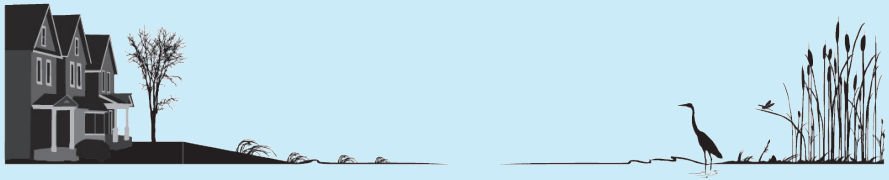
REBUILD BY DESIGN

MEADOWLANDS



FLOOD PROTECTION PROJECT

Boroughs of Little Ferry, Moonachie, Carlstadt, and Teterboro, and the Township of South Hackensack in Bergen County, New Jersey

CITIZEN ADVISORY GROUP (CAG) MEETING #5

ECOLOGY AND DRAINAGE BASIN OPPORTUNITY AREAS

AGENDA

- Welcome and Agenda
- Project Status Update & Schedule
- Project Process & Screening Criteria
- What We Learned from CAG #4 Meeting
- Project Area Ecology
- Drainage Basin Opportunity Areas

PROJECT STATUS UPDATE

Chris Benosky, AECOM

- Developed working draft Concept Screening Criteria
  - Updated based on CAG #3 meeting
- Completed and published to the project website
  - CAG #4 meeting minutes
  - September 2016 Newsletter
- Received additional input from CAG #4 meeting
- Developing the Preliminary Draft EIS
  - Conducting field work to support EIS and Feasibility Study
- Further developing the alternative conceptual ideas and locations

CAG SCHEDULE

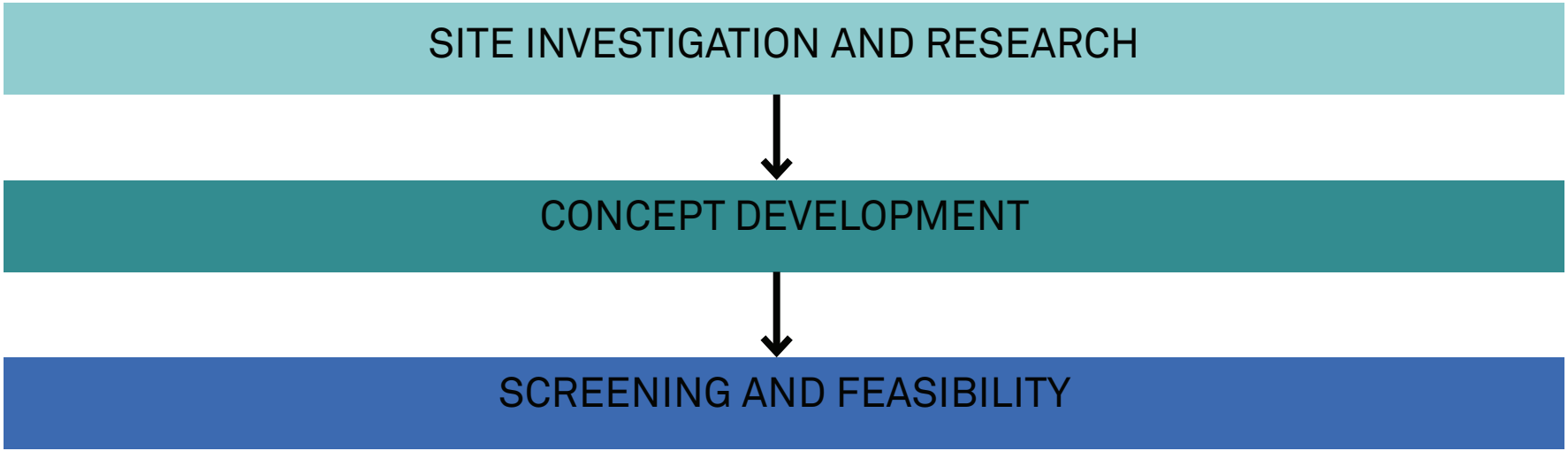
MOVING FORWARD

CAG #5
TONIGHT
Focus on Alternative 2: Storm Water Drainage Improvements

CAG #6
DECEMBER
Focus on Alternative 1: Structural Flood Reduction

CAG #7
JANUARY
Focus on Alternative 3: Hybrid

DEVELOPING CONCEPTS



PURPOSE & NEED COMPONENT	SCREENING CRITERION	COMPARATIVE CONCEPT SCREENING METRICS** ** Use of the terms "relative" or "relatively" indicates that concepts are compared to each other.		
		GOOD	FAIR	POOR
FLOOD RISK REDUCTION	Reduces Flood Risk from Coastal Storm Surge (Alternatives 1 and 3)	Provides the greatest relative reduction in future flood risk, as measured by annual flood damage reduction, from coastal storm surge risk.	Provides a moderate relative reduction in future flood risk, as measured by annual flood damage reduction, from coastal storm surge risk.	Provides the least relative reduction in future flood risk, as measured by annual flood damage reduction, from coastal storm surge risk.
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FLOOD RISK REDUCTION	Provides Protection to Vulnerable and Underserved Populations	Protects the greatest relative number of vulnerable and underserved populations as compared to other concepts.	Protects a moderate relative number of vulnerable and underserved populations as compared to other concepts.	Protects least relative number of vulnerable and underserved populations as compared to other concepts.
FLOOD RISK REDUCTION	Provides Protection to Critical Infrastructure (emergency services, hospitals, transit facilities)	Protects the greatest relative amount of critical infrastructure as compared to other concepts.	Protects a moderate relative amount of critical infrastructure as compared to other concepts.	Protects the least relative amount of critical infrastructure as compared to other concepts.
BUILT ENVIRONMENT/HUMAN ENVIRONMENT	Effects to Existing Utilities & Utility Infrastructure	Requires no or only limited relocations of existing utility infrastructure.	Requires a moderate amount of relocations of existing utility infrastructure.	Requires a large amount of relocations of existing utility infrastructure. However, these impacts could be mitigated in concert with Proposed Project implementation.
BUILT ENVIRONMENT/HUMAN ENVIRONMENT	Effects to Existing Transportation Network, Local Traffic, and Connectivity	Includes features to improve connectivity (vehicles, bike, pedestrians) of the street system that would improve connections and traffic circulation. Would result in long-term benefits to transportation infrastructure, with no adverse impacts to transportation infrastructure.	Does not include features to improve connectivity (vehicles, bike, pedestrians) of the street system that would improve connections and traffic circulation. However, the concept would not adversely affect existing or future-planned connectivity. Would not result in any long-term transportation improvements. May result in neutral or minor adverse impacts to transportation infrastructure.	May decrease connectivity or traffic circulation at some locations and/or conflict with future opportunities to improve connectivity (vehicles, bike, pedestrians). Would not result in any long-term transportation improvements. Would result in mitigatable adverse impacts to transportation infrastructure during construction or operation.
BUILT ENVIRONMENT/HUMAN ENVIRONMENT	Effects on Land Acquisition / Housing Displacements	May result in land use improvements over the long term. Would not require land acquisitions / easements, housing demolition, or permanent relocations.	Would not result in land use improvements over the long term. Would require minimal land acquisitions / easements. No housing demolition or permanent relocations would be required.	Would not result in land use improvements over the long term. Would require numerous land acquisitions / easements, and minimal housing demolition or permanent relocations.
BUILT ENVIRONMENT/HUMAN ENVIRONMENT	Potential to Provide Increased Waterfront Access	Includes features that would improve waterfront access within the Project Area.	Does not include features that would improve waterfront access within the Project Area.	Would result in a minor decrease in waterfront access within the Project Area.
BUILT ENVIRONMENT/HUMAN ENVIRONMENT	Effects to Recreational, Civic, and Cultural Amenities and Uses	Incorporates many new and/or improved amenities to support recreational, commercial, and cultural activities.	Incorporates few new and/or improved amenities to support recreational, commercial, and cultural activities.	Incorporates no new and/or improved amenities to support recreational, commercial, and cultural activities.
BUILT ENVIRONMENT/HUMAN ENVIRONMENT	Effects to Viewshed and Local Visual Quality	Includes features that would enhance views of water and other natural areas.	Does not include features that would enhance views of water and other natural resources.	Includes features that would result in a minor decrease in views of water and natural areas.

