hoboken and Jersey City pilots, explore program for installation of sensors to detect flooding, air, and heat quality in real-time to complement resident reports (**Outreach-07**)
- Support implementation of regional network of resilience hubs (**Service-01**)
- Consider expanding Resilient NENJ to consider broader sustainability needs (**Policy-01**)
- Consider developing a regional program framework to support individuals and municipalities with composting (**Service-02**)
- Support development of program guidance materials (Service recommendations)
- Help transition the objective to provide green space where it is lacking to a regionwide program (**All Hazards-01**)
- Work with the State and Infrastructure Coordination Council (see Phase 1) to develop 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.




State

- Complete the statewide data gap analysis⁴ and develop an Action Plan and policy requirements to fill data gaps (**Outreach-01**)
- Implement portals, policy, and procedures to ensure alignment with and maintain the single source of truth (**Outreach-01**)
- Create funding opportunities and administration support for the distribution of resources as part of a home resilience program; develop associated guidance materials in collaboration with the region (**Service-03**)



Academia



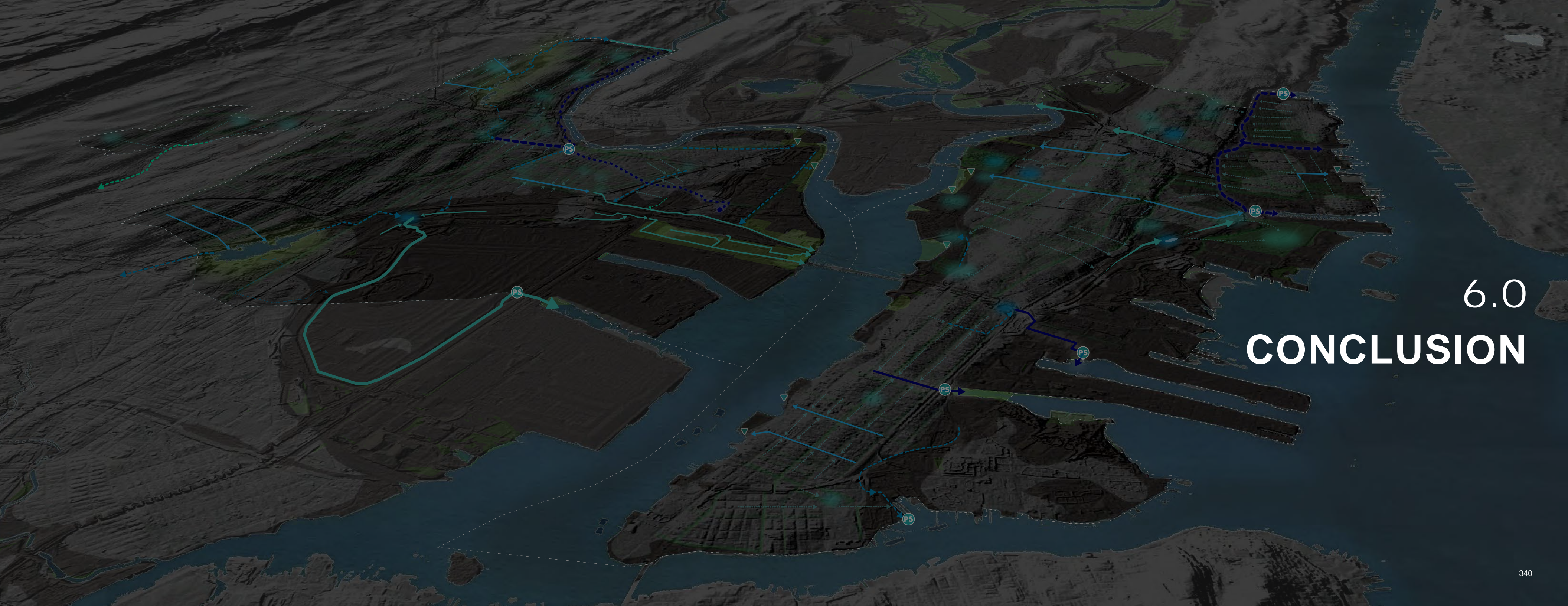
CBOs

- Continue to advance sensor technology and collaborate with the Region to explore implementation of sensors to support real-time understanding of hazards to support predictive analytics and complement other data gathering (**Outreach-07**)
- Support management of resilience hubs, and/or participate in and support promotion of outreach ambassador program to deploy ambassadors at the hubs (**Service-01**)

PHASE 3, 4 & BEYOND (YEARS 8 TO 15+)

All recommended activities should continue and receive periodic evaluations for effectiveness and to calibrate the approach. A five-year review schedule is typical for regional planning processes and could correspond with an update to the Resilient NENJ Action Plan, which the Steering Committee, State, and stakeholders should complete every 5 years integrating new science, lessons learned, and stakeholder feedback.

⁴ Resilient NENJ has included initially identified data gaps in the Flood Impact Assessment and Climate Hazard Assessment.



