REBUILDBYDESIGN

MEADOWLANDS

ODU ADAPTATION FORUM

DESIGN DEVELOPMENT // ENGAGEMENT // FINAL CONCEPT

JULY 20, 2018

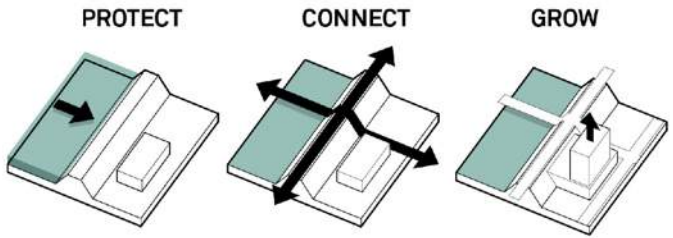
HURRICANE SANDY

REBUILD BY DESIGN: COMPETITION & AWARD

U.S. DEPARTMENT OF HOUSING & URBAN DEVELOPMENT

COMPETITION RENDERING

COMPETITION SECTION PERSPECTIVE



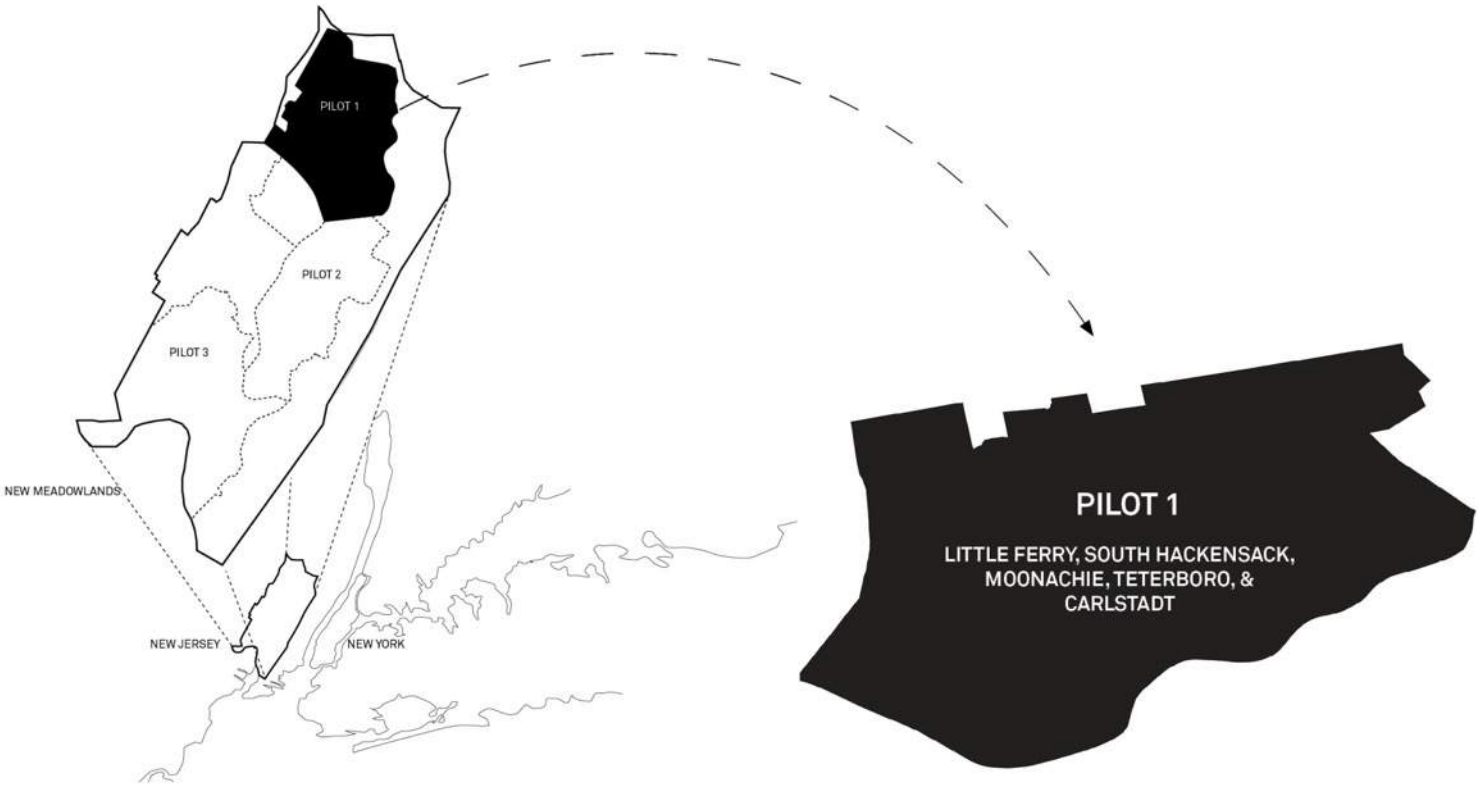
COMPETITION LENSES

- Original RBD Concept
- **Protect:** Flood Protection
- **Connect:** Transportation Improvements
- **Grow:** Re-Development
- Cost Estimate (Competition Cost) **Phase 1: $850M+**

Competition Graphic: MITCAU, ZUS, ORG

REBUILD BY DESIGN COMPETITION & AWARD

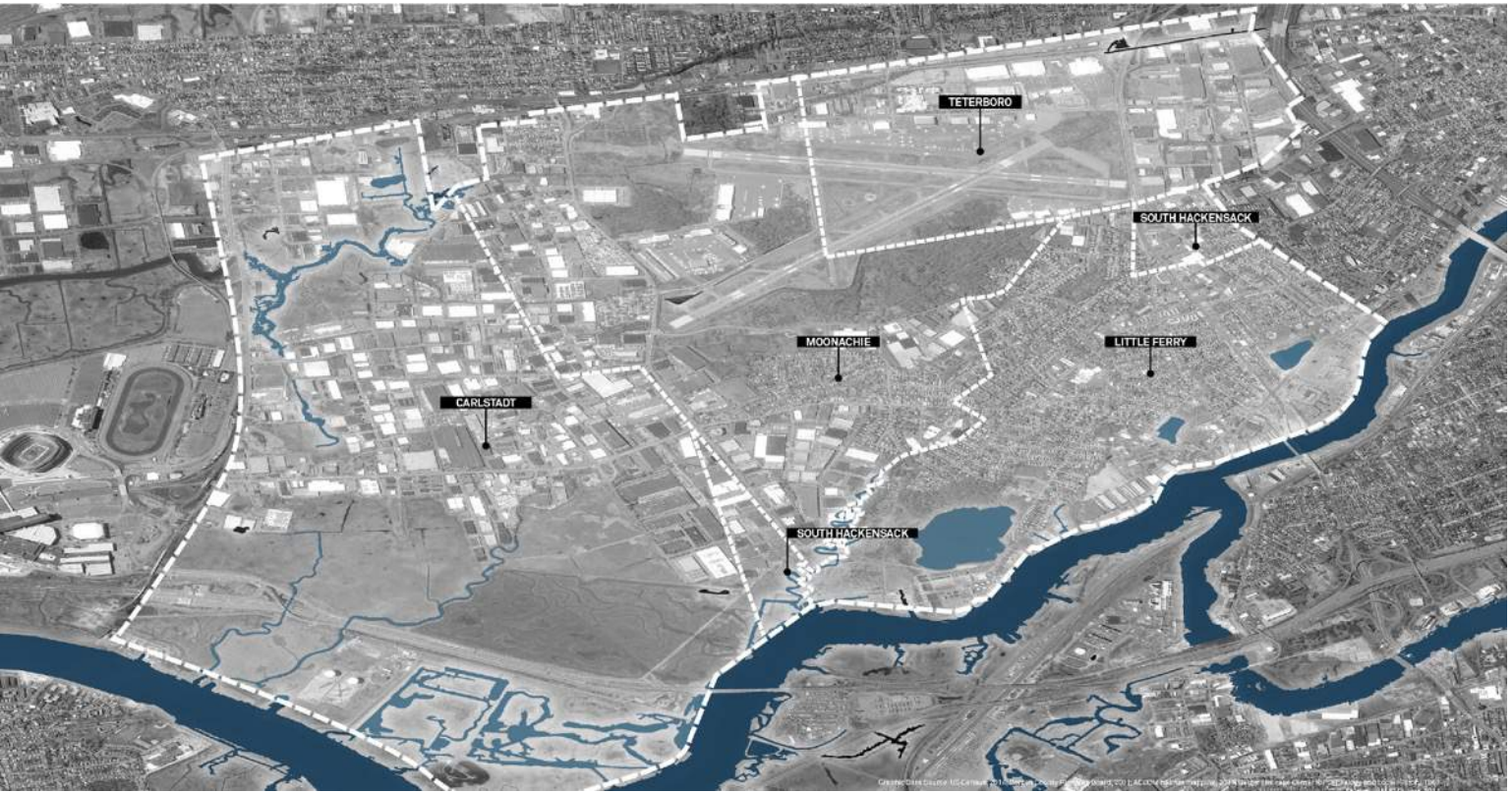
PILOT AREA 1 AWARDED



- HUD awarded State of New Jersey only **$150M for Phase 1 Pilot Area**
- Project must be functional and **completed by September 2022**

REBUILD BY DESIGN COMPETITION & AWARD

5 MUNICIPALITIES



Pilot Area 1

- 5,500 Acres
- 16,000 Residents
- Teterboro Airport
- Regional Transportation Corridors
- Regional Warehouse and Distribution Centers

REBUILD BY DESIGN COMPETITION & AWARD

FUNDING CONSTRAINTS

1. Construct a complete project that functions with **INDEPENDENT UTILITY** to meet purpose & need without relying on future projects