Sample of the screening criteria matrix

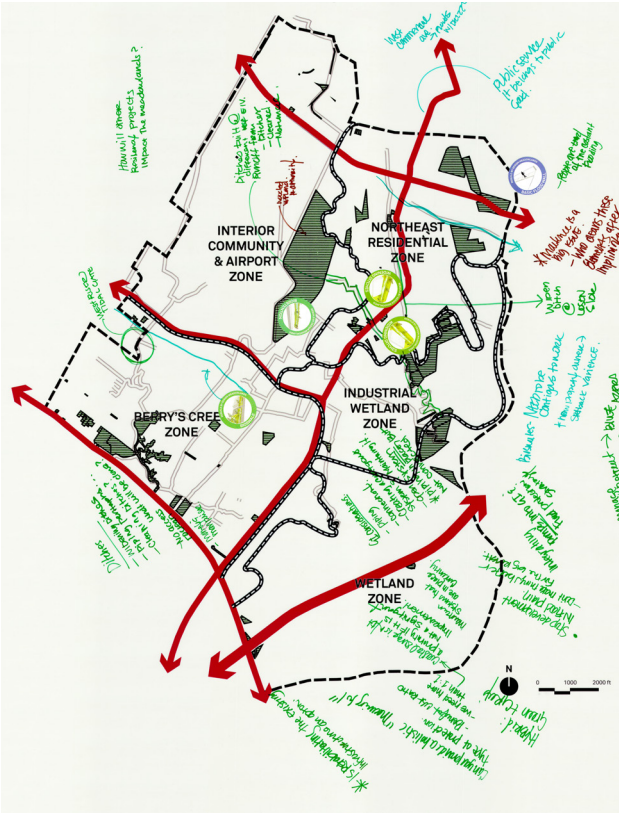
- How do we use the screening criteria to consolidate potential opportunity areas?
  - Identify potential opportunities and develop into concepts
  - Screen concepts using screening criteria
  - Not all opportunities/concepts will pass screening process

WHAT WE LEARNED FROM CAG #4 MEETING

Susan Bemis, AECOM

GENERAL - CAG #4 COMMENTS

Susan Bemis, AECOM



INVEST

- Address frequent flooding from rain fall events.
- Utilize the most immediate and cost efficient option(s) for protection from storm surges.

EXAMINE

- Potential water displacement towards neighboring communities.
- Holistic solution.

MAINTAIN

- Long-term maintenance of proposed project infrastructure is a concern: Who maintains and for how long?

DISCUSS AND CONSIDER

- Opportunities for private land acquisition during the concept development process.

ALTERNATIVE 1 - CAG #4 COMMENTS

STRUCTURAL FLOOD REDUCTION

Berry's Creek

WATERFRONT ACCESS
- Access to the Hackensack River needs to remain a priority.

PROTECTION OF WETLANDS
- Emphasize wetland and biological resources protection + enhancement.

MINIMIZE ENVIRONMENTAL IMPACTS
- Consider minimal footprints.

DEPLOYABLES
- Maintenance and operations of deployables are a concern.

PRIORITIZE FLOOD PROTECTION
- General interest in flood protection incorporated with public benefit, but flood protection is the main objective.

STORM WATER DRAINAGE IMPROVEMENTS

Green street example

CURRENT SYSTEMS

- Improve current systems, including ditches and pipes.
- Potential to install backflow preventers.

CONSIDER VARIOUS ENGINEERING IMPROVEMENTS

- Green - rain gardens, permeable paving, bioswales, among other green infrastructure elements.
- Grey - pump stations, increase flow capacity of drainage basins, and detention basins.

OPEN SPACES

- Enhance the performance of existing open spaces.

NATURAL CONDITIONS

- Return developed areas to natural conditions and find opportunities for enhancement.

ALTERNATIVE 3 - CAG #4 COMMENTS

HYBRID SOLUTION

Hackensack River

NO ADDITIONAL DEVELOPMENT

- Development has displaced natural habitat and systems.
- Improvements should not be used to generate or promote new development.

POLLUTION + CONTAMINATION

- Understand and consider pollution issues associated with Berry's Creek.
- Consider a tide gate at Paterson Plank Road.

GREEN + GREY INFRASTRUCTURE

- Utilize a combination of both to get the most benefit.

SITE-SPECIFIC - CAG #4 COMMENTS

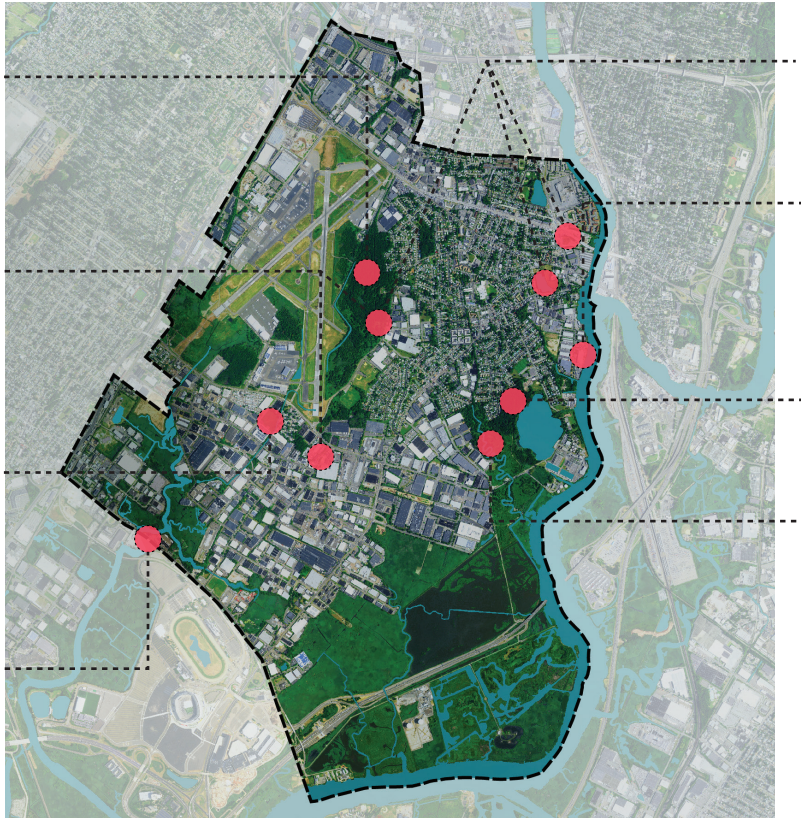
Susan Bemis, AECOM

TETERBORO AIRPORT
Opportunity for green infrastructure at Teterboro Airport (upgrade of disturbed environments).

TETERBORO AIRPORT, WEST COMMERCIAL AVENUE
Bioswales and green infrastructure (south/east of the Teterboro Airport, West Commercial Avenue, southern end of the Project Area).

EAST AND WEST RISER
Prioritize the East and West Riser ditches for Berry's Creek area, especially in consideration of the nearby mobile home communities.

PATERSON PLANK ROAD
Consider addition of a tide gate along Paterson Plank Road in the Berry's Creek Zone.



TETERBORO FOREST, LOSEN SLOTE, WILLOW LAKE, VACANT LOTS
Utilize existing open spaces.

HACKENSACK RIVER EDGE
Potential for additional habitat creation, water storage, and water access.

MEHRHOF WETLAND ZONE
Area immediately north of Mehrhof pond wetland zone could be a good location for recreational paths.

LOSEN SLOTE
Large migratory bird area would benefit from enhancements such as widening.

PROJECT AREA ECOLOGY

John Rollino, AECOM

PROJECT AREA ECOLOGY

John Rollino, AECOM

PRELIMINARY DATA

Existing habitat near development

- The Project Area contains natural areas surrounded by suburban, industrial, and commercial development. Several of these natural areas have not been intensively studied to date by others.
- The ecological studies being conducted by AECOM will be used to support the NEPA analysis, regulatory agency consultations, and associated permitting.

