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# Teaneck Creek Conservancy Freshwater Wetlands
# Area 1 – Overpeck County Park

A Restoration Project for
Bergen County and the Hackensack River Watershed

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October 2014

# Project Partners

- Bergen County
- Teaneck Creek Conservancy (TCC)
- TCC Community Volunteers
- Rutgers University
  - Center for Urban Environmental Sustainability (CUES)
  - NJAES Water Resources Program
- Previous Consultants

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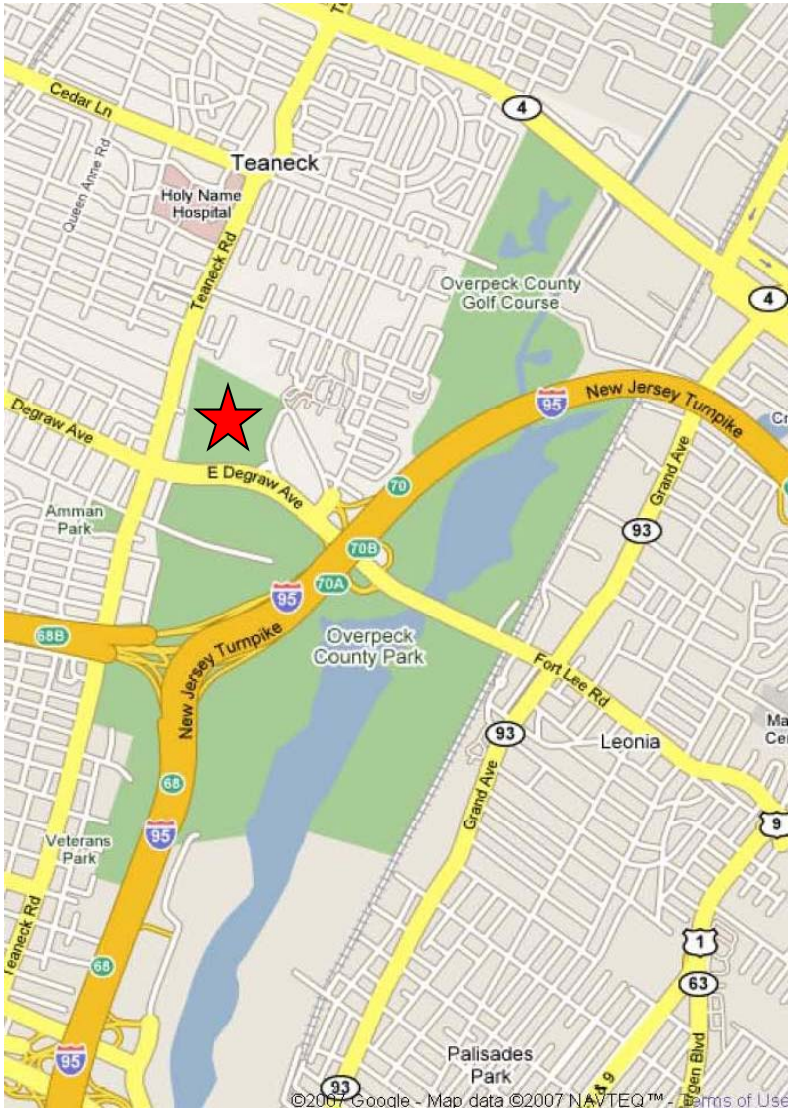
# Project History

- Partnership between BC & non-profit TCC
- TCC licensed by Bergen County Park System (2002) to develop and maintain Area 1 for passive recreation and environmental education
- Trail planning, engineering, and permitting completed (2003)
- Groundbreaking of trails, boardwalks, and outdoor classroom (2005)
- Construction completed and official park opening (2006)

- Planning, engineering, permitting and fund raising has been ongoing for next phase of the TCC Area 1 project, including landfill closure and **wetlands restoration**

