REBUILD BY DESIGN

M E A D O W L A N D S

COMMUNITY MEETING

PROJECT UPDATE AND PREFERRED ALTERNATIVE

January 11, 2018

PREPARED BY AECOM

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www.renewjerseystronger.org

Table of Contents

1.0 List of Acronyms

List of Acronyms

BCR	Benefit/Cost Ratio
CAG	Citizen Advisory Group
CDBG-DR	Community Development Block Grant – Disaster Recovery
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
HUD	Department of Housing and Urban Development
NEPA	National Environmental Policy Act
NJDEP	New Jersey Department of Environmental Protection
RBD	Rebuild by Design
RBDM	Rebuild by Design Meadowlands

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STATE OF NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION

2.0 Agenda

Project Update and Preferred Alternative

6-8 PM
January 11, 2018
Robert L. Craig School Gymnasium
20 West Park Street
Moonachie, NJ 07074

Project Website
www.rbd-meadowlands.nj.gov
Project Email
rbd-meadowlands@dep.nj.gov

Welcome

Presentation

- Opening Remarks (10 Minutes)
  - Welcoming (Linda Fisher, NJDEP & Borough Mayors)
  - Agenda (Chris Benosky, AECOM)
- Project Overview (Garrett Avery, AECOM)
- Selecting a Preferred Alternative (Lulu Loquidis, AECOM)
- Alternative 1 Storm Surge Flooding (Lulu Loquidis, AECOM)
- Alternative 2 Frequent Rain Flooding (Garrett Avery, AECOM)
- Alternative 3 The Preferred Alternative (Garrett Avery, AECOM)
- The Build Plan (Lulu Loquidis, AECOM)
- The Build Plan Benefits (Garrett Avery, AECOM)
- Next Steps & Q&A/Closure (Dave Rosenblatt, Assistant Commissioner NJDEP & Chris Benosky, AECOM)
  - Next Steps
  - Question and Answers

3.0 Power Point Presentation

REBUILD BY DESIGN

MEADOWLANDS

COMMUNITY MEETING

PROJECT UPDATE AND PREFERRED ALTERNATIVE
JANUARY 11, 2018

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AGENDA

Christopher Benosky, AECOM 2

- Welcome
- The Meadowlands Challenge
- Alternative 1
- Alternative 2
- Alternative 3
  - Build Plan
  - Future Plan
- Preferred Alternative
- Takeaways / Next Steps
- Question & Answer

REBUILD BY DESIGN MEADOWLANDS

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REBUILD BY DESIGN COMPETITION & AWARD

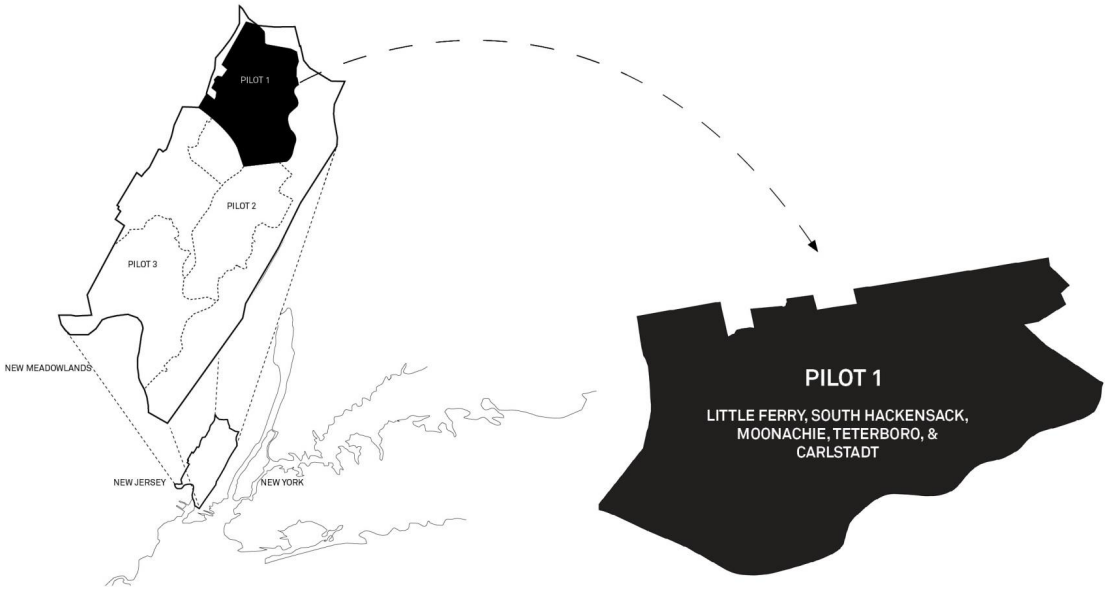
3

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

Competition Graphic: MIT

REBUILD BY DESIGN COMPETITION & AWARD

4



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

PROJECT OVERVIEW

GARRETT AVERY, AECOM

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THE PURPOSE

6

Address flood risk

Increase resiliency of the communities and ecosystems

Reduce impacts to critical infrastructure, residences, businesses, and ecological resources

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THE NEED

7

Address systemic **inland flooding** & **coastal flooding** from storm surges

Increase **community resiliency**

Reduce flood insurance **rates** and claims from future events

Enhance water quality and protect ecological resources

Protect life, public health, and property

Incorporate flood hazard risk reduction strategy with **civic, cultural, & recreational values**

PROJECT GOALS

8

1. Create the **BEST POSSIBLE PROJECT** with the available funding

2. Meets the Project Mandate by providing **FLOOD REDUCTION & CO-BENEFITS** such as reducing sediment & improving water quality

3. Construct a project that provides **STORM PROTECTION** and allows for a **QUICKER RECOVERY**

PROJECT CONSTRAINTS

9

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

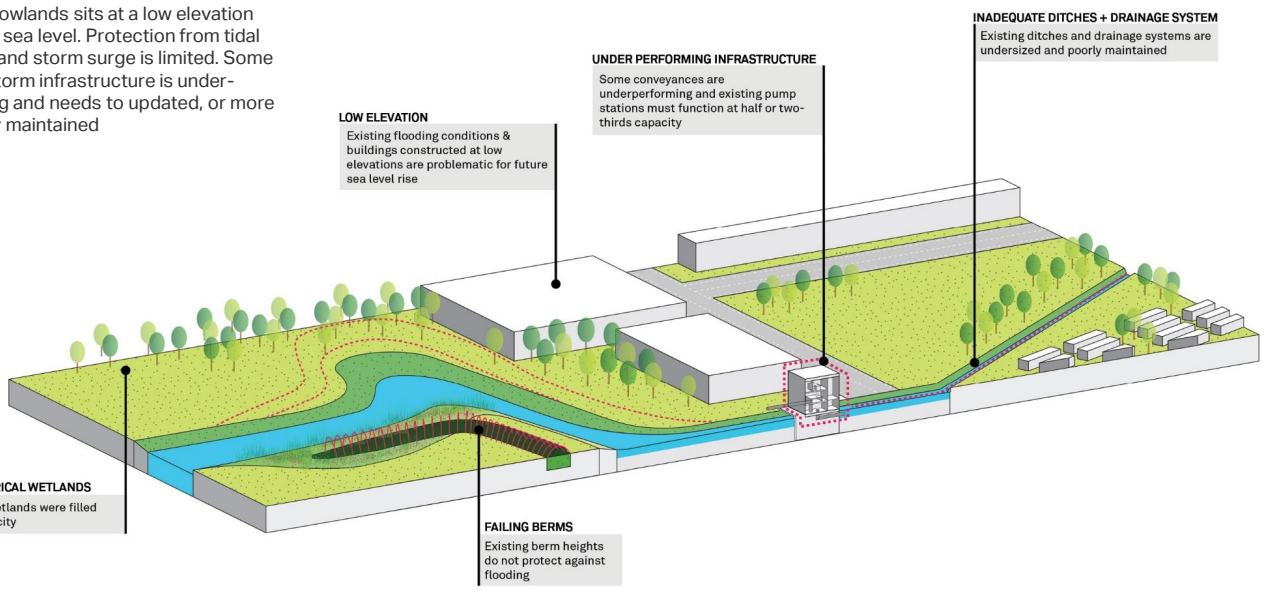
3. Construct a fully-functional project by **SEPTEMBER 2022**

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

PROJECT AREA CHALLENGES

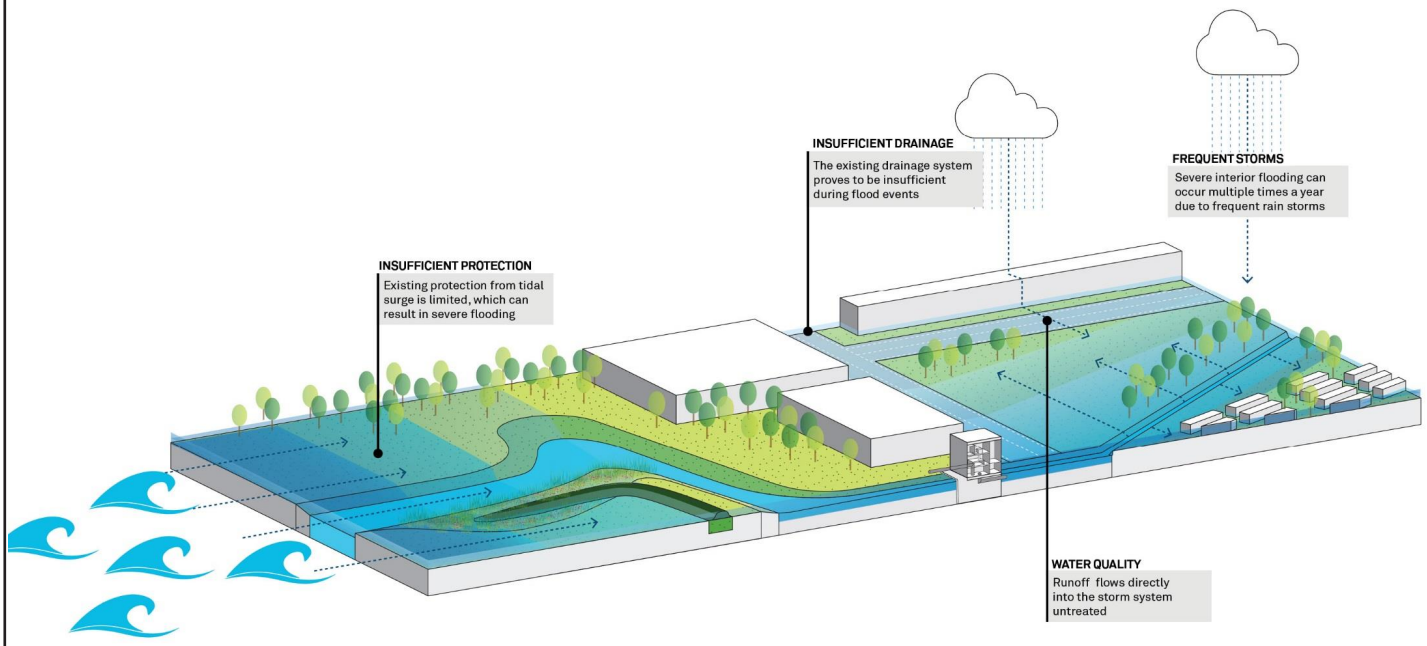
10

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

11



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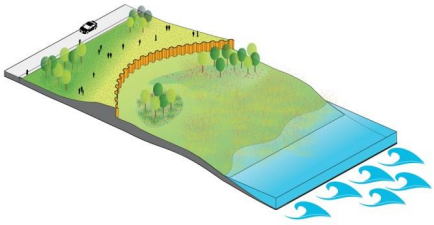
THE MEADOWLANDS - THREE ALTERNATIVES

12



Alternative 1:
Storm Surge Flooding

Alternative 2:
Frequent Rain Flooding

Alternative 3:
Storm Surge & Frequent Rain Flooding

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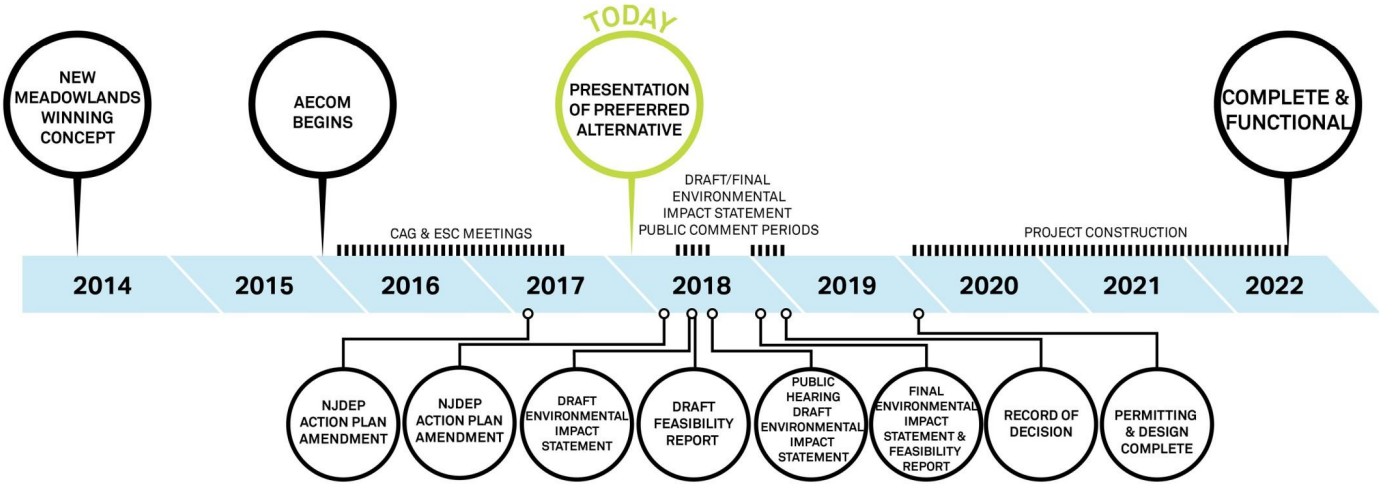
PROJECT ROADMAP