2. Use only **AVAILABLE FUNDS** without relying on future funding

3. Construct a fully-functional project by **SEPTEMBER 2022**

4. Project must have a **POSITIVE BENEFIT COST RATIO**

THE TEAM

THE TEAM

RESILIENCE THROUGH PARTNERING

AECOM

HDR

Dewberry

STEVENS INSTITUTE of TECHNOLOGY
THE INNOVATION UNIVERSITY

HR&A

New Meadowlands LLC

MATRIXNEWORLD

Remora Consulting

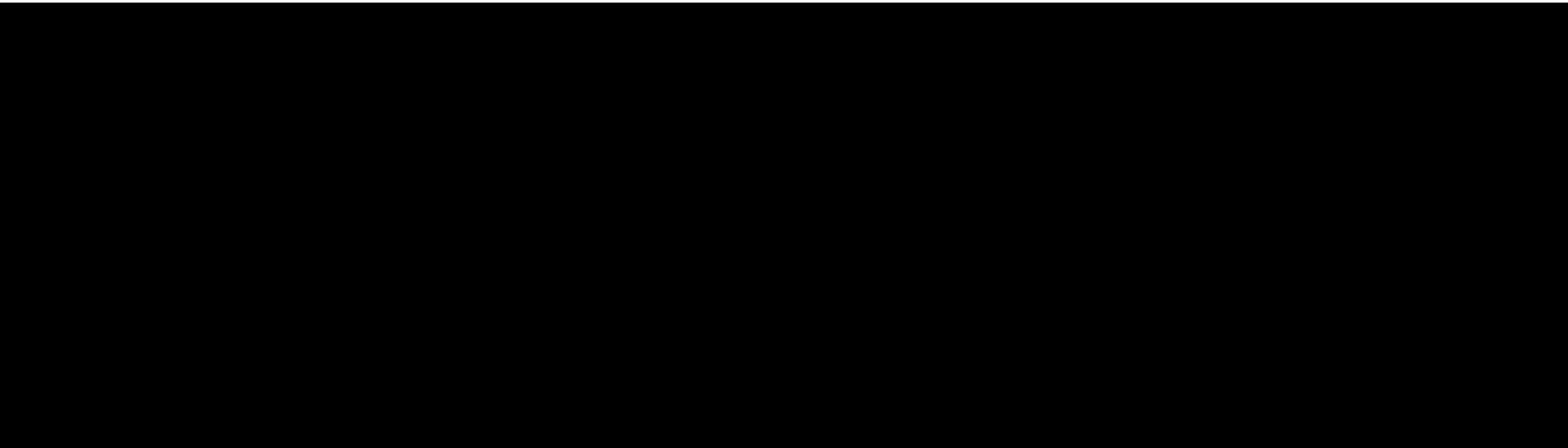
ROBINSON

RFI

THE TEAM

RESILIENCE IN PRACTICE

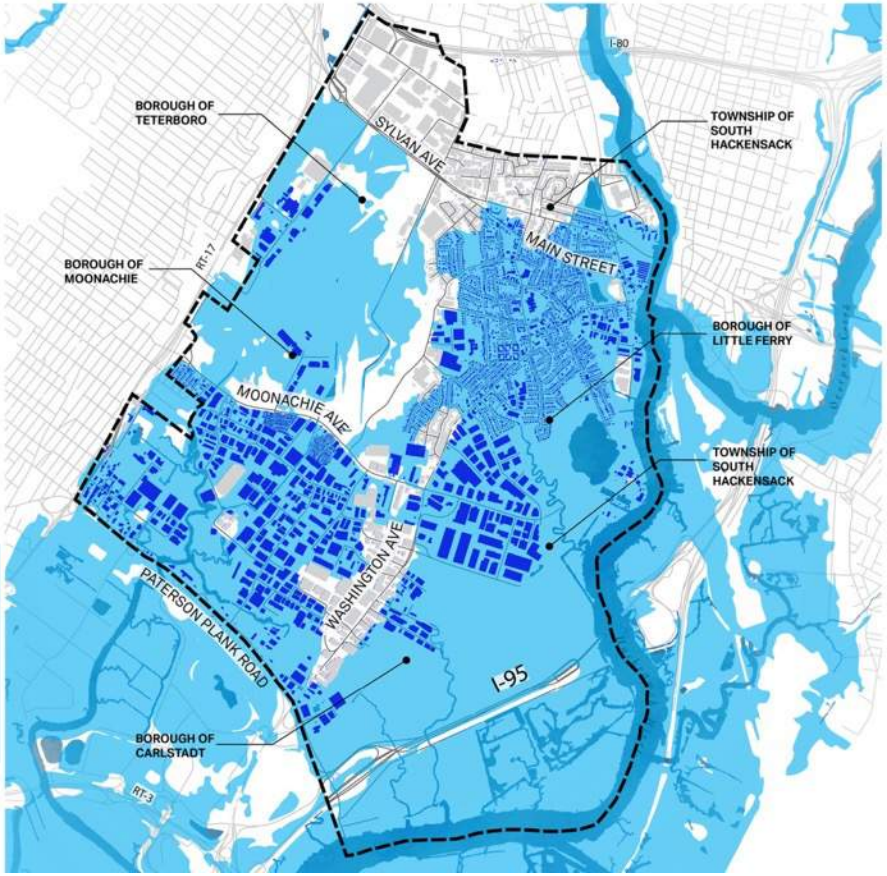
SITE OVERVIEW



PROJECT AREA CHALLENGES

EXISTING FLOODPLAIN

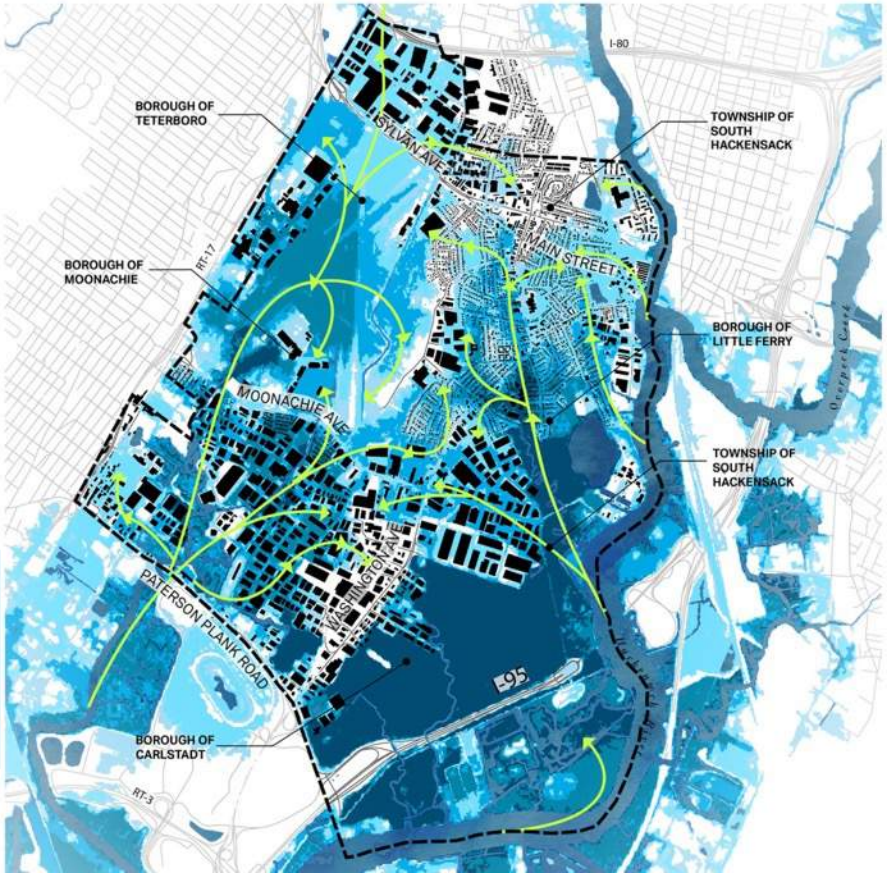
- ***98% OF THE PROJECT AREA IS WITHIN THE 100-YEAR FLOODPLAIN***



PROJECT AREA CHALLENGES

SEA LEVEL RISE BY 2075

- ***SEA LEVEL IS ESTIMATED TO RISE BETWEEN 1.2 – 2.4 FEET IN THE PROJECT AREA***
- ***STORM SURGE IS ESTIMATED TO INCREASE 0.8-1.6 FEET***



PROJECT AREA CHALLENGES

Challenges from

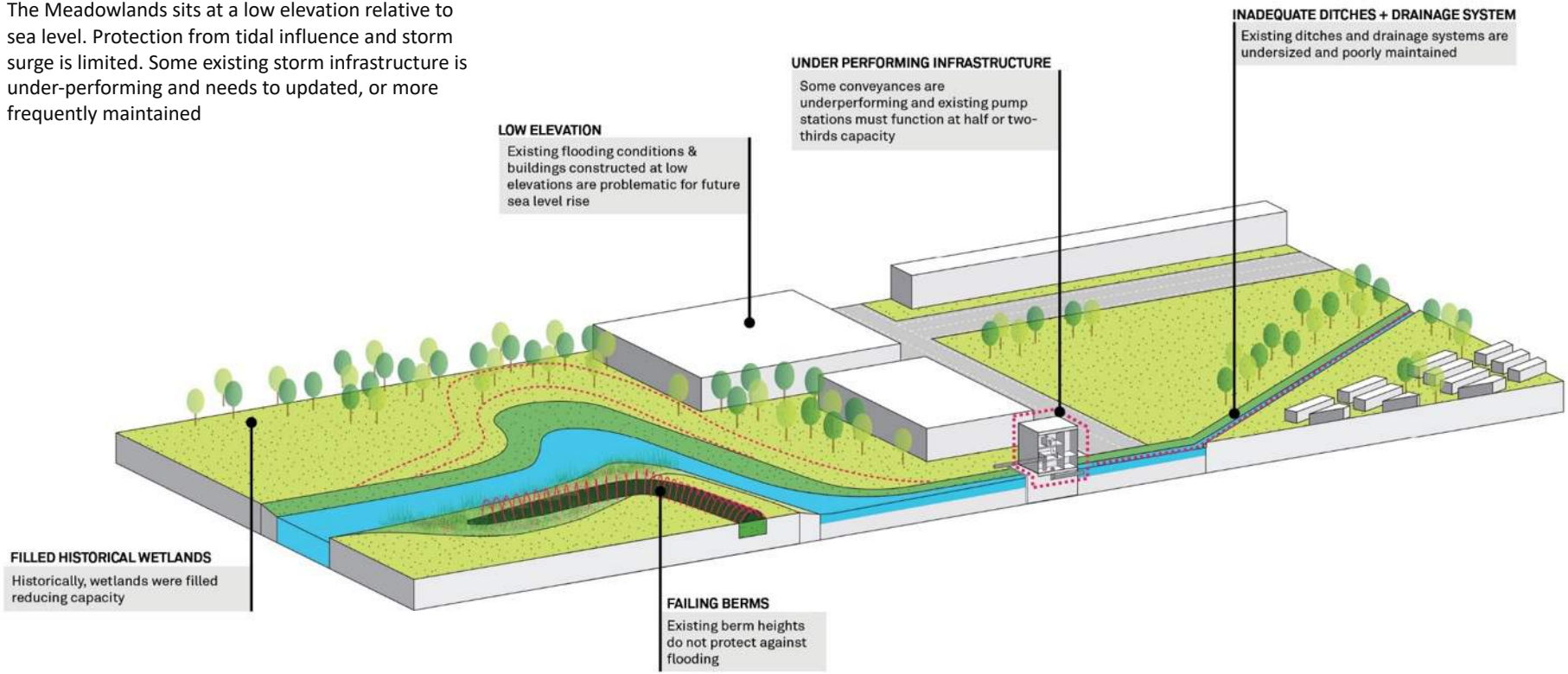
MAJOR STORM SURGE Flooding

Challenges from

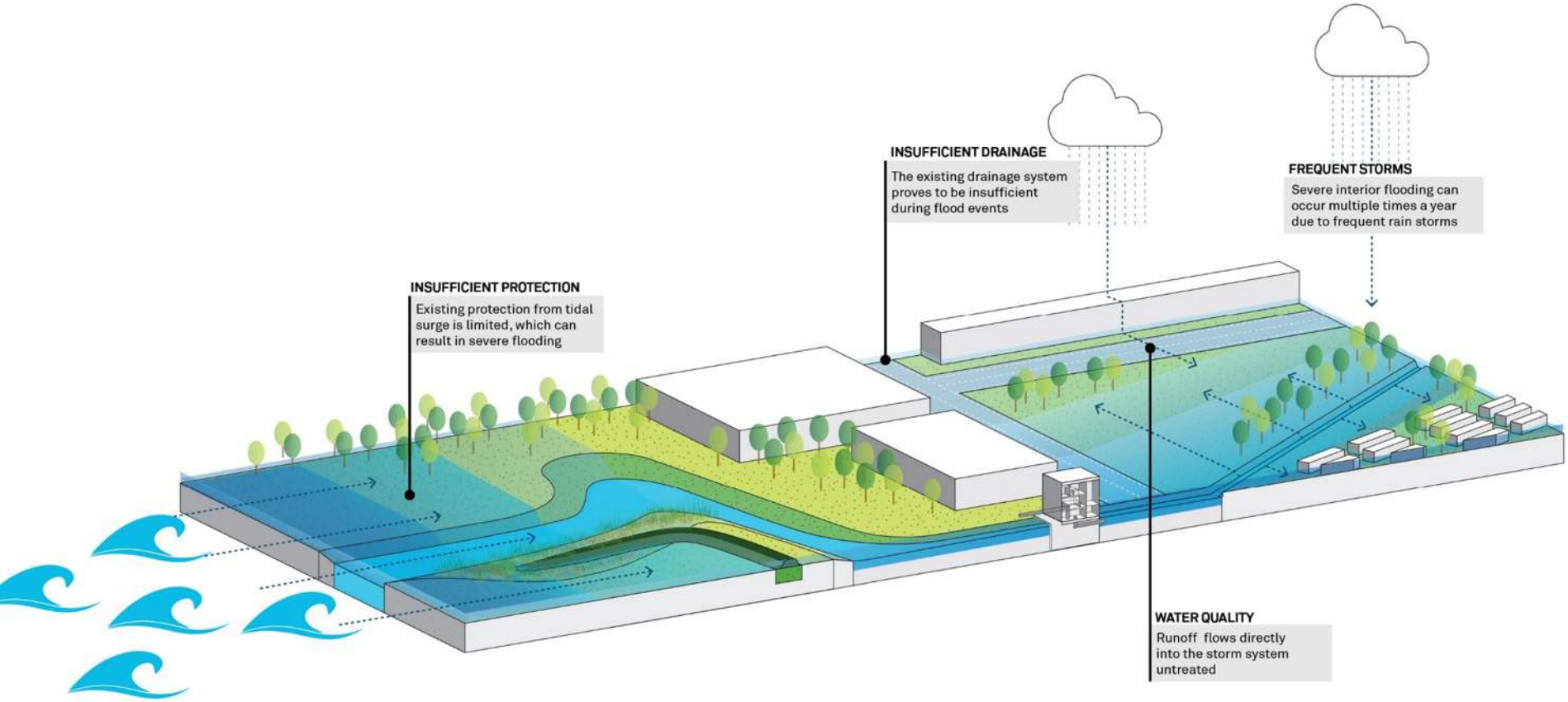
FREQUENT RAIN Flooding

PROJECT AREA CHALLENGES

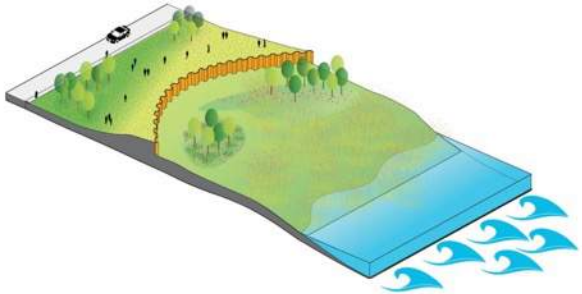
The Meadowlands sits at a low elevation relative to sea level. Protection from tidal influence and storm surge is limited. Some existing storm infrastructure is under-performing and needs to updated, or more frequently maintained



