Table of Contents

1.0 List of Acronyms ................................................................................................................................. 3
2.0 Agenda ................................................................................................................................................. 4
3.0 Power Point Presentation ...................................................................................................................... 5
4.0 Concept Worksheets ............................................................................................................................. 32
5.0 Personal Notes ...................................................................................................................................... 35

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
2.0 Agenda

Alternative 1: Structural Flood Reduction Concept Development

6-8 PM
December 6, 2016
Conference Room 90
Port Authority Conference Room
90 Moonachie Ave
Teterboro, NJ 07608

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

Welcome

Presentation

Opening Remarks (10 Minutes)

Agenda (Linda Fisher, NJDEP)

Project Status Update and Introduction to Alternative 1 (Chris Benosky, AECOM)

Alternative 1: Structural Flood Reduction Concept Development (40 Minutes)

Flood Conditions (Chris Benosky, AECOM)

Preliminary Flood Reduction Alignment Options (Garrett Avery, AECOM)

Design Elements- Applying the “Kit of Parts” (Susan Bemis, AECOM)

Next Steps & Q&A/Closure (30 Minutes)

Next Steps (Chris Benosky, AECOM)

Question and Answers
AGENDA

Welcome & Opening Remarks
Project Status Update and Schedule
Alternative 1: Structural Flood Reduction Concept Development
  - Flood Conditions
  - Flood Reduction Alignment Options
  - Developing the "Kit of Parts"
PROJECT STATUS UPDATE

Chris Benosky, AECOM

- Developed working draft Concept Screening Criteria
- Completed and published to Project Website:
  - Meeting Minutes from CAG Meeting #5
  - November 2016 Newsletter
- Developing Alignment Options

ALTERNATIVE 1:

STRUCTURAL FLOOD REDUCTION

CHRIS BENOSKY, AECOM
**EXISTING 100-YEAR FLOODPLAIN**

- NEARLY ALL THE PROJECT AREA IS WITHIN THE 100-YEAR FLOODPLAIN.

**Legend**
- Municipality
- 100-Year Floodplain
- Properties Within 100-Year Floodplain
- Properties Not Within 100-Year Floodplain

**ESTIMATED SEA LEVEL CHANGE IN ~35 YEARS**

- SEA LEVEL IS ESTIMATED TO RISE BETWEEN 0.5 – 1.1 FEET

**Legend**
- Municipality
- Direction of Water
- Water
- 0’ Sea Level Rise
- 1’ Sea Level Rise
- 2’ Sea Level Rise
- 3’ Sea Level Rise
- 4’ Sea Level Rise
- 5’ Sea Level Rise
- 6’ Sea Level Rise

Data Sources: NOAA Int-High, NOAA Int-Low/USACE Intermediate (Modified NRC Curve II, Sea Level Rise (SLR) Inundation Data, NOAA Coastal Services Center (2015))
**ESTIMATED SEA LEVEL CHANGE IN ~60 YEARS**

**SEA LEVEL RISE BY 2075**

*SEA LEVEL IS ESTIMATED TO RISE BETWEEN 1.2 – 2.4 FEET*

<table>
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<th>2' Sea Level Rise</th>
<th>3' Sea Level Rise</th>
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</table>

Data Sources: NOAA Int-High, NOAA Int-Low/USACE Intermediate (Modified NRC Curve II), Sea Level Rise (SLR) Inundation Data, NOAA Coastal Services Center (2015)

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**HACKENSACK RIVER EXISTING CONDITIONS**

**AVERAGE WATER LEVELS**

- 6': EXAMPLE GROUND ELEVATION (NAVD 88)
- 3.08': MEAN HIGHER HIGH WATER (NAVD 88)
- 2.75': MEAN WATER LEVEL (NAVD 88)
- 3.55': MEAN LOWER LOW WATER (NAVD 88)

*AVERAGE WATER LEVELS OF THE HACKENSACK RIVER RELATIVE TO A 5' GROUND ELEVATION*
10-YEAR STORM

- There is a 10% chance this storm could occur each year.

