Subject	**Meeting Minutes - Citizen Advisory Group (CAG) Meeting #5**
Meeting Date	**October 24, 2016**
Scheduled Time	**6:00 pm – 8:00 pm ET**
Location	**Learning Center Room, 4th Floor, One Bergen County Plaza, Hackensack, NJ 07601**
Attendees	**Attendee list available, *for internal use only***

- The PowerPoint slide presentation utilized at the meeting is attached to the meeting minutes (see **Attachment 1**).
- A CAG meeting packet was provided to all attendees and is also attached to the meeting minutes (see **Attachment 2**).
- Introductions – Linda Fisher, NJDEP Rebuild by Design Meadowlands (RBDM) Project Team Manager, started the meeting and thanked Bergen County for the use of their facility for the meeting.
- Chris Benosky, AECOM's Rebuild by Design (RBD) Program Manager, provided a brief overview of the meeting objectives, which included: (1) a Project status update; (2) a summary of the Project process and screening criteria; (3) an overview of what was learned from the CAG #4 meeting; (4) a report on biological data collected to date within the Project Area in support of the Environmental Impact Statement (EIS) and related regulatory agency reviews; and (5) information on drainage basin opportunity areas within the Project Area.
- The Draft Screening Criteria Matrix presented at the CAG #3 meeting was updated based on comments received from the CAG. This matrix is a decision-making tool that will be used to screen all Project opportunities, concepts, and alternatives. Further, it is a living document that will continue to be modified, as appropriate, during the alternative development process.
- Several Project drainage improvement opportunities were presented at the CAG #5 meeting; these opportunities are related to Alternative 2, the Storm Water Drainage Improvement alternative. Each of these opportunities will go through the screening process. While many of these opportunities will not make it through the screening process, they were shared to provide additional insight into the evaluation process for the CAG.
- The next CAG meeting will be on **December 6, 2016**; we will not have a meeting in November. The CAG #6 meeting will focus on Alternative 1, the Structural Flood Reduction alternative. The CAG #7 meeting will be held in January; it will focus on Alternative 3, the Hybrid alternative.
- Susan Bemis, AECOM Senior Planner, presented a summary of the input received during the CAG #4 meeting. The following overall key priorities were identified by the CAG during that meeting: (1) address frequent flooding from rain fall events; (2) implement the most immediate

and cost-efficient options; (3) identify a holistic solution; (4) address and identify long-term maintenance measures, requirements, and responsibilities; and (5) discuss and consider private land acquisitions. In addition, several key priorities for each of the Build Alternatives were also identified, as summarized below.

  - **Alternative 1 (Structural Flood Reduction)**: (1) waterfront access; (2) protection of wetlands; (3) maintenance and operation of deployables; and (4) prioritize flood protection.

  - **Alternative 2 (Storm Water Drainage Improvements):** (1) improve current stormwater drainage systems and find ways to link new systems with existing ones; (2) consider grey and green infrastructure; (3) enhance existing open spaces; and (4) return developed areas to a more natural state.

  - **Alternative 3 (Hybrid):** (1) improvements should not generate or promote more development; (2) contamination associated with Berry's Creek should be considered; and (3) consider a combination of grey and green infrastructure to achieve the greatest benefit.

- John Rollino, AECOM Senior Ecologist, presented a summary of the Project Area's ecology. The Project Team is studying all natural areas (i.e., approximately 1,800 acres of vegetative communities) within the Project Area, including the small, isolated natural areas and ditches within the urban/developed portions. The Project Team is reviewing existing surveys and data in conjunction with the current field work to characterize the ecology of the Project Area. There are numerous studies on the Hackensack River and adjacent wetlands, but studies are limited within the smaller, more interior portions of the Project Area that are surrounded by industrial/commercial uses.

- The biological resources field studies were initiated this summer, and will continue through the spring of 2017. Studies include: habitat mapping and evaluation, wetland delineations, botanical inventories, and fauna surveys (birds, benthic invertebrates, fish, amphibians, reptiles, and mammals).

- Habitat types and vegetation community structure were identified and mapped within the "natural areas" of the Project Area, along with their ecological value, to help facilitate the planning process and to minimize impacts to the extent possible. One way of determining ecological value is by using the US Army Corps of Engineers (USACE) Evaluation of Planned Wetlands (EPW) methodology, which provides mathematical scores that allow for habitat comparisons within the Project Area. These values can also provide context for post-construction mitigation purposes. There are some high value habitats in the Project Area (Teterboro Woods, Hackensack River wetlands, etc.), as well as some low-value habitats (drainage ditches and basins, etc.).

- Wildlife studies are being conducted seasonally, with some specialized studies (e.g., nesting, vernal pools, etc.) being conducted as well. Ten field study locations in the Project Area are being monitored for birds. Based on last summer's surveys, approximately 70 bird species have been identified to date, with the majority of the sightings being common species. Fish and benthic invertebrate studies are being conducted at nine locations. To date, documented species are typical of disturbed areas. Mammal surveys are being conducted in various locations using game cameras, presence observation (tracts, scat), nocturnal surveys, and (over this winter) snow tracking. To identify bat species in the area, echolocations are being recorded with ultrasonic microphones. To date, 14 mammals have been identified, all common to urban/suburban habitats.

- Based on preliminary data, the Project Area includes a number of invasive plant species, with some areas completely dominated by these species. Many small waterways are polluted and stressed. This Project presents an opportunity to not only reduce flooding, but to concurrently improve the ecological functions and values within Project Area habitats.

- Michael Vecchio, HDR Senior Engineer, presented a summary of the drainage basin opportunity areas in the Project Area. The Project Area has been divided into five distinct sub-basins to identify stormwater management strategies using both grey and green infrastructure. The five zones include: (1) Zone A: West Riser Ditch and Berry's Creek; (2) Zone B: East Riser Ditch; (3) Zone C: Losen Slote; (4) Zone D: DePeyster Creek and Main Street Ditch; and Zone E: Carol Place Ditch, Moonachie Creek, and Peach Island Creek.

- The opportunities identified within each of the five zones address flooding concerns associated with rainfall events under typical tidal conditions, and would not protect against coastal storm surge. A brief description of potential opportunities by zone (sub-basin) was provided. The Project Team is currently looking into opportunities in the northern portion of the Project Area to re-direct water from the Riser ditches to the Hackensack River (i.e., use the river as a storm water conveyance). In addition, it was noted that improvements (if deemed viable) along the East Riser would benefit a large portion of the Project Area because the East Riser traverses many of the Project Area communities. Further, it was noted that improvements along the upper portion of the Losen Slote could prove to be a challenge due to past activities (i.e., development and fill).

- To provide further context on how the potential storm water improvements may look in practice, Susan Bemis presented five examples illustrating the implementation of grey and green infrastructure within the Project Area:

    - Caesar Place: New wetlands and enhanced existing wetlands could become accessible to the public with a boardwalk.

  - Fluvial Park: Bio-swales, bio-retention basins, and created wetlands could be surrounded by permeable paving for public access.
  - East Riser: Widened bio-retention basins could be surrounded by vegetative filters and gravel trenches to provide infiltration of road runoff before flowing into an ecologically improved ditch.
  - Main Street: Rain gardens could be surrounded by open space, permeable street paving, and underlined by a perforated pipe to drain storm water during larger rain events.
  - Empire Boulevard: Bio-swales could be surrounded by open space, permeable street paving, and a "curb cut" that would allow infiltration of road runoff into the bio-swale, while still maintaining the safety of a raised curb.