13



ALTERNATIVE 3 - THE PREFERRED ALTERNATIVE

14

Alternative 3:
Storm Surge & Frequent Rain Flooding

SELECTING A PREFERRED ALTERNATIVE

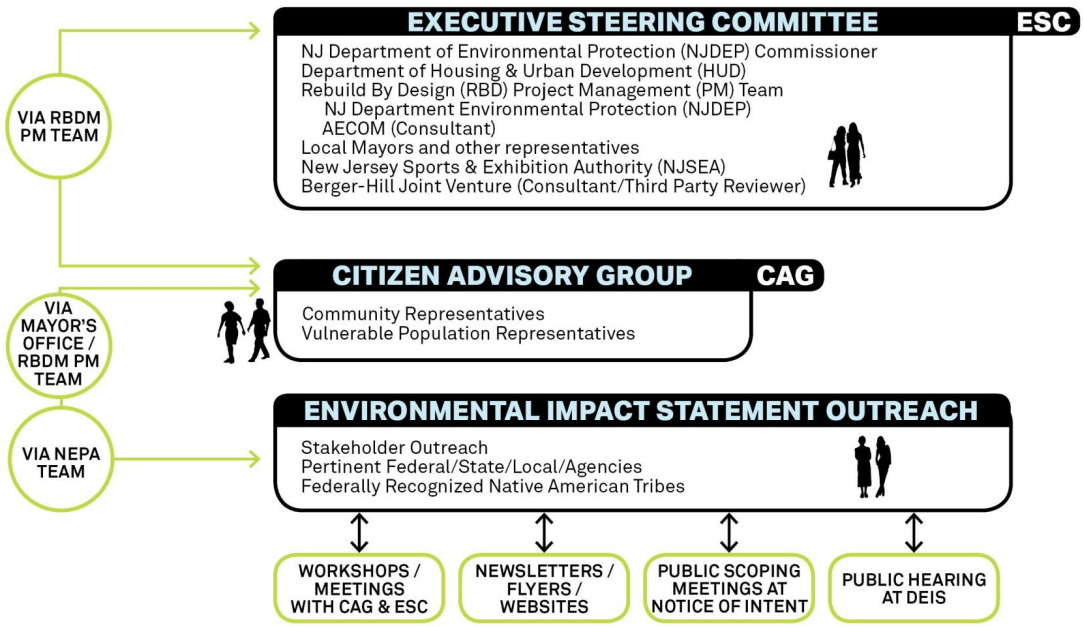
LULU LOQUIDIS, AECOM

AECOM

COMMUNITY ENGAGEMENT

16

EXECUTIVE STEERING COMMITTEE & CITIZENS ADVISORY GROUP



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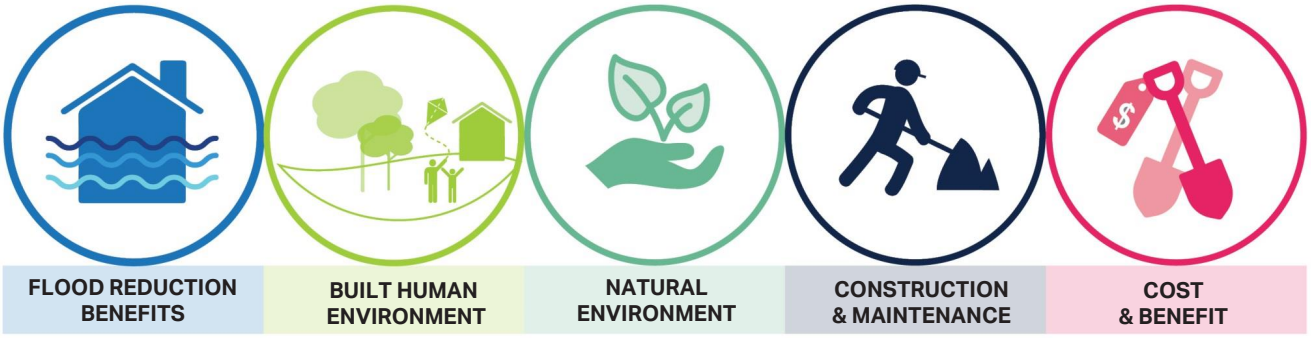
OUR PROCESS
THE SCREENING TOOL

17

Concepts are screened against each other to determine how they will meet the below metrics



FLOOD REDUCTION BENEFITS

18

Categories Evaluated:

- Reduces Flood Risk from Coastal Storm Surge (Alternatives 1 and 3)
- Reduces Flood Risk from Rainfall /Interior Drainage Challenges (Alternatives 2 and 3)
- Provides Protection to Vulnerable and Underserved Populations
- Provides Protection to Critical Infrastructure (emergency services, hospitals, transit facilities)

BUILT HUMAN ENVIRONMENT

19

Categories Evaluated:

- Effects to Existing Utilities & Utility Infrastructure
- Effects to Existing Transportation Network, Local Traffic, and Connectivity
- Effects on Land Acquisition / Housing Displacements
- Potential to Provide Increased Waterfront Access
- Effects to Recreational, Civic, and Cultural Amenities and Uses
- Effects to Viewshed and Local Visual Quality
- Effects to Air Traffic Safety at Teterboro Airport

NATURAL ENVIRONMENT

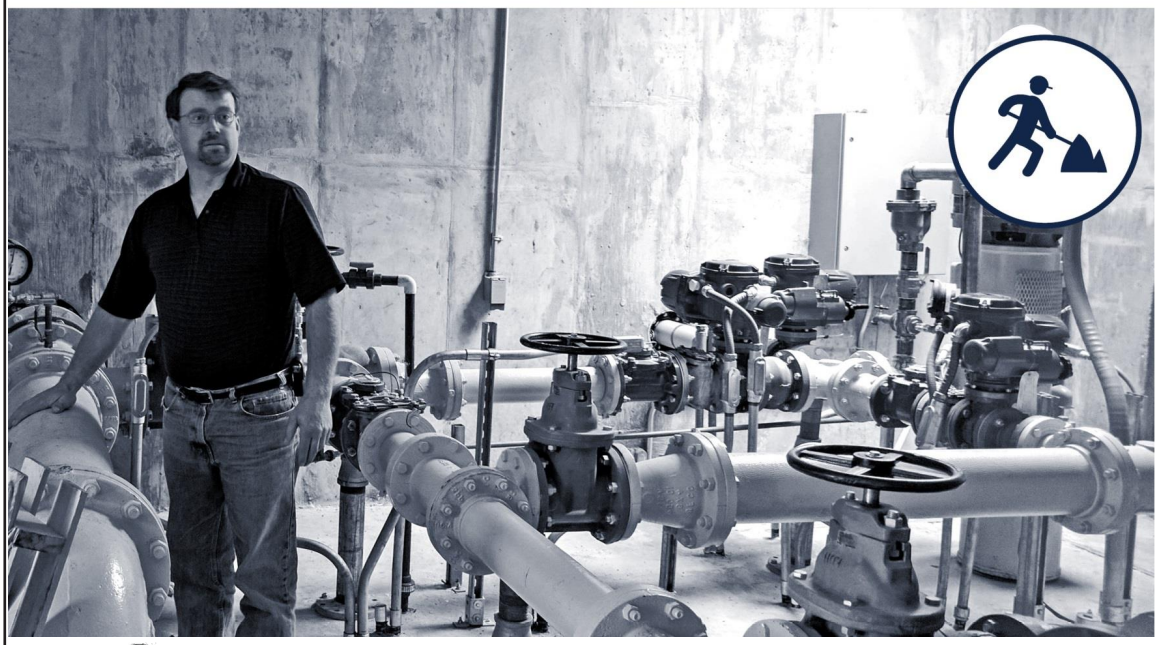
20

Categories Evaluated:

- Effects to Existing Hazardous Waste Sites
- Effects to Berry's Creek Remediation
- Effects on the Transport of Environmental Contaminants/ Sediments during Flood Events
- Effects to Water Resources, including Water Quality, "Waters of the US," Wetlands, and Mitigation Banks
- Effects to Fisheries and Essential Fish Habitat (EFH)
- Effects on Protected Species and their Habitats
- Effects on Other Sensitive Ecological Resources, including Biodiversity, Habitat, and Migration/Movement Corridors
- Effects to Historic and Prehistoric Cultural Resources

CONSTRUCTION & MAINTENANCE

21



Categories Evaluated:

- Constructability
- Minimizes Long-Term Maintenance & Operation Requirements for Overall System
- Potential to Complete by September 2022

BENEFIT & COST

22

Categories Evaluated:

- Provides Benefits to the Project Area and Community
- Can be Implemented within Available Funding Limits
- Has a Positive Benefit/Cost Ratio

BENEFIT COST RATIO

GRANT-SPECIFIC BENEFIT/COST EVALUATION CRITERIA

23

Economic Revitalization Benefits

- Direct effects on local or regional economy (e.g., tourism revenue)
- Improved Property Value (exclusive of enhanced flood protection)
- Value creation attributable to Rebuild By Design

Environmental Benefits

- Protection from disruptive non-disasters (nuisance flooding)
- Reduced vulnerability of energy and water infrastructure
- Improved Ecosystem and Biodiversity
- Water & Air Quality Improvements

Social Benefits

- Reductions in human suffering
- Improved Recreation Value
- Improved Community Identity and Social Cohesion
- Greater access to Cultural, Historical, Archeological Sites and Landscapes

STORM SURGE FLOODING

ALTERNATIVE 1

LULU LOQUIDIS, AECOM

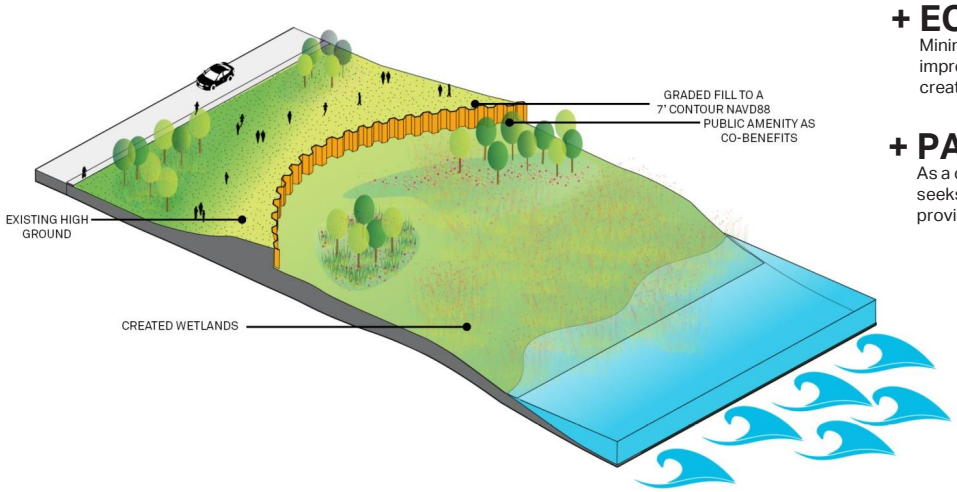
ALTERNATIVE 1 STORM SURGE
APPROACH & GOALS

25

+ 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

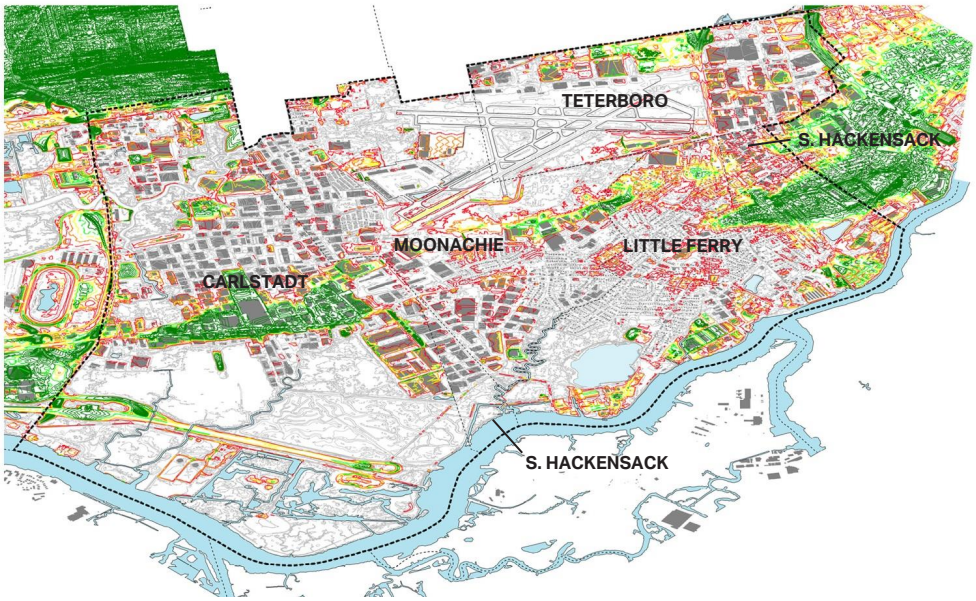
+ PARKS
As a co-benefit to flood reduction, the project seeks to connect existing public parks as well as provide new park space