PROJECT AREA NEEDS



THE MEADOWLANDS - THREE ALTERNATIVES



Alternative 1:
Storm Surge Flooding

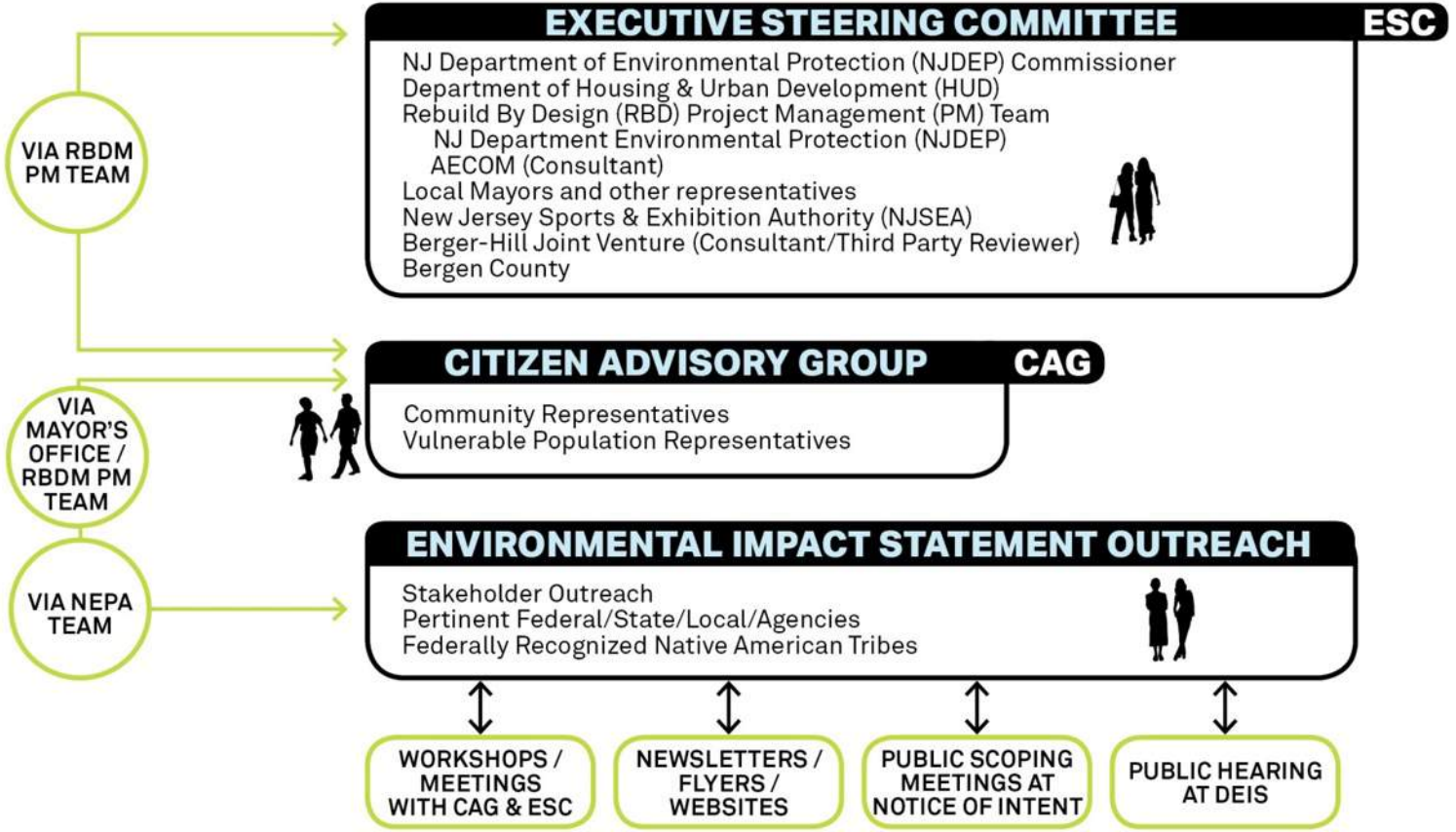
Alternative 2:
Frequent Rain Flooding

Alternative 3:
Storm Surge & Frequent Rain Flooding

DEVELOPING A PREFERRED ALTERNATIVE

COMMUNITY ENGAGEMENT

EXECUTIVE STEERING COMMITTEE & CITIZENS ADVISORY GROUP

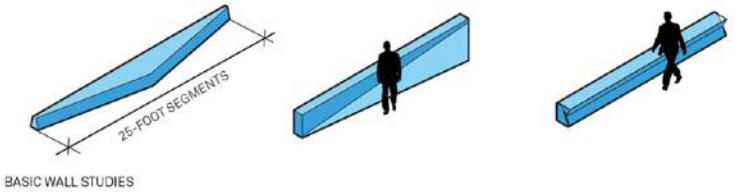


COMMUNITY ENGAGEMENT

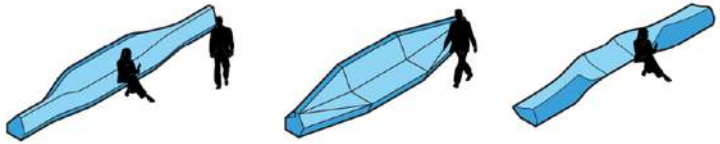
EARLY CONSULTATION + CONTINUED INVOLVEMENT

- 15 Public Meetings in 20 months
- Real-time Concept Development
- Real-time Environmental Analysis
-
- Real-time Feasibility / Scenario Testing

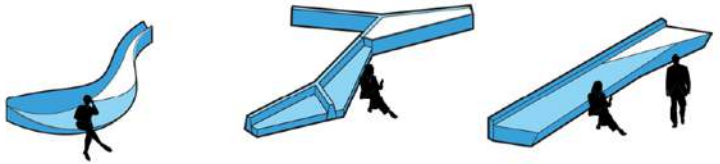
COMMUNITY ENGAGEMENT
GRAPHIC COMMUNICATION TOOLS