- Chris Benosky closed the presentation. He requested the CAG provide comments via rbd-meadowlands@dep.nj.gov on the CAG #5 meeting format and content, and encouraged the CAG to continue to build interest in the Project. Prior to closing the meeting, Mr. Benosky asked the CAG members if they had any questions or comments about the material presented.
- A CAG Member questioned the proposed tide gate at Patterson Plank Road. Based on previous studies, it was found that a tide gate in this location could increase pollution. A CAG Member identified that an increase in freshwater could increase the suspension of mercury; salt water keeps mercury from being suspended. The Project Team provided further clarification that this would not be a typical "tide gate", but rather a "sector gate" that would be left open during normal tidal fluctuations and only closed during a storm event. The Project Team is coordinating with the US Environmental Protection Agency (USEPA) on a regular basis (monthly meetings) to address potential pollution concerns associated with Berry's Creek.
- A CAG Member identified that the salinity in the Hackensack River norther of Route 3 seems to be decreasing; another CAG Member identified that the salinity level fluctuates over time based on rainfall and season.
- A CAG Member questioned how water would be re-routed to the Hackensack River. This would occur via pipes (downgradient areas) and possibly pump stations.
- A CAG Member questioned if a breeding bird survey will be conducted. A breeding survey will be conducted in the spring.
- A CAG Member asked for additional information on the potential West Riser pump station opportunity, identified in the "Zone A" drainage sub-basin discussion. The Project Team responded that this would likely be a new, stand-alone pump station, assuming this opportunity passes the screening process. CAG Members identified that improvements to the East and West Risers would benefit multiple towns.

- A CAG Member cautioned the Project Team about making high-quality and low-quality habitat judgements. For example, typically *Phragmites* spp. are considered a characteristic of low-quality habitats, but this is not necessarily true in the Meadowlands.

- Further, from a biodiversity standpoint, a CAG Member noted that it's important to know the specific species within a potential impact area. CAG Members encouraged the use of more precise biological surveys if these surveys are being used as a decision-making tool during alternative development and evaluation. For example, eastern and western mosquitofish species look similar, but the eastern species is native to the area and considered rare, while the western species is common with low ecological value.

- CAG Members discussed the draining of Merhoff Pond (approximately 40' deep with steep sides) that occurred in the 1950's; the pond was dry for a period. A pump house near the pond was used to drain the pond. There is a road bed that divides the pond at the bottom of the pond. At that time (1950's), Bergen County Utilities Authority (BCUA) began using one side of the drained pond as a sludge lagoon ("a black putrid mess"), which ultimately led to the other side of the pond becoming polluted. The bottom of the pond is likely layered with this sludge today. This pond used to have clear water that was fed by a cold water spring with abundant wildlife, including numerous frogs and toads. The CAG Member had not heard frogs and toads in the area for 40-50 years, including in the woods by Redneck Avenue (potential jet fuel contamination?). The pond is still a good waterfowl habitat (ruddy ducks) and bird-watching area (bald eagles), but, in general, wildlife habitat has declined greatly. CAG Members recommended this pond be restored, possibly incorporating this restoration with the potential improvements to the Losen Slote. The Project Team has a meeting scheduled with BCUA on October 26, 2016, and this is good information that will be discussed at that meeting. CAG Members also mentioned that an observation deck and other public amenities (non-contact with water) will be opened for public use at this pond in the spring.

- CAG Members indicated that they would be interested in getting another update on the biological resources surveys at the next CAG meeting and would like to see more specific and quantitative data. CAG Members would also be very interested in seeing ecological improvements and re-introduction of native species in the Project Area.

Meeting adjourned at 7:50 pm ET.

Attachment 1.
Power Point Slide Presentation (as delivered)

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

Linda Fisher, NJDEP

- 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

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- 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

Chris Benosky, AECOM

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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

PROCESS

Chris Benosky, AECOM

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DEVELOPING CONCEPTS

SITE INVESTIGATION AND RESEARCH

↓

CONCEPT DEVELOPMENT

↓

SCREENING AND FEASIBILITY

SCREENING CRITERIA

Chris Benosky, AECOM

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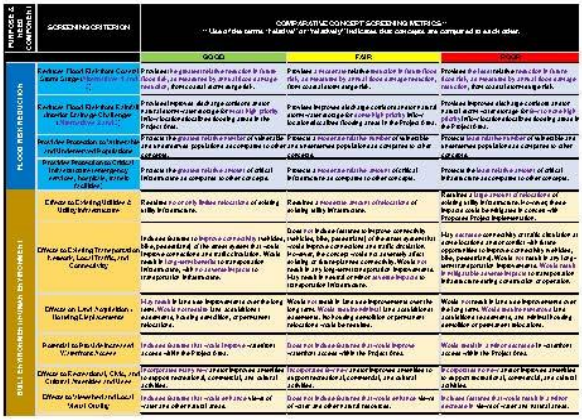


PURPOSE & NEED COMPONENT	SCREENING CRITERION	COMPARATIVE CONCEPT SCREENING METRICS -- Use of the terms "relative" or "relatively" indicates that concepts are compared to each other.		
		GOOD	FAIR	POOR
FLOOD RISK REDUCTION	Enhance Flood Risk Future Conditions Climate Change Resilience	Provides the greatest relative reduction in future flood risk, as measured by area of flood damage reduction, from coastal storm surge risk.	Provides a moderate relative reduction in future flood risk, as measured by area of flood damage reduction, from coastal storm surge risk.	Provides the least relative reduction in future flood risk, as measured by area of flood damage reduction, from coastal storm surge risk.
	Enhance Flood Risk Future Extreme Weather Climate Change Resilience	Provides improved discharge conditions under current storm water outlet conditions and high priority inflow locations during flooding areas in the Project Area.	Provides improved discharge conditions under current storm water outlet conditions and some high priority inflow locations during flooding areas in the Project Area.	Provides improved discharge conditions under current storm water outlet conditions and high priority inflow locations during flooding areas in the Project Area.
	Avoid Increased Exposure to Vulnerable Populations/Environmental Justice	Protects the greatest relative number of vulnerable and environmental populations as compared to other concepts.	Protects a moderate relative number of vulnerable and environmental populations as compared to other concepts.	Protects the least relative number of vulnerable and environmental populations as compared to other concepts.
	Provides Protection to Critical Infrastructure (emergency services, hospitals, schools, 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.
	Effects to Existing Transportation Network, Local Traffic, and Community	Induces Outcome to improve connectivity (vehicular, pedestrian, bike, passenger) 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 induce Outcome to improve connectivity (vehicular, pedestrian, bike, passenger) of the street system that would improve connections and traffic circulation. However, the concept would not adversely affect existing or future improved connectivity. Would not result in any long-term or regional transportation improvements. May result in need for minor or adverse impacts to transportation infrastructure.	May increase connectivity of traffic circulation at some locations and in conflict with future opportunities to improve connectivity (vehicular, bike, pedestrian). Would not result in any long-term or regional transportation improvements. Would result in mitigatible adverse impacts to transportation infrastructure existing construction or operation.
	Effects on Land Acquisition - Existing Land Ownership	May result in little or no improvements over the long term. Would not require little or no land acquisitions/easements, having small effect on private relocations.	Would not result in little or no improvements over the long term. Would require moderate land acquisitions/easements. No housing demolition or permanent relocations would be required.	Would not result in little or no improvements over the long term. Would require extensive land acquisitions/easements, the majority being demolition or permanent relocations.
	Potential to Result in Environmental Enhancement Opportunities	Induces Outcome that would improve condition/access within the Project Area.	Does not induce Outcome that would improve condition/access within the Project Area.	Would result in minor decrease in condition/access within the Project Area.
	Effects to Recreational, Civic, and Cultural Amenities and Uses	Proposed Concept Features that would improve amenities to support recreational, commercial, civic, cultural activities.	Proposed Concept Features that would improve amenities to support recreational, commercial, civic, cultural activities.	Proposed Concept Features that would improve amenities to support recreational, commercial, civic, cultural activities.
	Effects to Viewsheds and Local Visual Quality	Induces Outcome that would enhance views of other areas and uses.	Does not induce Outcome that would enhance views of other areas and uses.	Induces features that would result in a minor decrease in views of other areas and uses.