ALTERNATIVE 1 STORM SURGE - ANALYSIS
HIGH POINTS

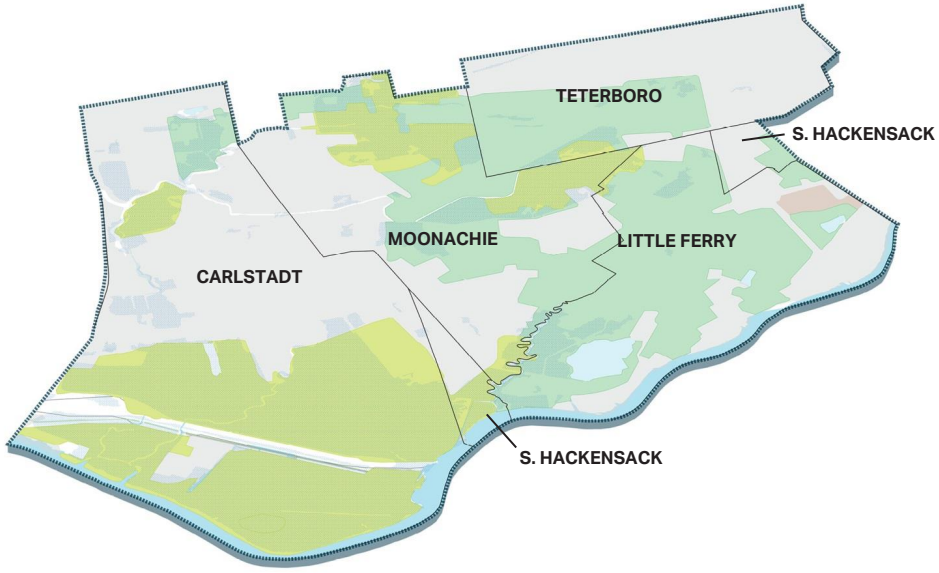
26

- Existing topography was analyzed to determine water flow and identify areas of high ground



ALTERNATIVE 1 STORM SURGE - ANALYSIS
SOILS & SUB-STRUCTURE

27



- All proposed flood protection strategies were informed by geo-technical analysis
- The soil type helped the team determine how deep the piles and sub-structure needed to extend

Frequently flooded-soils
Urban soils-wet sub stratum
Urban soils
Loam-urban context

Data Source:
USDA WSS AOI Web Soil Survey
http://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx

ALTERNATIVE 1 STORM SURGE
SCREENING EXAMPLE

28

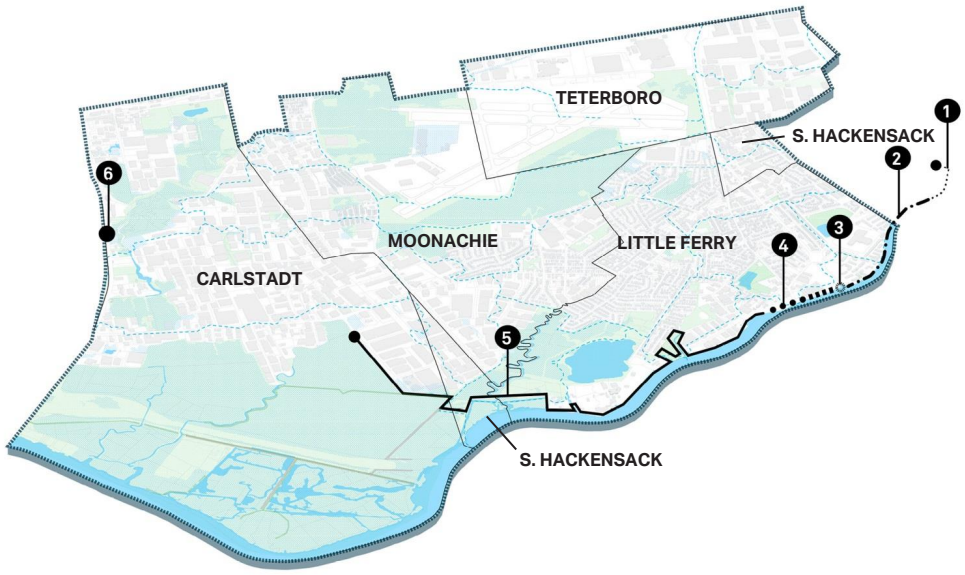
- Explored many options to a 100-year flood, but both Options 1 and 2 resulted in fatal flaw
- The 7' NAVD88 design elevation was further analyzed

Initial Concepts	Description	Within Budget	No Increased Flood Risk	Benefit Cost Ratio >1
Option 1	100-year Storm Protection/ Expanded Project Area	X	●	●
Option 2	100-year Storm Protection/ Project Area	X	●	●
Option 3	50-year Level of Protection/ Project Area	●	●	●
Option 4	Ring Levees/ Reduced Project Area	●	●	X
Option 5	Storm Surge Barrier on Hackensack River	X	X	●

50-YEAR LEVEL OF PROTECTION ADVANCES

ALTERNATIVE 1 STORM SURGE - PLAN

29



- 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

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CANTILEVER WALKWAY

CONCEPTUAL RENDERING FOR ILLUSTRATIVE PURPOSES

30

- The Cantilever Walkway combines flood protection and public access

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

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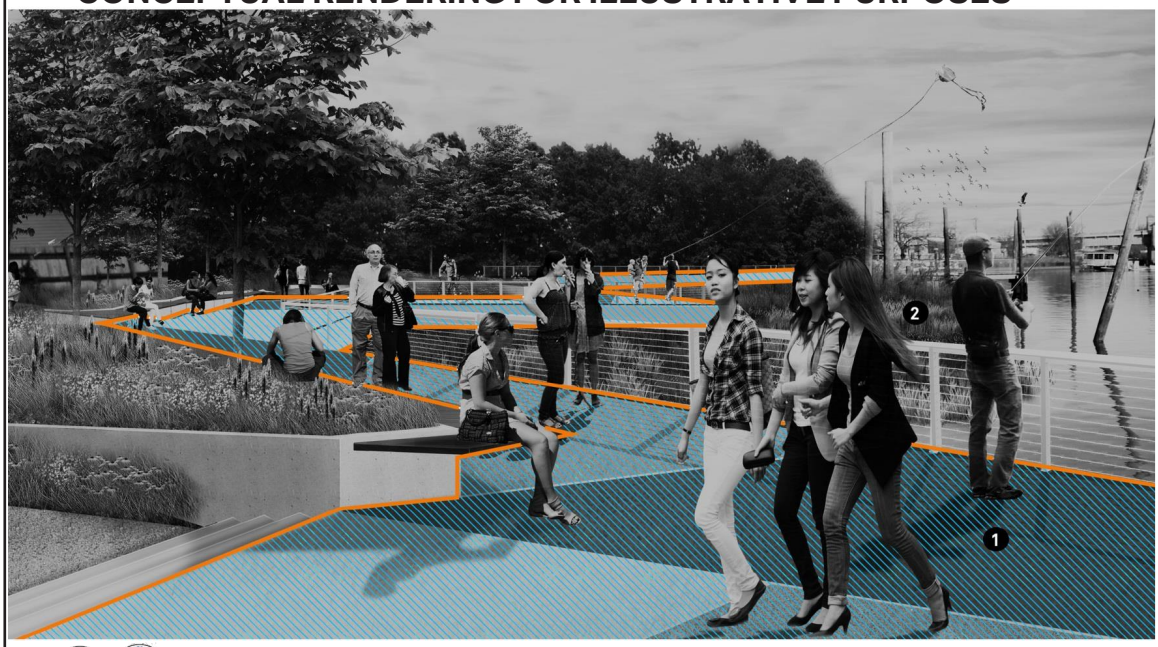
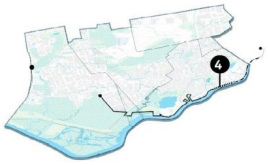
FLOOD PROTECTION

CONCEPTUAL RENDERING FOR ILLUSTRATIVE PURPOSES

31



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



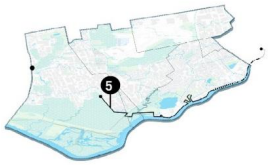
1. Flood protection system
2. Newly-created tidal wetland

VIEWING PLATFORM & SHEET PILE

CONCEPTUAL RENDERING FOR ILLUSTRATIVE PURPOSES

32

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

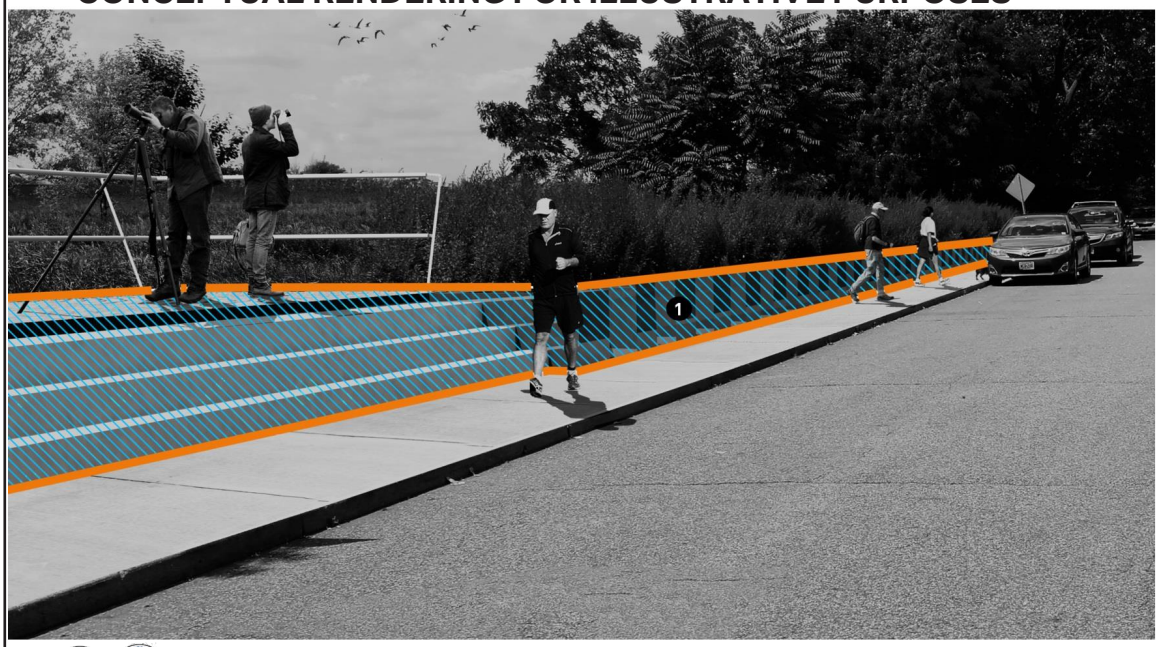


1. Viewing deck
2. Wetland

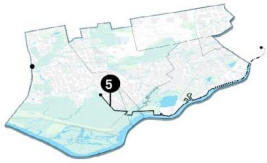
FLOOD PROTECTION

CONCEPTUAL RENDERING FOR ILLUSTRATIVE PURPOSES

33



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



1 Sheet pile

FREQUENT RAIN FLOODING

ALTERNATIVE 2

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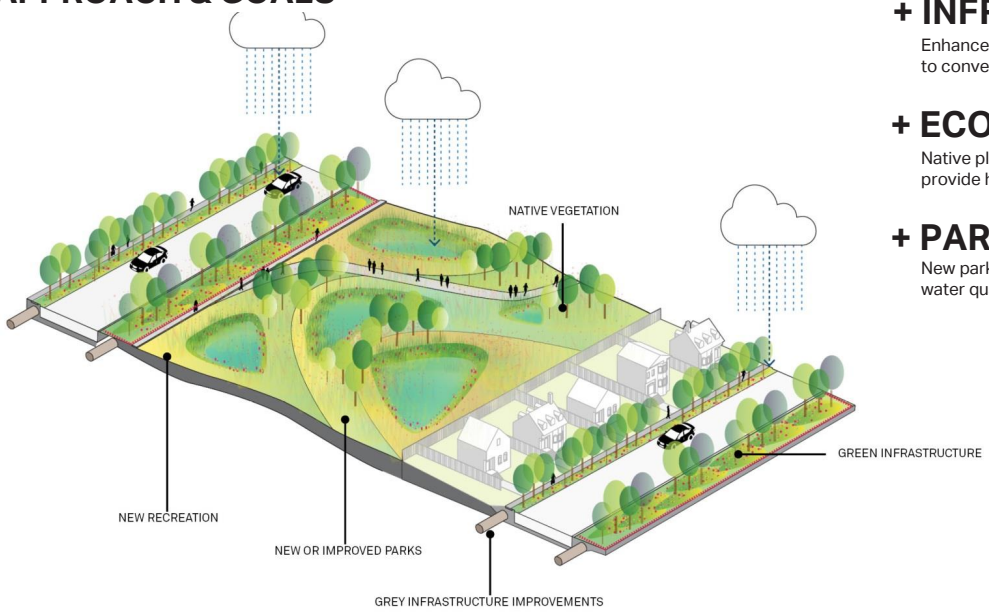
ALTERNATIVE 2 FREQUENT RAIN FLOODING

