



# Red Root Creek Restoration Plan

**RUTGERS**

Edward J. Bloustein School  
of Planning and Public Policy

April 23, 2014



# INTRODUCTION

# Who We Are

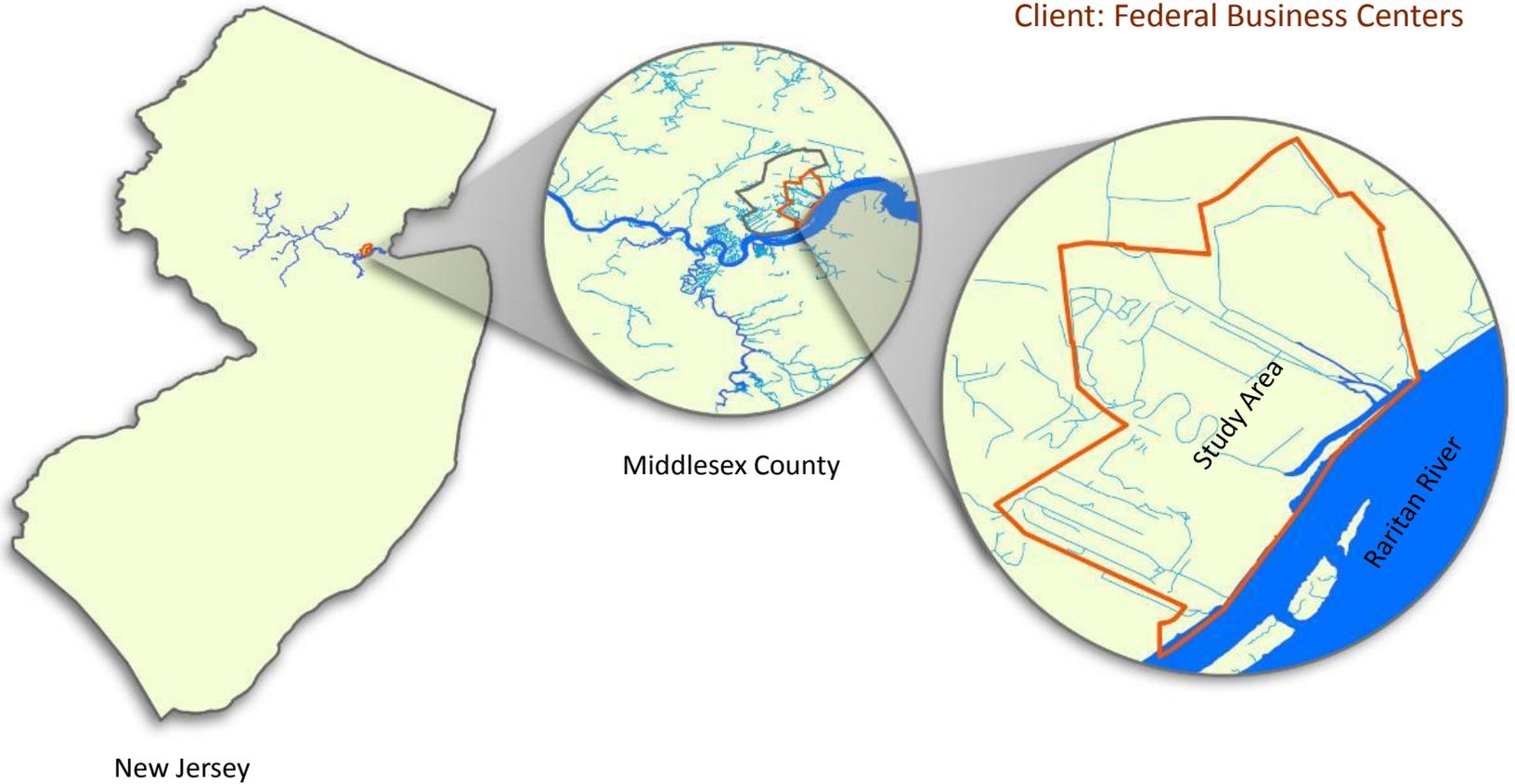


Red Root Creek Site Visit 2/8/14

# Site Context

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Client: Federal Business Centers