PRELIMINARY DATA

(Foreground) Birds and marshes along the Hackensack
(Background) NJ Turnpike Bridge

- As part of the EIS, the field data collection will be supplemented with previous and ongoing studies (e.g., Fisheries Inventory of the Hackensack River, FAA Wildlife, etc.)
- Members of the project team have past experience conducting studies for the NJSEA (formerly HMDC) (e.g., Secaucus High School Site) and/or other multi-year studies (Empire Tract)

PRELIMINARY DATA

East Riser Ditch, looking north from Amor Ave, Carlstadt, NJ

- Biological resource studies (ongoing) include:
  - Habitat mapping and evaluation
  - Wetland delineation
  - Botanical inventories
  - Wildlife studies:
    - Avifauna (birds)
    - Benthic Invertebrates
    - Fish
    - Herptofauna (Reptiles and Amphibians)
    - Mammals

BIOLOGICAL RESOURCES: GOALS

John Rollino, AECOM

PRELIMINARY DATA

Scientists evaluate soil conditions in Little Ferry

- Categorize habitats, flora, and fauna, and conduct ecological evaluations in support of a NEPA-level analysis.
- Identify high-value ecological resources and provide input into planning process in order to minimize impacts to greatest extent possible.
- Identify and develop opportunities to increase ecologic value of the Project Area post project construction.

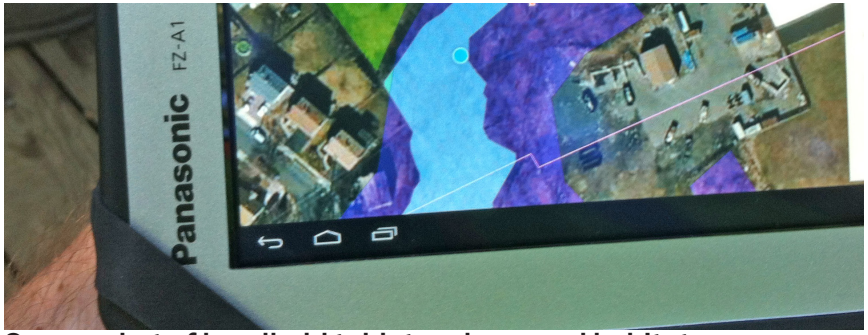
PRELIMINARY DATA

Mowed lawn detention basin, Moonachie, NJ

Hardwood Swamp, Teterboro, NJ

- Project Area ~5,800 acres.
- ~4,000 acres are commercial, industrial, and residential.
- ~1,800 acres are “natural areas” – parcels with vegetated communities.

PRELIMINARY DATA



Screen shot of handheld tablet and mapped habitats


Scientists mapping habitats

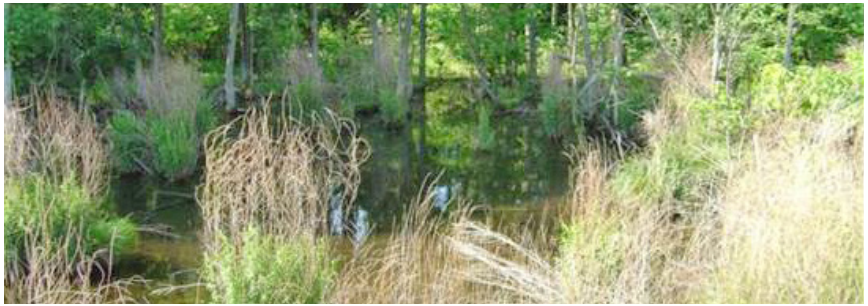
- Scientists traversed the Project Area on foot and identified “natural areas.”
- Aerial images of the Project Area were used as a background on hand-held tablets.
- Natural areas were sketched in tablets and inputed as a GIS file.
- ~ 400 habitat polygons and shoreline developments (~1,800 ac).
- Each natural area was given an alpha-numeric code, based on its geographic location.

PRELIMINARY DATA

Wetland /Herbaceous/emergent/Drainage (Y)/Disturbed (Y)/ *Phragmites australis, Persicaria perfoliata*/Common Reed Marsh

- Other data collected for each natural area polygon included:
- Dominant Habitat Type - wetland/ upland/waterbody/etc.
  - Covertype – herbaceous, forested, deciduous, etc.
  - Ditch/drainage present/adjacent – Y/N
  - Disturbed – Y/N
  - Dominant species – species identified
  - Habitat Community – floodplain forest, urban woodlot, common reed marsh.

PRELIMINARY DATA



High value wetland

Low value wetland

- Using US Army Corps of Engineers “Evaluation of Planned Wetlands (EPW)” methodology.
- EPW mathematically scores wetlands on a number of functions (sediment stabilization, wildlife habitat, water quality, etc).
- Through computation, scientists assess “health” of existing wetlands and calculate the “Functions and values” of mitigated wetlands.
- Using site-specific information gathered from studies, habitats are being coded based on ecological value and function.

PRELIMINARY DATA

(Foreground) Created/enhanced marsh, Secaucus, NJ
(Background) Project Area

- Section 404 of the Federal Clean Water Act: Wetlands are *"areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas."*

- Freshwater Wetlands: The "three parameter approach." Wetlands under normal conditions have hydric soils; dominance of hydric vegetation; and presence of hydrology.

- Tidal Wetlands: Use elevation data too (e.g., Spring high tide line).

PRELIMINARY DATA

- **Upland soils**
  Note brown color, loose friable texture. Soils are dry.

- **Wetland soils**
  Note dark black color, mucky appearance, obvious saturation. Changes in soil are a result of anoxic conditions.

- **Bog Iron**

Soils cores taken less than 5 feet from each other at a site near Bellman's Creek.

DELINEATED LINE

PRELIMINARY DATA

Wetland site, Durham, Ct

- During a wetland delineation, scientists note soil characteristics, hydrology, and vegetation. These observations allow for the delineation (i.e., delineated line) between uplands and wetlands.

PRELIMINARY DATA

Indian Lake, Little Ferry, NJ

- Birds, reptiles/amphibeans, fish, benthic invertebrates, and mammal studies occur seasonally (summer completed).
- Additional studies for birds – weekly during summer, fall, and spring. Specialized nesting study in spring.
- Other specialized studies – vernal pools, nocturnal species/activity, game cameras.

PRELIMINARY DATA

Caption: Northern Mockingbird resting on branch along Commerce, Blvd.

- At 10 locations throughout the Project Area, scientists conduct morning and/or evening studies.
- All birds sighted are counted. Activity is noted, as well as direction and distance from scientist.
- Data allows for the creation of a spherical histogram to be overlaid on habitat mapping data to determine site usage.

PRELIMINARY DATA

Double-crested cormorant flying above Hackensack River

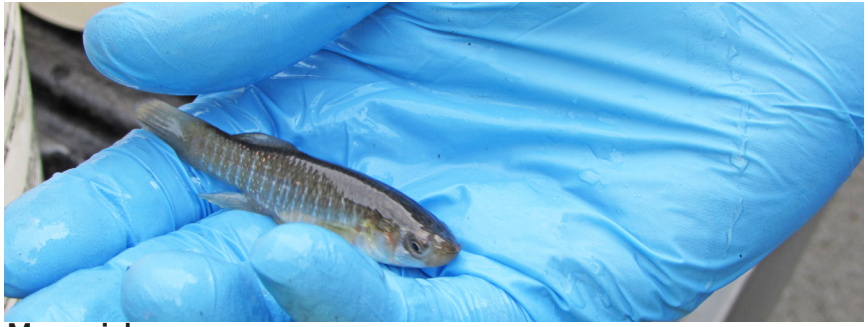
- To date, over 70 bird species identified.
- Majority of sightings were very common species: European starlings, mourning dove, ring-billed gull.
- Habitats in which birds sighted:
  - 7.07% Open Water
  - 19.87% Structure
  - 21.80% Upland
  - 51.33% Wetland

PRELIMINARY DATA

American Crow
American Goldvinch
American Kestrel
American Redstart
American Robin
American Tree Sparrow
Bald Eagle
Barn Swallow
Belted Kingfisher
Blue Jay
Brown-headed Cowbird
Bufflehead
Canada Goose
Carolina Chickedee
Carolina Wren
Cedar Waxwing
Chimney Swift
Common Grackle
Common Yellowthroat
Domestic Goose
Double-crested Cormorant
Downey Woodpecker
Eastern Pheobe
European Starling
Field Sparrow
Fish Crow
Gray Catbird
Great Black-backed Gull
Great Blue Heron
Great Egret
Herring Gull
House Finch
House Sparrow
Killdeer
King Bird
Kinglet sp.
Lesser Yellow Legs
Little Blue Heron
Mallard
Marsh Wren
Mourning Dove
Northern Cardinal
Northern Flicker
Northern Harrier
Northern Mockingbird
Osprey
Ovenbird
Palm Warbler
Peregrine Falcon
Red Tail Hawk
Red Winged Blackbird
Red-bellied Woodpecker
Ring-billed Gull
Rock Dove
Rufous-sided Towhee
Sandpiper sp.
Sharp-shinned hawk
Snowy Egret
Song Sparrow
Sparrow sp.
Spotted Sandpiper
Swallow sp.
Tree Swallow
Water Thrush
White-breasted Nuthatch
Wood Duck
Yellow Rumped Warbler
Yellow Warbler
Yellow Throated Warbler

PRELIMINARY DATA

Minnow traps in Losen Slote headwater



Mummichog

- Sampled from 9 different locations in the Project Area using fish traps.
- Fish identified to date include: bluegill, pumpkinseed, catfish, carp, goldfish, mummichogs, and mosquitofish.
- Species common to disturbed environments.