35

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

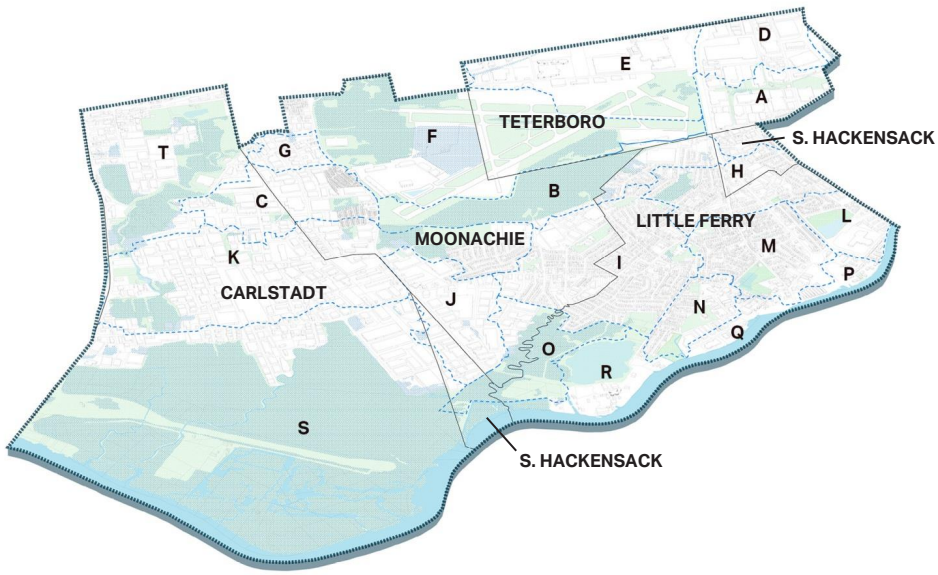
+ PARKS

New park spaces slowing runoff & improve water quality

ALTERNATIVE 2 FREQUENT RAIN FLOODING -ANALYSIS

36

20 SUB-BASINS



- Analyzed 20 sub-basin areas in the hydrologic model

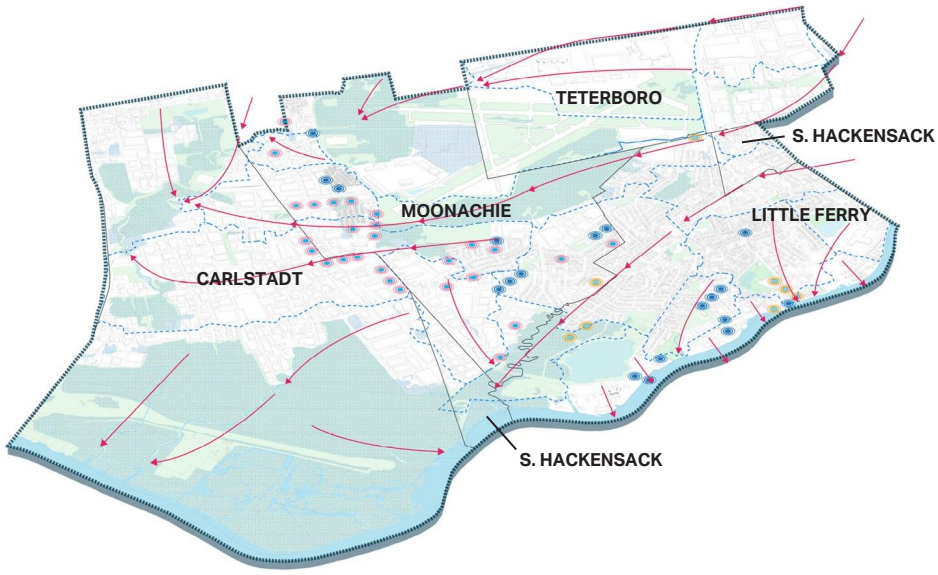
A: UPPER EAST RISER
B: MIDDLE EAST RISER
C: LOWER EAST RISER
D: UPPER WEST RISER 1
E: UPPER WEST RISER 2
F: MIDDLE WEST RISER
G: LOWER WEST RISER
H: UPPER LOSEN SLOTE 1
I: UPPER LOSEN SLOTE 2
J: MOONACHIE
K: CARLSTADT
L: INDIAN LAKE
M: MAIN STREET
N: DEPEYSTER CREEK
O: LOWER LOSEN SLOTE
P: UPPER HACKENSACK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

----- Sub-basin boundary

ALTERNATIVE 2 FREQUENT RAIN FLOODING -ANALYSIS

37

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

38

SCREENING EXAMPLE

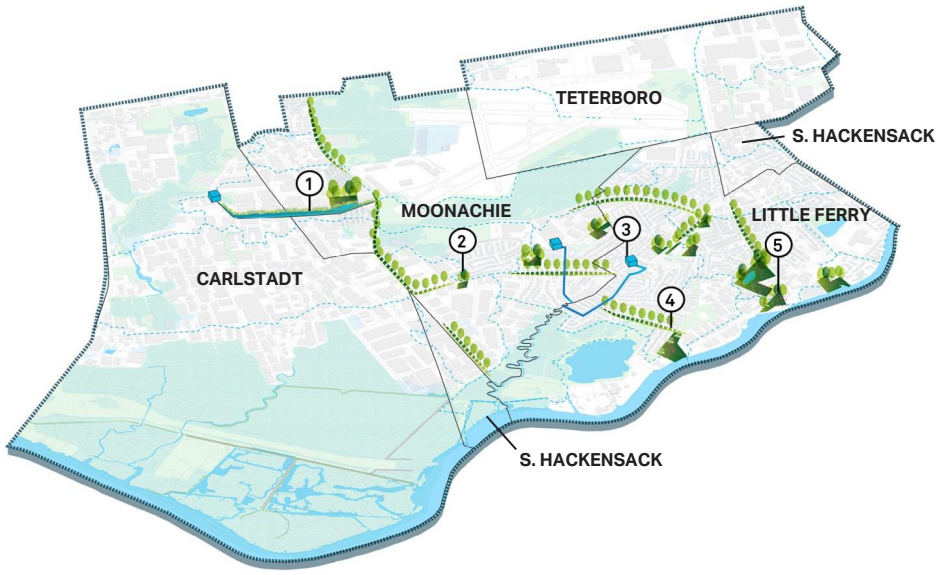
Initial Concepts	Description	Within Budget	Distribution of Benefits	Benefit Cost Ratio >1
Main Street	Increase storage capacity at Indian Lake, improves storm drainage pipes, includes upgrades to existing Willow Lake pump station discharge line, and new street and park green infrastructure	●	X	X
DePeyster Creek	Upgrade of existing pump station, upgrades of existing upstream culvert, channel dredging with habitat restoration, and new street and park green infrastructure	●	●	X
Losen Slote & Carol Place	Two new pump stations and force mains to divert stormwater from residential area to downstream of Losen Slote, upgrades to existing storm drainage ditches and culverts, and new street and park green infrastructure	●	●	X
West Riser	New pump station, channel conveyance improvements with habitat restoration, culvert upgrades, and new street green infrastructure.	●	X	●
East Riser	Pump station improvements, channel conveyance improvements with habitat restoration, culvert and bridge upgrades, and new street and park green infrastructure.	X	●	●
Revised Concept	New pump station and force mains to divert stormwater from residential area to downstream of Losen Slote, upgrades to culverts and bridge crossings, East Riser Ditch conveyance improvement and new pump station, and new street and park green infrastructure	●	●	●

REVISED CONCEPT ADVANCES

- Top concepts were reviewed and evaluated using the screening criteria
- The Revised Concept was a result of reviewing and rearranging to create a concept carrying increased benefits

ALTERNATIVE 2 – FREQUENT RAIN FLOODING PLAN

39



- Reduction in areal extent of flooding and depth of flooding for fluvial storms of a recurrence interval of 100-yr or less
- Provides community co-benefits through green infrastructure
- Positive Benefit Cost Ratio greater >1
- Revised Feasibility-level concept cost exceeds $150M

1. East Riser Channel Improvements + New Park
2. Green Infrastructure + New Park
3. Force Main + Public Facility Improvements
4. Green Infrastructure + New Park
5. Park Improvements + 3 New Parks + Green Infrastructure

LOSEN SLOTE DRAINAGE IMPROVEMENTS

CONCEPTUAL RENDERING FOR ILLUSTRATIVE PURPOSES

40

- New pump stations improve conveyance capacity by moving water from one location to another

1. Submersible pump
2. 36" force main
3. Losen Slote
4. Control panel

GREEN INFRASTRUCTURE & PARK IMPROVEMENTS

41

CONCEPTUAL RENDERING FOR ILLUSTRATIVE PURPOSES

- 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

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THE PREFERRED ALTERNATIVE

ALTERNATIVE 3 – STORM SURGE & FREQUENT RAIN FLOODING

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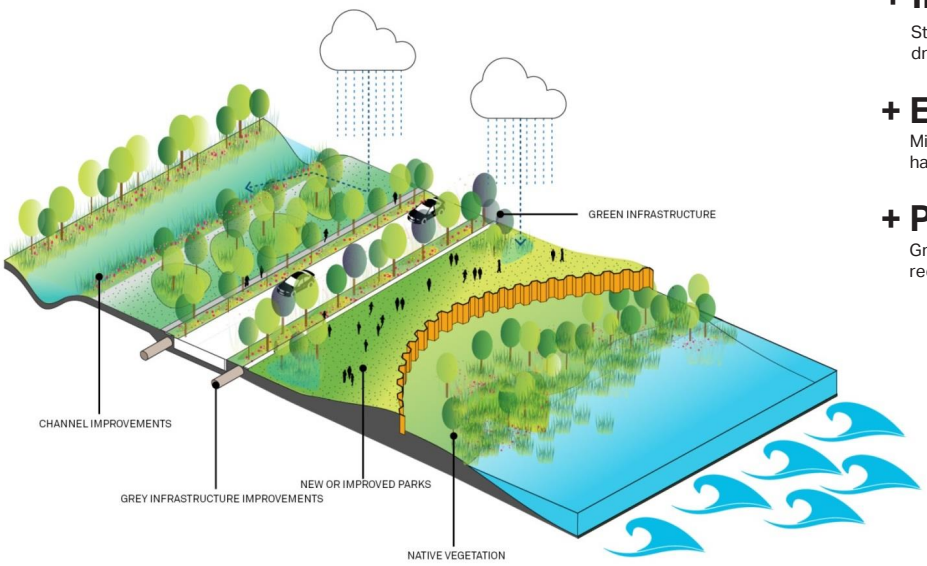
ALTERNATIVE 3 – HYBRID
APPROACH & GOALS

43



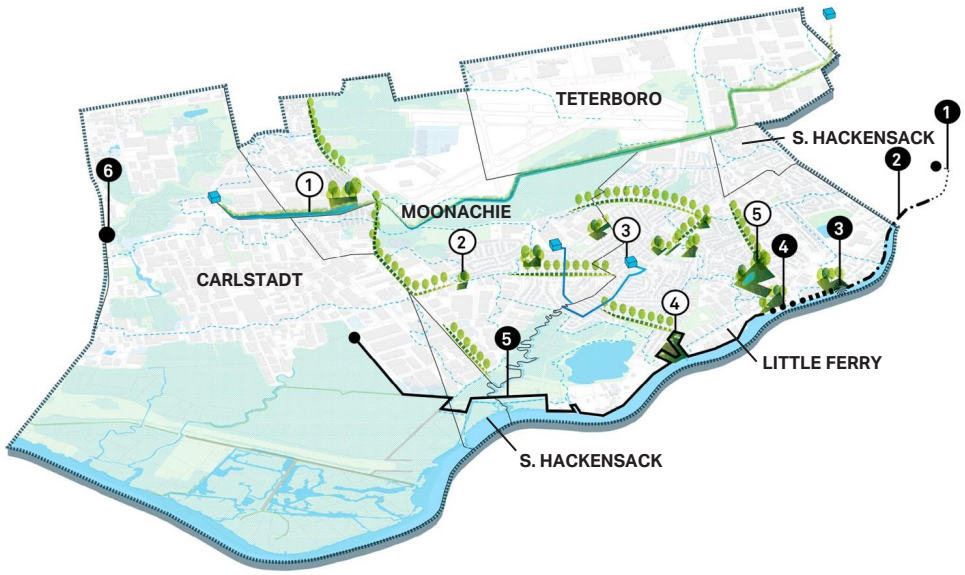
+ INFRASTRUCTURE
Structural Flood Reduction and local drainage infrastructure improvements