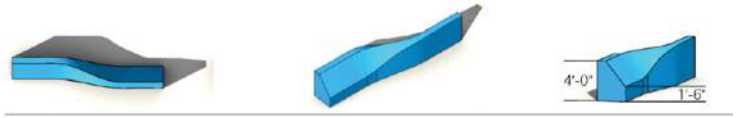
BASIC WALL STUDIES



BENCH STUDIES



BENCH + PLANTER STUDIES

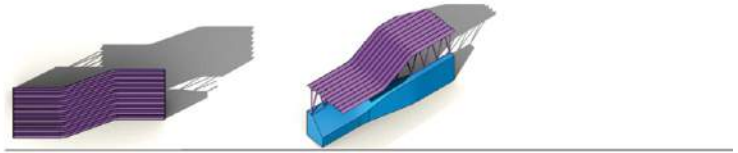


STRUCTURAL WALL UNIT

BENCH UNIT

PLANTER UNIT

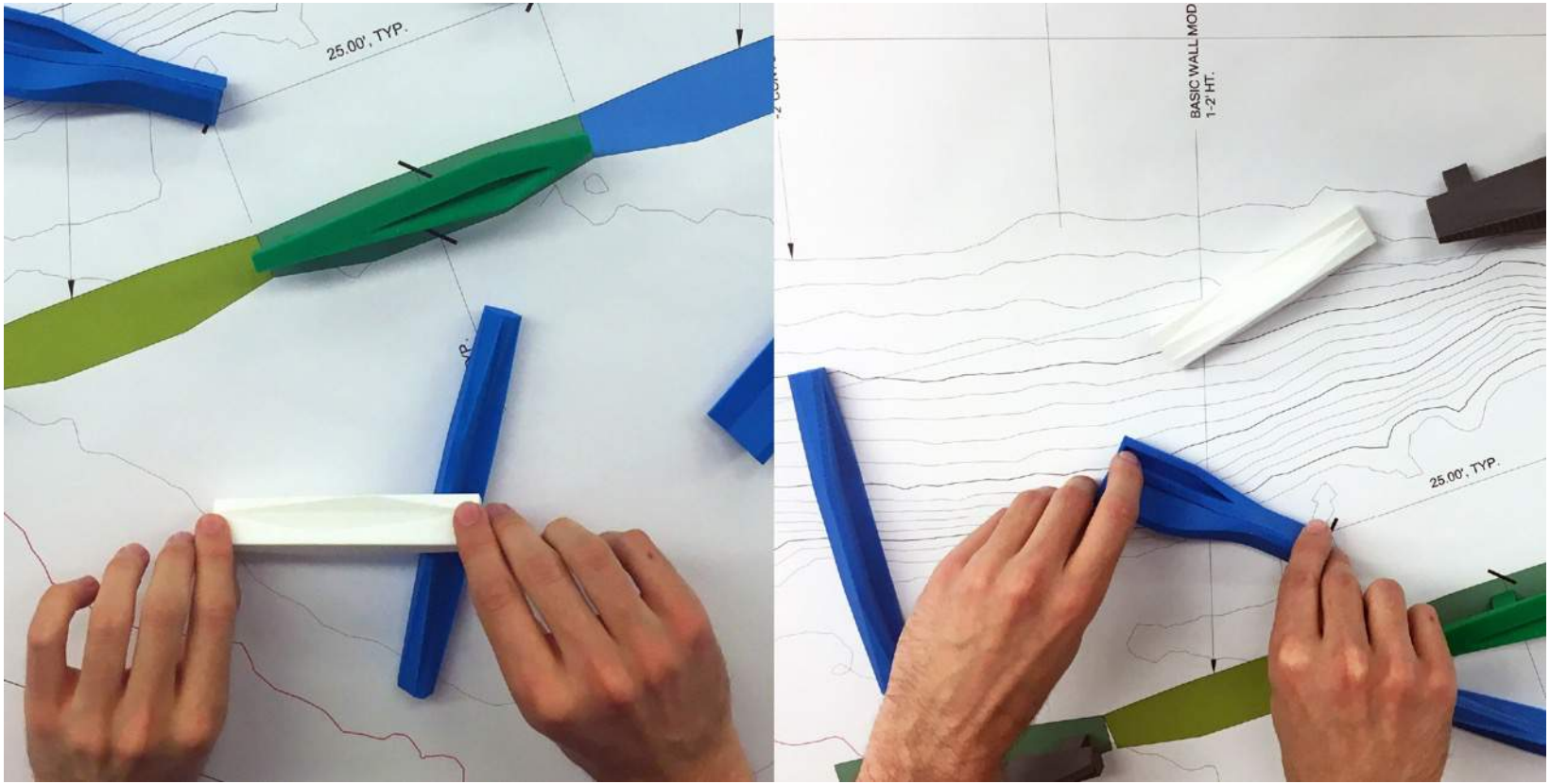
AMPHITHEATER UNIT



CANOPY UNIT

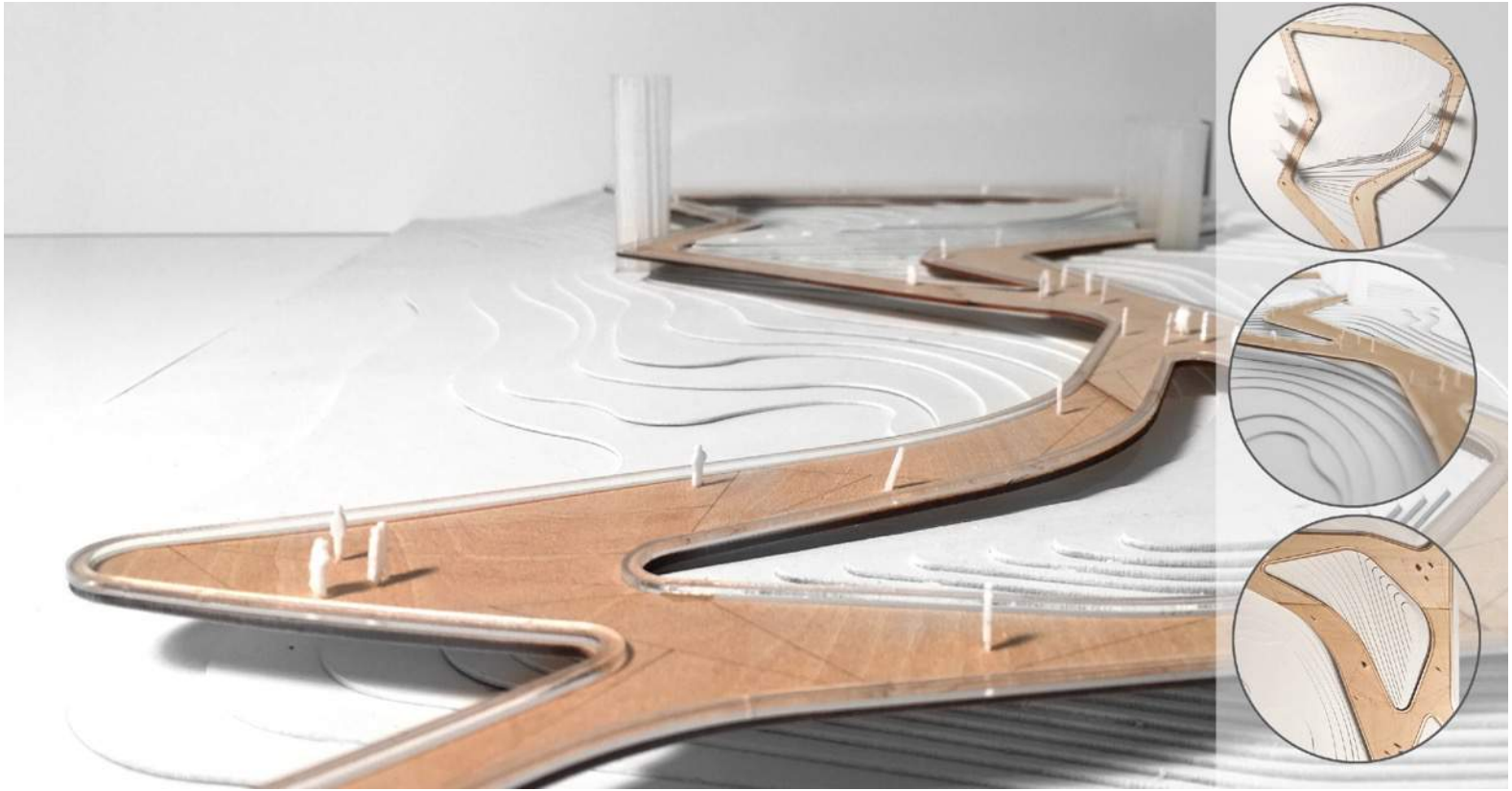
COMMUNITY ENGAGEMENT

PHYSICAL COMMUNICATION TOOLS



COMMUNITY ENGAGEMENT

PHYSICAL COMMUNICATION TOOLS

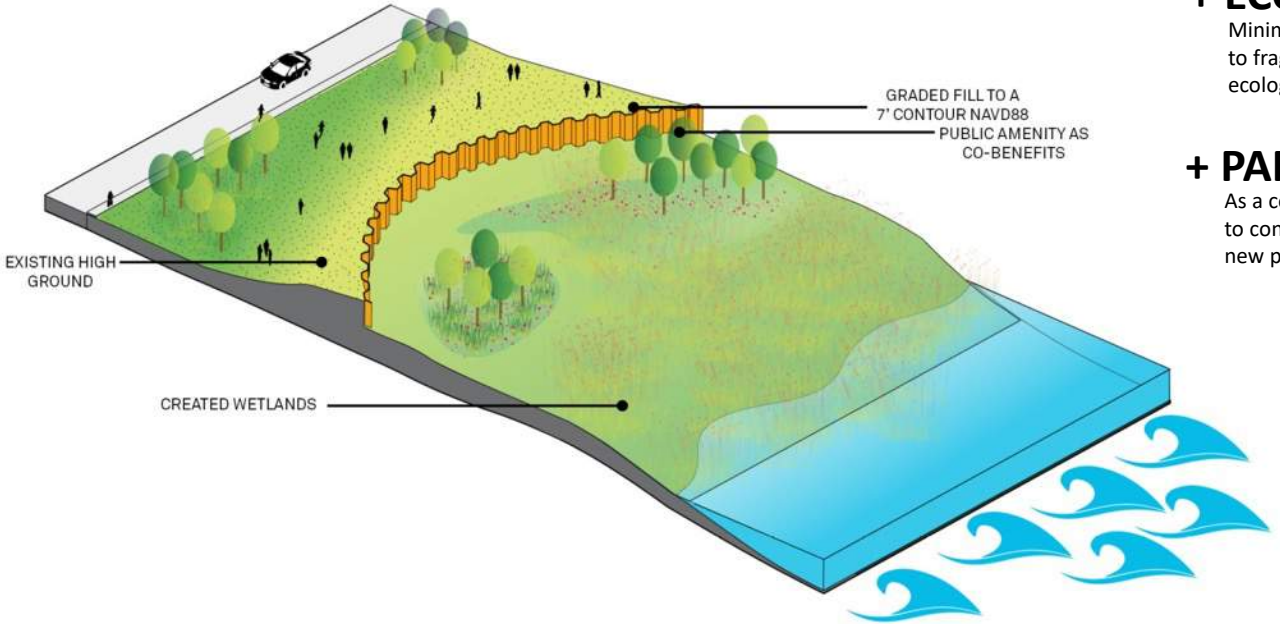


STORM SURGE FLOODING

ALTERNATIVE 1

ALTERNATIVE 1 STORM SURGE

APPROACH & GOALS



+ INFRASTRUCTURE

Connecting to high points to reduce construction costs and minimize grading

+ ECOLOGY

Minimize disturbance, consider habitat improvements to fragmented systems, and creation of new ecological zones

+ PARKS

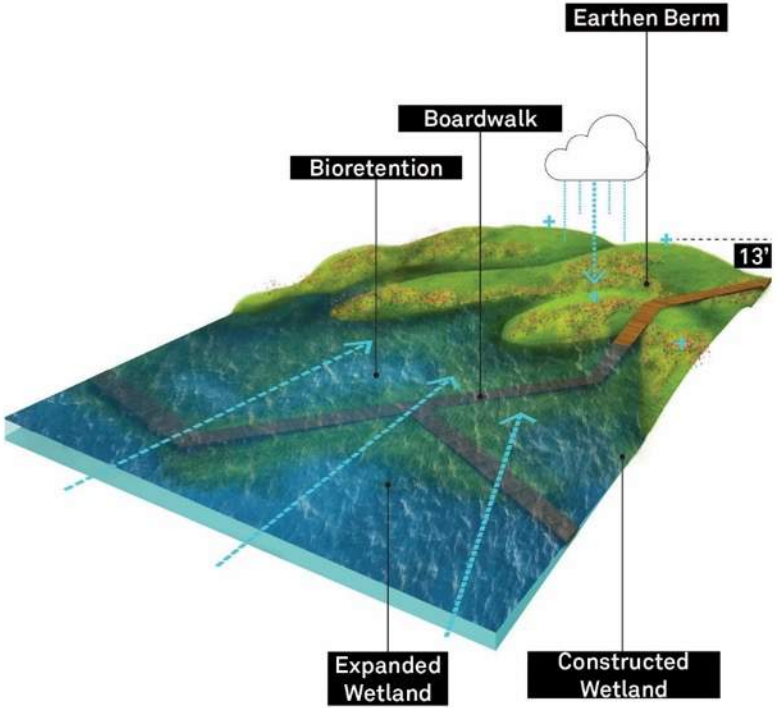
As a co-benefit to flood reduction, the project seeks to connect existing public parks as well as provide new park space

CANTILEVER WALKWAY

CONCEPT DIAGRAMS

RESIDENTIAL PASSAGE

Cantilevered Walkway

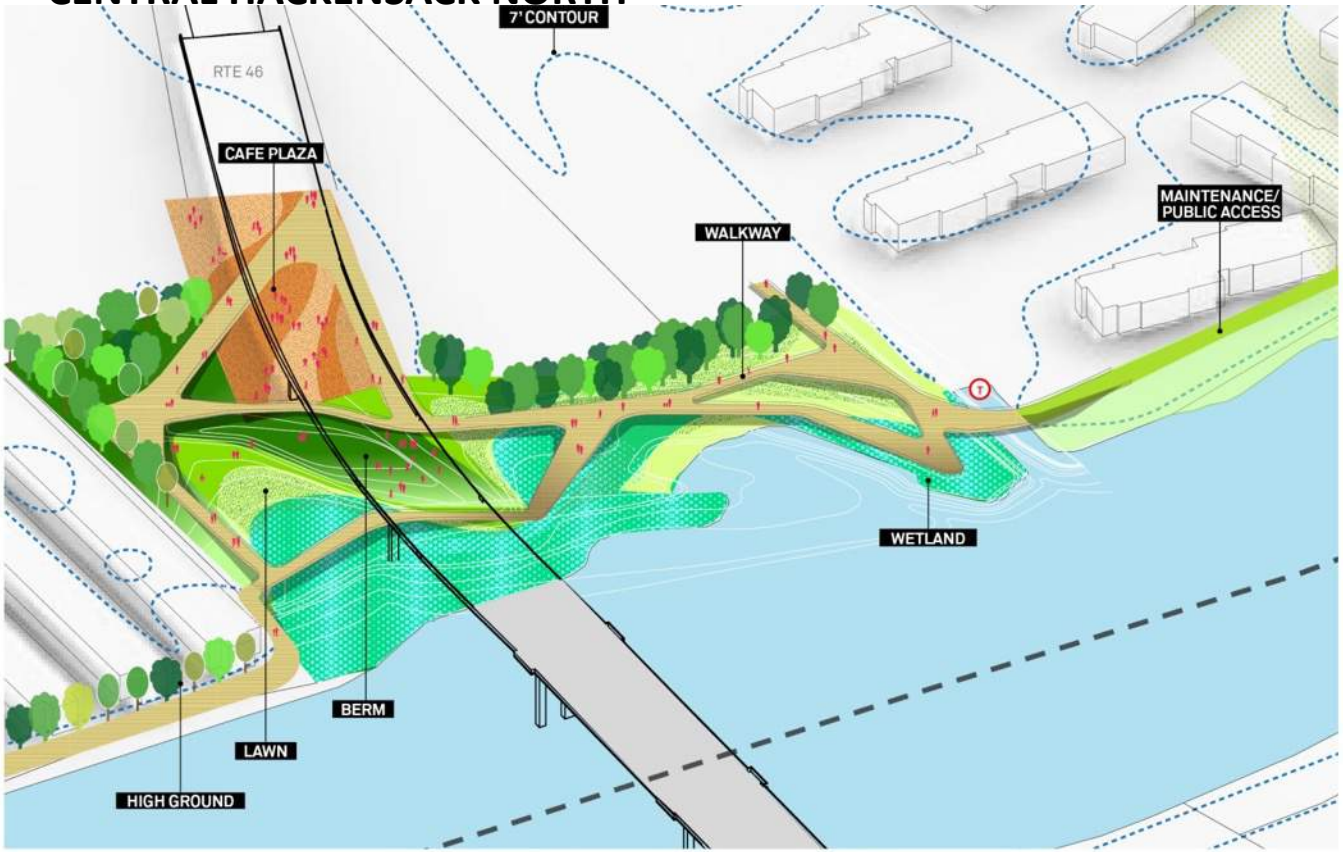


FLUVIAL WETLAND PARK

A Flooded View of the Park

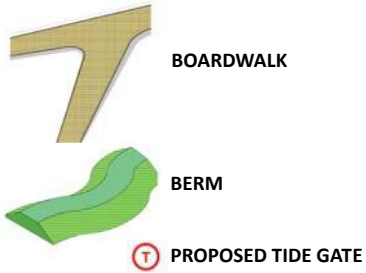
ALIGNMENT DEVELOPMENT – FLUVIAL PARK

CENTRAL HACKENSACK NORTH



APPLYING THE "KIT OF PARTS"

- A berm system turns into a public space under Route 46
- The berm system allows for inundation on the river's side during a flood event



ALIGNMENT DEVELOPMENT – FLUVIAL PARK CONNECTION

CENTRAL HACKENSACK NORTH

ALIGNMENT DEVELOPMENT – FLUVIAL PARK CONNECTION

CENTRAL HACKENSACK NORTH

CANTILEVER WALKWAY

CONCEPTUAL RENDERING FOR ILLUSTRATIVE PURPOSES

- The Cantilever Walkway combines flood protection and public access

1. Public walk
2. Modular planter
3. Cantilever access
4. Recreational space

CANTILEVER WALKWAY

CONCEPTUAL RENDERING FOR ILLUSTRATIVE PURPOSES

- The Cantilever Walkway combines flood protection and public access

1. Public walk
2. Modular planter
3. Cantilever access
4. Recreational space

FLOOD PROTECTION

CONCEPTUAL RENDERING FOR ILLUSTRATIVE PURPOSES

- The entire structure is built up to a 7’NAVD88 elevation

1. Flood protection system
2. Newly-created tidal wetland

VIEWING PLATFORM & SHEET PILE

CONCEPTUAL RENDERING FOR ILLUSTRATIVE PURPOSES

- Sheet pile is a cost effective material used in the southeast
- Public viewing platforms were integrated into the system

1 Viewing deck

2 Wetland

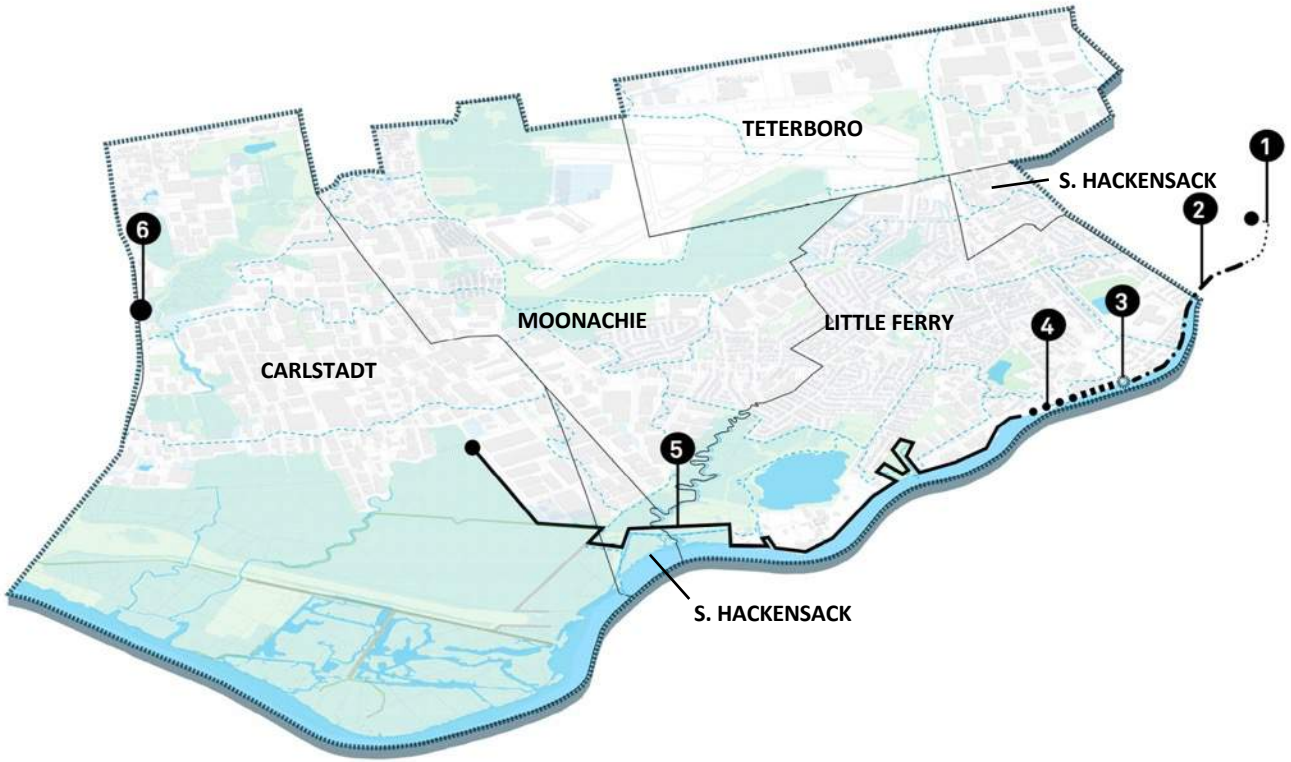
FLOOD PROTECTION

CONCEPTUAL RENDERING FOR ILLUSTRATIVE PURPOSES

- Sheet pile wraps around viewing platform to form the flood protection system

1 Sheet pile

ALTERNATIVE 1 STORM SURGE - PLAN



- Provides protection from a storm surge to elevation 7' NAVD88 (approximately a 50-yr storm)
- Provides community co-benefits through water access & multifunctional wall elements
- Positive Benefit Cost Ratio greater >1
- Revised Feasibility-level concept cost exceeds $150M