PRELIMINARY DATA

Skunk captured on infrared game camera near River Barge Park in the southern portion of the study area.

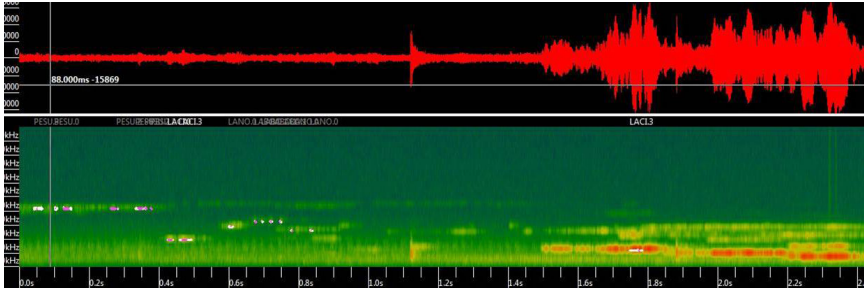
- Mammals surveyed through game cameras, presence identification (tracks and scat), nocturnal surveys, and (soon) snow tracking.
- Mammal survey locations occur throughout Project Area in a variety of representative habitats.
- Bats studied with night vision scopes, meters, and ultrasonic microphones that capture bat echolocations.
- Game cameras stationed throughout the Project Area in a variety of habitats.

PRELIMINARY DATA

- Big Brown Bat (*Eptesicus fuscus*)
- Cat (*Felis silvestris catus*)
- Chipmunk, unknown species
- Grey Squirrel (*Sciurus carolinensis*)
- Groundhog (*Marmota monax*)
- Little Brown Bat (*Myotis lucifugus*)
- Muskrat (*Ondatra zibethicus*)
- Opossum (*Didelphis virginiana*)
- Rabbit (*Sylvilagus floridanus*)
- Raccoon (*Procyon lotor*)
- Rat (unknown species)
- Red Fox (*Vulpes vulpes*)
- Skunk (*Mephitis mephitis*)
- White-tailed Deer (*Odocoileus virginianus*)

PRELIMINARY DATA

Bat meter with ultrasonic microphone at Losen Slote



Screen shot of bat echolocation using acoustical software

- Using a meter with ultrasonic microphone, scientists record bat echolocations.
- Analyzing timing, kHz, and other factors, scientists can identify what species are present in an area.

PRELIMINARY DATA

Forested Mitigation Area, Duke Farms, Hillsborough, NJ

- Using existing data collected to identify potential areas to avoid and enhance.
- Using ecological value calculation methods (e.g., EPW, IVA, etc.) and other metrics, it is possible to quantify impacts and ensure that enhancement would provide a net ecological benefit.

View of Hackensack River, looking south from Rt 46 Bridge

- Many Project Area habitats are home to invasive species and other stressors.
- Studies to date have shown aquatic fauna affected by contamination south of Moonachie Ave.
- Many small waterways are polluted and stressed, often due to previous engineering projects and efforts.
- To date, data has shown that developed industrial / commercial areas have limited ecological value to fauna.

Tidal Gate along Berry's Creek

- The Proposed Project presents a unique opportunity to reduce flooding and simultaneously improve habitat values and functions.
- Improvements could include, but are not limited to:
  - New marshes along the Hackensack
  - Upgrades of streams – daylighting, select plantings, fish habitat improvements.
  - Invasive species removal.

DRAINAGE BASIN OPPORTUNITY AREAS

Michael Vecchio, HDR

PROCESS + SCREENING CRITERIA

DEVELOPING CONCEPTS

SITE INVESTIGATION AND RESEARCH

↓

CONCEPT DEVELOPMENT

↓

SCREENING AND FEASIBILITY

PURPOSE & NEED COMPONENT	SCREENING CRITERION	COMPARATIVE CONCEPT SCREENING METRICS** ** Use of the terms "relative" or "relatively" indicates that concepts are compared to each other.		
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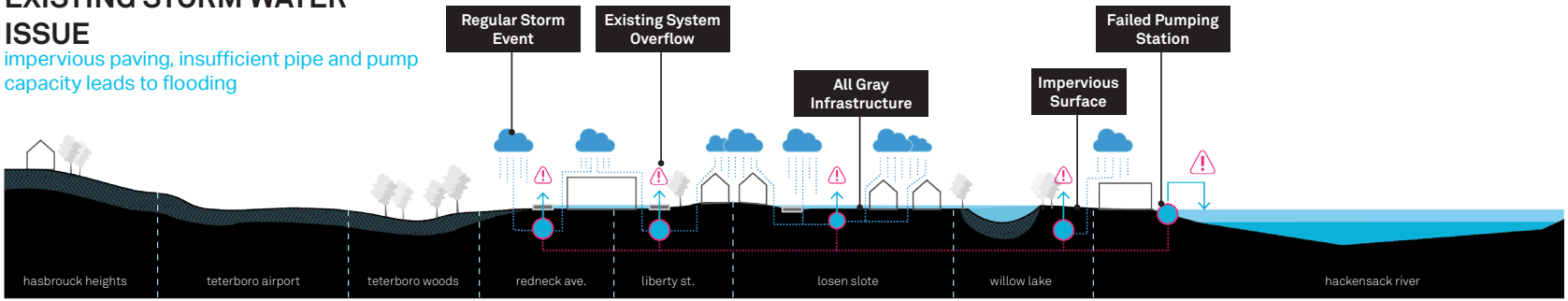
- How do we use the screening criteria to consolidate potential opportunity areas?
  - Identify potential opportunities and develop into concepts
  - Screen concepts using screening criteria
  - Not all opportunities/concepts will pass screening process

STORM WATER IMPROVEMENTS

Michael Vecchio, HDR

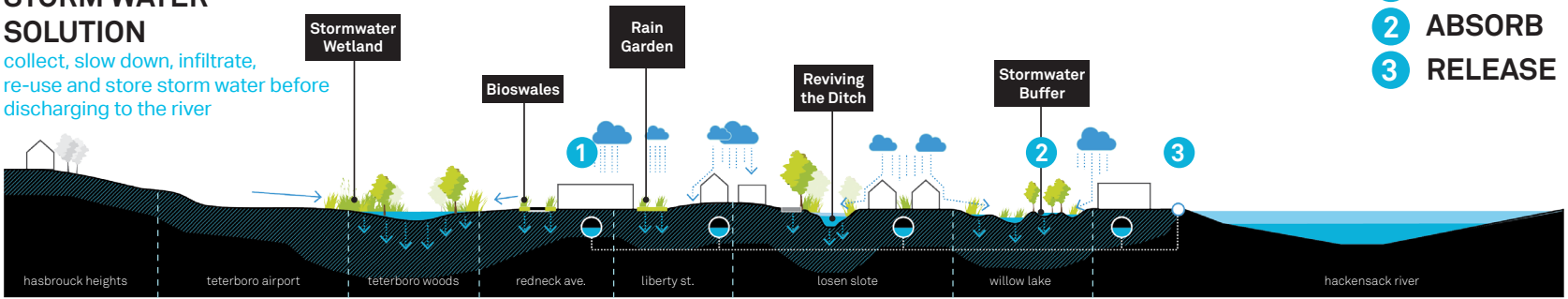
EXISTING STORM WATER ISSUE

impervious paving, insufficient pipe and pump capacity leads to flooding



STORM WATER SOLUTION

collect, slow down, infiltrate, re-use and store storm water before discharging to the river



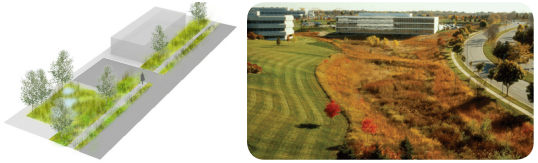
1. CAPTURE
2. ABSORB
3. RELEASE

KIT OF PARTS:

MOVING FROM **STRATEGY** TO **OPPORTUNITY**

OPEN SPACE

BIOSWALE

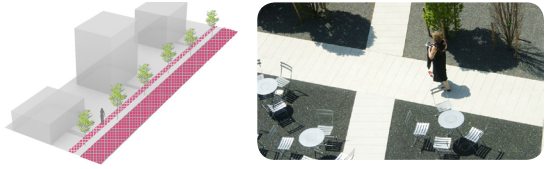


WETLAND ENHANCEMENT/CREATION

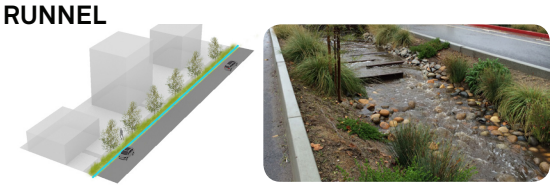
BIORETENTION

FILTER STRIP

PERMEABLE PAVING



RUNNEL



RAIN GARDEN

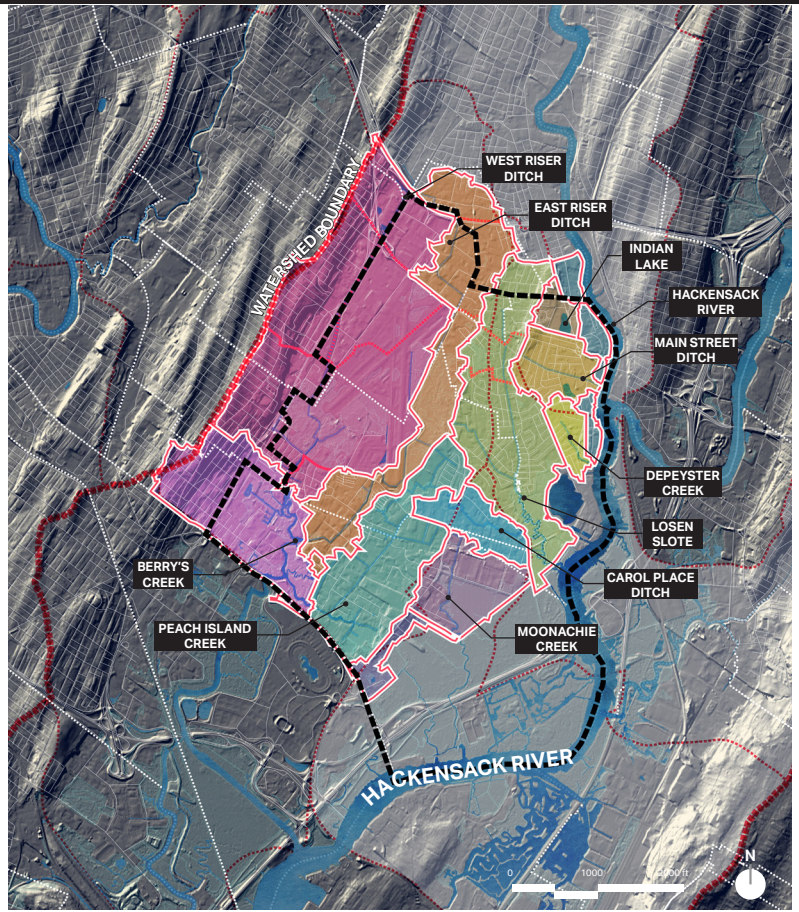
BIKEABLE STREETS

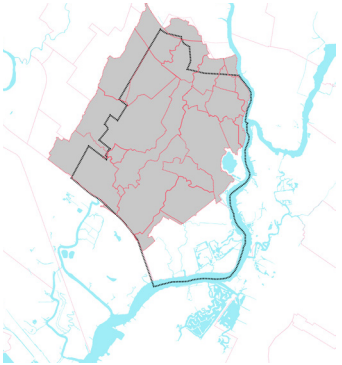
WIDENING DITCHES

DRAINAGE SUB-BASINS

Michael Vecchio, HDR

- Zones represent distinct sub-basins within the Project Area.
- Identify storm water management strategies within watershed and zones:
  - Grey Infrastructure
  - Green Infrastructure





KEY MAP

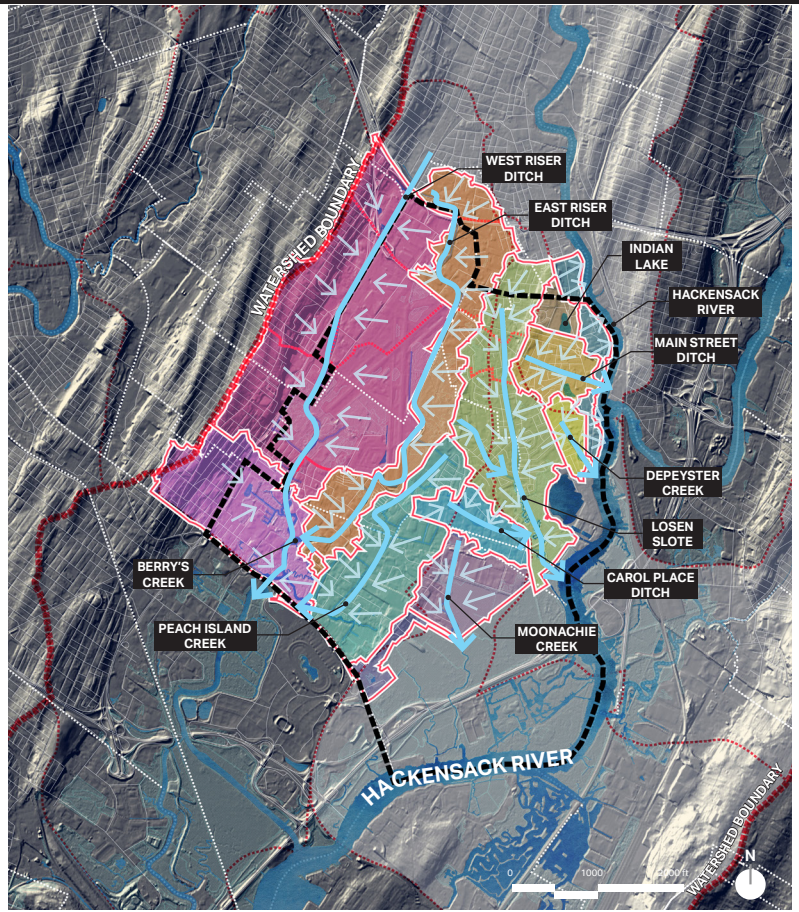
LEGEND

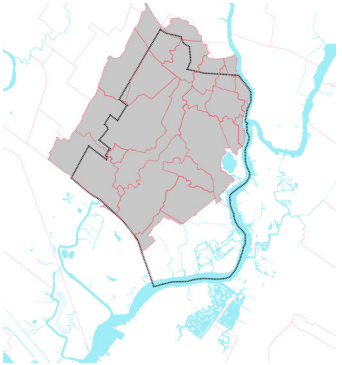
- WATERSHED
- SUB-WATERSHED
- SUB-BASIN BOUNDARIES
- PROJECT BOUNDARY
- MUNICIPAL BOUNDARY

DRAINAGE SUB-BASIN FLOWS

Michael Vecchio, HDR

- How is water moving and being captured within each sub-basin?