50-YEAR STORM

- There is a 2% chance this storm could occur each year.
100-YEAR STORM

- THERE IS A 1% CHANCE THIS STORM COULD OCCUR EACH YEAR

DEVELOPING THE ALIGNMENT

Starting at a 7’ Elevation

- 7’ NAVD88 is approximately 8’ NGVD29
- Using the 7’ elevation as a study baseline
- 7’ elevation maintains existing level of protection with Sea Level Rise through 2050
- Other elevation heights are being considered and will be included as costs and feasibility inputs are identified
- Currently investigating tie-in options and footprint locations
CONNECTING HIGH GROUND
7' ELEVATION - FILLING IN THE GAPS

- EXISTING GROUND CONDITIONS IN THE PROJECT AREA MAY BE AT OR ABOVE A 7' ELEVATION
- FOR STUDY PURPOSES, THIS ALIGNMENT CONSIDERS 7' ELEVATION TO BE HIGH GROUND

CONNECTING HIGH GROUND
7' ELEVATION - FILLING IN THE GAPS

- A FLOOD REDUCTION STRATEGY WILL BE PROPOSED IN AREAS WHERE GROUND ELEVATION IS BELOW 7'
CONNECTING HIGH GROUND
HOW TIE-INS WORK

- STRUCTURAL FLOOD REDUCTION CONNECTS EXISTING HIGH GROUND (7' ELEVATION)

17

PRIMARY FLOOD REDUCTION TYPES
HARD & SOFT EDGES

THE COLORS ON THE FOLLOWING ALIGNMENT MAPS REPRESENT POTENTIAL LOCATION OF WALLS AND BERMS

18
7' ELEVATION ALIGNMENT OVERVIEW

- Overview of all alignment options at 7' elevation
- Screening of options is ongoing
- Interactive maps available post-meeting

Preliminary Flood Reduction Alignment Options

Garrett Avery, AECOM
ALIGNMENT OVERVIEW

ZONE KEY

- SIX AREAS WITH SEVERAL OPTIONS
- MIX OF WALLS AND BERMS PROVIDE FLOOD PROTECTION
- NEW TIDAL GATES AND PUMP STATIONS

ALIGNMENT OPTION – ZONE 1

- OPTION 1: TIE-IN WEST OF BERGEN TNPK. ROAD REGRADING OR A DEPLOYABLE WOULD BE REQUIRED.
- OPTION 2: TIE-IN NORTH OF PROJECT AREA. NO ROAD CROSSINGS OR REGRADING NEEDED.
- OPTION 3: TIE INTO HACKENSACK RIVERWALK NORTH OF PROJECT AREA. NO ROAD-CROSSING REQUIRED.
ALIGNMENT OPTION – ZONE 2

- **OPTION 4:** INTERIOR ALIGNMENT, TIE-IN AT 7' CONTOUR AT INDIAN LAKE. WOULD REQUIRE ROAD REGRADING AND DEPLOYABLES.

- **OPTION 5:** INTERIOR ALIGNMENT, TIE-IN AT 7' CONTOUR ON THE EAST SIDE OF BERGEN TNPK. WOULD REQUIRE ROAD REGRADING AND DEPLOYABLES.

ALIGNMENT OPTION – ZONE 3

- **ELEVATION 7’ ALIGNMENT CONTINUES ALONG THE EDGE.**

- **TYING INTO TO HIGHGROUND AND USING BERMS WHERE POSSIBLE.**

- **EXISTING RIVER ACCESS PRESERVED BY CLOSURE GATES.**
**ALIGNMENT OPTION – ZONE 4**

- ELEVATION 7’ ALIGNMENT COMPOSED OF FLOODWALL OR BERM AS SPACE ALLOWS.
- SURGE GATE TO PROTECT EXISTING TREATMENT PLANT OUTFALLS.
- REINFORCEMENT OR REPLACEMENT OF EXISTING BERMS BEING STUDIED. FLOODWALL AND BERM BEING CONSIDERED TO LIMIT POTENTIAL WETLAND DISTURBANCE.