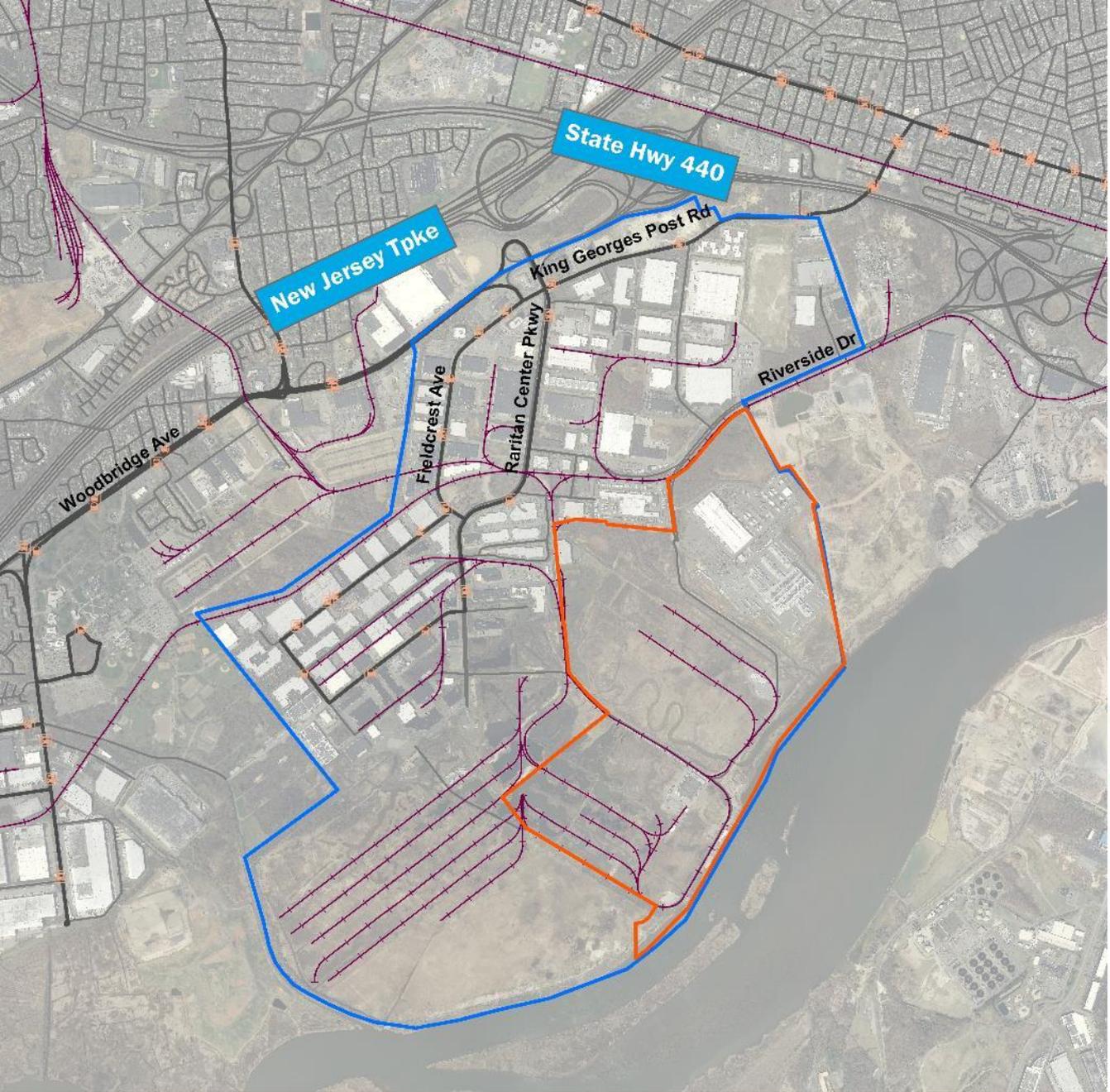
# Site Evolution: 1930-2012



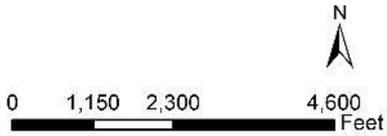
# Balance of Uses



# Transportation

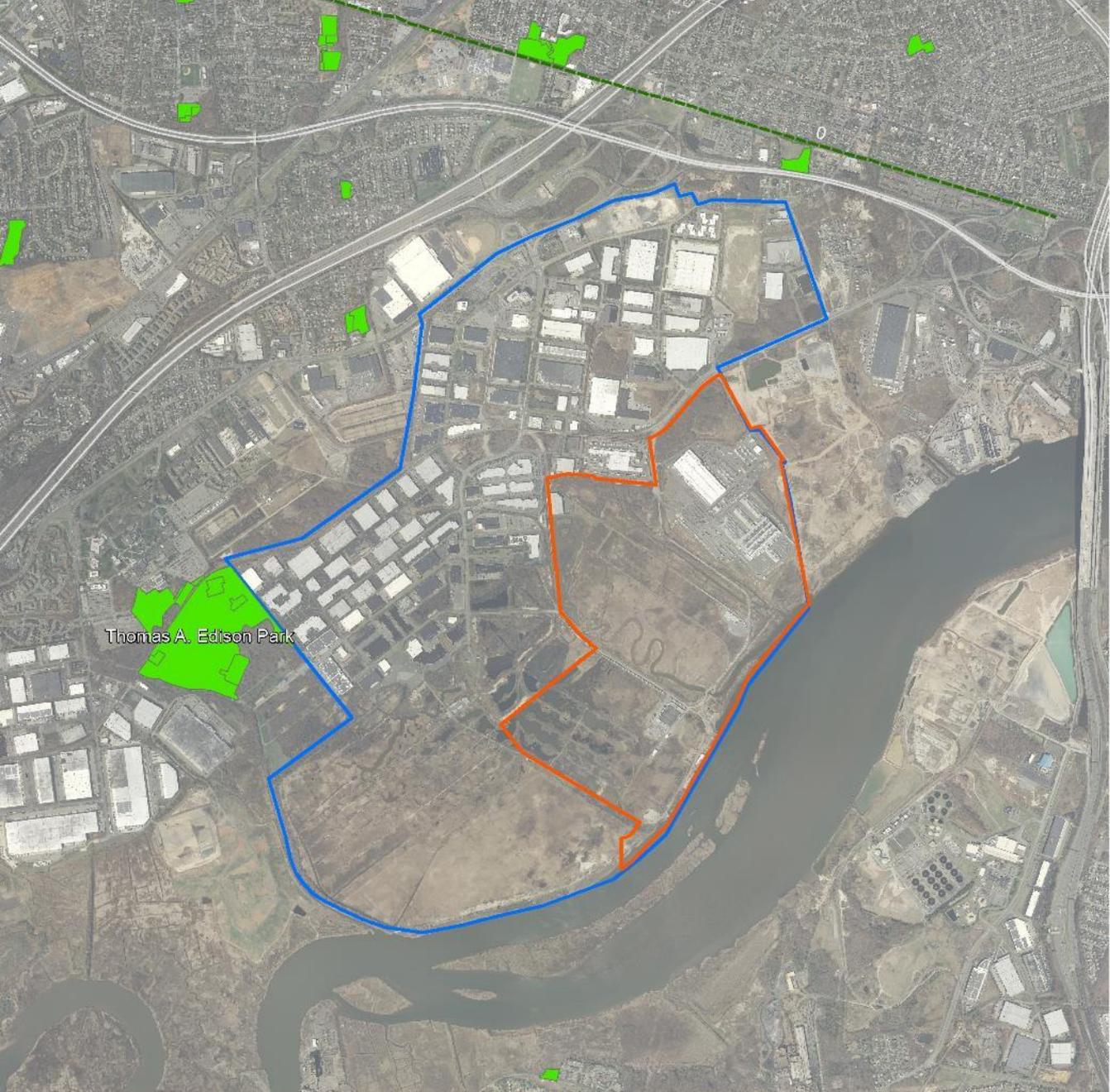


- Study Area
- Raritan Center Boundary
- Bus Stops
- Freight Rail
- Bus Routes
- Roads

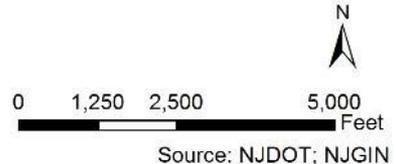


Source: NJ Transit, NJGIN

# Nearby Open Space



- Study Area
- Raritan Center Boundary
- Recreation Sites
- Middlesex Greenway
- Major Highways





# SITE ANALYSIS

# Contamination

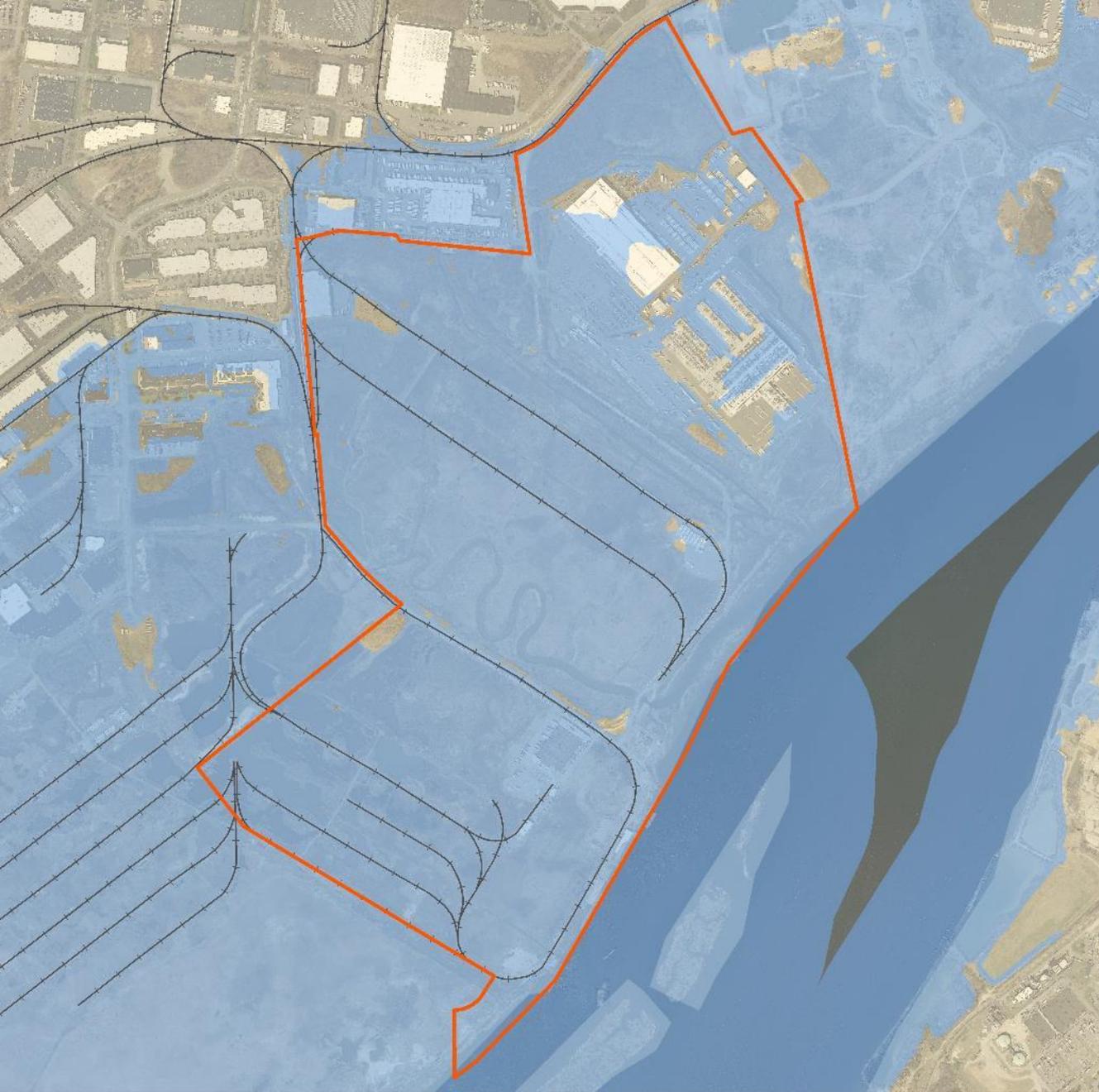


-  Study Area
-  Raritan Center Boundary
-  Area of Concerns
- Within Study Area**
-  Burning Ground & Improvement
-  Chemical / Mustard Disposal
-  Dredge Material Disposal
-  Dredge Material & Explosive Detonation
-  Dredge Material & Explosive Disposal
-  Former Magazine Area
-  TNT Washout & Munitions Demilitarization
-  Submerged Dock Area