KEY MAP

LEGEND

- WATERSHED
- SUB-WATERSHED
- SUB-BASIN BOUNDARIES
- PROJECT BOUNDARY
- MUNICIPAL BOUNDARY

DRAINAGE SUB-BASIN ZONES

Michael Vecchio, HDR

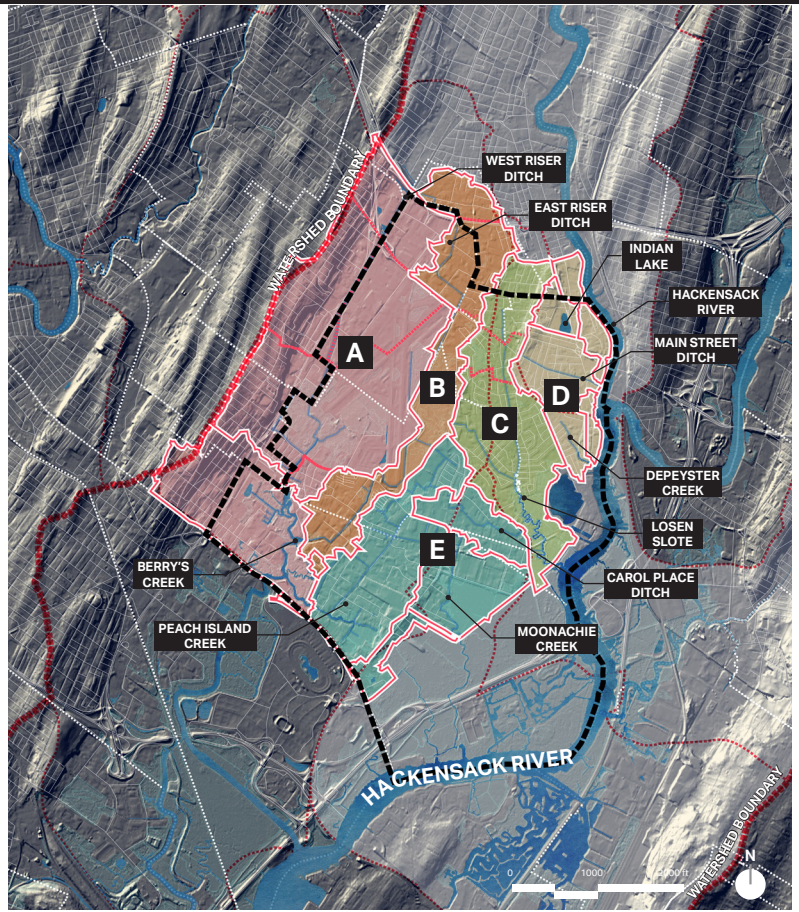
ZONE A
West Riser Ditch + Berry's Creek

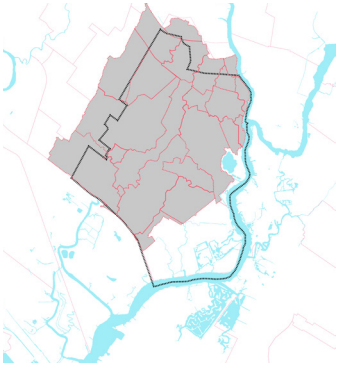
ZONE B
East Riser Ditch

ZONE C
Losen Slote

ZONE D
DePeyster Creek + Main Street Ditch

ZONE E
Carol Place Ditch + Moonachie Creek + Peach Island Creek





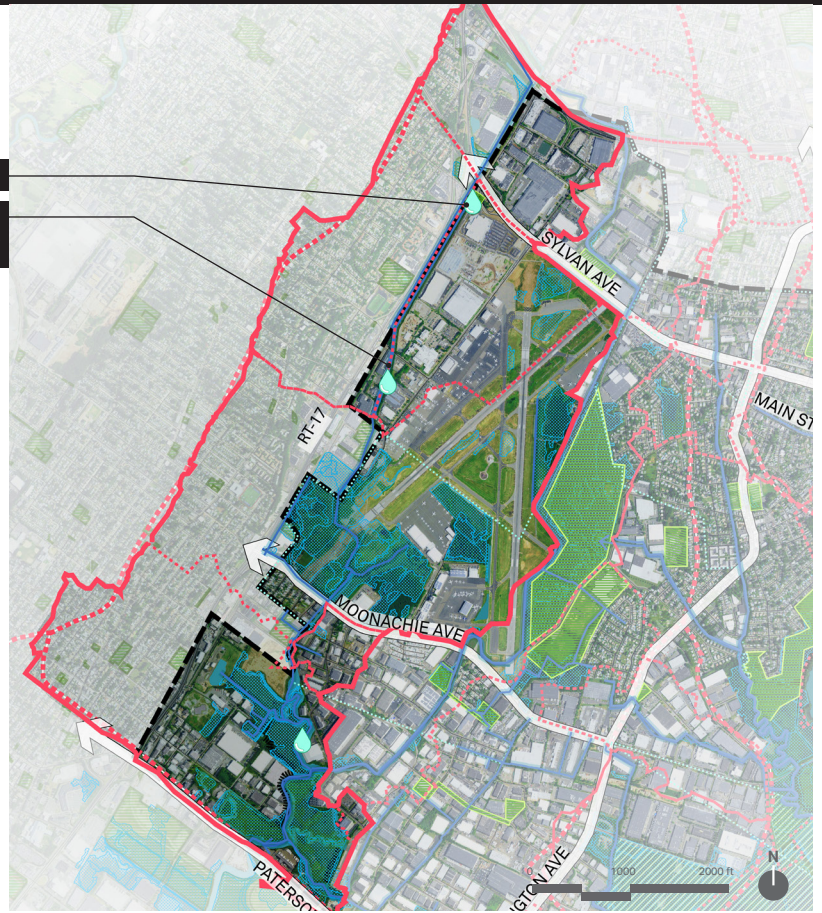
KEY MAP

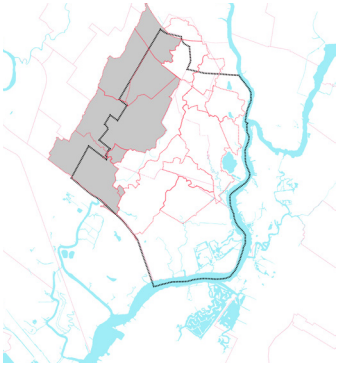
LEGEND

- WATERSHED
- SUB-WATERSHED
- SUB-BASIN BOUNDARIES
- PROJECT BOUNDARY
- MUNICIPAL BOUNDARY

POTENTIAL OPPORTUNITIES

- West Riser dredging
- West Riser Tide Gate and Pump Station
- Access for O&M
- Green streets





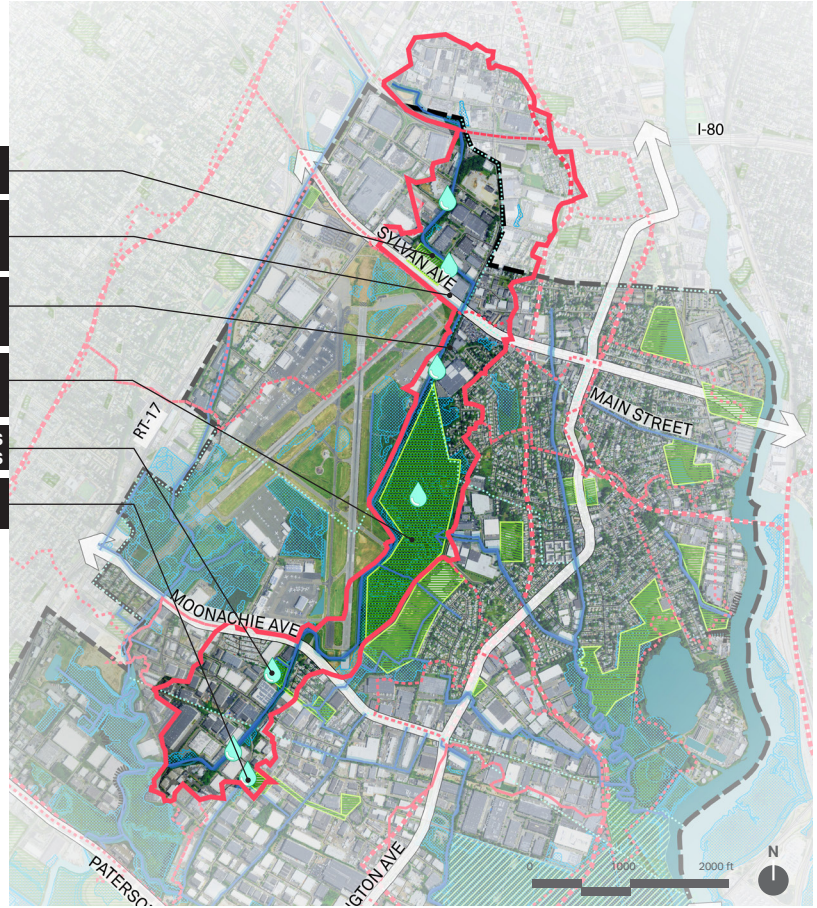
KEY MAP

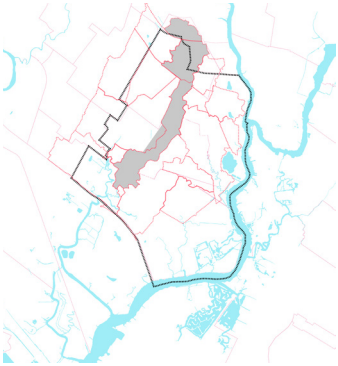
LEGEND

- STORM WATER IMPROVEMENT POTENTIAL OPPORTUNITIES
- OPEN SPACE IMPROVEMENT OPPORTUNITY
- PROJECT BOUNDARY
- ZONE
- SUB-WATERSHED
- SUB-BASIN BOUNDARIES
- MUNICIPAL BOUNDARY
- DITCH
- EVACUATION ROUTE