**ALIGNMENT OPTION – ZONE 5**

- OPTION 1: TIE-OFF ON NORTH SIDE OF COMMERCE BLVD. WOULD REQUIRE ROAD REGRADING AND CLOSURE GATES (CROSSES ACCESS POINTS).
- OPTION 2: TIE-OFF ON SOUTH SIDE OF COMMERCE BLVD. COULD BE A BERM OR A WALL. NO REGRADING OR STREET CROSSINGS.
- OPTION 3: TIE-OFF TO 7’ CONTOUR. FOLLOWS PATH OF EXISTING BERM TO LIMIT POTENTIAL WETLAND DISTURBANCE.
ALIGNMENT OPTION – ZONE 6

OPTION - 1

- Surge barrier at Paterson Plank Road (south of the bridge) would protect over 50% of the project area.
- 3 Closure gates, regrading, and minor wall to tie-off.
- New pump station to control water level in Berry’s Creek due to rainfall.

OPTION - 2

- Interior alignment along the east bank of Berry’s Creek.
- Connects existing tide gates and surrounding points at 7' ground elevation.
- Would require additional tide gates and new pump station.
ALIGNMENT OPTION – ZONE 6

OPTION - 3

ROUTE 17

PATTERSON PLANK RD

BERRY'S CREEK

GRAND ST.

RISER DITCH

GOTHAM PARKWAY

- INTERIOR CONNECTIONS TYING OFF TO 7' CONTOURS.

DESIGN ELEMENTS

APPLYING THE "KIT OF PARTS"

SUSAN BEMIS, AECOM
"KIT OF PARTS" – INITIAL IDEAS

- Basic Flood Wall
- Sheet Pile
- BERM + WALL
- Vine Planting
- Bench
- BERM + PATH
- Planter
- Canopy
- CANTILEVERED WALKWAY
- Art
- Amphitheater
- INFLATABLE DEPLOYABLE
- Panel Deployable
- FLIP DEPLOYABLE

MODULARIZING THE "KIT OF PARTS"

WHAT GOES WHERE?

- Walls
  - Basic Wall
  - Bench
  - Planter
  - Amphitheater
  - Canopy
  - CANTILEVERED WALKWAY
  - Sheet Pile

- BERM
  - BERM + Path
  - Basic BERM

- DEPLOYABLES
  - FLIP DEPLOYABLE
  - INFLATABLE DEPLOYABLE
  - ROLLER DEPLOYABLE
MODULARIZING THE “KIT OF PARTS”

WHAT GOES WHERE?

COMMERCIAL
- BASIC WALL
- BENCH
- PLANTER
- CANOPY
- ROLLER DEPLOYABLE
- FLIP DEPLOYABLE

RESIDENTIAL
- BASIC WALL
- BENCH
- PLANTER
- AMPHITHEATER
- CANTILEVERED WALKWAY
- BERM + PATH

INDUSTRIAL
- BASIC WALL
- SHEET PILE
- BASIC BERM
- FLIP DEPLOYABLE
- INFLATABLE DEPLOYABLE
- ROLLER DEPLOYABLE

COMMERCIAL ZONE

EXISTING CONDITIONS

• BUILDING THE LINE OF PROTECTION
• RESPONDING TO THE EXISTING COMMERCIAL ENVIRONMENT
COMMERCIAL ZONE
BUILDING THE PROTECTION

• STARTING WITH THE BASIC WALL

• BUILDING THE SYSTEM WHERE APPROPRIATE

COMMERCIAL ZONE

MODULAR SYSTEM WORKS IN 30’ UNITS

SYSTEM REDUCES COST AND TIME OF CONSTRUCTION

COMMERCIAL ZONE

REBUILD BY DESIGN MEADOWLANDS

CAG Meeting #6 // December 6, 2016
COMMERCIAL ZONE
BUILDING THE PROTECTION

• UNITS ARE INTERCHANGEABLE

COMMERCIAL ZONE MODULAR SYSTEM EXAMPLE

• FLOOD PROTECTION + STREET AND PUBLIC BENEFITS

• INTERIOR CONDITION
RESIDENTIAL ZONE
EXISTING CONDITIONS

- RESPONDING TO THE RESIDENTIAL CONTEXT
- PROVIDE ACCESS AND VIEWS TO THE HACKENSACK RIVER
- POTENTIAL FOR RECREATION AND NEIGHBORHOOD CONNECTIONS

RESIDENTIAL ZONE
MODULAR SYSTEM EXAMPLE

- THE MODULAR SYSTEM PROVIDES PLACES TO SIT AND ENGAGE WITH THE HACKENSACK RIVER

THIS...
**RESIDENTIAL ZONE**

**BERM + WALKWAY EXAMPLE**

- In areas that allow for a greater footprint, a soft berm could be incorporated.