Source: Weston Solutions, Inc.; NJGIN

# Storm Surge



-  Study Area
-  RAIL
-  High Resolution Surge Area
-  Impact Level - Very High



0 600 1,200 2,400  
Feet

Source: FEMA; NJDEP; NJOIT



Image © 2014 DigitalGlobe

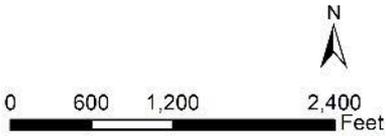


Source: Robert Pisani RRPictureArchives.net

# Flood Hazard Zones

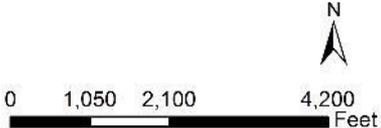
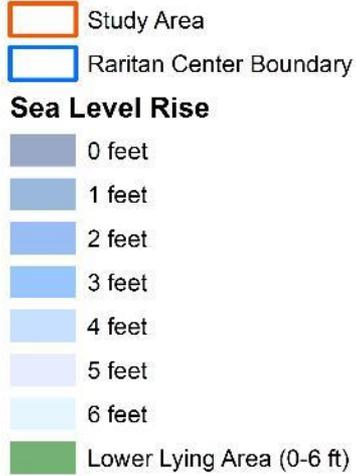


- Study Area
- Rail
- Limit of Moderate Wave
- Flood Zone**
- VE
- AE
- 500\_yr Flood Plain
- X
- Open Water



Source: NJDEP; NJGIN

# Sea Level Rise



Source: NOAA; NJGIN

0 Feet





# GOALS OF THE PROJECT

1. To enhance the resiliency and other wetland ecosystem services provided to the Raritan Center, including **storm surge protection, flood control and stormwater treatment**
2. To restore the system to a state that is more **resilient to sea level rise** in the long term **and storm surge events** in the nearer term
3. To **enhance the biological diversity and quality** of the wetland system on a species and habitat level
4. To enable long-term wetland **research and monitoring opportunities** on the site
5. To create a **demonstration project** that can be replicated elsewhere
6. To provide **managed public access** for targeted audiences to the restored wetland to promote awareness and to enhance community and tenant relations
7. To **capture natural, societal, educational and economic value** from the restored wetland



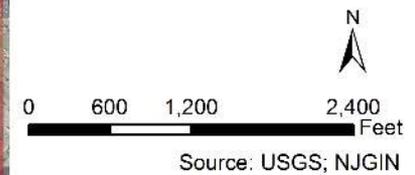
# DESIGN VISION

# Components of the Design

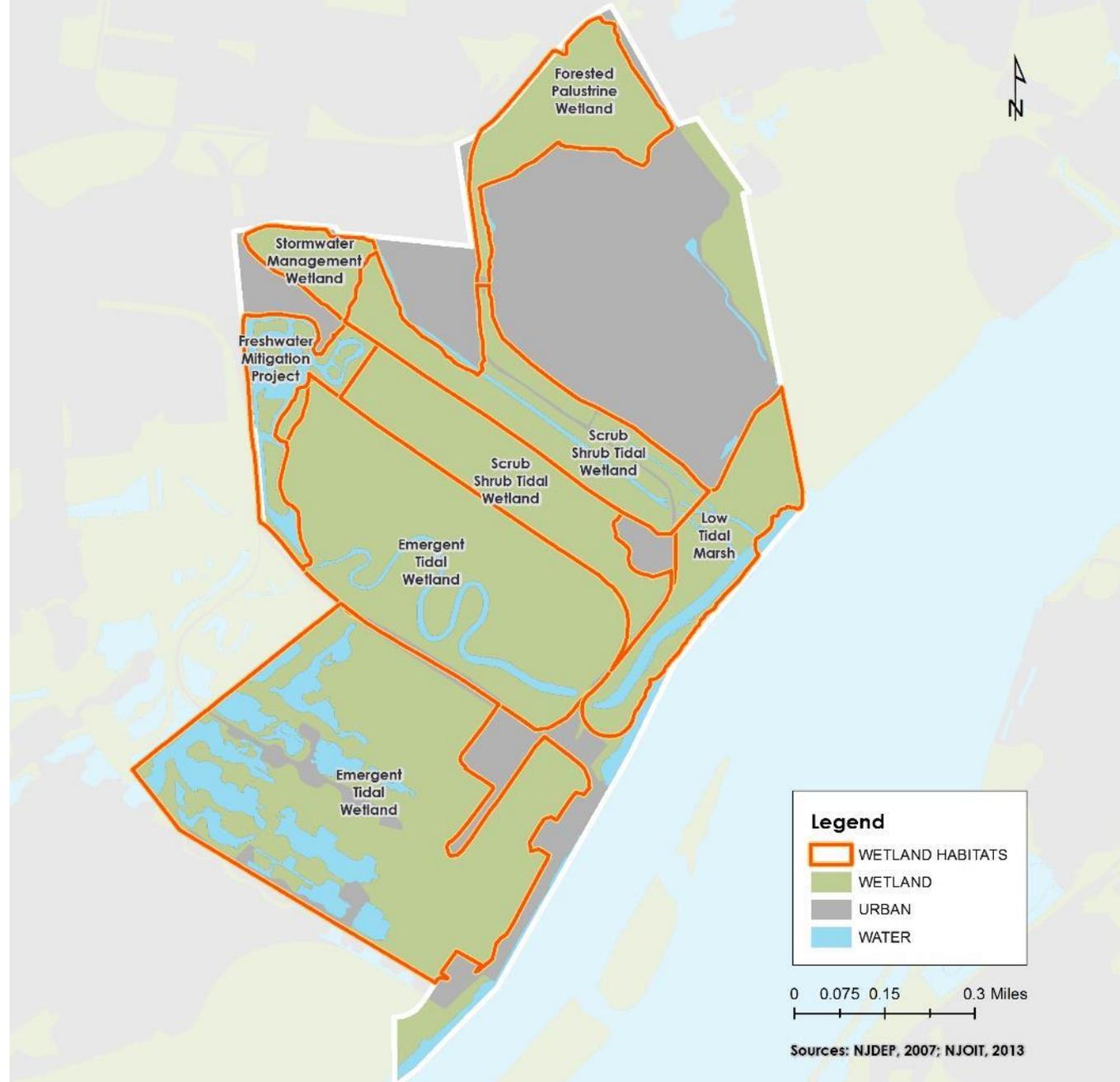
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1. Restoration of the wetlands – returning to natural trajectory
  - Reintroduction of tidal system
  - Mosaic of habitats
2. Enhanced protection of property
  - Enhance existing berm
3. Managed public access
  - System of controlled boardwalks
4. Greening of Raritan Center
  - Inclusion of green infrastructure for stormwater management
  - Maximize benefits of restoration