+ 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

44



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

ARRIVING AT A PREFERRED
ALTERNATIVE SCREENING

45

Alternatives	Description	Stormwater & Storm Surge Protection	Distribution of Benefits	Benefit Cost Ratio >1
Alternative 1	Final Storm Surge Protection Concept	X	●	●
Alternative 2	Final Stormwater Reduction Concept	X	●	●
Alternative 3	Final Storm Surge & Stormwater Protection Concept	●	●	●

THE PREFERRED ALTERNATIVE

ALTERNATIVE 3 HYBRID - THE BUILD & FUTURE PLAN

46

Build Plan

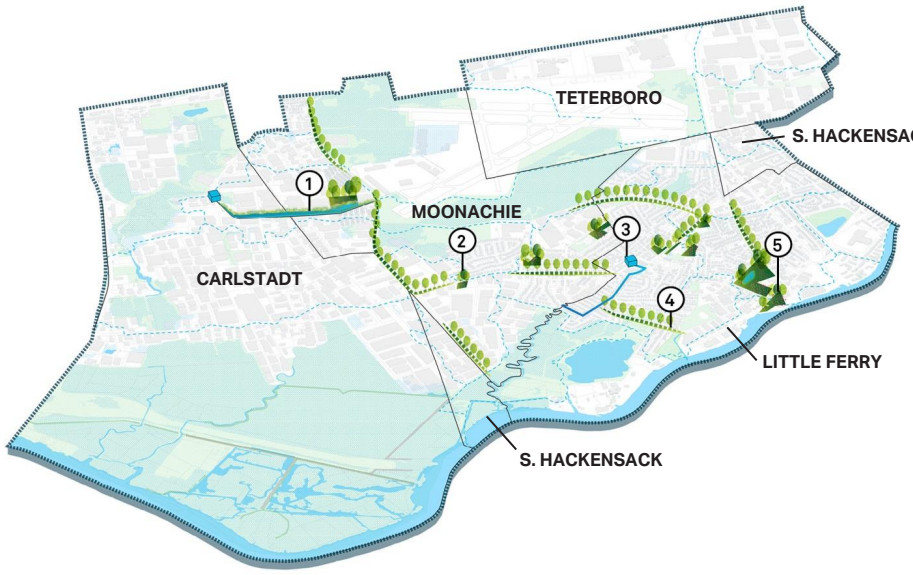
The *Build Plan* represents a feasible project that can be **constructed by 2022.** Components include flood reduction strategies to address frequent rain flooding

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

47



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

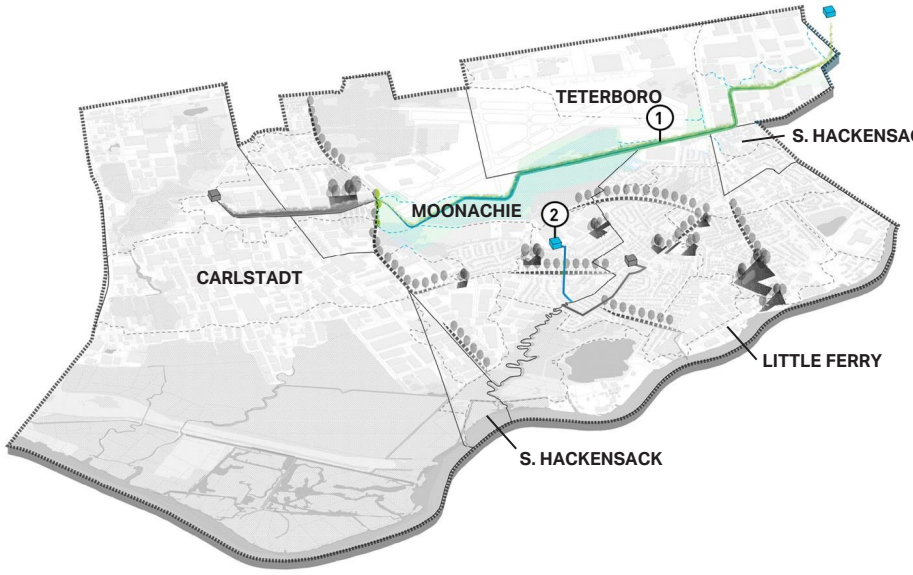
1. East Riser: Channel Improvements + Enhanced Wetland Open Space
2. Avanti Park: Street Green Infrastructure + Enhanced Open Space
3. Losen Slote: Force Main + Public Facility Improvements
4. Green Infrastructure + Enhanced Wetland Open Space
5. GI Improvements to Willow Lake Park + 1 New Wetland /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

REBUILD BY DESIGN MEADOWLANDS

Community Meeting // January 11, 2018 AECOM

FOR FUTURE IMPLEMENTATION
ADDITIONAL RAIN FLOODING REDUCTION FROM ALTERNATIVE 2

48



1. East Riser Channel Improvements Extension toward South Hackensack
2. A second Losen Slote Pump Station & Force Main

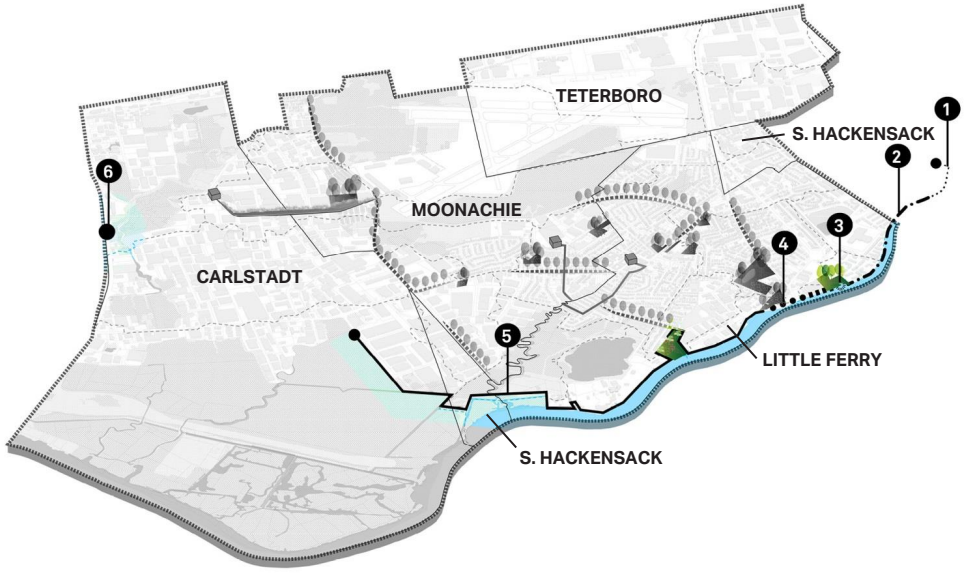
REBUILD BY DESIGN MEADOWLANDS

Community Meeting // January 11, 2018 AECOM

FOR FUTURE IMPLEMENTATION

50-YEAR STORM SURGE PROTECTION FROM ALTERNATIVE 1

49



- All Future Plan elements will be evaluated in the Feasibility Study and Draft EIS
- Utilizing the Feasibility Study and EIS could reduce the timeline and initial expense for those implementing Future Plan components

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

REBUILD BY DESIGN MEADOWLANDS

Community Meeting // January 11, 2018 AECOM

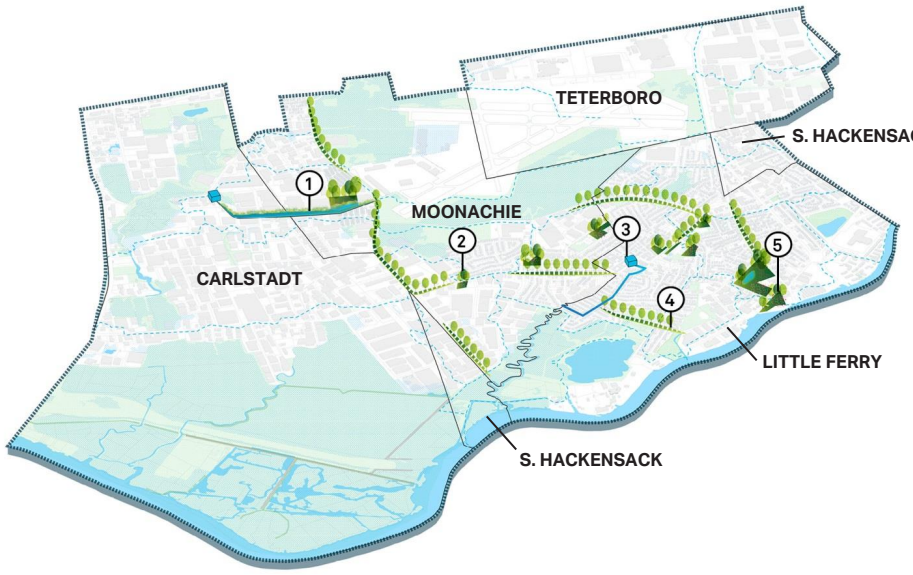
THE BUILD PLAN

LULU LOQUIDIS, AECOM

AECOM

ALTERNATIVE 3 - BUILD PLAN

51



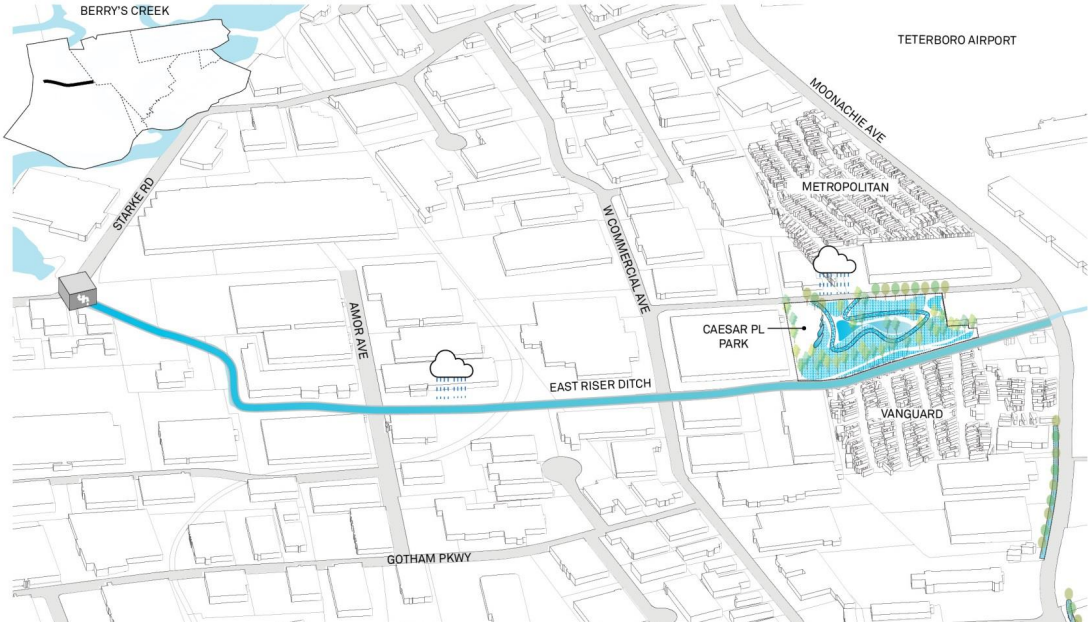
- The Build Plan can be constructed and functional by 2022
- Will require less maintenance than that of an Alternative 1 system
- Positive Benefit Cost Ratio greater >1
- Can be constructed within Available Funds

1 East Riser Channel Improvements + New Park
2 Green Infrastructure + New Park
3 Force Main + Public Facility Improvements
4 Green Infrastructure
5 Park Improvements + 1 New Park + Green Infrastructure

EAST RISER CHANNEL IMPROVEMENTS

FLOOD REDUCTION BENEFITS

52



- **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

CONCEPTUAL RENDERING FOR ILLUSTRATIVE PURPOSES

53

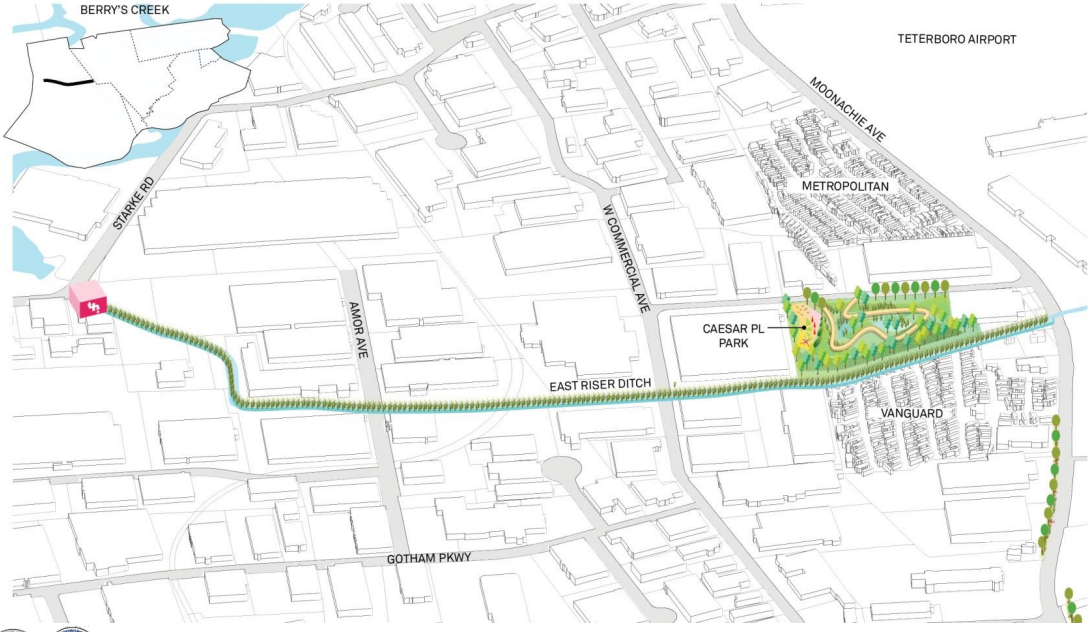
- Improves conveyance capacity
- Captures road runoff and filters suspended solids
- Native vegetation provides habitat and improves visual quality along the channel