6.0 CONCLUSION

The Resilient Northeastern NJ region matters. Jersey City, Newark, Hoboken, and Bayonne are home to over 700,000 people. The region also includes transportation, trade, and energy assets of national importance. People treasure the region's parks and cultural spaces. Still, rainfall flood events like Ida (2021) and record-breaking heat in the summer of 2022 show how the climate is changing. High poverty rates (about 20-percent of the region lives below the poverty level),¹ a history of environmental justice issues, and pollution and contaminated sites are the legacy of the region's current and former industry. These are examples of the interacting challenges that compound the impacts of climate change.

This Action Plan shows how people can work together to address today's needs and prepare for the future. Such people are community members, as well as part of businesses, community-based organizations, academia, utilities and infrastructure agencies, and local, state, and federal agencies. The recommended actions could cost about \$13 billion over the next 15 to 20 years. Implementation will take significant dedication of time and resources. While this is a big price tag, the investment is worthwhile when measured against the costs of inaction. A future Hurricane Sandy-like storm surge event, for example, could bring over \$30 billion in direct losses to the region.² A major rain event³ could cause \$6 billion in direct losses. These calculations do not include possible long-term community and economic degradation from such events, nor loss that might result from more frequent flooding due to climate change.

¹ 2021 US Census Bureau Population Estimates Program

² Hurricane Sandy 2012 high water marks with 2.4 feet of sea level rise

³ 9.2 inches of rainfall over a 24 hour period with 2.4 feet of sea level rise

HOW COULD THIS SHAPE THE REGION?

The actions in this plan will change the built environment. The proposed investment will reduce losses from flooding and other climate-related hazards. Integrating resilience into parks, walkways, contaminated sites, and vacant spaces will create new green space and recreational amenities while addressing concerns like toxin exposure and urban heat. Green infrastructure and restored urban and coastal environments will support wildlife, improve water quality, and offer educational opportunities. Resilience hubs will serve as multi-purpose community spaces offering shelter during disasters and providing resources to community members. Policies that govern new development and redevelopment will reduce impervious surfaces (like concrete surfaces that prevent water from being absorbed) and elevate critical buildings and systems above flood levels.

Actions will also change the way we work together and improve availability of information and resources. The “single source of truth” will improve clarity and communication of important information to guide decision-making. Increased coordination between infrastructure entities, local government, and other stakeholders will increase efficiency in the use of time and funds and reduce disruption from construction activities by helping agencies collaborate to “dig-once.” Programs, such as the outreach ambassador program, adopt-a-catch-basin programs, and community clean-up days, will involve more community members in the solution and ensure that the most at-risk and historically excluded people are centered and included.

Combined, the actions proposed in this plan will advance a vision for a collaborative, diverse, innovative, and green region. By easing burdens, protecting key infrastructure and the most vulnerable people, and connecting people and places, the NENJ region will thrive and regenerate its social, economic, environmental, physical, and governance infrastructure in the face of climate change.

Photos are examples of what projects could look like in different areas.



WHAT COMES NEXT?

The Resilient NENJ Steering Committee continues to work to advance the plan. The Action Plan recommends responsibilities for different stakeholders (see Section 3.0 Preferred Scenario and Recommendations). It outlines actions by timeframe in Section 5.0 Roadmap. The actions table in Appendix A summarizes everything in one place. Depending on the action, next steps may involve coordination and engagement, feasibility studies, program development, or funding applications. Resilient NENJ recommends regular updates to the Action Plan (approximately every five years) to track and communicate progress, as well as integrate new data, needs, and to make adjustments as needed.

IF YOU ARE

WHAT YOU CAN DO NEXT

A RESIDENT, BUSINESS OWNER, OR PROPERTY OWNER IN THE REGION

- Know your risk today and in the future
- Take steps to improve preparedness, including following alerts and warnings when hazards are in the forecast
- Purchase and maintain flood insurance
- Reach out to elected officials to support actions you want to see happen
- Share this plan with your friends, family, and neighbors

A REPRESENTATIVE OF A COMMUNITY-BASED ORGANIZATION

- Carefully review this plan and stay informed about progress
- Get involved by coordinating with Resilient NENJ and municipal and county staff to identify partnership opportunities
- Work with Resilient NENJ and municipal and county staff to take action
- Help raise public awareness of flood and other climate hazards risk and the Action Plan through your networks

A MEMBER OF MUNICIPAL, COUNTY, OR STATE STAFF

- Carefully review this plan and stay informed about and involved in the implementation process
- Share the Action Plan with colleagues. Advocate for implementation of priority strategies
- Support identifying, developing, and overseeing funding opportunities from various sources

STAY INVOLVED!

Please check-out the website at www.resilient.nj.gov/nenj to learn more about the program. Check in frequently for updates on progress.

Get in touch with us anytime:

Through our website: www.resilient.nj.gov/nenj

Via email: resilientNENJ@gmail.com

On social media:

@resilientNENJ on Facebook & Twitter

@resilient_nenj on Instagram



Image Sources: Resilient NENJ;
City of Jersey City



NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION



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