Sample of the screening criteria matrix

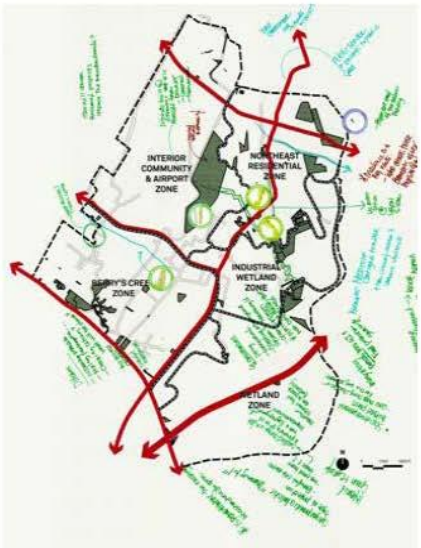
- How do we use the screening criteria to consolidate potential opportunity areas?
  - Identify potential opportunities and develop into concepts
  - Screen concepts using screening criteria
  - Not all opportunities/concepts will pass screening process

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

Susan Bemis, AECOM

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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.

ALTERNATIVE 2 - CAG #4 COMMENTS

Susan Bemis, AECOM

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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

Susan Bemis, AECOM

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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

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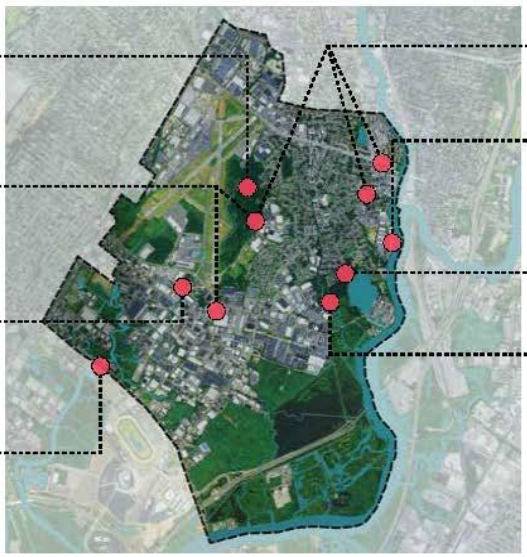
TETERBORO AIRPORT
Opportunity for green infrastructure at Teterboro Airport (upgrade of disturbed environments).

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 14

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.

REBUILD BY DESIGN MEADOWLANDS Citizen Advisory Group (CAG) Meeting #5 // October 24, 2016 AECOM

PROJECT AREA ECOLOGY

John Rollino, AECOM

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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)

BIOLOGICAL RESOURCES

John Rollino, AECOM

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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

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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.

HABITAT MAPPING

John Rollino, AECOM

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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.

MAPPED DATA COLLECTION

John Rollino, AECOM

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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.

MAPPED DATA COLLECTION

John Rollino, AECOM

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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.

ECOLOGICAL EVALUATION

John Rollino, AECOM

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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.

WETLANDS

John Rollino, AECOM

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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).

SOILS: UPLAND AND WETLAND

John Rollino, AECOM

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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

John Rollino, AECOM

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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.

WILDLIFE STUDIES

John Rollino, AECOM

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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.

BIRDS

John Rollino, AECOM

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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.

BIRDS

John Rollino, AECOM

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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

BIRDS

John Rollino, AECOM

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PRELIMINARY DATA

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

FISH AND BENTHIC INVERTEBRATES

John Rollino, AECOM

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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.

MAMMALS

John Rollino, AECOM

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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.

MAMMALS

John Rollino, AECOM

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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*)

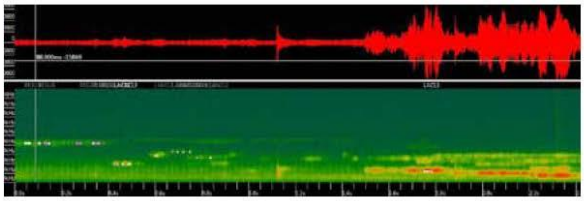
MAMMALS

John Rollino, AECOM

32

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.

ECOLOGICAL ENHANCEMENT

John Rollino, AECOM

33

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.

PRELIMINARY CONCLUSIONS

John Rollino, AECOM

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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.