# Project Location

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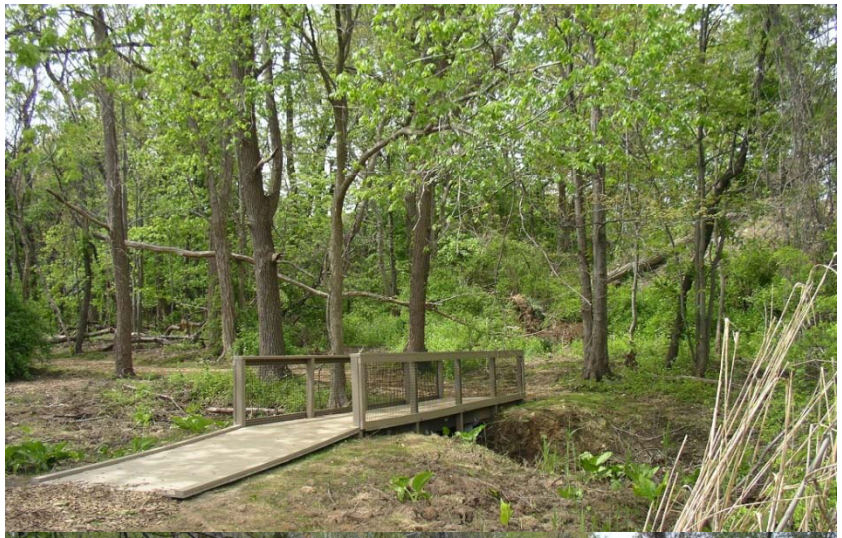
# Constructed Trails, Boardwalks, and Bridges



# Wetlands Research & Restoration Project Initiation

- Funded by a 3-year, $300,000 New Jersey Wetlands Mitigation Council (NJWMC) grant awarded to Teaneck Creek Conservancy (2004).
- Project partners include:
  - Rutgers CUES (formerly Rutgers Environmental Research Clinic)
  - Rutgers Cooperative Extension Water Resources Program
  - USGS New Jersey Water Science Center
  - TRC Environmental Corporation
  - Bergen County (Freeholders Resolution(February 16, 2005) approving a MOU between the County, TCC and Rutgers to coordinate research and seek funding through NJWMC)
- An additional $30,000 CUES grant from NJ Water Resources Institute funded air quality monitoring.

# Wetlands Research & TCC Restoration Goals

- Create & enhance TCC wetlands by:
  - Documenting urban baseline conditions
  - Restoring drainage connections between the Teaneck Creek and wetland areas
  - Enhance degraded wetlands by promoting onsite re-development of forested freshwater wetlands
- Provide model restoration site for the Overpeck Creek Watershed and other urban areas
  - Scientific study of urban impacts
- Develop quality wildlife habitat areas
- Promote public education & passive recreation

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# Wetlands Research & Restoration Design Project Tasks

- Collect environmental data and document existing conditions
- Develop a hydrologic model and water budget (allocation of water on-site) of the wetlands system
- Prepare restoration designs including planting and invasive species control plan

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# Wetlands Research & Restoration Design Environmental Data Collection

- Groundwater Sampling
  - Nitrogen and Phosphorus Concentrations
- Surface Water Sampling
  - Low Flow/Stormwater and Nitrogen/Phosphorus
- Vegetation Survey
  - Floristic Quality Evaluation
- Sediment/Soil Sampling
  - Soil Characteristics and Carbon/Nitrogen/Phosphorus
- Atmospheric Deposition Data
  - Dry and Wet Weather Nitrogen Deposition

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# Wetlands Research & Restoration Design
# Environmental Data Collection


Soil cores obtained from a) undisturbed area with native wetland vegetation, b) and c) from an area vegetated with monospecific stands of common reed (*Phragmites australis*).

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# Wetlands Research & Restoration Design
# Soils and Floristic Quality Index

Fig. 4.