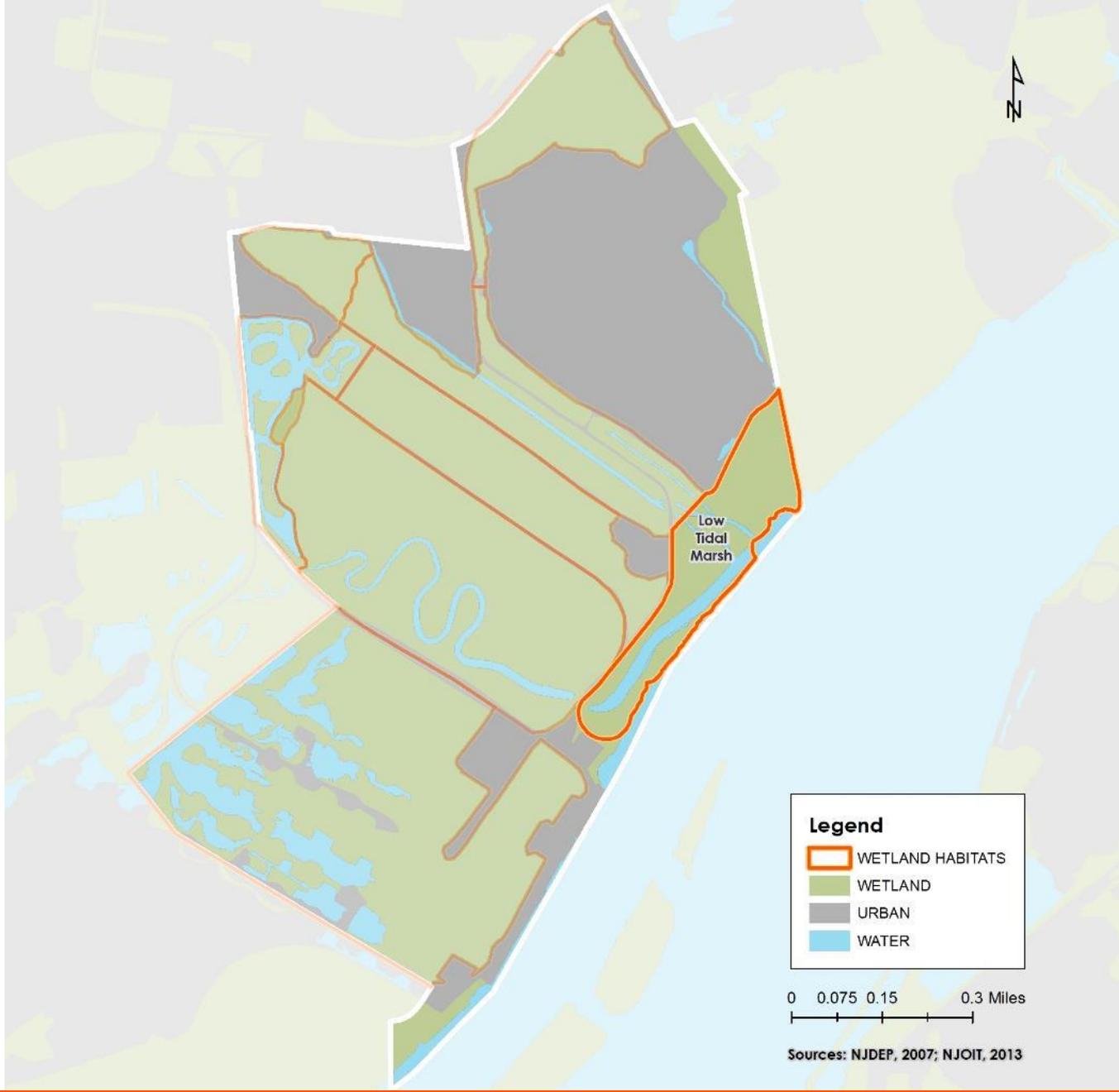
# Topography



# Mosaic of Vegetative Communities



# Low Tidal Marsh



# Emergent Tidal Wetland

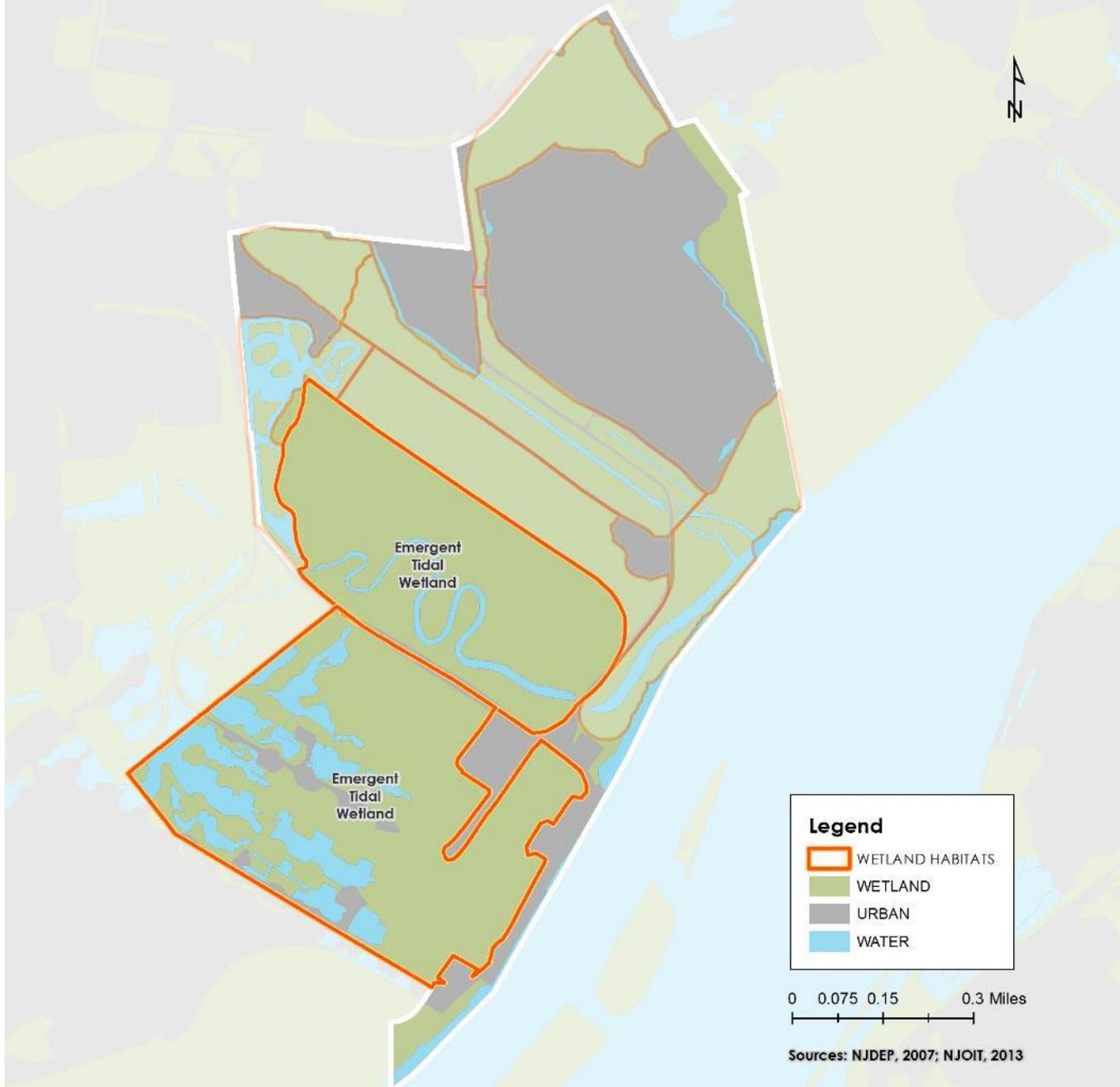
*Spartina alterniflora*



Glasswort



Fleabane



# Scrub Shrub Wetland

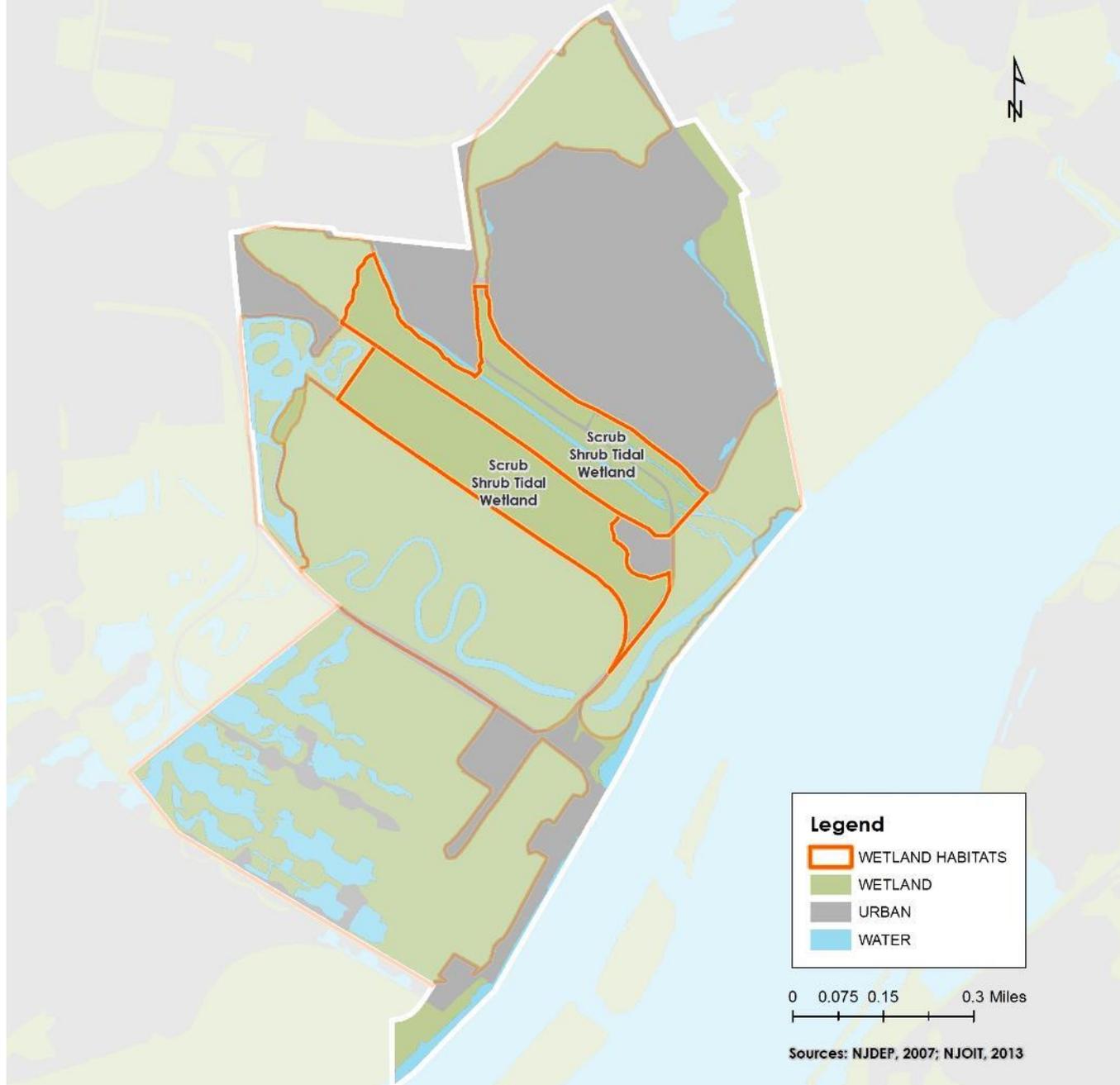
Bayberry



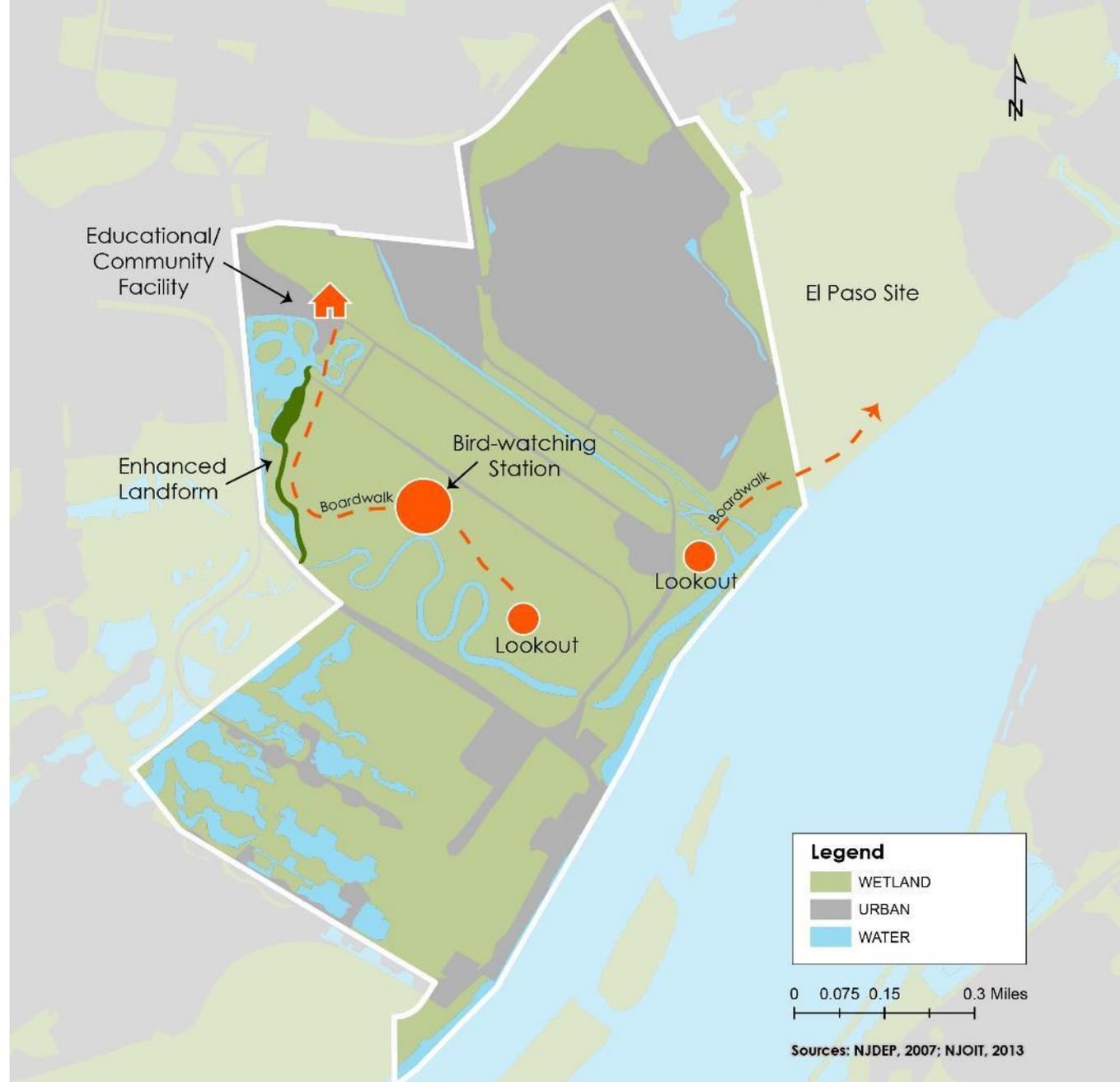
Sea Myrtle



Sea Lavender



# Public Access Concept



# Illustrative Concept Plan

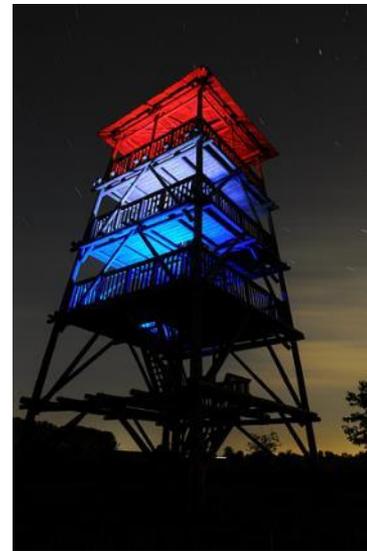


# Boardwalk

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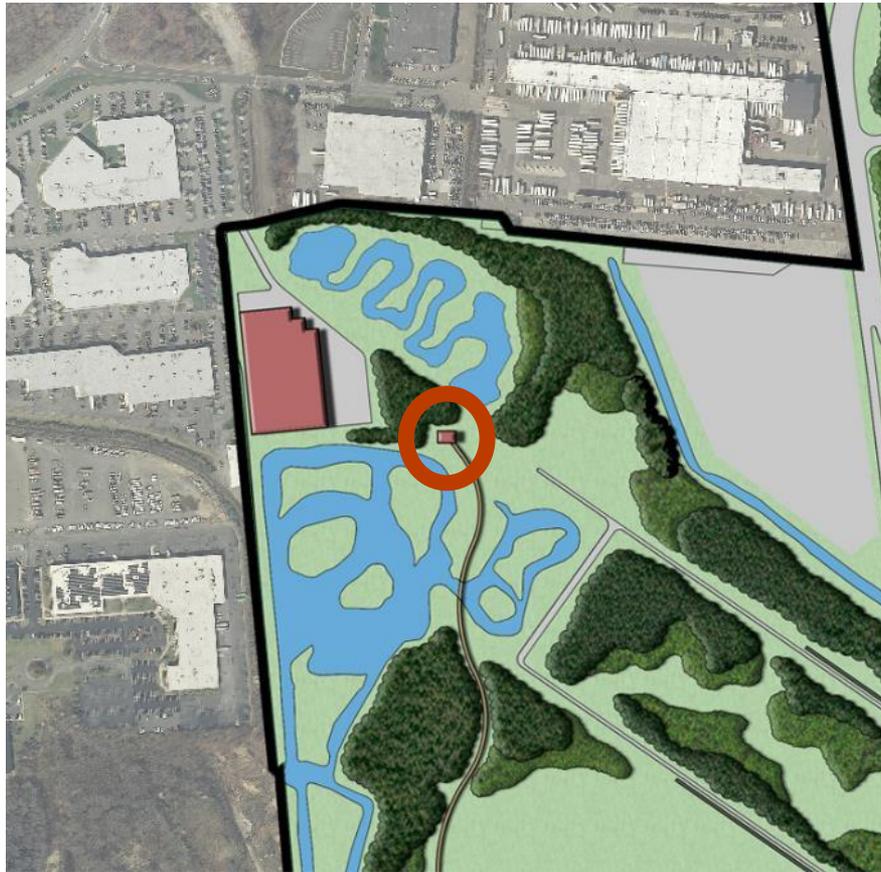


# Birdwatching



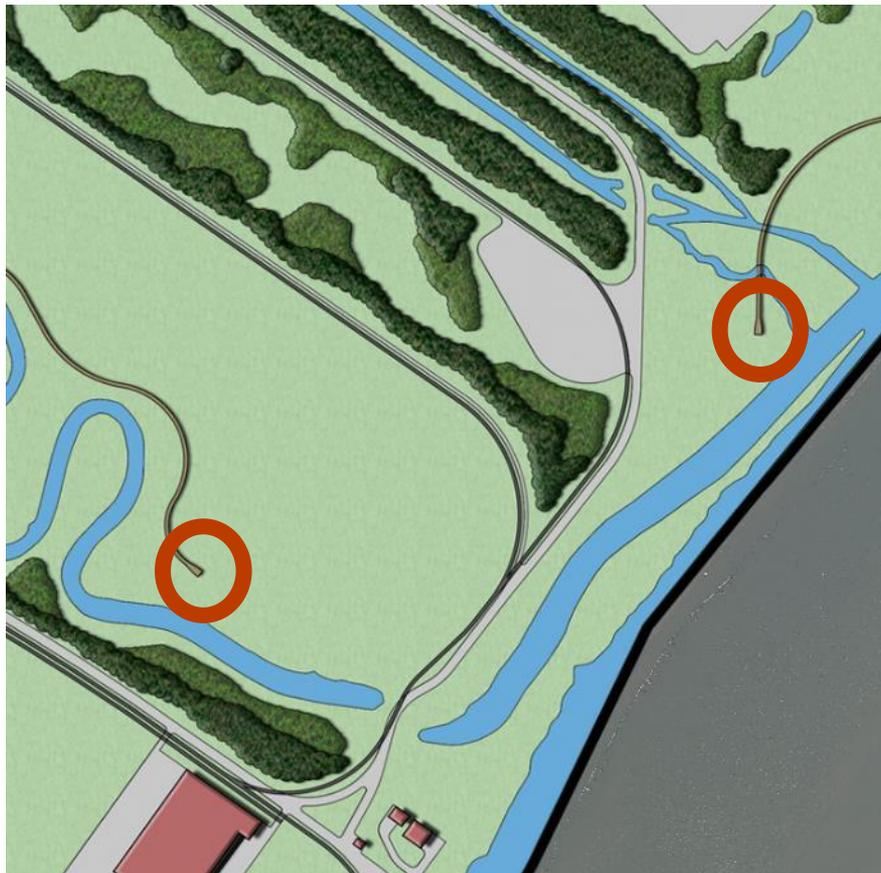
# Education Center

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# Lookout

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# Green Office Park

## Recommended Strategies Matrix

	<b>Efficient Site</b>	<b>Integration with Nature</b>	<b>Connectivity</b>
<b>Building</b>	Retrofit existing buildings, Build new high performance buildings, Obtain LEED certification	Green Sites	Co-location, Industrial Symbiosis
<b>Infrastructure</b>	Install renewable energy (on-site renewable resources), Incorporate co-generation	Green Infrastructure	Boulevard Streets, Bike/Walking Trails