PRELIMINARY CONCLUSIONS

John Rollino, AECOM

35

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

Michael Vecchio, HDR

37

DEVELOPING CONCEPTS

SITE INVESTIGATION AND RESEARCH

↓

CONCEPT DEVELOPMENT

↓

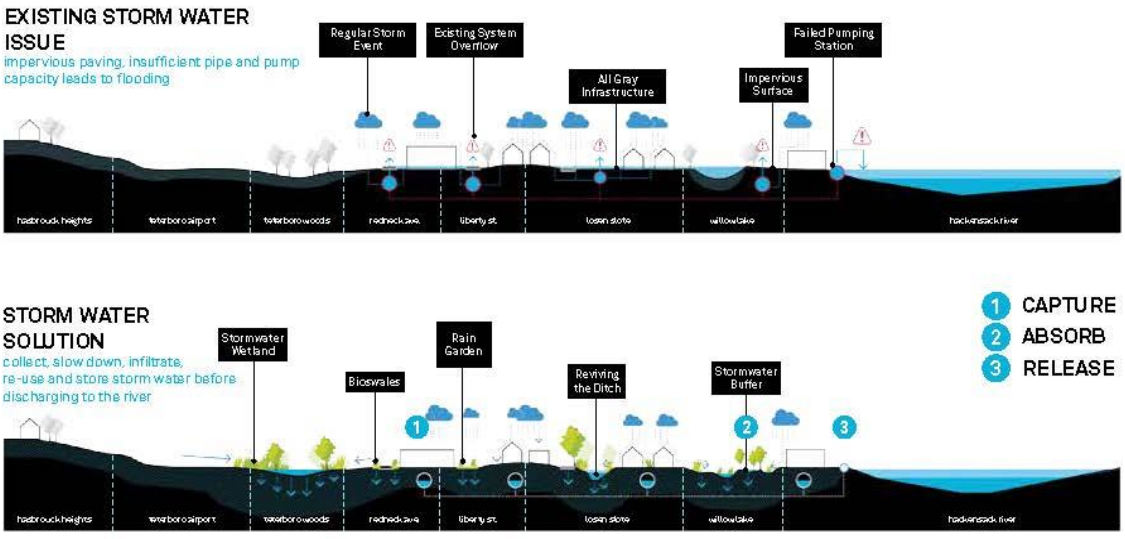
SCREENING AND FEASIBILITY

- 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

38



STORM WATER DRAINAGE

Michael Vecchio, HDR

39

KIT OF PARTS:
MOVING FROM **STRATEGY** TO **OPPORTUNITY**

RUNNEL

OPEN SPACE

BIORETENTION

RAIN GARDEN

BIOSWALE

FILTER STRIP

BIKEABLE STREETS

WETLAND ENHANCEMENT/CREATION

PERMEABLE PAVING

WIDENING DITCHES

REBUILD BY DESIGN MEADOWLANDS

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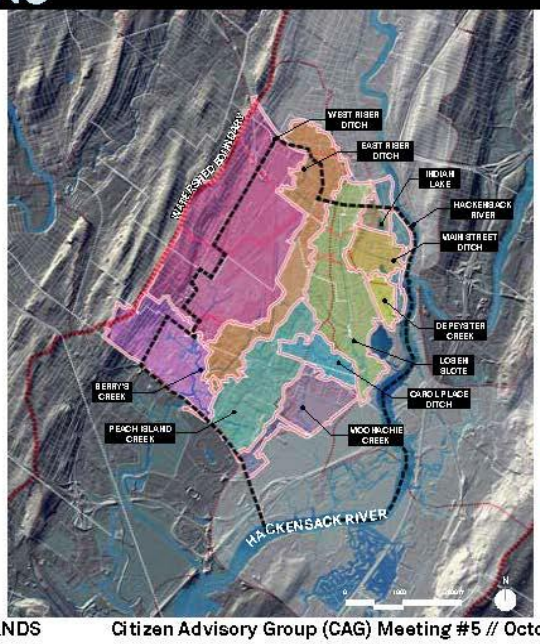
AECOM

DRAINAGE SUB-BASINS

Michael Vecchio, HDR

40

- 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

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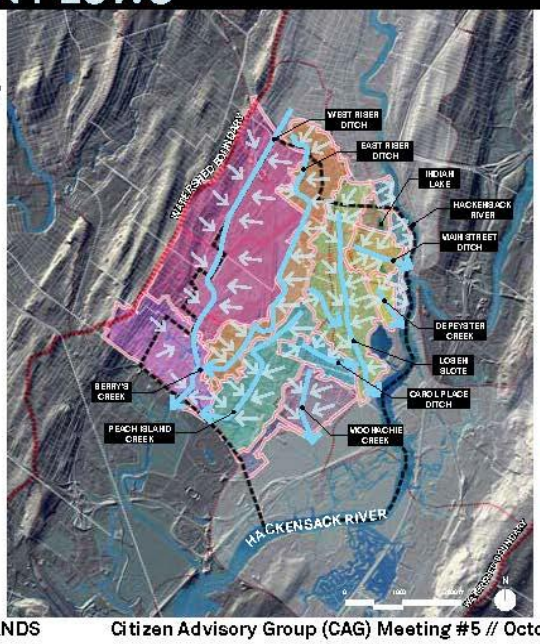
DRAINAGE SUB-BASIN FLOWS

Michael Vecchio, HDR

41

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



KEY MAP

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DRAINAGE SUB-BASIN ZONES

Michael Vecchio, HDR

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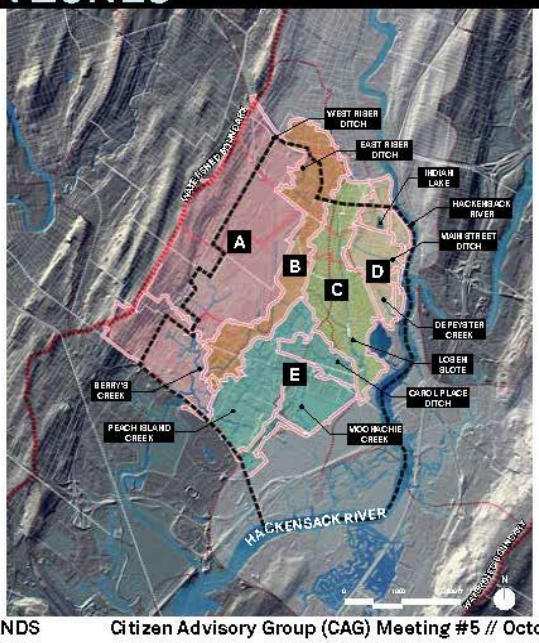
- ZONE A: West Riser Ditch + Berry's Creek
- ZONE B: East Riser Ditch
- ZONE C: Losen Slote
- ZONE D: DePeyster Creek + MainStreet Ditch
- ZONE E: Carol Place Ditch + Moonachie Creek + Peach Island Creek