POTENTIAL OPPORTUNITIES

- East Riser dredging
- East Riser Tide Gate
- Pump Station
- East Riser Tide Gate upgrade
- Off-channel storage





KEY MAP

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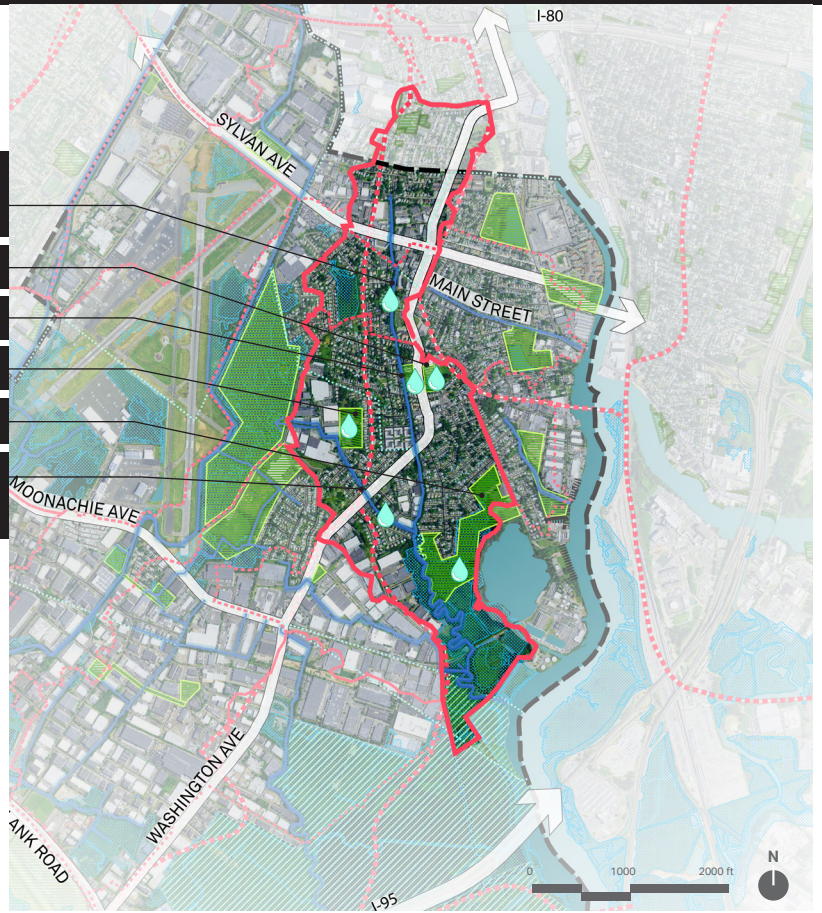
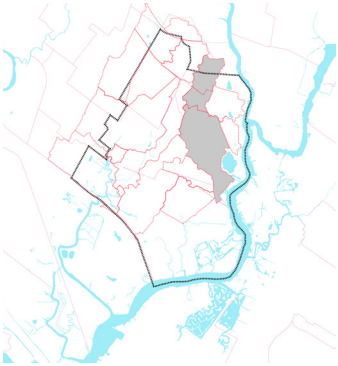
POTENTIAL OPPORTUNITIES

- Losen Slote outfall backflow prevention
- Losen Slote dredging
- Storm sewer capacity upgrades





KEY MAP

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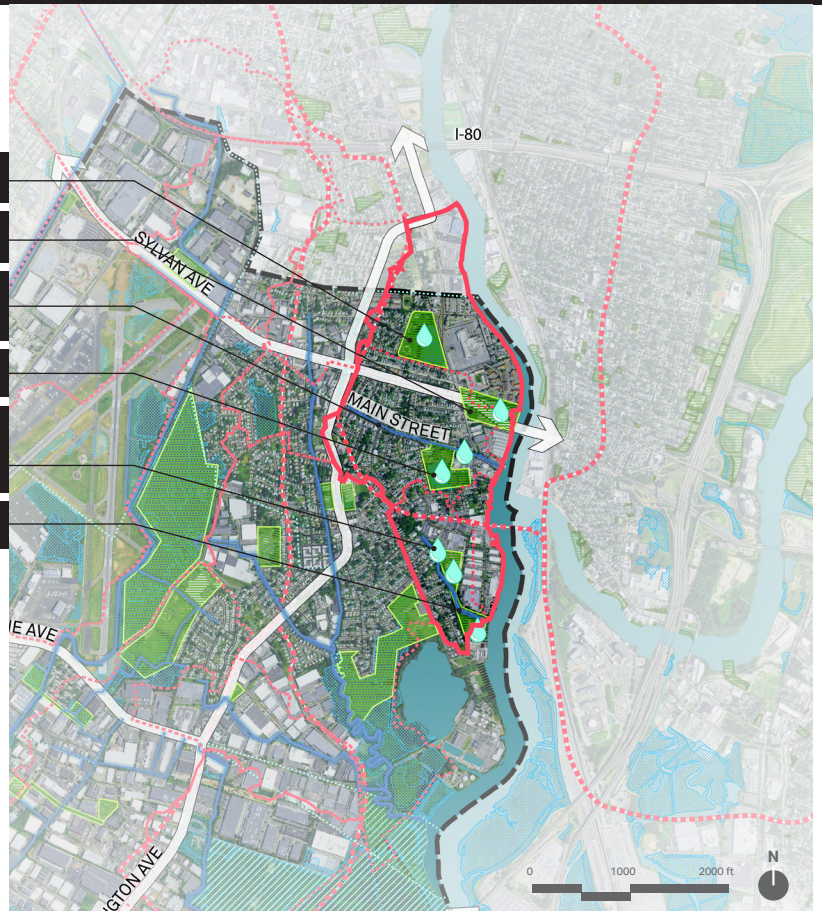
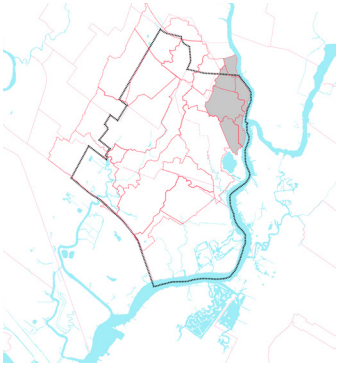
- EVACUATION ROUTE

DRAINAGE SUB-BASIN ZONE D

POTENTIAL OPPORTUNITIES

- Depeyster Creek Pump Station upgrade and Willow Lake
- Storm sewer capacity upgrades
- Main Street conveyance
- Backflow protection on Hackensack





KEY MAP

LEGEND

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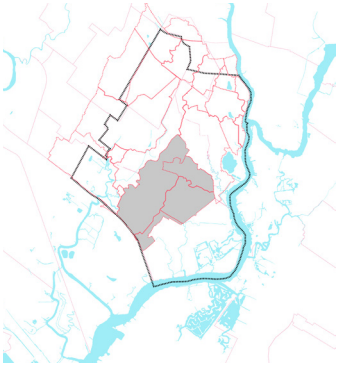
- EVACUATION ROUTE

DRAINAGE SUB-BASIN ZONE E

POTENTIAL OPPORTUNITIES

- Storm sewer capacity upgrades
- Interior pump stations
- Pump station upstream of Peach Island Creek Tide Gate
- Upgrade of Peach Island Creek Tide Gate



KEY MAP

LEGEND

- STORM WATER IMPROVEMENT POTENTIAL OPPORTUNITIES
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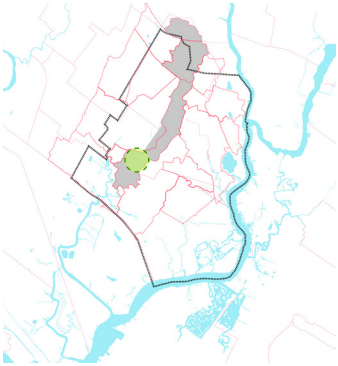
WHAT COULD THESE LOOK LIKE?