OR THIS...

**RESIDENTIAL ZONE**

**CANTILEVERED WALKWAY EXAMPLE**

- Cantilevered walkway is still being considered where possible.
- Provides recreation and water access.

OR THIS.
INDUSTRIAL ZONE

EXISTING CONDITIONS

• BLENDING INTO THE INDUSTRIAL ENVIRONMENT
• COST EFFICIENCY

INDUSTRIAL ZONE

EXISTING CONDITIONS

INDUSTRIAL ZONE

MODULAR SYSTEM EXAMPLE

• SHEET PILE AND BASIC WALLS FOR AREAS WITH SMALL FOOTPRINTS

INDUSTRIAL ZONE

THIS...
INDUSTRIAL ZONE
BASIC BERM EXAMPLE

- BASIC BERM WHEN LARGER FOOTPRINT CAN BE ACCOMMODATED

OR THIS.

MODULAR COMPONENT DEVELOPMENT
INVESTIGATION: 1

- THE DESIGN TEAM IS CURRENTLY DEVELOPING THE MODULAR SYSTEM BASED ON FEEDBACK FROM CAG #4 WORKSHOP

- THE FOLLOWING IMAGES REFLECT CURRENT SYSTEM DESIGN STUDIES
MODULAR COMPONENT DEVELOPMENT

INVESTIGATION: 2

MODULAR COMPONENT DEVELOPMENT

INVESTIGATION: 3
MODULAR COMPONENT DEVELOPMENT
INVESTIGATION: 4

MODULAR COMPONENT DEVELOPMENT
INVESTIGATION: 5
NEXT STEPS

CHRIS BENOSKY, AECOM

NJDEP / AECOM UPCOMING ACTIVITIES

- Prepare Meeting Summary for CAG #6
- Continue developing:
  - Concepts and Alternatives
- CAG #7 in January
  - Alternative 3 - Hybrid
**NEXT STEPS**

**CAG: CALL TO ACTION**

- Submit comments & worksheet from CAG #6 meeting on **December 16, 2016**
- Share information from this Meeting with friends and neighbors
- Continue to build interest in the Project
- Ensure the public knows about upcoming information (to be posted on Project website)

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**NEXT STEPS**

**Critical Information**

**January 31, 2017**
CAG Meeting #7: Alternative 3 (Hybrid)

**Project Website**
[www.rbd-meadowlands.nj.gov](http://www.rbd-meadowlands.nj.gov)

**Project Email**
rbd-meadowlands@dep.nj.gov

**Question & Answer**
4.0 Concept Worksheets

ALIGNMENT OPTION - ZONE 1

What alignment do you prefer, and why?

Are there any options you dislike, and why?

ALIGNMENT OPTION - ZONE 2

What alignment do you prefer, and why?

Are there any options you dislike, and why?

ALIGNMENT OPTION - ZONE 3

What alignment do you prefer, and why?

Are there any options you dislike, and why?
ALIGNMENT OPTION - ZONE 4

What alignment do you prefer, and why?

Are there any options you dislike, and why?

ALIGNMENT OPTION - ZONE 5

What alignment do you prefer, and why?

Are there any options you dislike, and why?

ALIGNMENT OPTION - ZONE 6

OPTION 1

What alignment do you prefer, and why?

Are there any options you dislike, and why?
ALIGNMENT OPTION - ZONE 6
OPTION 2

What alignment do you prefer, and why?

Are there any options you dislike, and why?

ALIGNMENT OPTION - ZONE 6
OPTION 3

What alignment do you prefer, and why?

Are there any options you dislike, and why?