KEY MAP

LEGEND

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DRAINAGE SUB-BASIN ZONE A
Michael Vecchio, HDR
43
POTENTIAL OPPORTUNITIES
West Riser dredging
West Riser Tide Gate and Pump Station
Access for O&M
Green streets
WILLIAMS AVE STATION
WEST RISER DITCH
Length: 13,888 ft
Drainage Area: 3.89 sq mi
SYLVAN AVE
MAIN ST
MOONACHIE AVE
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
REBUILD BY DESIGN MEADOWLANDS
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DRAINAGE SUB-BASIN ZONE B
Michael Vecchio, HDR
44
POTENTIAL OPPORTUNITIES
East Riser dredging
East Riser Tide Gate
Pump Station
East Riser Tide Gate upgrade
Off-channel storage
BERGEN COUNTY TECHNICAL SCHOOL
SYLVAN AVE
Length: 1.7 mi
Right of Way Width: 60 ft
EAST RISER DITCH
Length: 16,304 ft
Drainage Area: 1.14 sq mi
TETERBORO WOODED WET LAND
Area: 128.2 acres
MOBILE ESTATES POCKET PARKS
CARLSTADT POCKET PARKS
Area: 0.8 acres/2.6 acres
I-80
MAIN STREET
MOONACHIE AVE
KEY MAP
LEGEND
STORM WATER IMPROVEMENT POTENTIAL OPPORTUNITIES
OPEN SPACE IMPROVEMENT OPPORTUNITY
PROJECT BOUNDARY
ZONE
SUB-WATERSHED
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DITCH
EVACUATION ROUTE
REBUILD BY DESIGN MEADOWLANDS
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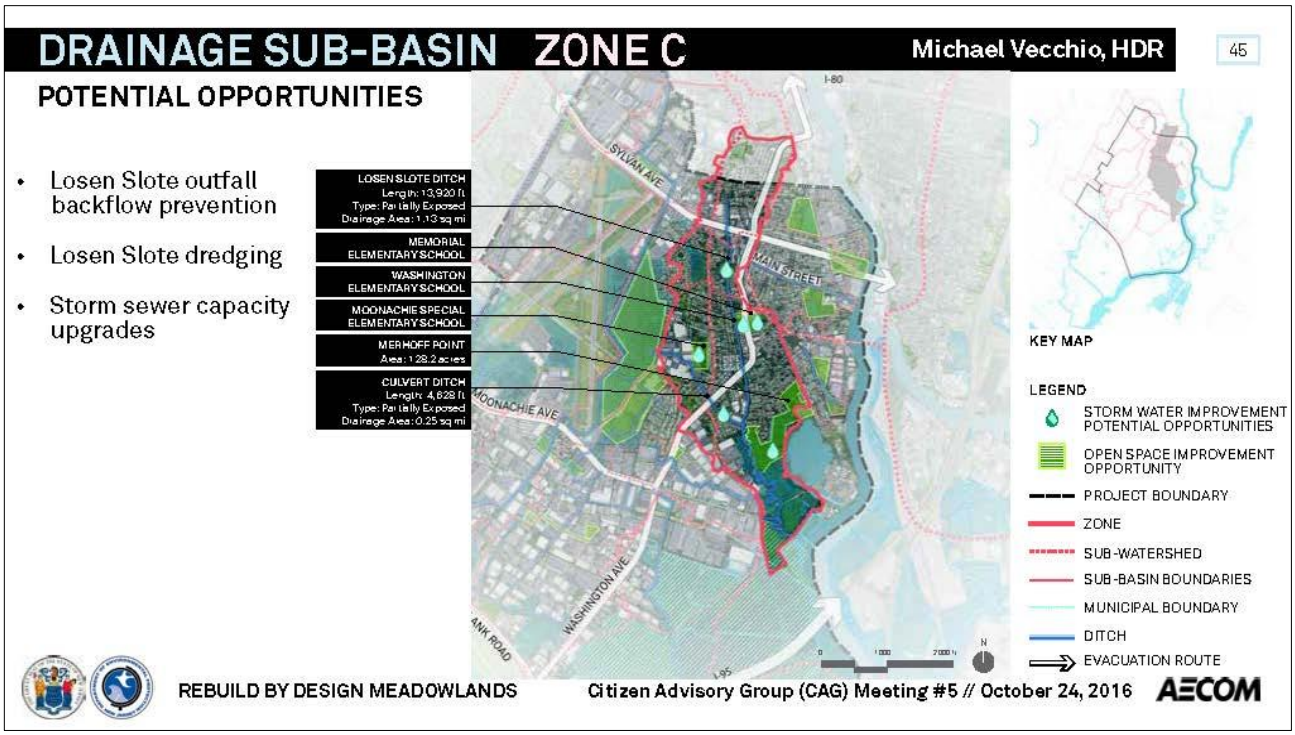
DRAINAGE SUB-BASIN ZONE C
Michael Vecchio, HDR
45
POTENTIAL OPPORTUNITIES
• Losen Slote outfall backflow prevention
• Losen Slote dredging
• Storm sewer capacity upgrades
LOSEN SLOTE DITCH
Length: 13,920 ft
Type: Partially Exposed
Drainage Area: 1.13 sq mi
MEMORIAL ELEMENTARY SCHOOL
WASHINGTON ELEMENTARY SCHOOL
MOONACHIE SPECIAL ELEMENTARY SCHOOL
MERHOFF POINT
Area: 128.2 acres
CULVERT DITCH
Length: 4,628 ft
Type: Partially Exposed
Drainage Area: 0.25 sq mi
I-80
SYLVAN AVE
MAIN STREET
MOONACHIE AVE
WASHINGTON AVE
I-95
KEY MAP
LEGEND
STORM WATER IMPROVEMENT POTENTIAL OPPORTUNITIES
OPEN SPACE IMPROVEMENT OPPORTUNITY
PROJECT BOUNDARY
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EVACUATION ROUTE
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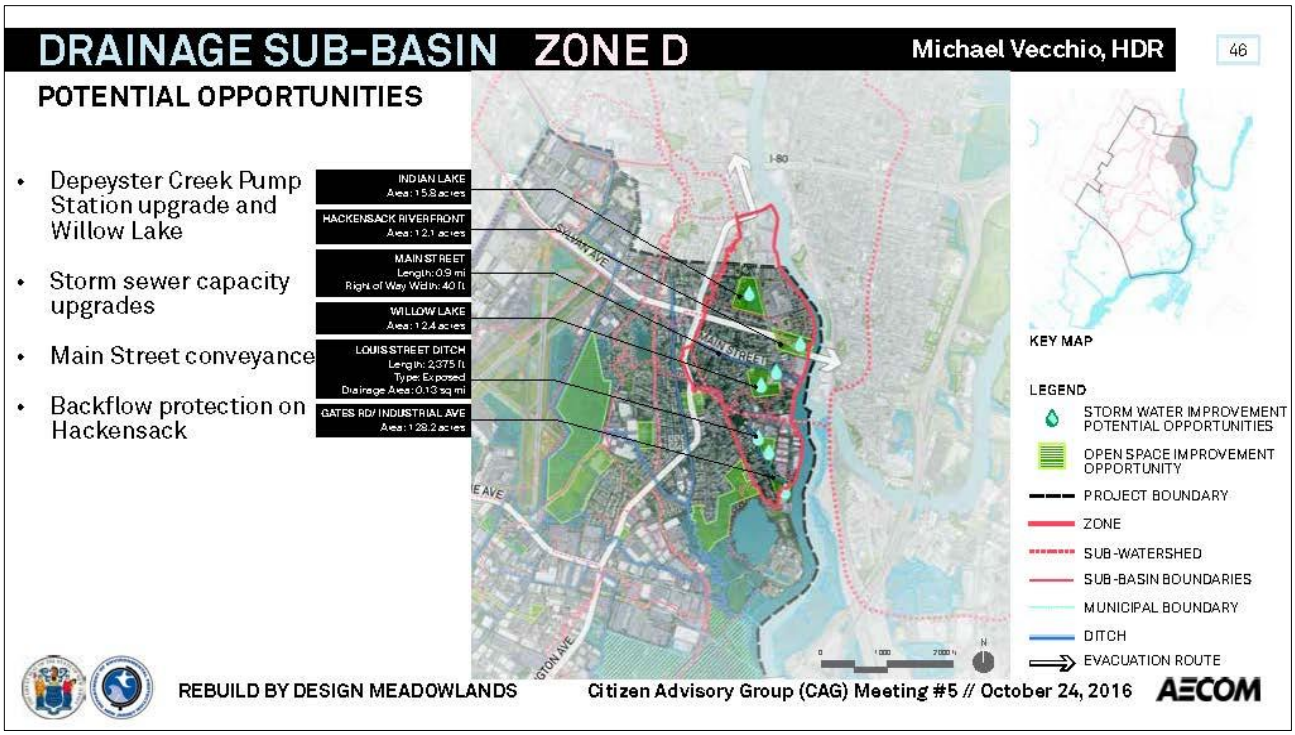
DRAINAGE SUB-BASIN ZONE D
Michael Vecchio, HDR
46
POTENTIAL OPPORTUNITIES
• Depeyster Creek Pump Station upgrade and Willow Lake
• Storm sewer capacity upgrades
• Main Street conveyance
• Backflow protection on Hackensack
INDIAN LAKE
Area: 15.8 acres
HACKENSACK RIVERFRONT
Area: 12.1 acres
MAIN STREET
Length: 0.9 mi
Right of Way Width: 40 ft
WILLOW LAKE
Area: 12.4 acres
LOUIS STREET DITCH
Length: 2,375 ft
Type: Exposed
Drainage Area: 0.13 sq mi
GATES RD/ INDUSTRIAL AVE
Area: 128.2 acres
I-80
SYLVAN AVE
MAIN STREET
KEY MAP
LEGEND
STORM WATER IMPROVEMENT POTENTIAL OPPORTUNITIES
OPEN SPACE IMPROVEMENT OPPORTUNITY
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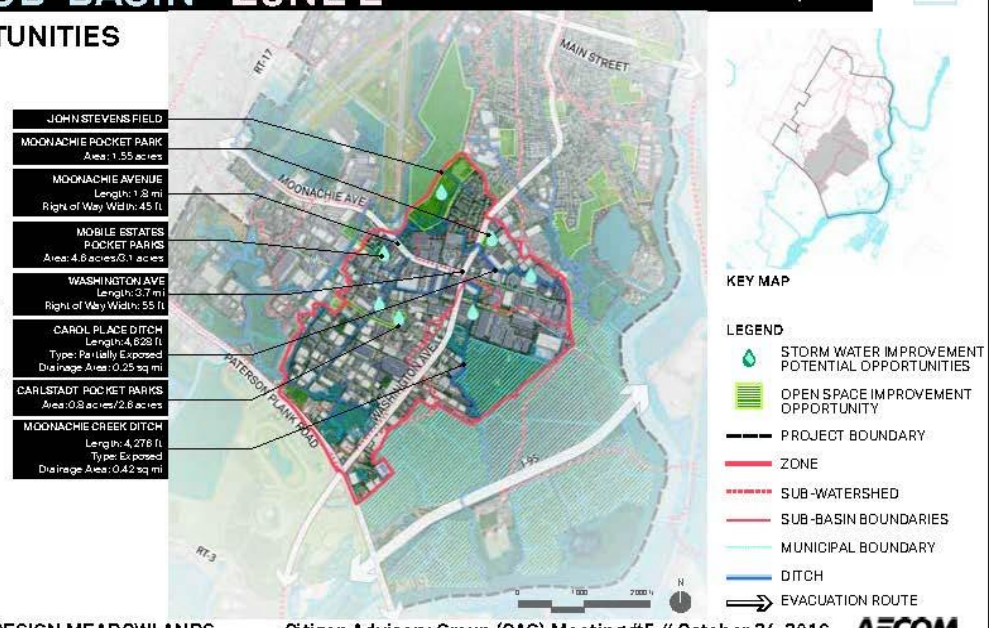
DRAINAGE SUB-BASIN ZONE E