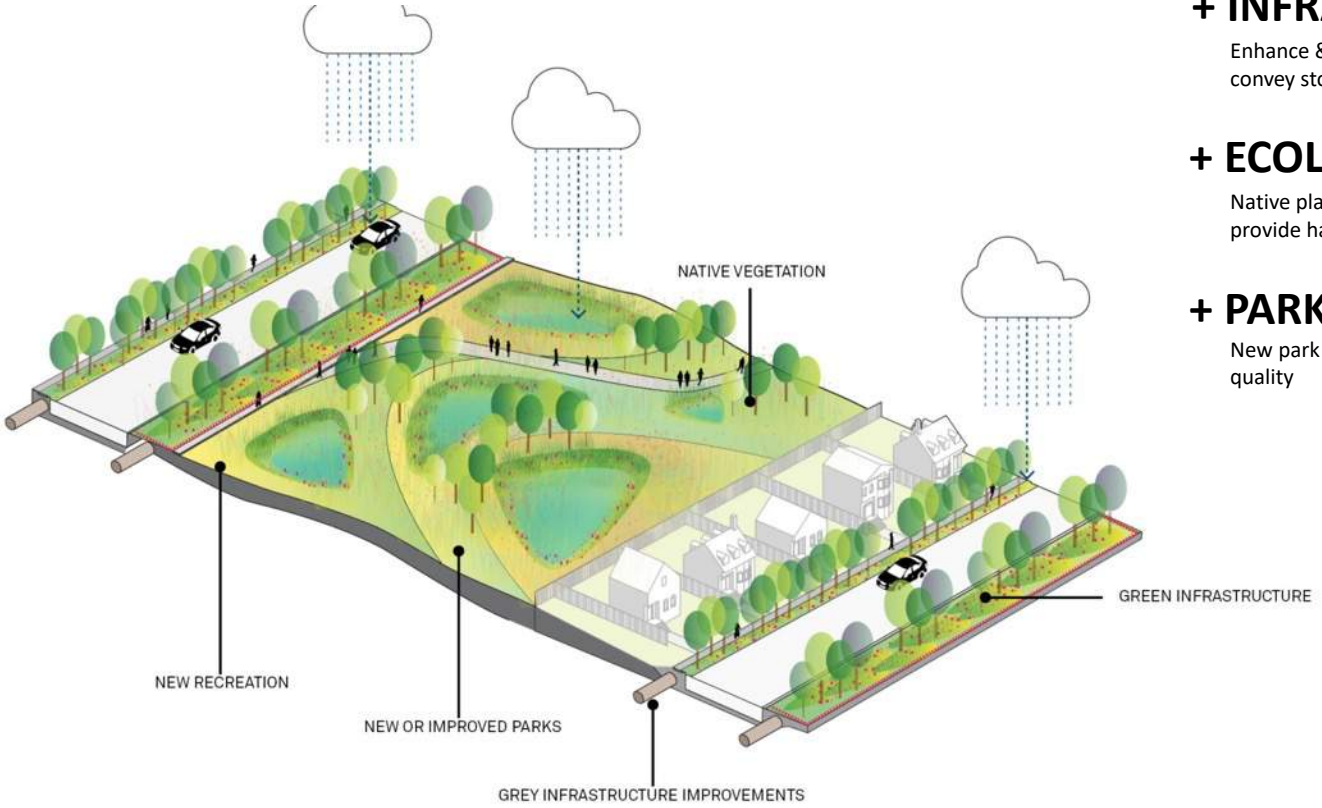
1 Existing Riverwalk
2 Sheet Pile Cantilever
3 Berms at Fluvial Park
4 Cantilever Walkway
5 Sheet pile or Floodwall
6 Surge Barrier

FREQUENT RAIN FLOODING

ALTERNATIVE 2

ALTERNATIVE 2 FREQUENT RAIN FLOODING

APPROACH & GOALS



+ INFRASTRUCTURE

Enhance & restore channels to improve capacity to convey stormwater

+ ECOLOGY

Native plantings and naturalized channel edges provide habitat and improve water quality

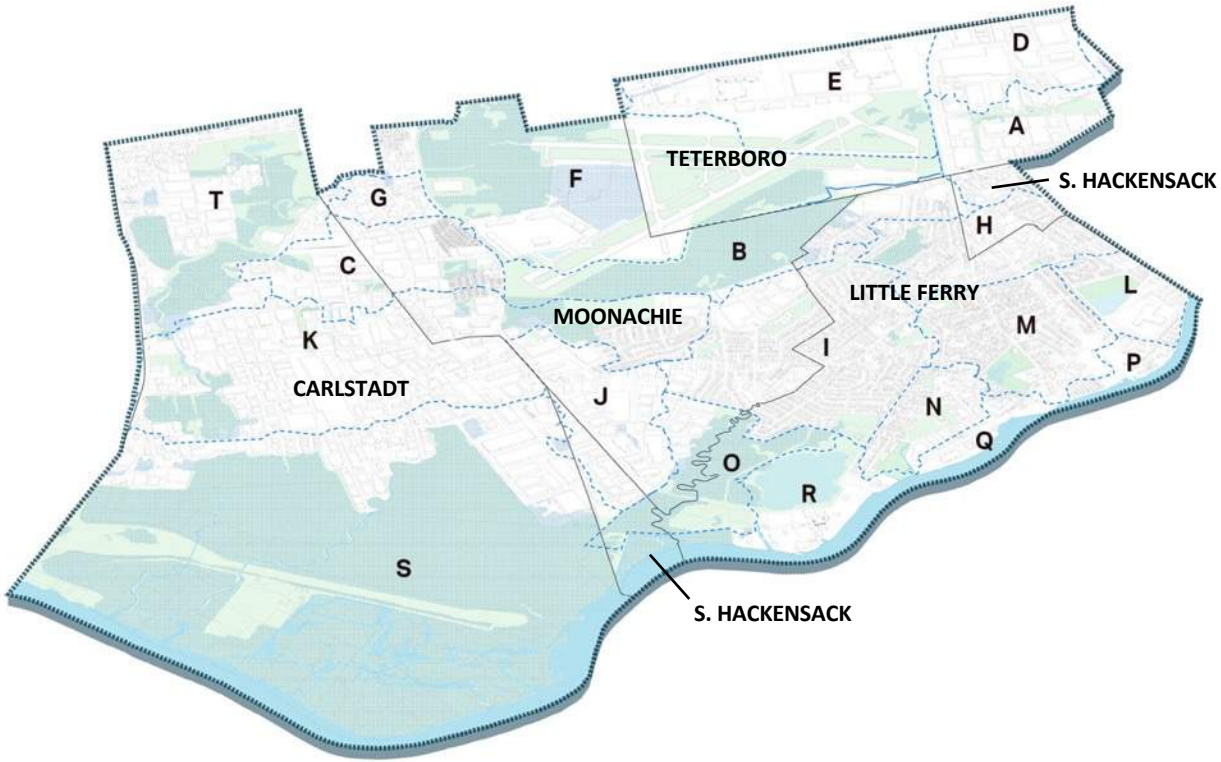
+ PARKS

New park spaces slowing runoff & improve water quality

ALTERNATIVE 2 FREQUENT RAIN FLOODING -ANALYSIS

20 SUB-BASINS

- Analyzed 20 sub-basin areas in the hydrologic model

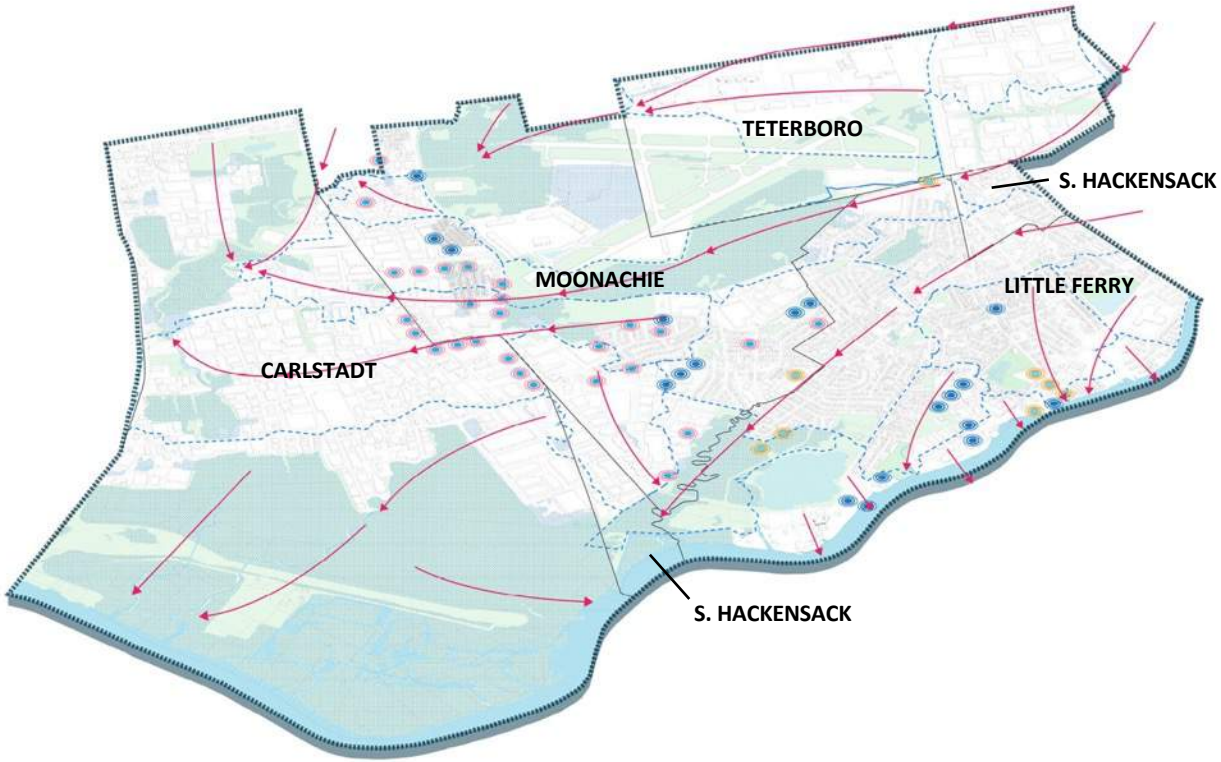


A: UPPER EAST RISER
B: MIDDLE EAST RISER
C: LOWER EAST RISER
D: UPPER WEST RISER 1
E: UPPER WEST RISER 2
F: MIDDLE WEST RISER
G: LOWER WEST RISER
H: UPPER LOSEN SLOTE 1
I: UPPER LOSEN SLOTE 2
J: MOONACHIE
K: CARLSTADT
L: INDIAN LAKE
M: MAIN STREET
N: DEPEYSTER CREEK
O: LOWER LOSEN SLOTE
P: UPPER HACKENSACK
Q: MIDDLE HACKENSACK 1
R: MIDDLE HACKENSACK 2
S: LOWER HACKENSACK
T: BERRY'S CREEK

Sub-basin boundary

ALTERNATIVE 2 FREQUENT RAIN FLOODING -ANALYSIS

FREQUENCY & FLOW



- Runoff flows to lower elevations, into creeks or ditches and is conveyed eventually into the Hackensack River or Berry's Creek
- We listened to the community members and used their input to map areas of frequent flooding