<b>Community Program</b>	Implement zero-waste program, waste exchange program	Cooperative Education Volunteer & Community Program, Open Space Preservation	Car & Bike Sharing, Shared commuting, Shared Shipping, Intra-park Transportation

# Green Office Park



Source: [www.cnu.org/](http://www.cnu.org/)

- Pedestrian connectivity allowing people to easily walk or bicycle between businesses and to amenity areas.
- Provide bike path and pedestrian walkway to nearby Edison Park.
- Shuttle connection inside and outside the park and organized van and car pools.



# VALUE CAPTURE

# Value Capture

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***“The services of ecological systems and the natural capital stocks that produce them are critical to the functioning of the Earth’s life-support system. They contribute to human welfare, both directly and indirectly, and therefore represent part of the total economic value of the planet.”***

Although very conceptual at this time, identifying and valuing natural capital is important because:

- It makes the potential values of ecosystem services more apparent
- It sets up a framework for further and continued analysis and research
- It stimulates debate and gives weight to ecosystem services in policy decisions
- It can begin to reshape the way land development can improve the collective environment instead of producing further environmental problems

Source: Costanza et al. The Value of the World’s Ecosystem Services and Natural Capital & Daily, G. (ed.) Nature’s Services: Societal Dependence on Natural Ecosystems(Island, Washington DC, 1997).

# Value Capture

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**Natural Capital** = Raritan Center's land, waters and biodiversity among the wetlands

## Ecosystem Services

- The stream of benefits flowing from natural capital to Raritan Center

## Ecotourism

- Yields derived from the stewardship of Raritan Center's natural systems

## Eco-tenant Opportunities

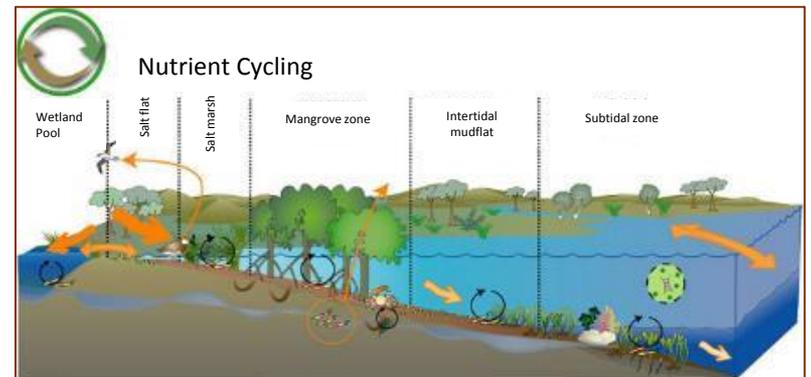
- Market for businesses looking for a more sustainable real estate solution

# Ecosystem Service Benefits

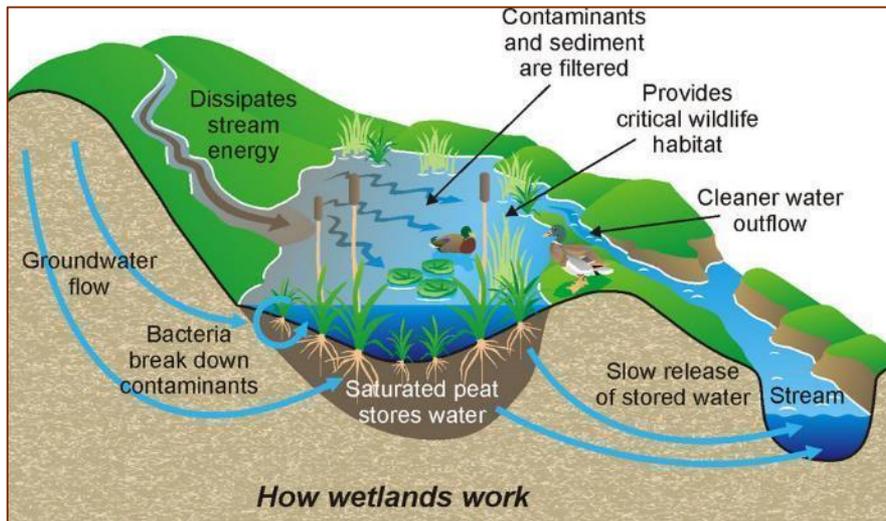
- Sediment removal
- Water filtration
- Nutrient cycling & movement
- Dilution of air pollutants
- Protection from floods and storm surge