Michael Vecchio, HDR

47

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



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WHAT COULD THESE LOOK LIKE?

Susan Bemis, AECOM

REBUILD BY DESIGN MEADOWLANDS

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OPEN SPACE + HABITAT IMPROVEMENTS
Susan Bemis, AECOM
49
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
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OPEN SPACE IMPROVEMENTS
Susan Bemis, AECOM
50
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
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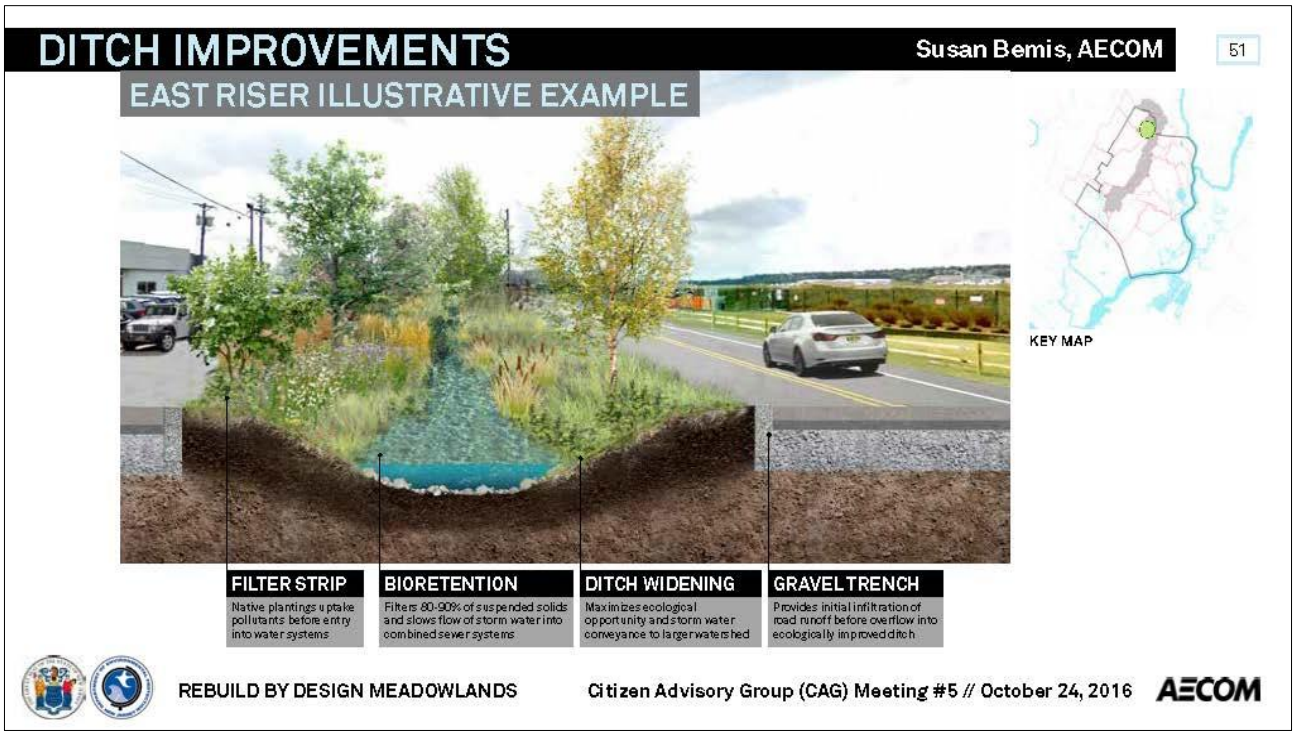
DITCH IMPROVEMENTS
Susan Bemis, AECOM
51
EAST RISER ILLUSTRATIVE EXAMPLE
KEY MAP
FILTER STRIP
Native plantings uptake pollutants before entry into water systems
BIORETENTION
Filters 80-90% of suspended solids and slows flow of storm water into combined sewer systems
DITCH WIDENING
Maximizes ecological opportunity and storm water conveyance to larger watershed
GRAVEL TRENCH
Provides initial infiltration of road runoff before overflow into ecologically improved ditch
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STREET IMPROVEMENTS
Susan Bemis, AECOM
52
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
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STREET IMPROVEMENTS

Susan Bemis, AECOM

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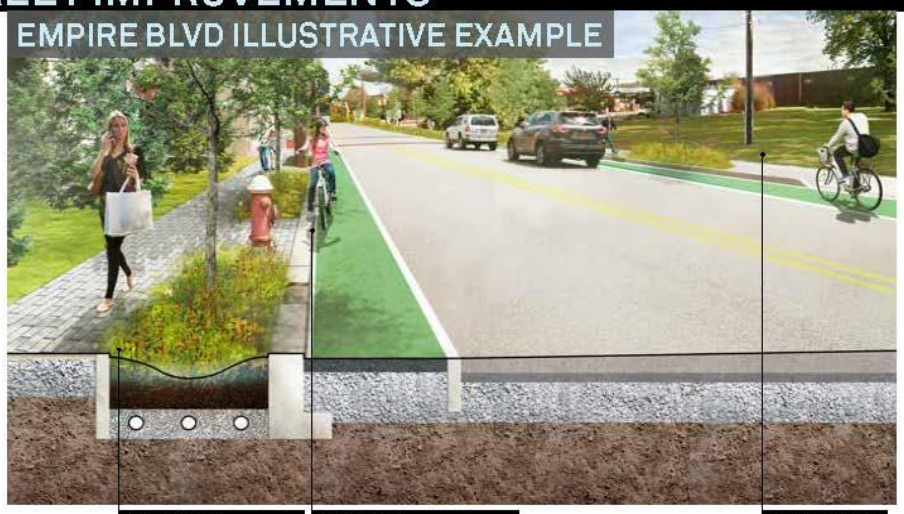
EMPIRE BLVD ILLUSTRATIVE EXAMPLE



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

NEXT STEPS

Chris Benosky, AECOM

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NJDEP / AECOM UPCOMING ACTIVITIES

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

NEXT STEPS

Chris Benosky, AECOM

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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).

NEXT STEPS

Chris Benosky, AECOM

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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!