Floods in regular event

Floods in heavy event

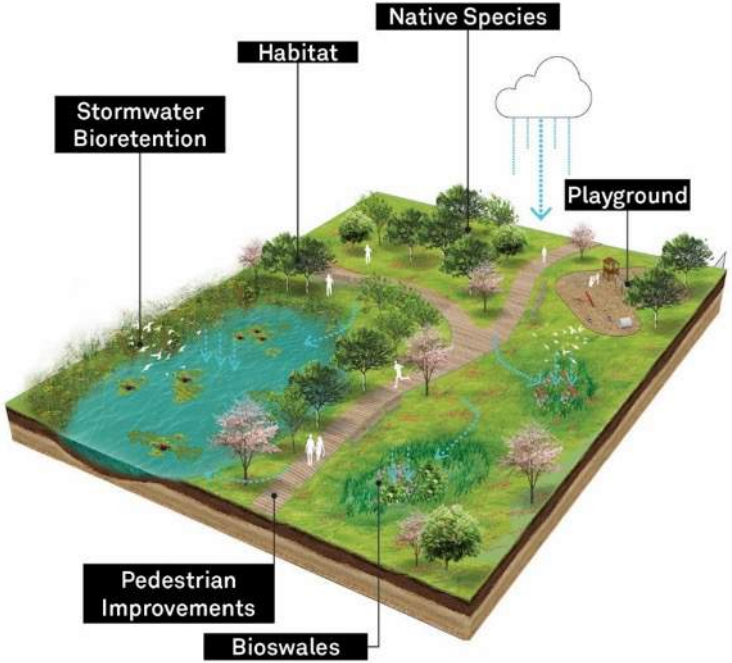
Floods in major event

Primary conveyance direction

Sub-basin

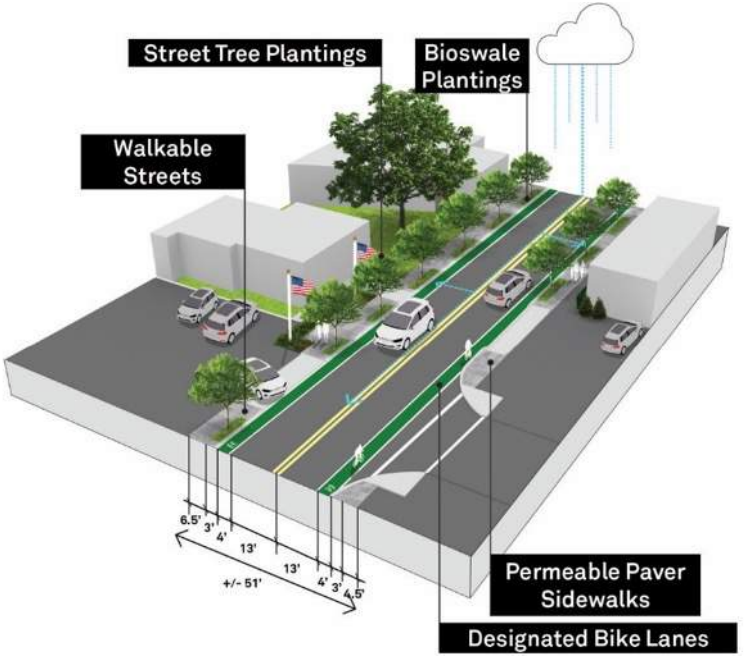
ALTERNATIVE 2 FREQUENT RAIN FLOODING

CONCEPT DIAGRAMS



OPEN SPACE

Managing Water + Providing Open Space

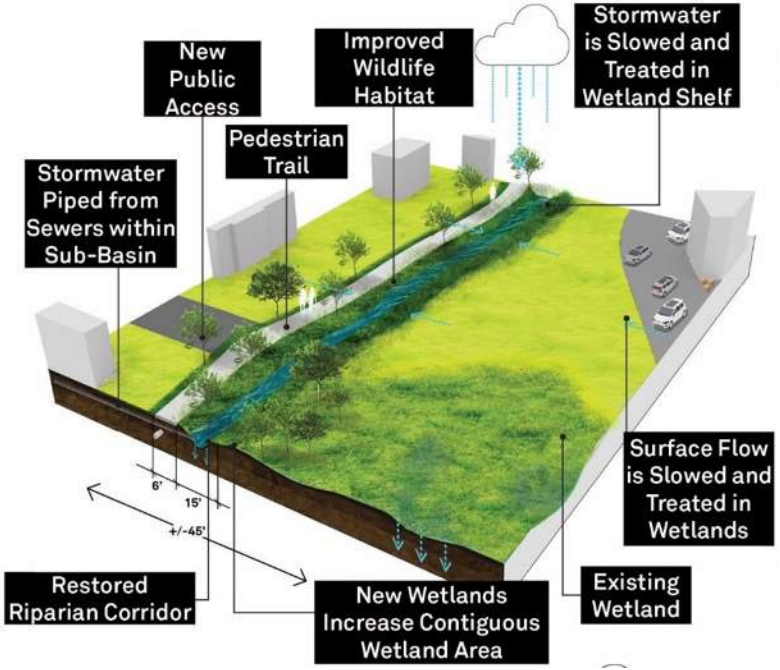


STREET IMPROVEMENTS

Walkable Streets + Bike Lanes

ALTERNATIVE 2 FREQUENT RAIN FLOODING

CONCEPT DIAGRAMS



REVIVING THE DITCH

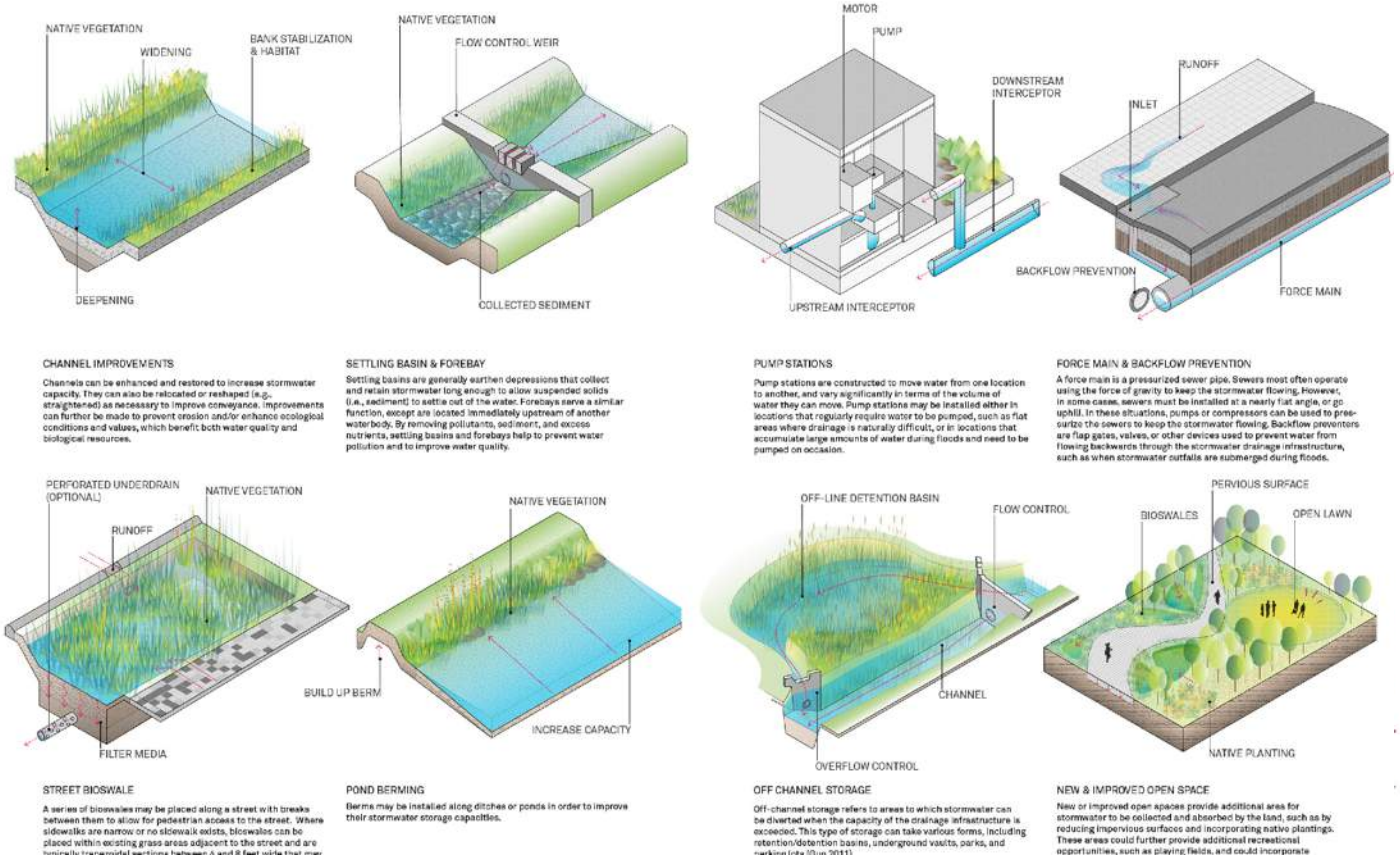
Option 1: Extend the Riparian Corridor

REVIVING THE DITCH

Option 2: Daylight and Enhance the Ditch

ALTERNATIVE 2 FREQUENT RAIN FLOODING

CONCEPTUAL KIT OF PARTS

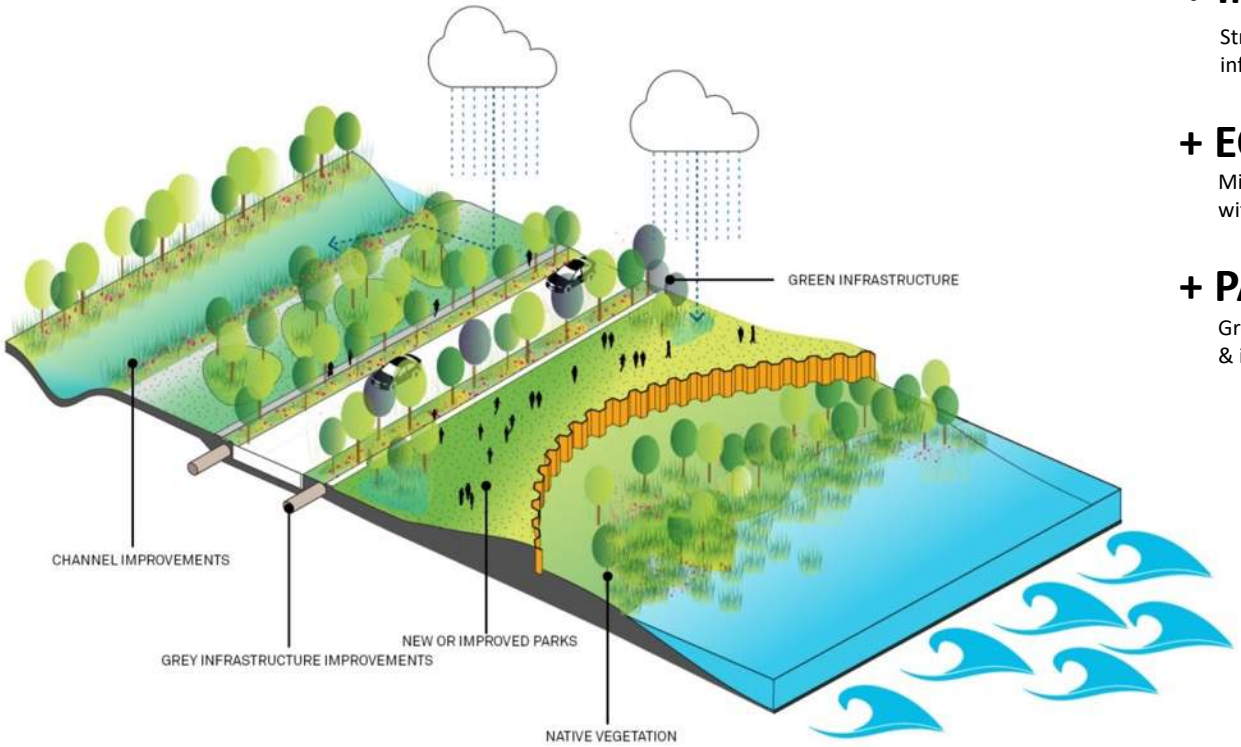


THE PREFERRED ALTERNATIVE

ALTERNATIVE 3 – STORM SURGE & FREQUENT RAIN FLOODING

ALTERNATIVE 3 – HYBRID

APPROACH & GOALS



+ INFRASTRUCTURE

Structural Flood Reduction and local drainage infrastructure improvements

+ ECOLOGY

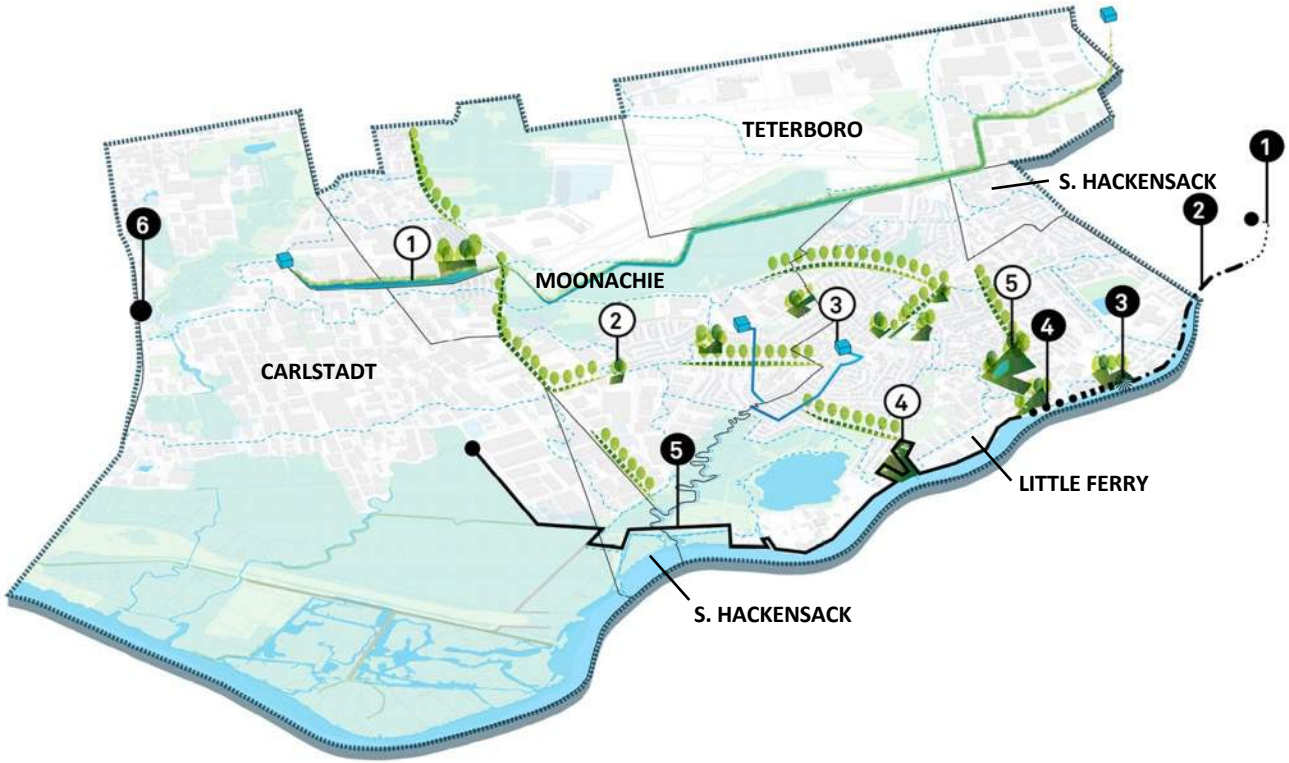
Minimize ecological disturbance and improve habitat within channels, streets, and parks

+ PARKS

Green infrastructure provides additional flood reduction & improves existing public parks

ALTERNATIVE 3 – THE PREFERRED

A PLAN FOR BOTH CHALLENGES



Stormwater Management

1. East Riser Channel Improvements + Enhanced Wetland Open Space
2. Green Infrastructure + Enhanced Existing Open Space
3. Force Main + Public Facility Improvements
4. Green Infrastructure + Enhanced Open Space
5. GI Improvements to Existing Park + 3 New Wetland / Open Spaces