1. Gravel trench
2. Channel improvement
3. Native vegetation
4. Curb cut

EAST RISER CHANNEL IMPROVEMENTS

FLOOD REDUCTION CO-BENEFITS

54



- 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

55

CONCEPTUAL RENDERING FOR ILLUSTRATIVE PURPOSES

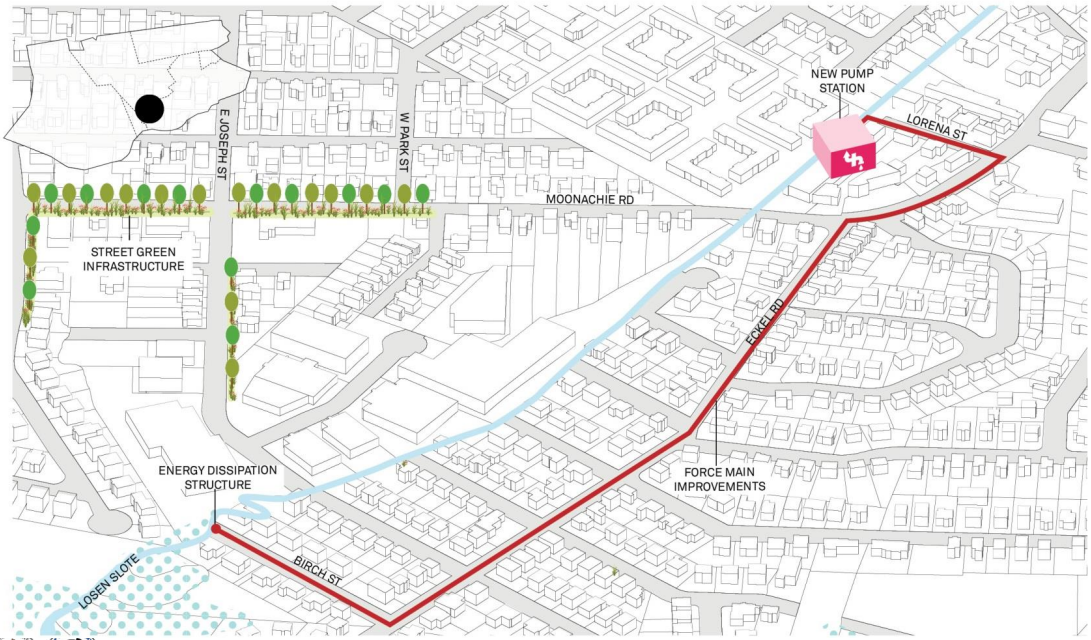
- Wetland enhancement, improves storage and treatment capacities, and improves public recreation opportunity

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

LOSEN SLOTE DRAINAGE IMPROVEMENTS

56

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

LOSEN SLOTE DRAINAGE IMPROVEMENTS

CONCEPTUAL RENDERING FOR ILLUSTRATIVE PURPOSES

57

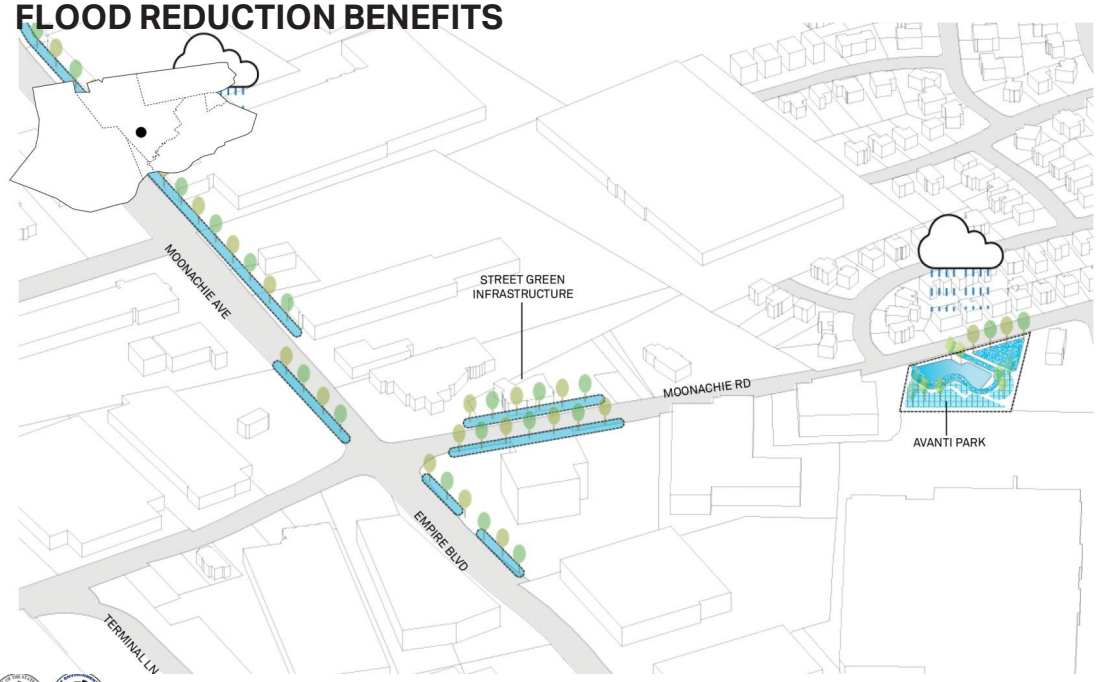
- A new pump station improves conveyance capacity by moving water from one location to another

1. Submersible pump
2. 36" force main
3. Losen Slote
4. Control panel

AVANTI PARK

FLOOD REDUCTION BENEFITS

58

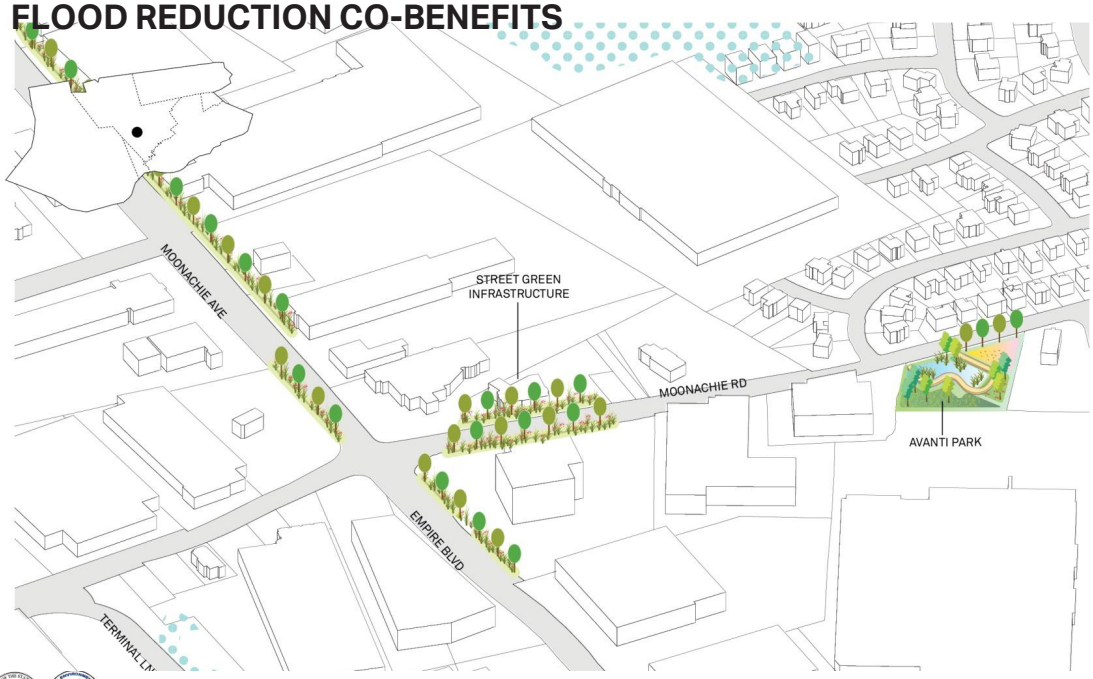


- **Water is stored** in new open space and green infrastructure
- ~19,000 SF of **improved wetland** and ~11,000 SF of native planting and raingardens **capture total suspended solids**

AVANTI PARK

FLOOD REDUCTION CO-BENEFITS

59



- Street green infrastructure **improves water quality**, creates new habitat, and **provides visual improvements**
- New park space also creates places for people to gather, **new habitat**, and space for **recreation**

AVANTI PARK

CONCEPTUAL RENDERING FOR ILLUSTRATIVE PURPOSES

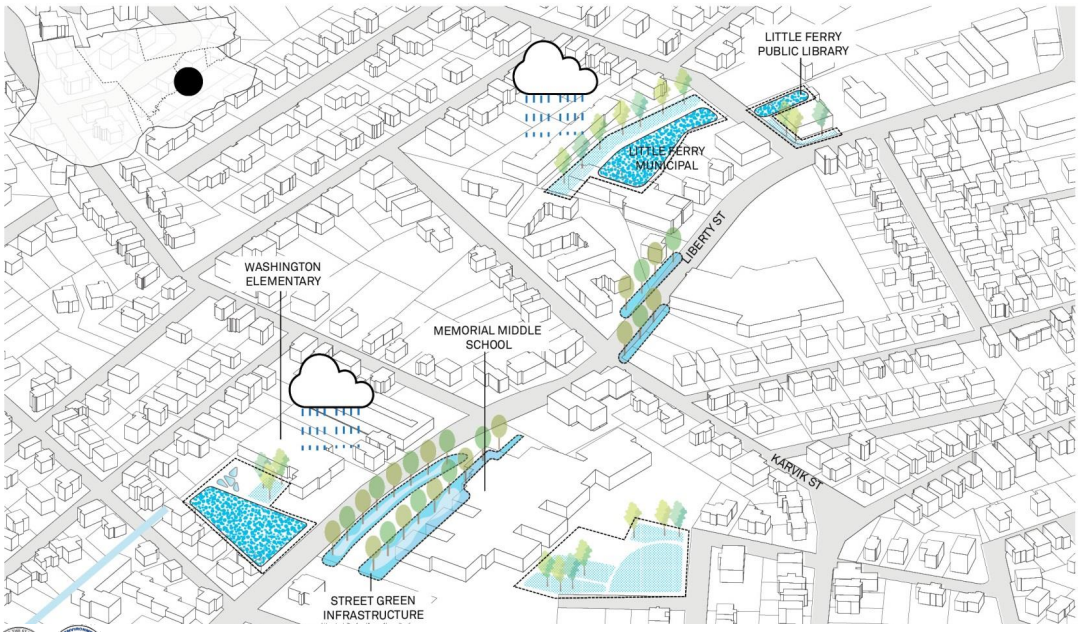
60

- 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 BENEFITS

61



- 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

CIVIC LOCATIONS
FLOOD REDUCTION CO-BENEFITS

62

- 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

63

CONCEPTUAL RENDERING FOR ILLUSTRATIVE PURPOSES

- 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

STREET GREEN INFRASTRUCTURE

64

CONCEPTUAL RENDERING FOR ILLUSTRATIVE PURPOSES

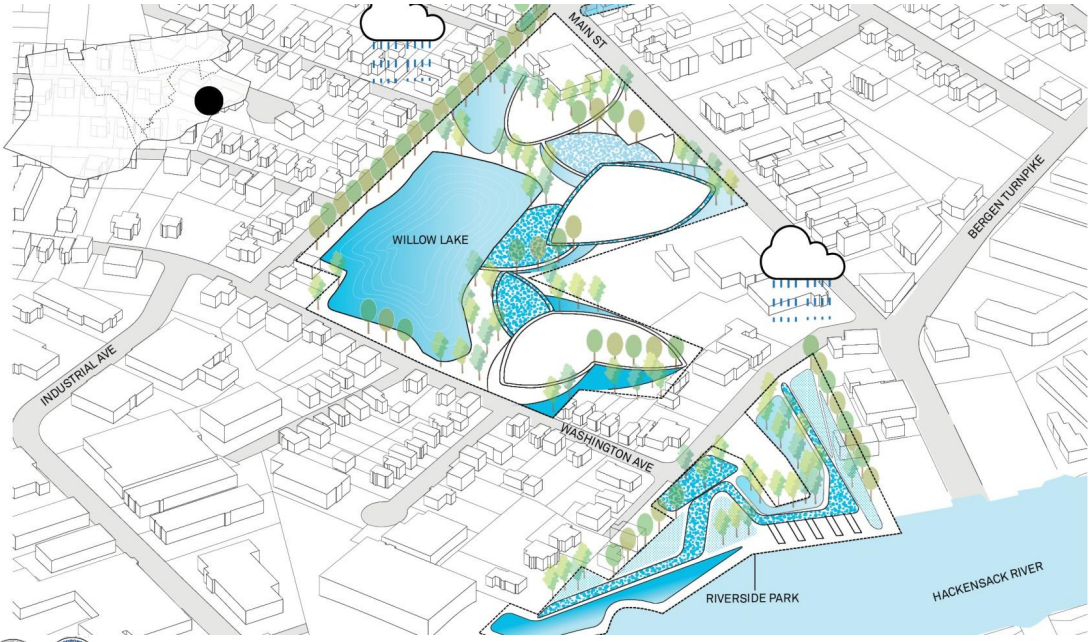
- Green infrastructure provides a holding space for street runoff that is slowly released back into the stormwater system
- Subsurface green infrastructure features provide storage and ability to infiltrate runoff to reduce peak flow reaching the existing stormwater system