Source: <http://livingrootless.blogspot.com/>



Source: <http://www.ozcoasts.gov.au/>



Source: <http://www.ci.buffalo.mn.us/engineering/>

# Eco-tourism Benefits

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- Array of wild species (i.e., birding tourism such as Audubon Society)
- Recreational opportunities (i.e., guided walking and site seeing)
- Educational Partnership opportunities (i.e., further research opportunities involving monitoring and maintenance of wetlands once restoration is complete)



Source: <http://www.americantrails.org/>



Source: <http://blog.nj.com/> - Somerset County Park Commission

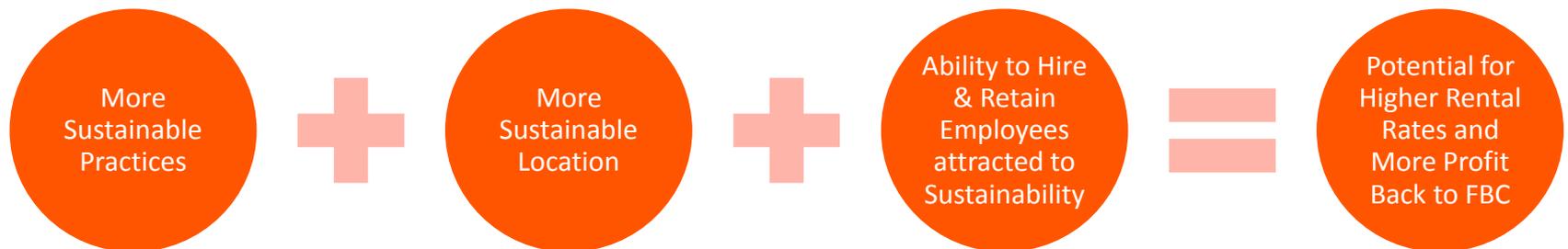


Source: <http://www.drexel.edu/>

# Eco-tenant Benefits

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- Today, business are looking for sustainable amenities from their landlords
- Today's workforce is looking for socially and environmentally responsible employers
- Red Root Creek wetland and habitat restoration embodies both sustainability and environmental responsibility





# IMPLEMENTATION

# Partnerships

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## Education, maintenance and monitoring

Engage local schools, community groups, and environmental NGOs to help:

- Nurse and plant wetland species during site restoration
- Provide managed and guided public access
- Provide routine maintenance/monitoring (e.g. trash removal, weeding, species counts, water quality monitoring).

## Research

Engage research universities/institutions in long term monitoring and research on site.

- Variety of habitat types provides a rich research setting
- Excellent opportunity to study important scientific questions, e.g. wetland restoration best practices and sea level rise adaptation
- Enhance Center reputation and contribute to “green” branding

# Potential Funding Mechanisms

	<p><b>Partners for Fish &amp; Wildlife (FWS)</b></p>		<p>Physical Disaster Loans (<i>SBA</i>)</p>
	<p><b>Tidal Wetland Mitigation Banking</b></p>		<p>Migratory Bird Joint Ventures (<i>FWS</i>)</p>
	<p><b>National Coastal Wetlands Conservation Grant Program (<i>PANYNJ</i>)</b></p>		<p>Federal Aid in Wildlife Restoration (<i>FWS</i>)</p>
	<p>Section 404 Grants – Mitigation/In-Lieu Fee</p>		<p>North American Wetlands Conservation Fund (<i>FWS</i>)</p>
	<p>Wetlands Mitigation Fund (<i>NJ DEP</i>)</p>		<p>Five Star Wetland Restoration Grants</p>
	<p>Natural Resource Damage Settlements (<i>NJ DEP</i>)</p>		<p>Clean Water Act Nonpoint Source Grant (Section 319h) (<i>EPA</i>)</p>
	<p>Section 206 and Section 1135 Programs (<i>USACE</i>)</p>		<p>Coastal and Marine Habitat Restoration (<i>NOAA</i>)</p>

# Next Steps

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- ❑ Coordinate with USACE remediation efforts
- ❑ Align with stakeholders
- ❑ Refine conceptual design
- ❑ Engineering design of site
- ❑ Identify funding sources
- ❑ Obtain necessary permits
- ❑ Enhance protection of berm
- ❑ Construction of boardwalk
- ❑ Removal of tide gates
- ❑ Implement wetlands restoration

## Plans to be developed:

- Operations & Maintenance
- Adaptive Management
- Contingency

# Acknowledgments

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## **Federal Business Centers**

Peter Visceglia, *President*

## **PS&S**

Tom Zetkulic, *Vice President*

Brian Kirkpatrick, *Project Manager*

Bruce Hawkins, *Vice President*

## **Sustainable Raritan River Initiative**

Sara Malone, *Research Associate*

Judy Shaw, *Director*

## **Duke Farms**

Michael Catania, *Executive Director*

Thom Almendinger, *Director of Stewardship*

## **Edward J. Bloustein School**

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James Hughes, *Dean*

Jeanne Herb, *Associate Director*

## **Conservation Resources**

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## **NY/NJ Baykeeper**

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## **Woodbridge Redevelopment Agency**

Caroline Ehrlich, *Executive Director*

## **Township of Woodbridge**

Marta Lefsky, *Planning and Development*

**Open Space Institute**

**The Louis Berger Group**

**PSE&G**

# Thank you for your time!

## QUESTIONS?

Presentation and final report will be available here:

<http://policy.rutgers.edu/academics/projects/studios/>

# Additional Information

GOAL	PLANNED MECHANISMS FOR ACCOMPLISHMENT
1. To enhance the resiliency and other wetland ecosystem services provided to the Raritan Center, including storm surge protection, flood control and stormwater treatment.	<ul style="list-style-type: none"> <li>• Integrate a hardening device/structure in restoration plan</li> <li>• Include green infrastructure throughout the site to reduce stormwater runoff</li> <li>• Utilize previously restored freshwater system to help retain and treat stormwater runoff</li> </ul>
1. To enhance the biological diversity and quality of the wetland system on a species and habitat level	<ul style="list-style-type: none"> <li>• Manipulate existing system of berms and water control structures (and add new ones as necessary) to regulate water levels in order to create different habitat zones</li> <li>• Encourage different vegetative communities in the various habitat zones</li> </ul>
1. To restore the system to a state that is more resilient to sea level rise in the long term and storm surge events in the nearer term	<ul style="list-style-type: none"> <li>• Focus the restoration around conversion back to a tidal system except for the previously restored freshwater area</li> </ul>
1. To enable long-term wetland research and monitoring opportunities on the site	<ul style="list-style-type: none"> <li>• Develop partnerships with local and regional universities and research centers</li> </ul>
1. To provide managed public access for targeted audiences to the restored wetland to promote awareness and to enhance community and tenant relations	<ul style="list-style-type: none"> <li>• Develop a system of controlled boardwalks and lookout points in strategic locations that do not conflict with site uses</li> <li>• Partner with local schools, agencies and non-governmental organizations</li> <li>• Provide scheduled guided tours</li> </ul>
1. To capture value from the wetland restoration to help offset costs and realize an economic benefit.	<ul style="list-style-type: none"> <li>• Pursue development of a wetland mitigation bank</li> <li>• Seek carbon sequestration credits</li> </ul>
1. To create a demonstration project that can be replicated elsewhere	<ul style="list-style-type: none"> <li>• Carefully document plan and plan implementation. Make results publically available.</li> </ul>

# Nearby Development

## INTRODUCTION

The Raritan River - called the "Queen of Rivers" - is the longest river solely in New Jersey. The Lower Raritan River Watershed is a rich ecological system that hosts hundreds of wildlife and marine species including Osprey, Cooper's hawk, Bald Eagle, Striped Bass, Pike, Weakfish, Bluefish, Flounder, Blue Claw Crabs and other shellfish. This incredible natural resource also hosts a variety of public recreational opportunities. Many people enjoy fishing, crabbing, boating, kayaking, bird watching and hiking along the river.