Soil Quality of Each 100m x 100m Teaneck Creek Sampling Unit

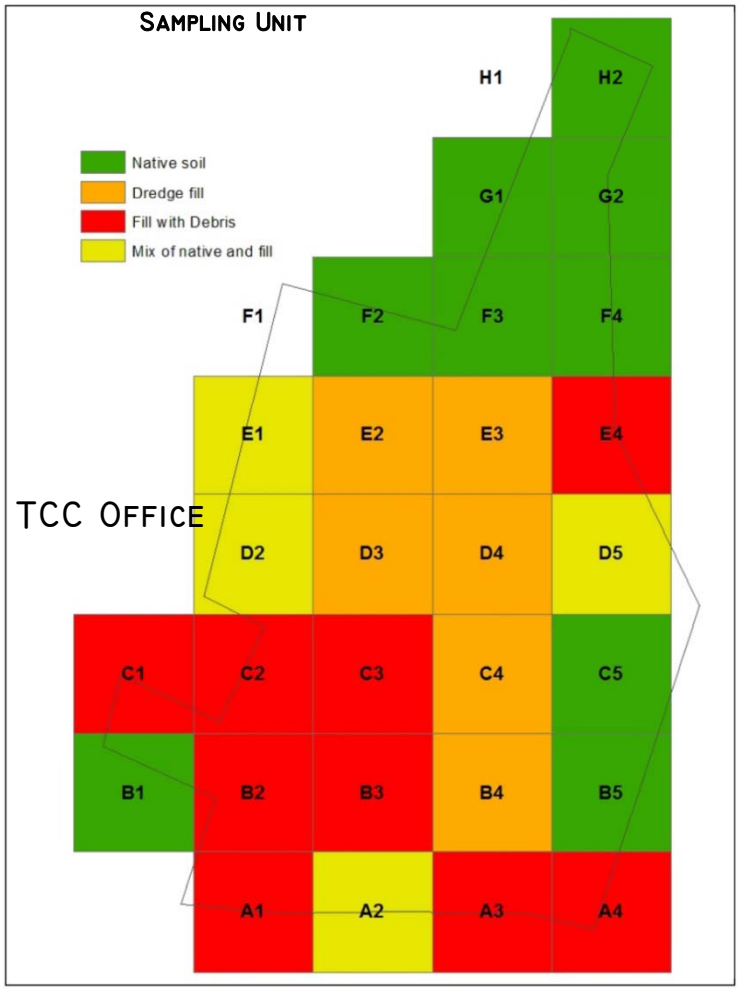
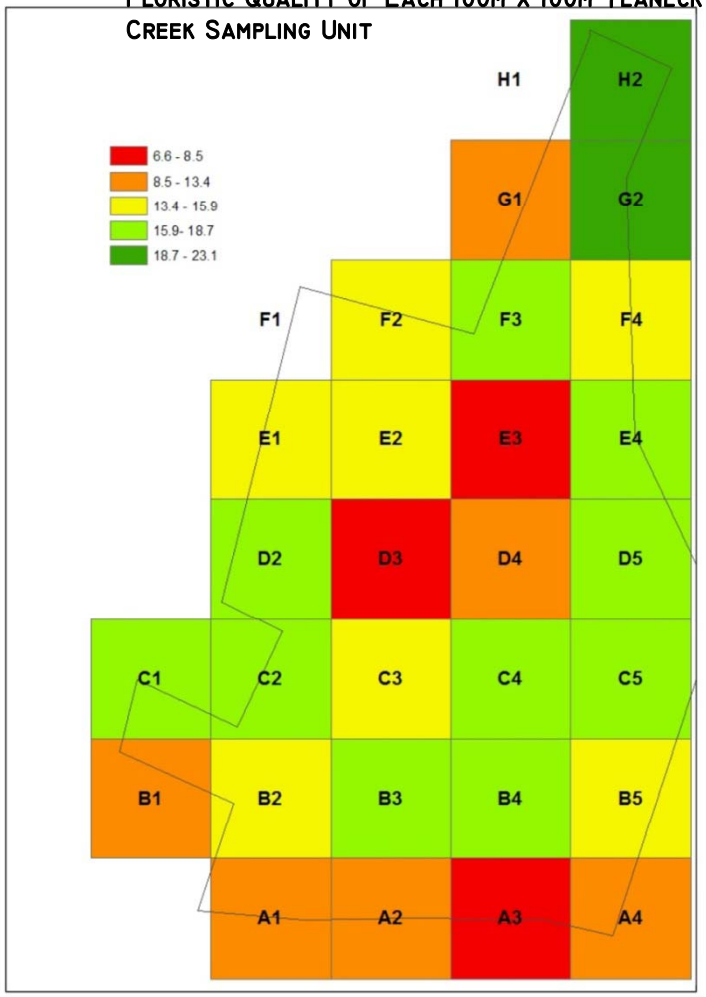