1. Connection to storm system
2. Filter media
3. Native vegetation
4. Street Trees

WILLOW LAKE & RIVERSIDE PARKS

FLOOD REDUCTION BENEFITS

65



- 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

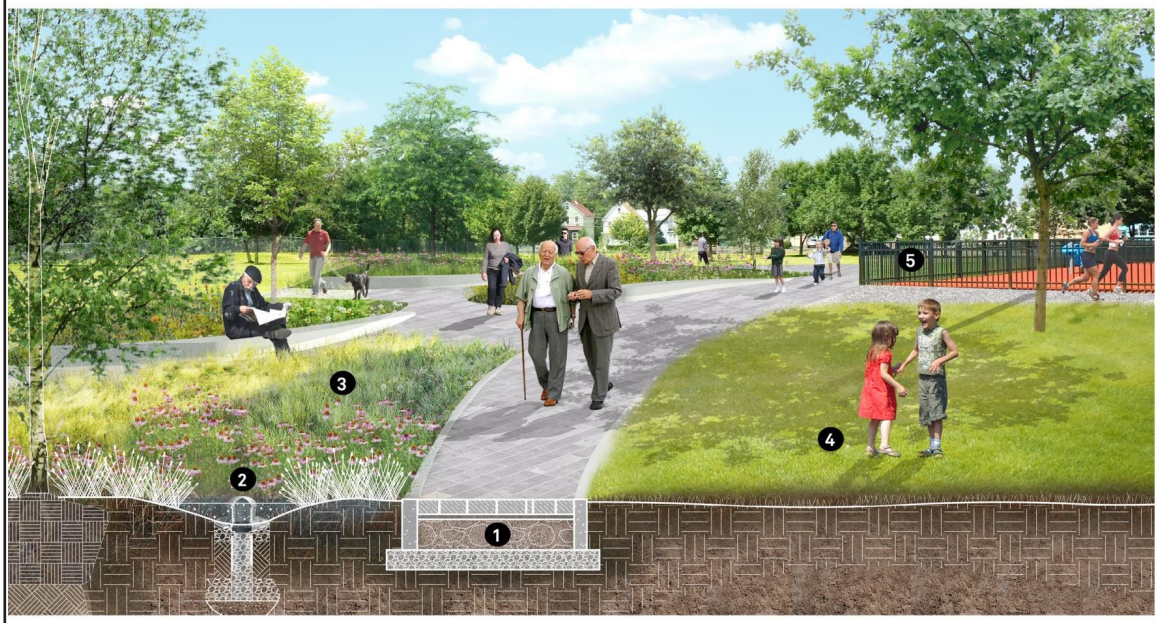
66

- 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 FOR ILLUSTRATIVE PURPOSES

67



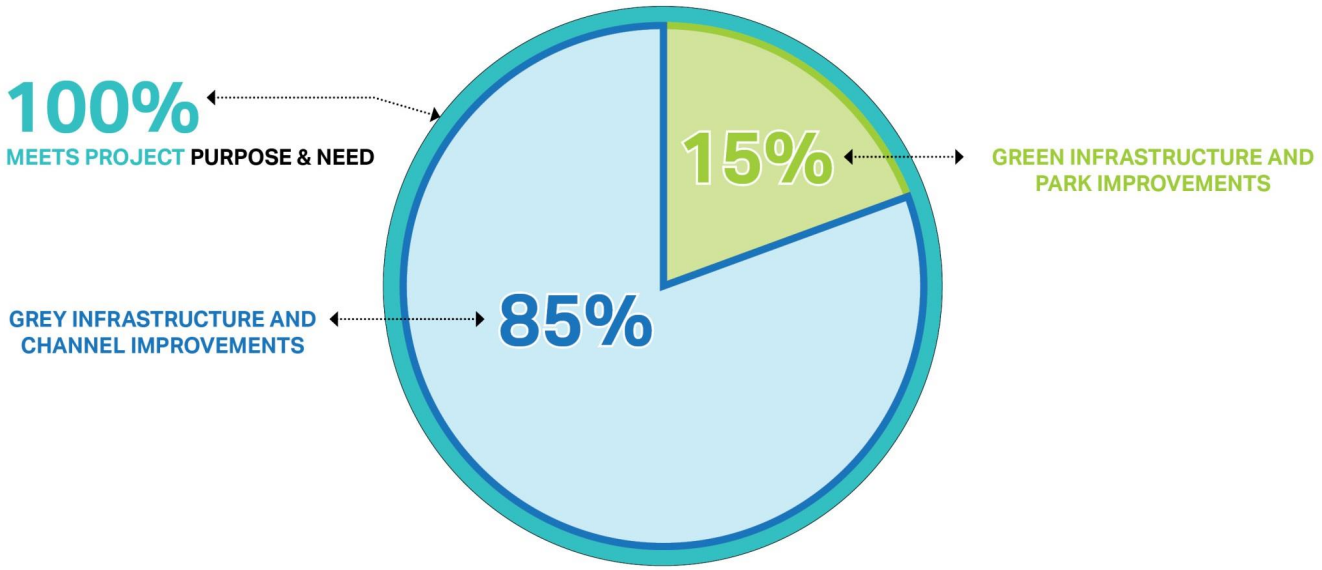
- Green infrastructure system would be sized to capture and treat 1.25 inches of rainfall in two hours
- Stone chimneys provided outlet for ponding water to reach stone storage
- Improvements to Willow Lake Park enhance water quality and user experience

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

BUILD PLAN CONSTRUCTION COST

FEASIBILITY-LEVEL COST BREAKDOWN

68



BUILD PLAN BENEFITS

GARRETT AVERY, AECOM

AECOM

BUILD PLAN BENEFITS

2-YEAR STORM (2023)

70

- **Approximately 20 ACRES** would no longer flood during the 2-year storm (2023)
- **Approximately 642 ACRES*** would experience a reduction in flood water between 0.1ft to 3ft

* Additional Flood depth reduction would occur in the vicinity of the drainage channels within East Riser Ditch (East Riser Ditch tide gate to Route 46) and Losen Slote (East Joseph Street to Niehaus) watersheds.

BUILD PLAN BENEFITS
100-YEAR STORM (2023)

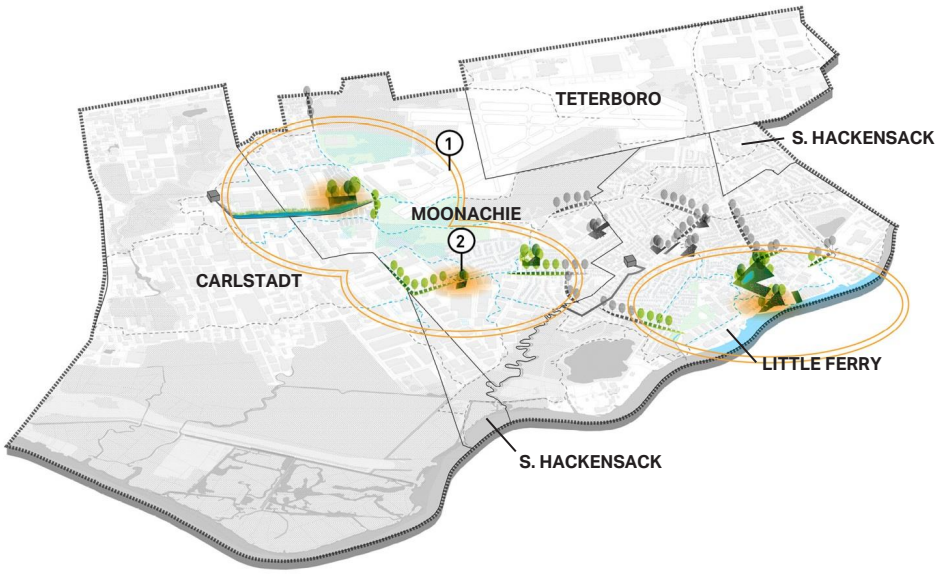
71

- **Approximately 39 ACRES** would no longer flood during the 100-year storm (2023)
- **Approximately 1,244 ACRES*** would experience a reduction in flood water between 0.1ft to 3ft

* Additional Flood depth reduction would occur in the vicinity of the drainage channels within East Riser Ditch (East Riser Ditch tide gate to Route 46) and Losen Slote (East Joseph Street to Niehaus) watersheds.

BUILD PLAN BENEFIT
OPEN SPACE ENHANCEMENT: POPULATION & HOUSEHOLDS

72



~300 HOUSEHOLDS
Within 500' of a new park

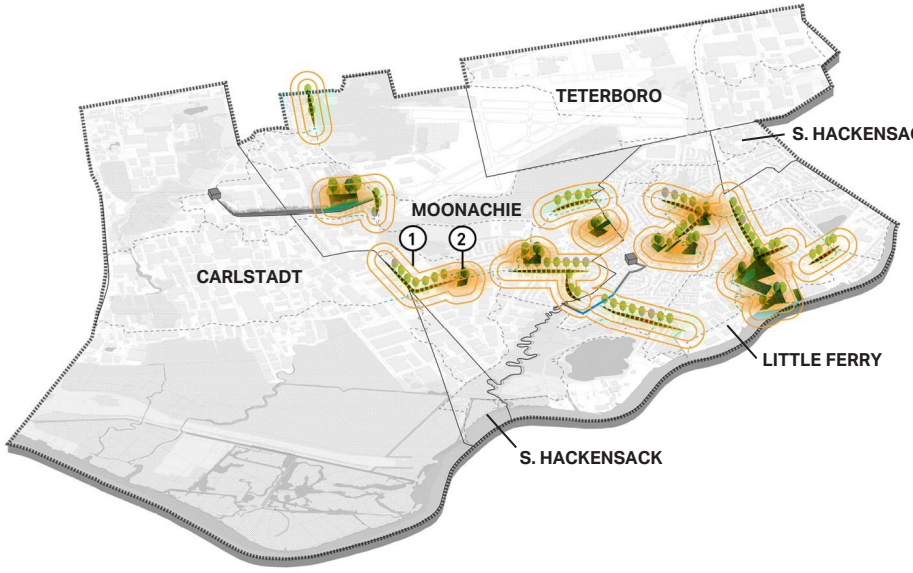
~5,000 PEOPLE
Within 0.25 miles of a new park

Benefit Inputs
1 0.25 Mile Buffer from New Parks
2 500' Buffer from New Parks

BUILD PLAN BENEFIT

STREET GREEN INFRASTRUCTURE: HOUSEHOLDS

73



~218 HOUSEHOLDS
Within 100' of a new trees

~775 TREES
New Trees Planted

Benefit Inputs

1. 100' Buffer from New Trees in Parks and Streets
2. Improvements in Parks, Schools, and Public and Municipal Facilities

BENEFIT COST RATIO

GRANT-SPECIFIC BENEFIT/COST EVALUATION CRITERIA

74

Economic Revitalization Benefits

- Direct effects on local or regional economy (e.g., tourism revenue)
- Improved Property Value (exclusive of enhanced flood protection)
- Value creation attributable to Rebuild By Design

Environmental Benefits

- Protection from disruptive non-disasters (nuisance flooding)
- Reduced vulnerability of energy and water infrastructure
- Improved Ecosystem and Biodiversity
- Water & Air Quality Improvements