However, the Lower Raritan River, formerly deemed the "Chemical Belt" due to its rich industrial past during the Industrial and Technological Revolutions, is severely impacted by industrial and chemical pollution. There are numerous unremediated toxic waste sites that line its coast that continually contribute to the tainted water quality of the river. Because of the past and present contamination, the consumption of fish, crabs, and other seafood from this area is restricted due to associated public health risks. Redevelopment of these sites generally requires extensive remediation.

Fortunately, the river can be cleaned and restored. In fact, cleanup is required by the federal Clean Water Act. Remediation has commenced at some of the worst toxic sites along the river due to the ongoing advocacy and legal actions of Edison Wetlands Association (EWA). Additionally, NJ/NJ Baykeeper is leading a regional water quality improvement campaign that moves toward the overdue Clean Water Act goals of making the Lower Raritan Watershed and other watersheds fishable and swimmable once again. To educate the public, Raritan Riverkeeper leads kayak tours and is working to improve public access to the river.

Together these groups strongly advocate that the polluters must pay for the cleanups, so taxpayers don't have to. They also work with and support economy boosting green redevelopment on former industrial sites. This means excavating and removing contamination, restoring and preserving natural land within redevelopment areas, integrating regional transportation systems, and creating sustainable facilities and infrastructure.

Local municipalities, counties and the New Jersey Department of Environmental Protection (NJDEP) are responsible for reviewing redevelopment plans. Too often they approve plans, like at the former National Lead site in Sayreville, that are driven by developers, lobbyists, and politicians who focus on short-term financial interests, rather than long-term community well-being.

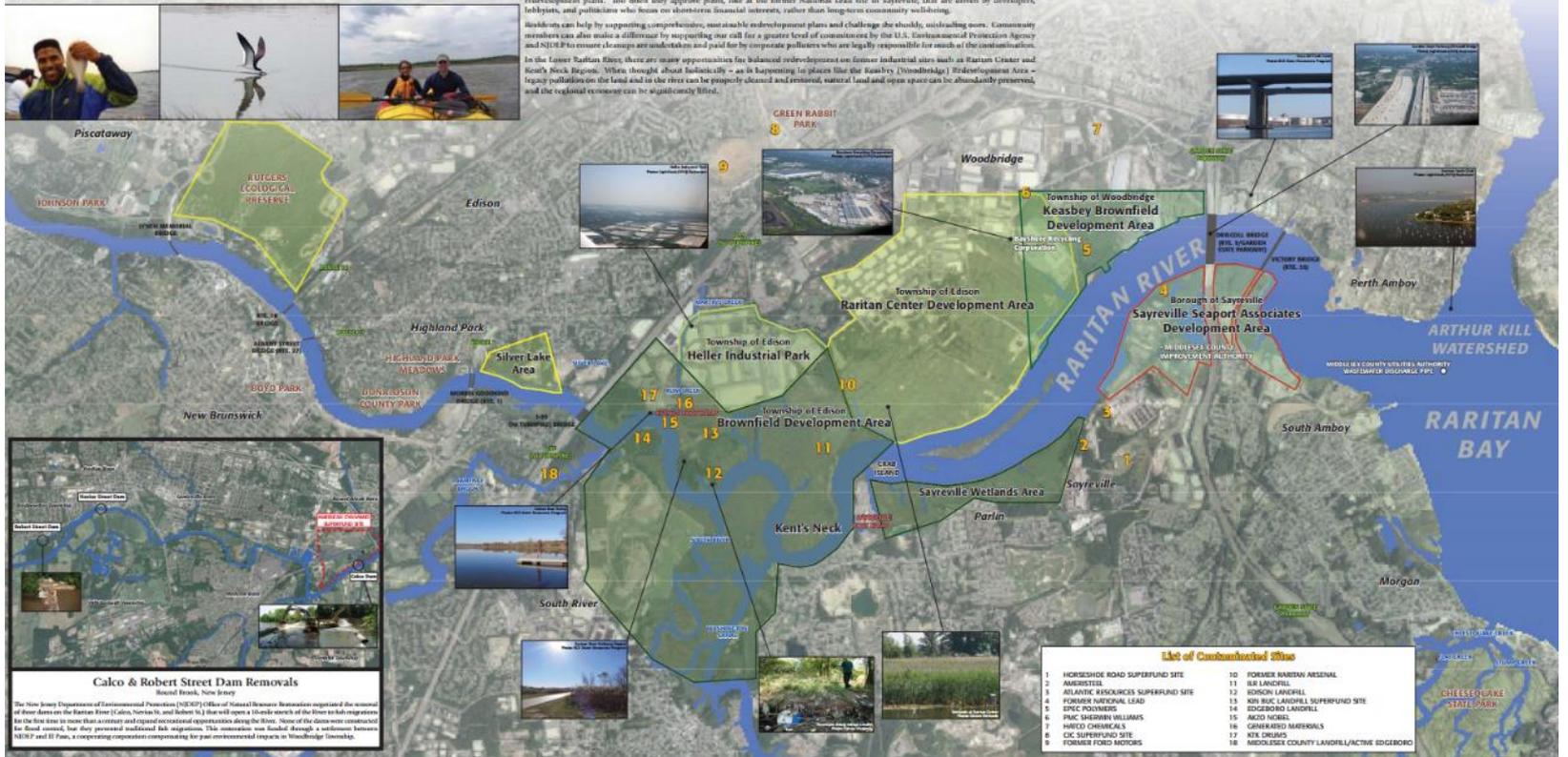
Residents can help by supporting comprehensive, sustainable redevelopment plans and challenge the shoddy, outmoded ones. Community members can also make a difference by supporting our call for a greater level of commitment by the U.S. Environmental Protection Agency and NJDEP to ensure cleanups are undertaken and paid for by corporate polluters who are legally responsible for much of the contamination. In the Lower Raritan River, there are many opportunities for balanced redevelopment on former industrial sites such as Raritan Center and South Neck Region. When thought about holistically - as is happening in places like the Keaney (Woodbridge) Redevelopment Area - legacy pollution on the land and in the river can be properly cleaned and restored, natural land and open space can be abundantly preserved, and the regional economy can be significantly lifted.



NJ/NJ BAYKEEPER  
52 West Front Street  
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## THE LOWER RARITAN RIVER MIDDLESEX COUNTY • NEW JERSEY

A River at the Crossroads: Envisioning a Revitalized Raritan River



**List of Contaminated Sites**

1 HORSHESHOE ROAD SUPERFUND SITE	10 FORMER RARITAN ARSENAL
2 AMERISTEEL	11 I&L LANDFILL
3 ATLANTIC RESOURCES SUPERFUND SITE	12 DUNSON LANDFILL
4 FORMER NATIONAL LEAD	13 KEN BRICK LANDFILL SUPERFUND SITE
5 ERIC POWERS	14 EDGEBORO LANDFILL
6 PACC SHERWIN WILLIAMS	15 ACID NOBLES
7 HAVCO CHEMICALS	16 GARDNER'S MATERIALS
8 CFC SUPERFUND SITE	17 K&L DRUMS
9 FORMER FORD MOTORS	18 MIDDLESEX COUNTY LANDFILL/ACTIVE EDGEBORO

# Public Access – Education & Research Activities

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Could develop partnerships with schools/ institutions to support educational & research programs.

- Monitor long-term wetland restoration process
- Studies on wetland related fields, such as water quality, stormwater management, etc.
- Guided tours for school children



<http://www.dnrec.delaware.gov/Admin/DelawareWetlands/PublishingImages/tidal%20assessment.jpg>

# A Greener Raritan Center

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Rebrand Raritan Center as a green office park by incorporating green features that

- Minimize water and energy use
- Reduce stormwater runoff
- Recycle waste products
- Attract firms that produce green products such as solar panels, wind turbines, energy saving light fixtures, or water saving devices

Incorporate eco-industrial development features

- Seeking opportunities of industrial symbiosis in which energy and materials produced by one industry are consumed as inputs by another.