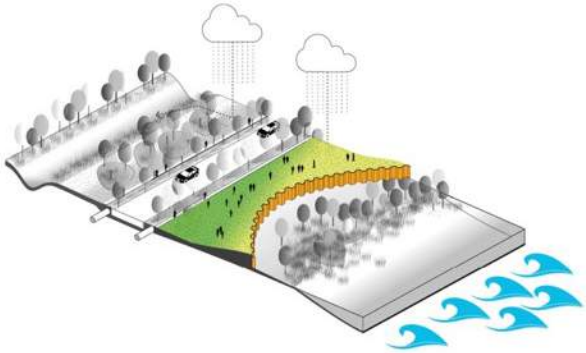
Storm Surge Protection

1. Existing Riverwalk
2. Sheet Pile Cantilever
3. Berms at Fluvial Park
4. Cantilever Walkway
5. Sheet pile or Floodwall
6. Surge Barrier

ALTERNATIVE 3 HYBRID - THE BUILD & FUTURE PLAN

Build Plan

The *Build Plan* represents a feasible project that can be **constructed by 2022.** Components include flood reduction strategies to address frequent rain flooding

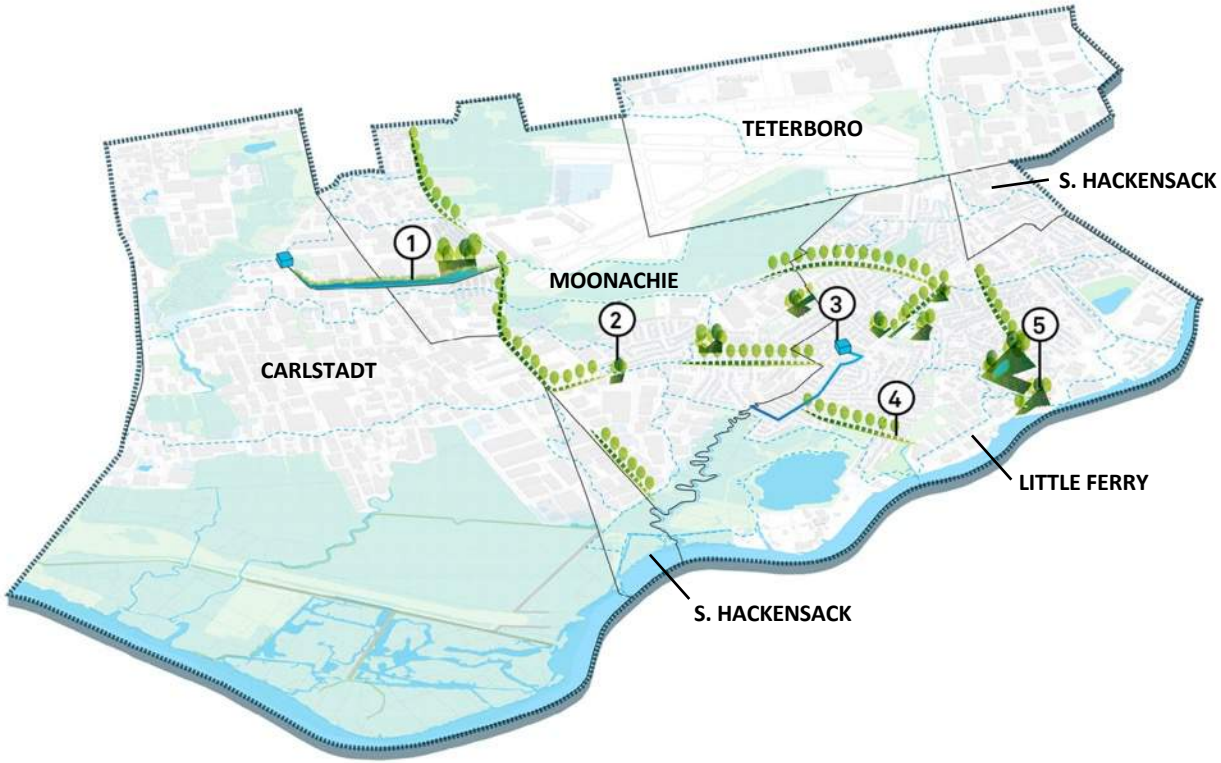


Future Plan

Components that were not selected for the *Build Plan* became elements of a *Future Plan*. These elements could **be implemented** by others **over time** as new funding sources become available

ALTERNATIVE 3 - BUILD PLAN

FREQUENT FLOOD REDUCTION



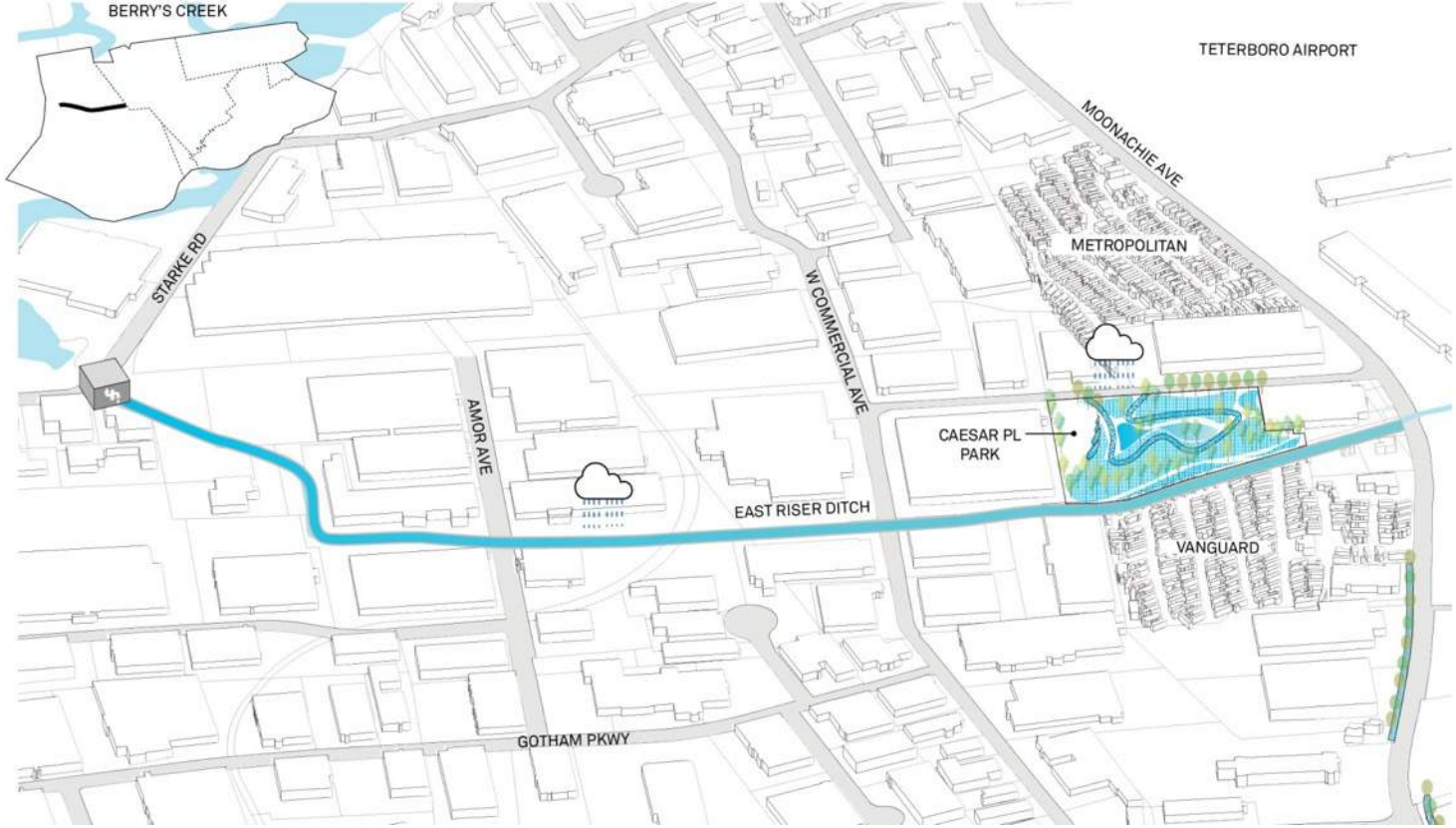
1. Pump station +Channel Improvements + New Park
2. Green Infrastructure + New Park
3. Pump Station + Force Main + Public Facility Improvements
4. Green Infrastructure
5. Park Improvements + 1 New Park + Green Infrastructure

Stormwater Management Features

1. East Riser: Channel Improvements + Enhanced Wetland Open Space
2. Avanti Park: Street Green Infrastructure + Enhanced Open Space
3. Losen Slote: Force Main + Public Facility Improvements
4. Green Infrastructure + Enhanced Wetland Open Space
5. GI Improvements to Willow Lake Park + 1 New Wetland / Open Space along Hackensack River

EAST RISER CHANNEL IMPROVEMENTS

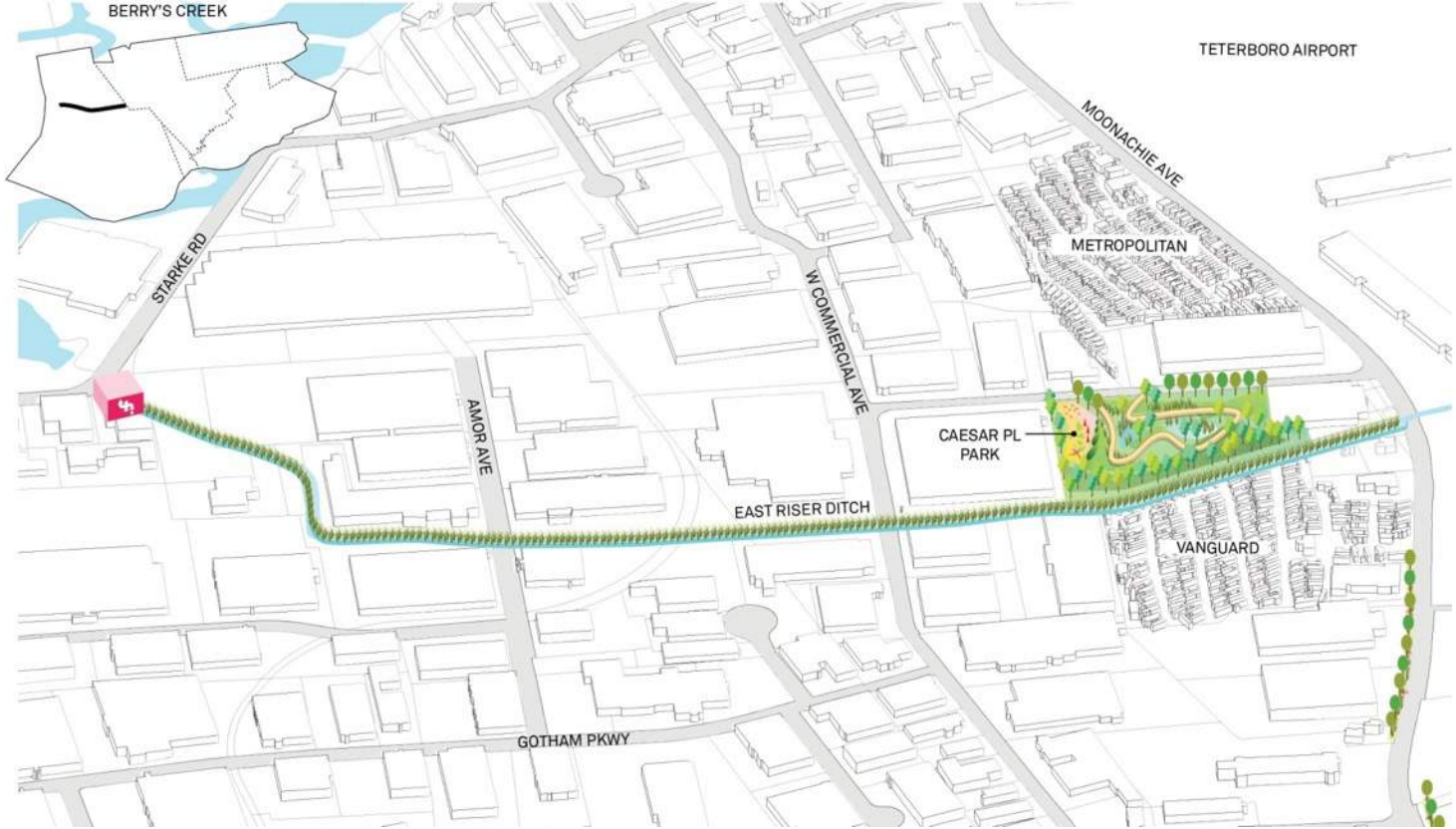
FLOOD REDUCTION BENEFITS



- **Channel conveyance improvements** below Moonachie Ave with a **new pump station**
- New wetland eco-park with ~12,000 SF of **integrated green infrastructure** and ~129,000 SF of wooded and emergent wetland to **improve storage** and **water quality**

EAST RISER CHANNEL IMPROVEMENTS

FLOOD REDUCTION CO-BENEFITS



- Channel conveyance improvements include **habitat restoration with native vegetation**
- New wetland eco-park is part of the flood reduction system, but also offers benefits in the form of **habitat, environmental education,** and **recreation space**