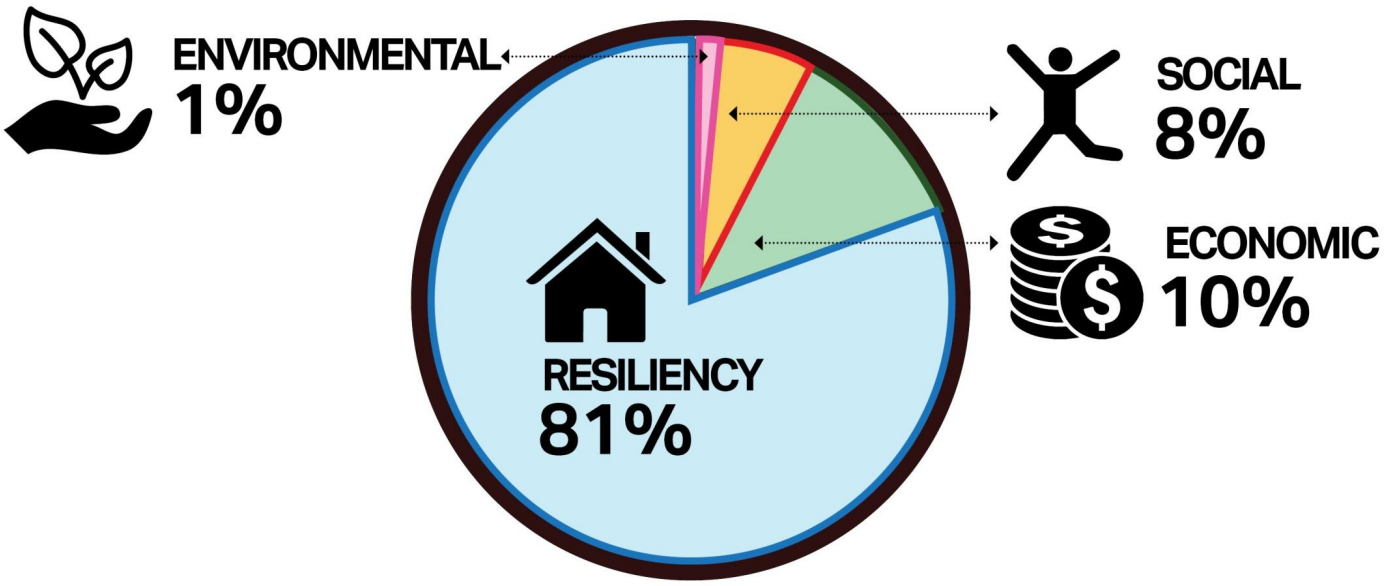
Social Benefits

- Reductions in human suffering
- Improved Recreation Value
- Improved Community Identity and Social Cohesion
- Greater access to Cultural, Historical, Archeological Sites and Landscapes

BENEFITS CATEGORIES ANALYZED

BENEFIT/COST EVALUATION

75

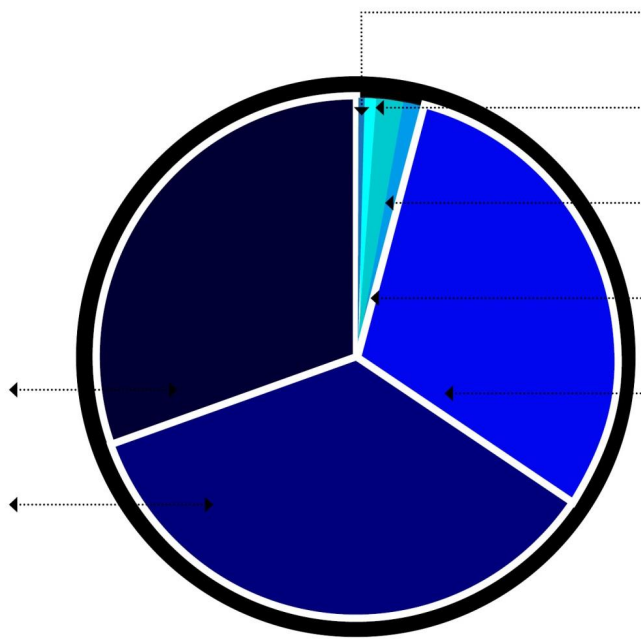


BUILD PLAN BENEFITS

RESILIENCY

76

PRESENT VALUE
$87.1M

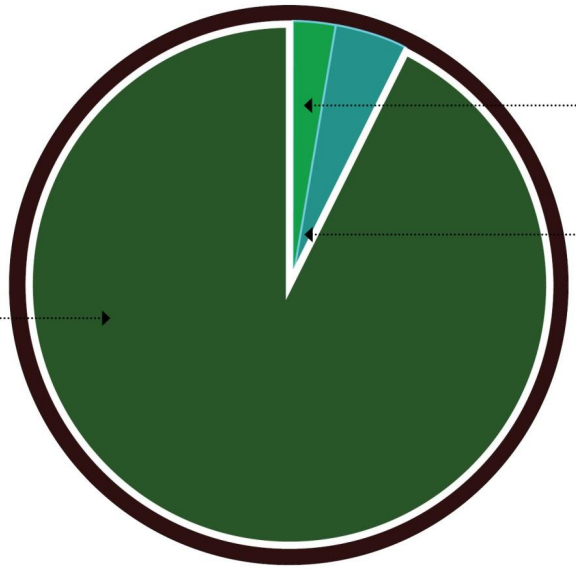


*Other category benefits include: Apartment Structures, Utility Structures, Debris Removal, Emergency Service, Critical Facility Disruption

BUILD PLAN BENEFITS
ECONOMIC REVITALIZATION

77

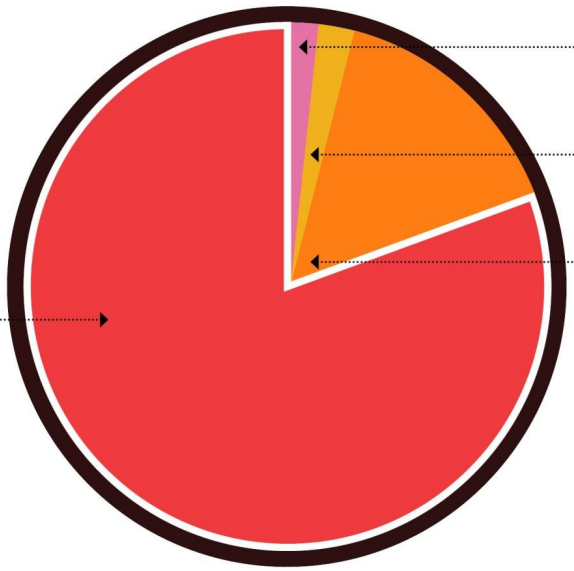
PRESENT VALUE
$10.9M



BENEFIT EVALUATED
SOCIAL BENEFITS

78

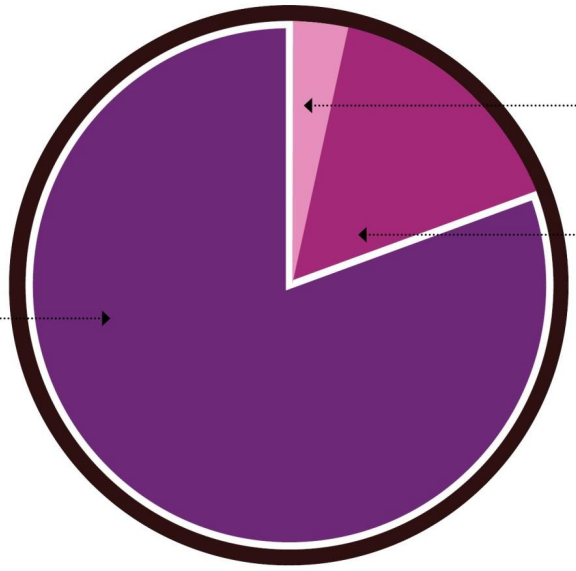
PRESENT VALUE
$8.8M



BENEFIT EVALUATED
ENVIRONMENTAL BENEFITS

79

PRESENT VALUE
$175,000



NEXT STEPS

DAVE ROSENBLATT, ASSISTANT COMMISSIONER
NJDEP

AECOM

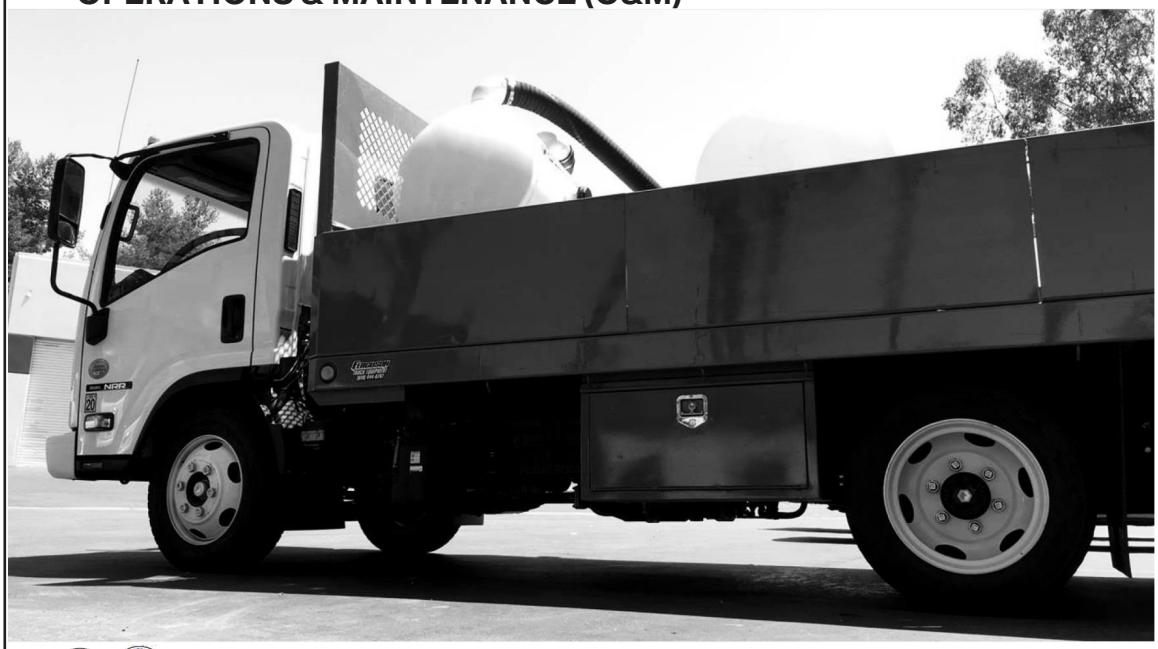
CONSTRUCTING THE PREFERRED ALTERNATIVE

81

- Meets the project Purpose & Need
- Satisfies HUD mandate
- Can be constructed by 2022 with the allocated funding
- Provides Flood Reduction & numerous co-benefits

NEXT STEPS
OPERATIONS & MAINTENANCE (O&M)

82



- The State will provide an O&M plan that identifies the entities performing routine, on-going maintenance
- In cooperation with the Agencies and local municipalities receiving flood protection benefits, the State has begun by establishing an O&M Subcommittee

NEXT STEPS

83

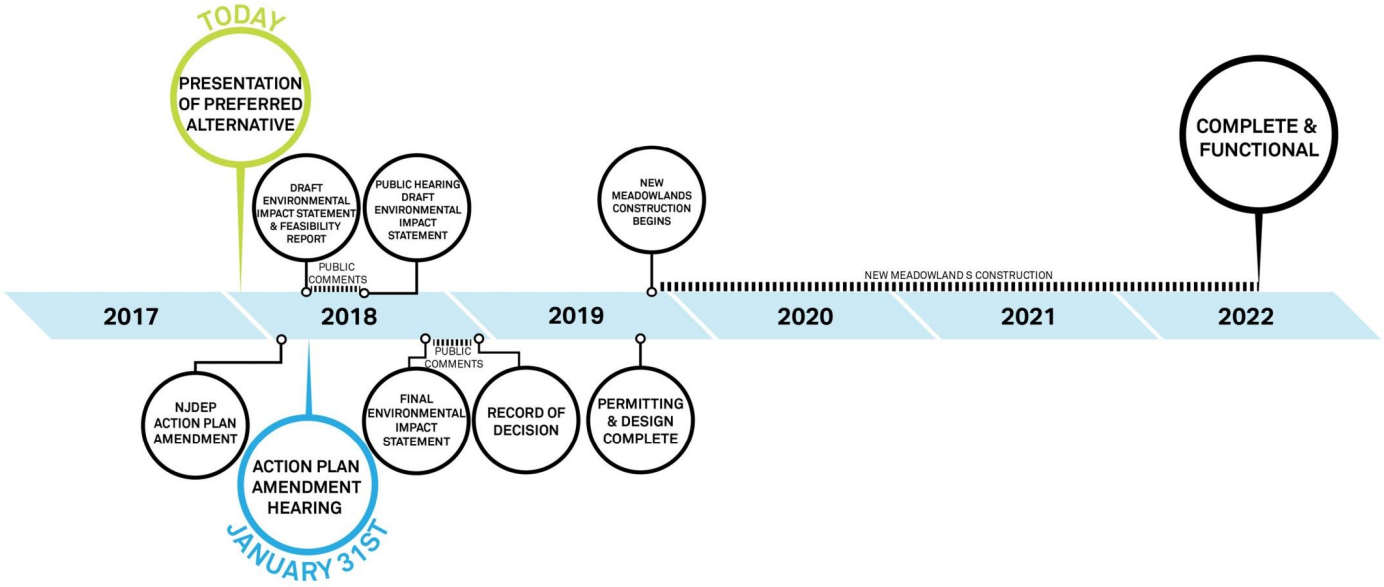
NJDEP: UPCOMING ACTIVITIES

- **Action Plan Amendment (APA) 25:**
  - Draft **APA** publication: **January 12, 2018**
  - **APA** public comment period: **January 13 – February 12, 2018**
  - **APA** Public Hearing: **January 31, 2018**

- **Draft Environmental Impact Statement (DEIS):**
  - **DEIS** publication: **Spring 2018**
  - **DEIS** public comment period: **45 Days**
  - **DEIS** Public Hearing: **Spring 2018 (during public comment period)**

UPCOMING SCHEDULE

84



NEXT STEPS

85

Critical Information

Project Website
www.rbd-meadowlands.nj.gov

Project Email
rbd-meadowlands@dep.nj.gov

Question & Answer

THANK YOU

4.0 Personal Notes