Attachment 2.
CAG Meeting Packet #5 (provided as handout at meeting)

REBUILD BY DESIGN

MEADOWLANDS

CITIZEN ADVISORY GROUP (CAG) MEETING #5

ECOLOGY AND DRAINAGE BASIN OPPORTUNITY AREAS

October 24, 2016

FLOOD PROTECTION PROJECT

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

PREPARED BY AECOM

Español 中文:繁體版 Việt-ngữ 한국어 Tagalog
Português العربية Kreyòl ગુજરાતી Italiano Polski
www.renewjerseystronger.org

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1.0 List of Acronyms and Glossary

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

Glossary

Bioretention - is the process in which contaminants and sedimentation are removed from storm water runoff. Storm water is collected in treatment areas which often include landscape vegetation

Bioswale - a vegetated landscape swale that removes silt and pollution from surface runoff water, usually with gently sloped sides

Easement - the right to use and/or enter onto the property of another without possessing it

Encumbrance - an encumbrance is property which may be owned by one entity but other entities may have a right to or legal liability on the property

Filter strip - a flat vegetated area that removes pollutants from storm water as the storm water moves across as sheet flow. Filter strips are between 25 and 100 feet long

Fluvial Park - a public park with various ecosystems, especially related to wetlands and river ecosystems, with varying elevations and habitats. During a flood event the park can handle water inundation

Permeable Paving - a type of paving that allows rainwater to filter through the surface into a water catchment base, often created with interlocking paver tiles or a porous material surface

Public Realm - publicly owned streets, pathways, right of ways, parks, publicly accessible open spaces and any public and civic building and facilities

Rain Garden - a planted depression in a garden that absorbs rainwater runoff from impervious areas such as roofs, driveways, walkways, parking lots, and lawn areas

Runnel - a designed and landscaped channel that directs and assists the flow of rainwater

Widening Ditch – (3) Main ways to improve the ditches; daylighting and increasing habitat and vegetation, extending the ditch to connect to riparian corridor, and filling the ditch with aggregate, but expanding habitat above

2.0 Agenda

6-8 pm
October 24, 2016
Learning Center Room, 4th Floor
One Bergen County Plaza
Hackensack, NJ 07601

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

Welcome

Presentation

- Opening Remarks (15 Minutes)
  - Agenda (Linda Fisher, NJDEP)
  - Project Status Update and Project Process (Chris Benosky, AECOM)
- What We Learned from CAG #4 (10 Minutes)
  - General Comments, Alternatives, & Site-Specific Feedback (Susan Bemis, AECOM)
- Project Area Ecology (40 Minutes)
  - Project Area Ecology (John Rollino, AECOM)
- Drainage Basin Opportunity Areas (20 Minutes)
  - Storm Water Improvements within Sub-basins,
    Drainage Zone Areas (Michael Vecchio, HDR)
    What Could These Look Like? (Susan Bemis, AECOM)
- Next Steps & Q&A/Closure (15 Minutes)
  - Next Steps (Chris Benosky, AECOM)
  - Question and Answers

3.0 Power Point Presentation

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

Linda Fisher, NJDEP

2

- 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

3

- 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

Chris Benosky, AECOM

4

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

PROCESS

Chris Benosky, AECOM

5

DEVELOPING CONCEPTS

SITE INVESTIGATION AND RESEARCH

↓

CONCEPT DEVELOPMENT

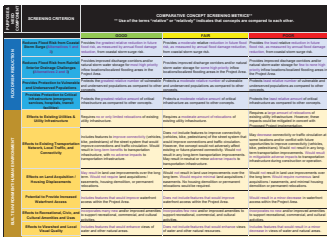
↓

SCREENING AND FEASIBILITY

SCREENING CRITERIA

Chris Benosky, AECOM

6



Sample of the screening criteria matrix

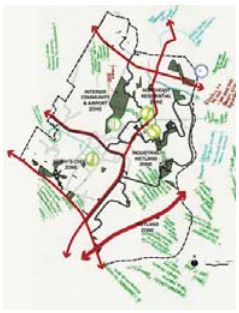
- How do we use the screening criteria to consolidate potential opportunity areas?
  - Identify potential opportunities and develop into concepts
  - Screen concepts using screening criteria
  - Not all opportunities/concepts will pass screening process

WHAT WE LEARNED FROM CAG #4 MEETING

Susan Bemis, AECOM

GENERAL - CAG #4 COMMENTS

Susan Bemis, AECOM 8



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

Susan Bemis, AECOM 9

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.

ALTERNATIVE 2 - CAG #4 COMMENTS

Susan Bemis, AECOM 10

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

Susan Bemis, AECOM 11

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 12

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 14

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.

PROJECT AREA ECOLOGY

John Rollino, AECOM 15

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)

BIOLOGICAL RESOURCES

John Rollino, AECOM 16

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 17

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.

HABITAT MAPPING

John Rollino, AECOM 18

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.

MAPPED DATA COLLECTION

John Rollino, AECOM

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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.

MAPPED DATA COLLECTION

John Rollino, AECOM

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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.

ECOLOGICAL EVALUATION

John Rollino, AECOM

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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.

WETLANDS

John Rollino, AECOM

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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).

SOILS: UPLAND AND WETLAND

John Rollino, AECOM

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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

John Rollino, AECOM

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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.

WILDLIFE STUDIES

John Rollino, AECOM

25

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.

BIRDS

John Rollino, AECOM

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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.

BIRDS

John Rollino, AECOM

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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

BIRDS

John Rollino, AECOM

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PRELIMINARY DATA

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

FISH AND BENTHIC INVERTEBRATES

John Rollino, AECOM

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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.

MAMMALS

John Rollino, AECOM

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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.

MAMMALS

John Rollino, AECOM

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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*)

MAMMALS

John Rollino, AECOM

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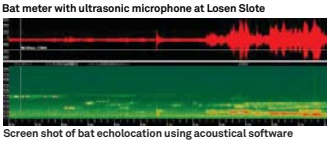
PRELIMINARY DATA

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.

ECOLOGICAL ENHANCEMENT

John Rollino, AECOM

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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.

PRELIMINARY CONCLUSIONS

John Rollino, AECOM

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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.

PRELIMINARY CONCLUSIONS

John Rollino, AECOM

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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