GREEN INFRASTRUCTURE & PARK IMPROVEMENTS

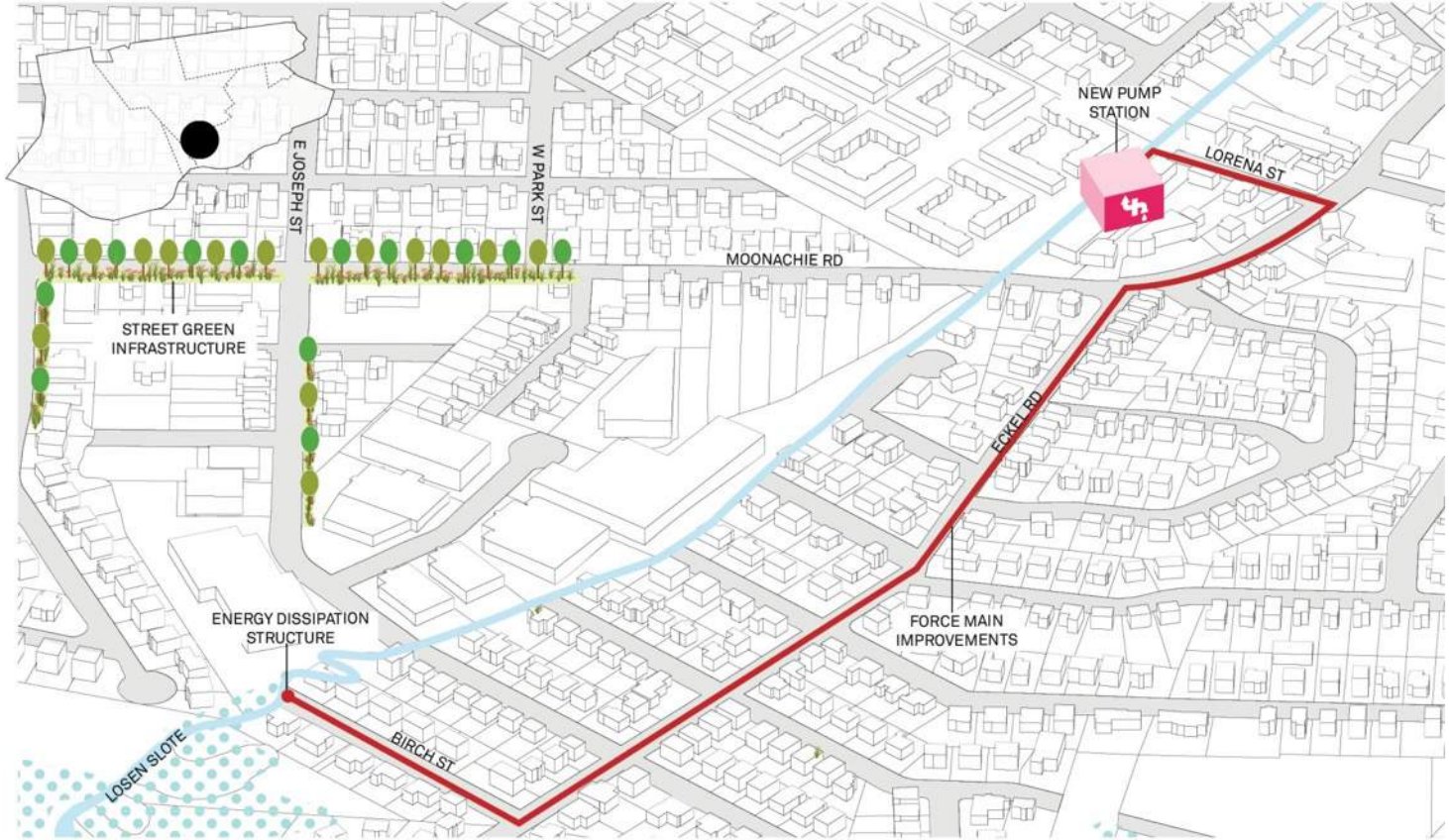
CONCEPTUAL RENDERING

- Wetland enhancement, improves storage and treatment capacities, and improves public recreation opportunity

1. Elevated boardwalk
2. Channel improvements
3. Shallow emergent marsh
4. Native vegetation

LOSEN SLOTE DRAINAGE IMPROVEMENTS

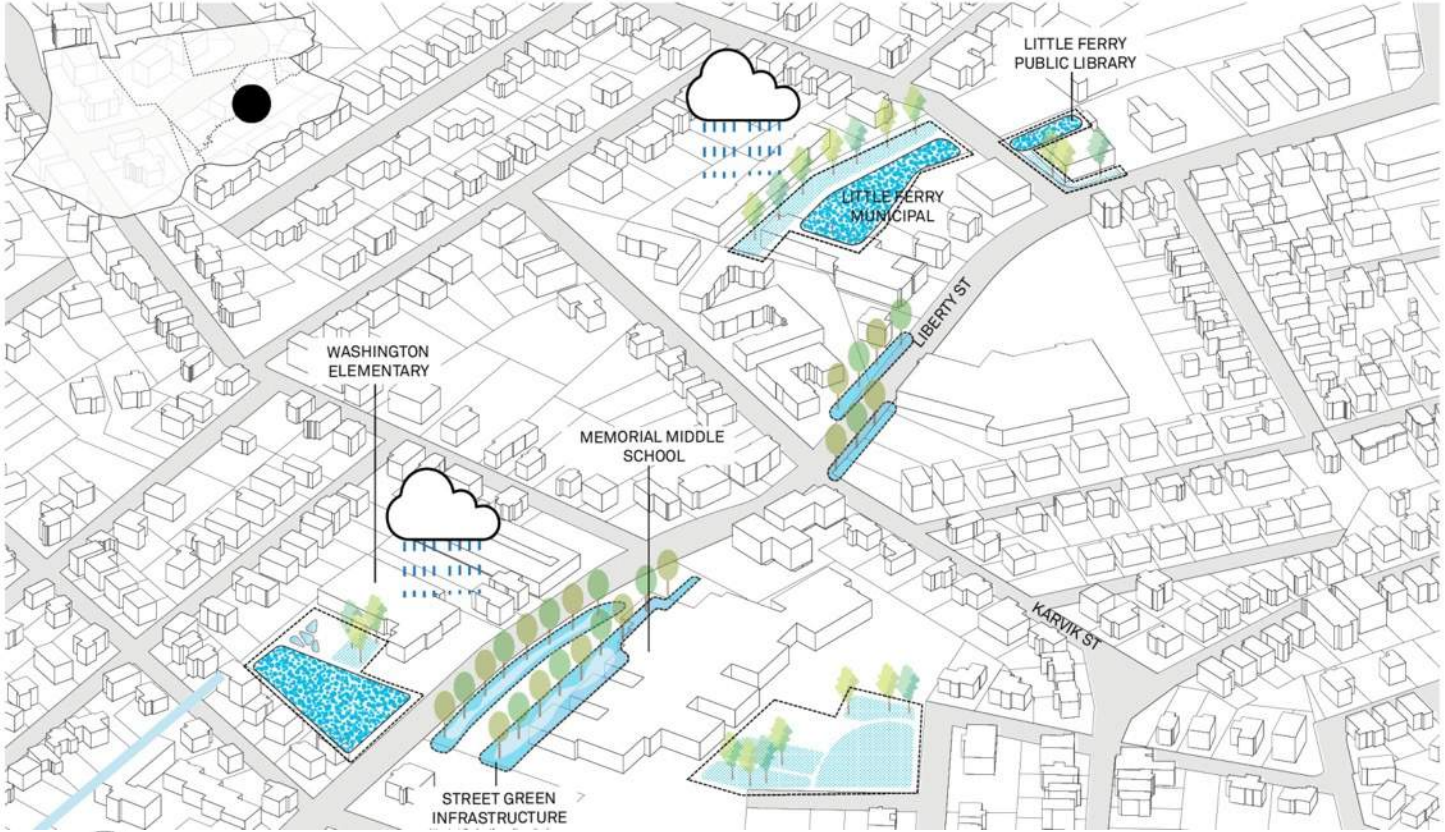
FLOOD REDUCTION & CO-BENEFITS



- **New pump station** within the residential area of the stream
- Stormwater discharges via a **36" force main** to the downstream Losen Slote marsh
- **Energy dissipation structure** limits erosion at discharge points
- Street green infrastructure **collects water** and **filters** total suspended solids

CIVIC LOCATIONS

FLOOD REDUCTION BENEFITS



- Multiple improvements are proposed at public facilities in Little Ferry such as bioswales and underground storage trenches
- Improvements are planned for the following facilities: Little Ferry Library, Little Ferry Municipal Building, Memorial Middle School, Washington Elementary, and Robert Craig Elementary

AVANTI PARK

CONCEPTUAL RENDERING

- Bioretention systems capture and filters 1.25 inches of rainfall in two hours through planting media
- New retention areas create room for additional water storage
- Undeveloped land becomes public park and productive ecosystem

1. Boardwalk foundation
2. Headwall & inlet pipe
3. Energy dissipator
4. Native planting
5. Integrated seating

CIVIC LOCATIONS

FLOOD REDUCTION CO-BENEFITS

- Co-benefits to the municipal buildings include improvements near community buildings, such as opportunities for education, community outreach and involvement, and new habitat

MUNICIPAL BUILDINGS & SCHOOLS

CONCEPTUAL RENDERING

- Permeable paving and rain gardens collect and filters 1.25 inches of rainfall in two hours through planting media
- Green infrastructure can be an educational opportunity for schools and public buildings
- Greener streets improve habitat, create safer streets, and improve visual quality of the street

1. Permeable paver
2. Bioretention
3. Grass and concrete permeable paver

WILLOW LAKE & RIVERSIDE PARKS

FLOOD REDUCTION BENEFITS

- Reduce sedimentation into the drainage system & slows water movement
- Improvements to Willow Lake include approximately 65,000 SF of new native planting and low meadow and approximately 1,200 SF of rain gardens
- A new public open space on the Hackensack River includes approximately 5,700 SF of restored riparian wetland and approximately 30,000 SF of native planting and bioswales

WILLOW LAKE & RIVERSIDE PARKS

FLOOD REDUCTION CO-BENEFITS

- Co-benefits to the new and improved Little Ferry open spaces include new walking trails, space for recreation, water access, new habitat, and visual improvements

WILLOW LAKE PARK IMPROVEMENTS

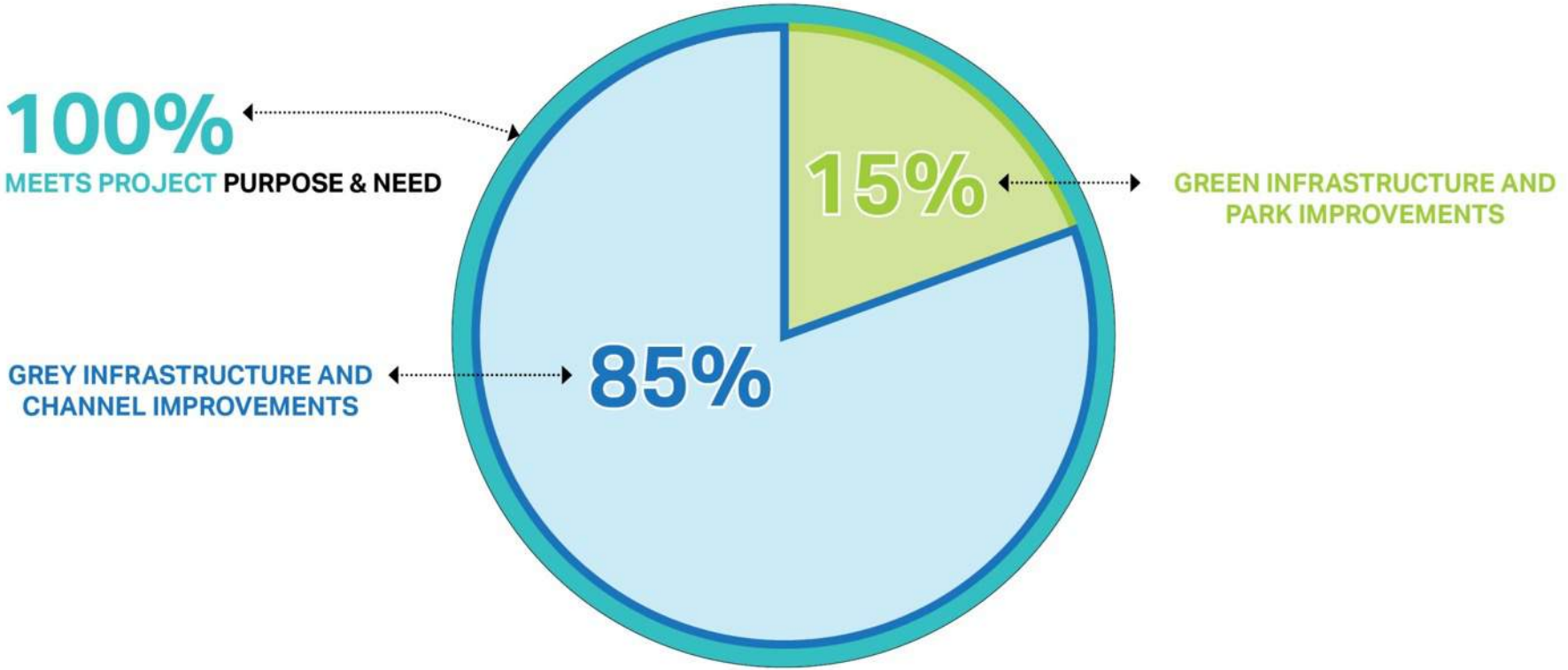
CONCEPTUAL RENDERING

- Green infrastructure system would be sized to capture and treat 1.25 inches of rainfall in two hours
- Stone chimneys provided outlet for ponding water to reach stone storage
- Improvements to Willow Lake Park enhance water quality and user experience

1. Permeable paving
2. Stone chimney
3. Native planting
4. Recreation space
5. Existing playground

BUILD PLAN CONSTRUCTION COST

FEASIBILITY-LEVEL COST BREAKDOWN



QUESTIONS?

THANK YOU