Susan Bemis, AECOM

OPEN SPACE + HABITAT IMPROVEMENTS

Susan Bemis, AECOM

CAESAR PLACE ILLUSTRATIVE EXAMPLE



KEY MAP

WETLAND CREATION

Through grading and wetland planting, existing upland is transformed into wetland

WETLAND ENHANCEMENT

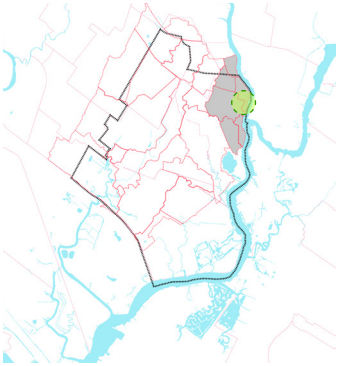
With minimal re-grading and native plantings, existing west Riser Ditch and low-quality wetlands are improved to filter and store more storm water

BOARDWALK

Accessible walkway allows for contiguous wetland and storm water system beneath

OPEN SPACE IMPROVEMENTS

FLUVIAL PARK ILLUSTRATIVE EXAMPLE



KEY MAP

PERMEABLE PAVING
Gravel paving absorbs storm water

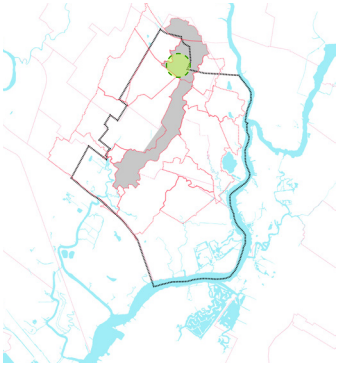
BIOSWALES
Filters 60-90% of suspended solids and prevents water from overflowing sewer systems

BIORETENTION
Filters 80-90% of suspended solids and slows flow of storm water into sewer systems

WETLAND CREATION
Native ecological habitat and storm water infiltration

DITCH IMPROVEMENTS

EAST RISER ILLUSTRATIVE EXAMPLE



KEY MAP

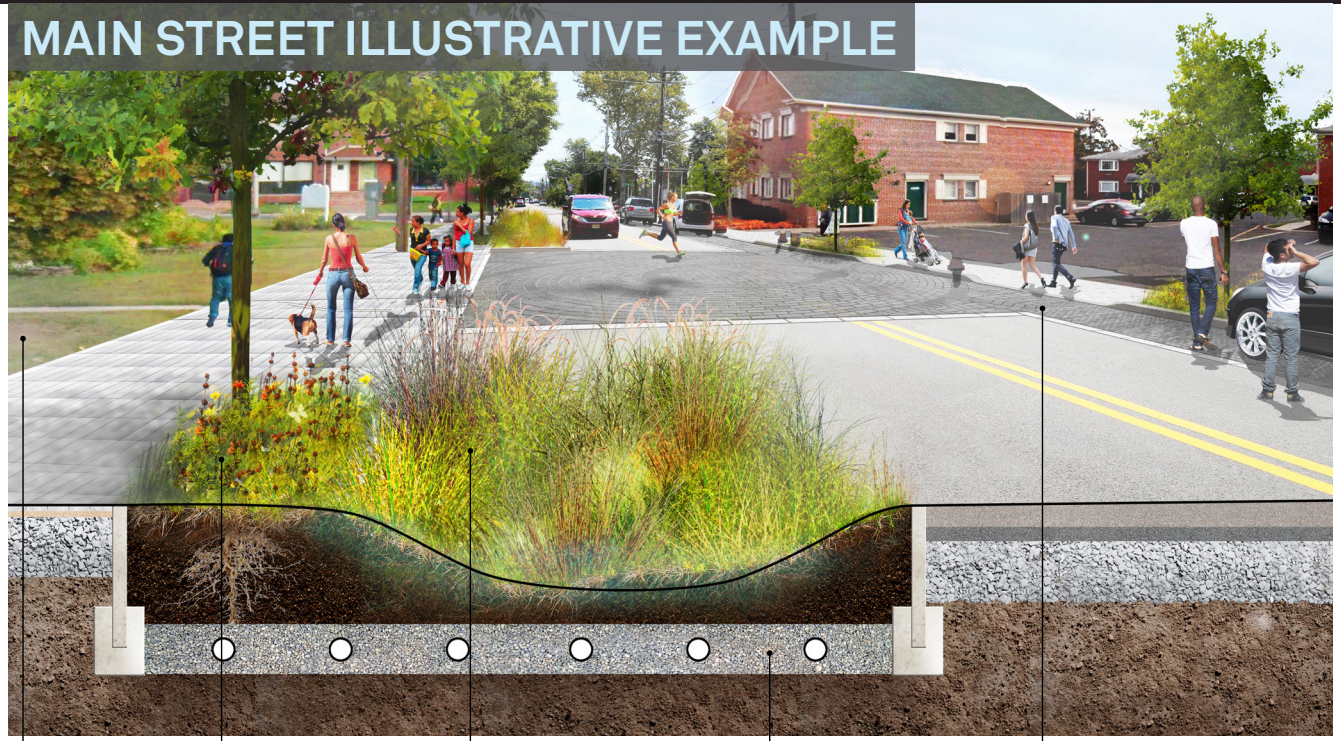
FILTER STRIP
Native plantings uptake pollutants before entry into water systems

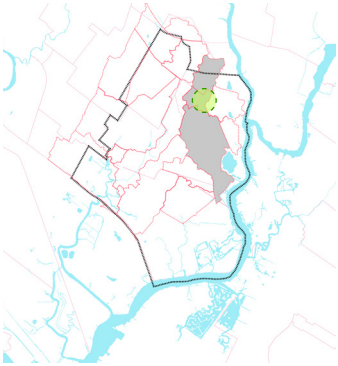
BIORETENTION
Filters 80-90% of suspended solids and slows flow of storm water into combined sewer systems

DITCH WIDENING
Maximizes ecological opportunity and storm water conveyance to larger watershed

GRAVEL TRENCH
Provides initial infiltration of road runoff before overflow into ecologically improved ditch

MAIN STREET ILLUSTRATIVE EXAMPLE





KEY MAP

OPEN SPACE
Absorbs more storm water

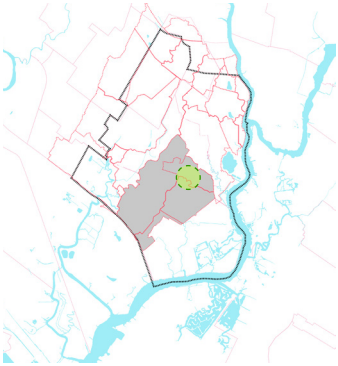
NATIVE PLANTS
Low-maintenance options that contribute to native ecological systems

RAIN GARDENS
Filters 60-90% of suspended solids and prevents water from overflowing sewer systems

PERFORATED PIPE
Drains storm water overflow during larger rain events

PERMEABLE PAVING
Absorbs storm water and serves as place-making for Main Street

EMPIRE BLVD ILLUSTRATIVE EXAMPLE



KEY MAP

BIOSWALES

Filters 60-90% of suspended solids and prevents water from overflowing sewer systems

CURB CUT

Allows infiltration of road runoff into adjacent bioswales while maintaining the safety of raised curbs

OPEN SPACE

Absorbs more storm water

NEXT STEPS

Chris Benosky, AECOM

NJDEP / AECOM UPCOMING ACTIVITIES

- Prepare Meeting Summary for CAG #5 meeting
- Continue developing:
  - Initial Alternatives and Concepts
  - Preliminary Draft EIS

CAG CALL TO ACTION

- Review and comment on Meeting Summary for CAG #5 meeting.
- Share information from this meeting with friends and neighbors.
- Educate your friends and colleagues on the Project and NEPA process.
- Continue to build interest in the Project.
- Continue obtaining information, ideas, and potential concerns from constituents.
- Ensure the public knows about upcoming information (to be posted on Project website).

CRITICAL INFORMATION

TUESDAY DECEMBER 6TH
CAG MEETING #6

PROJECT WEBSITE
WWW.RBD-MEADOWLANDS.NJ.GOV

PROJECT EMAIL
RBD-MEADOWLANDS@DEP.NJ.GOV

Q&A

THANK YOU!