Michael Vecchio, HDR | 37

DEVELOPING CONCEPTS

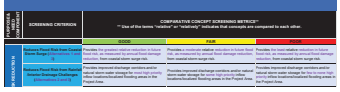
SITE INVESTIGATION AND RESEARCH

↓

CONCEPT DEVELOPMENT

↓

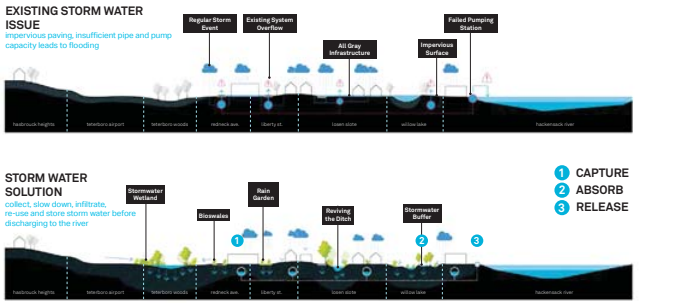
SCREENING AND FEASIBILITY



- 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 | 38



STORM WATER DRAINAGE

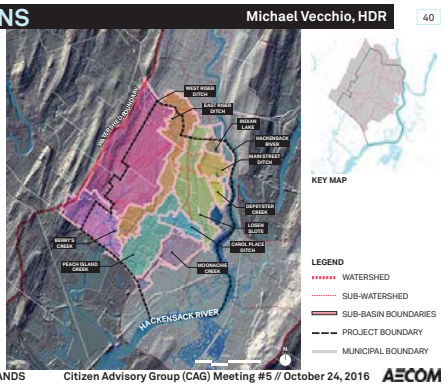
Michael Vecchio, HDR | 39

KIT OF PARTS:
MOVING FROM **STRATEGY** TO **OPPORTUNITY**

DRAINAGE SUB-BASINS

Michael Vecchio, HDR | 40

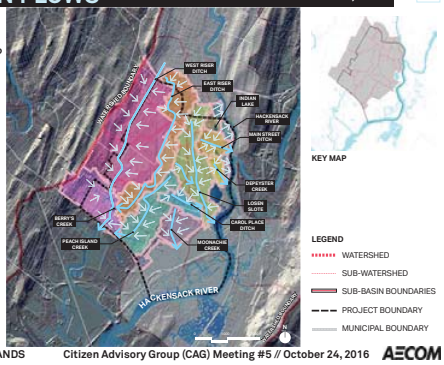
- Zones represent distinct sub-basins within the Project Area.
- Identify storm water management strategies within watershed and zones:
  - Grey Infrastructure
  - Green Infrastructure



DRAINAGE SUB-BASIN FLOWS

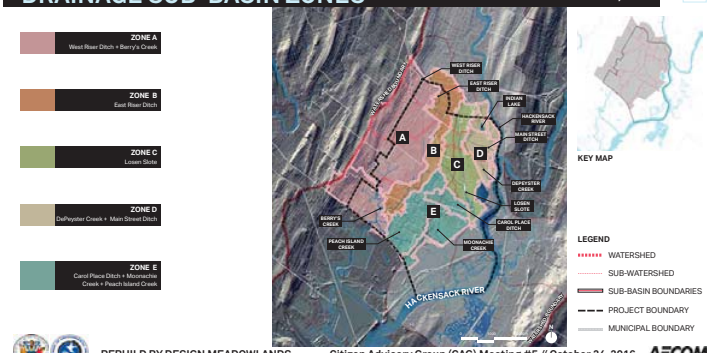
Michael Vecchio, HDR | 41

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



DRAINAGE SUB-BASIN ZONES

Michael Vecchio, HDR | 42



DRAINAGE SUB-BASIN ZONE A

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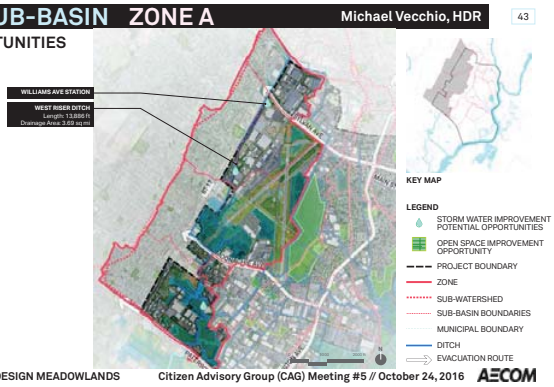
POTENTIAL OPPORTUNITIES

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



DRAINAGE SUB-BASIN ZONE B

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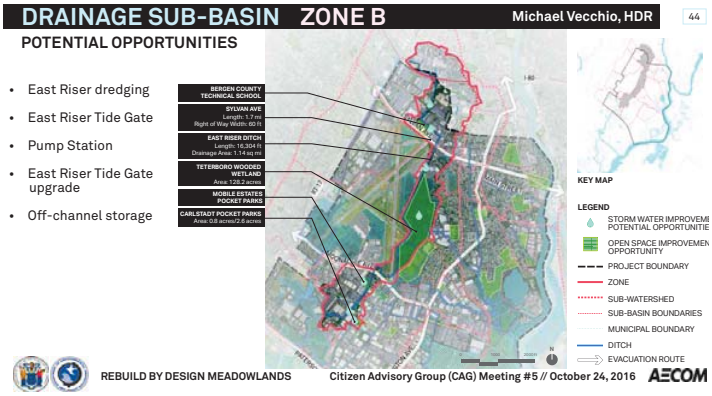
POTENTIAL OPPORTUNITIES

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

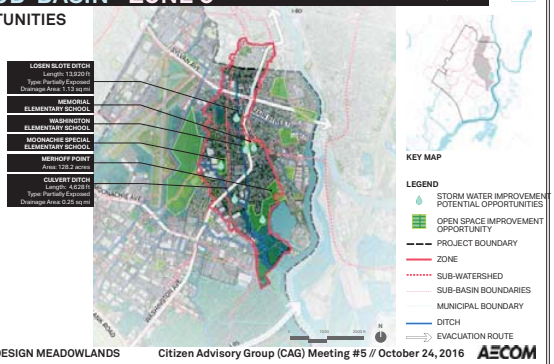


DRAINAGE SUB-BASIN ZONE C

Michael Vecchio, HDR | 45

POTENTIAL OPPORTUNITIES

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



DRAINAGE SUB-BASIN ZONE D

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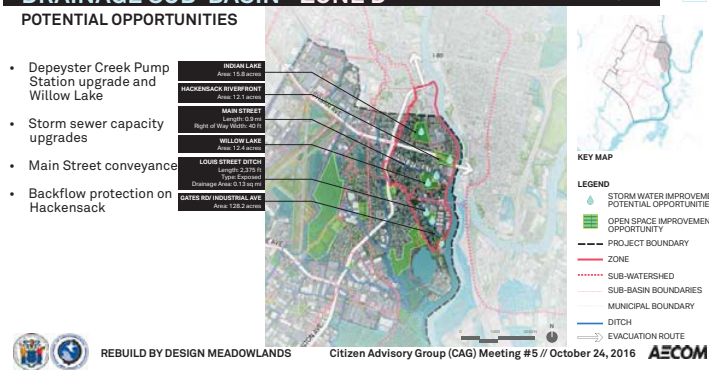
POTENTIAL OPPORTUNITIES

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



DRAINAGE SUB-BASIN ZONE E

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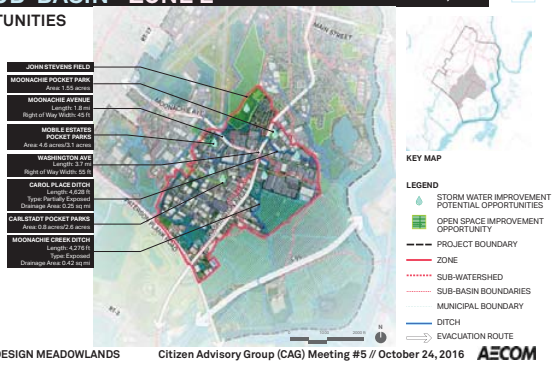
POTENTIAL OPPORTUNITIES

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



WHAT COULD THESE LOOK LIKE?

Susan Bemis, AECOM

OPEN SPACE + HABITAT IMPROVEMENTS

Susan Bemis, AECOM

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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 River 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

Susan Bemis, AECOM

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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
Forms ecological habitat and storm water infiltration

DITCH IMPROVEMENTS

Susan Bemis, AECOM

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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

STREET IMPROVEMENTS

Susan Bemis, AECOM

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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

STREET IMPROVEMENTS

Susan Bemis, AECOM

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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

NEXT STEPS

Chris Benosky, AECOM

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NJDEP / AECOM UPCOMING ACTIVITIES

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

NEXT STEPS

Chris Benosky, AECOM

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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).

NEXT STEPS

Chris Benosky, AECOM

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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!

6.0 Personal Notes