Fig. 5

Floristic Quality of Each 100m x 100m Teaneck Creek Sampling Unit



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# Wetlands Research & Restoration Design
# Hydrologic Model & Water Budget

Fig. 2. Surface Water Routing Through Teaneck Creek Wetlands

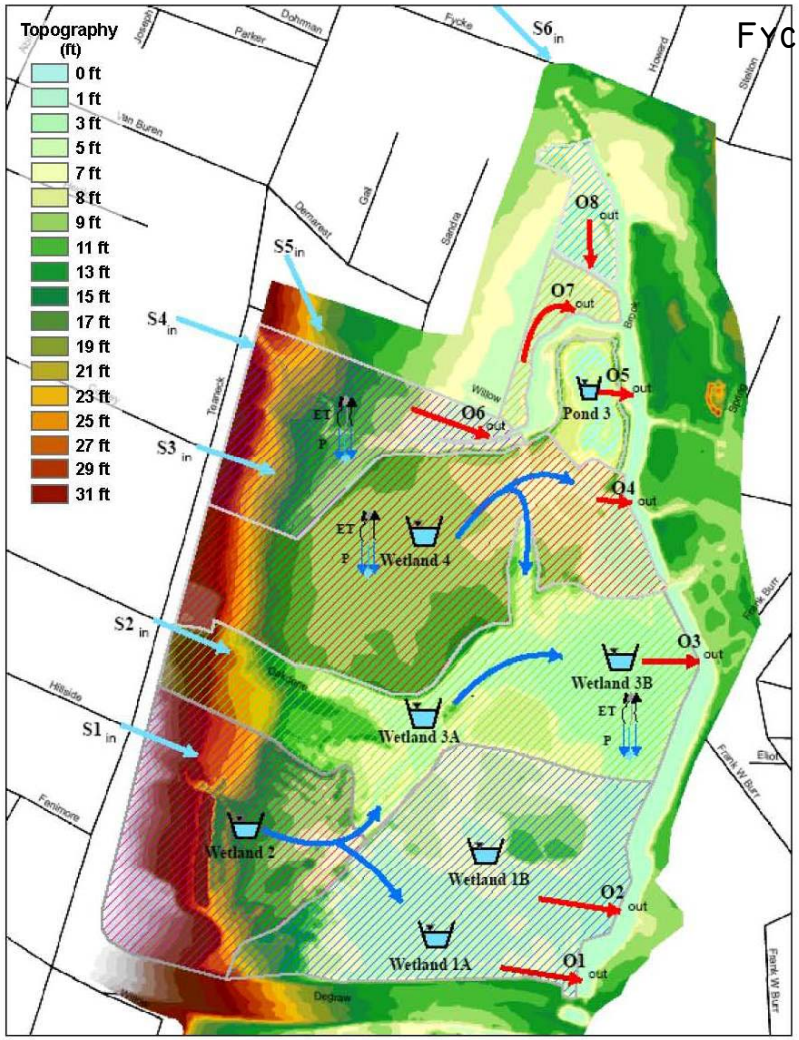
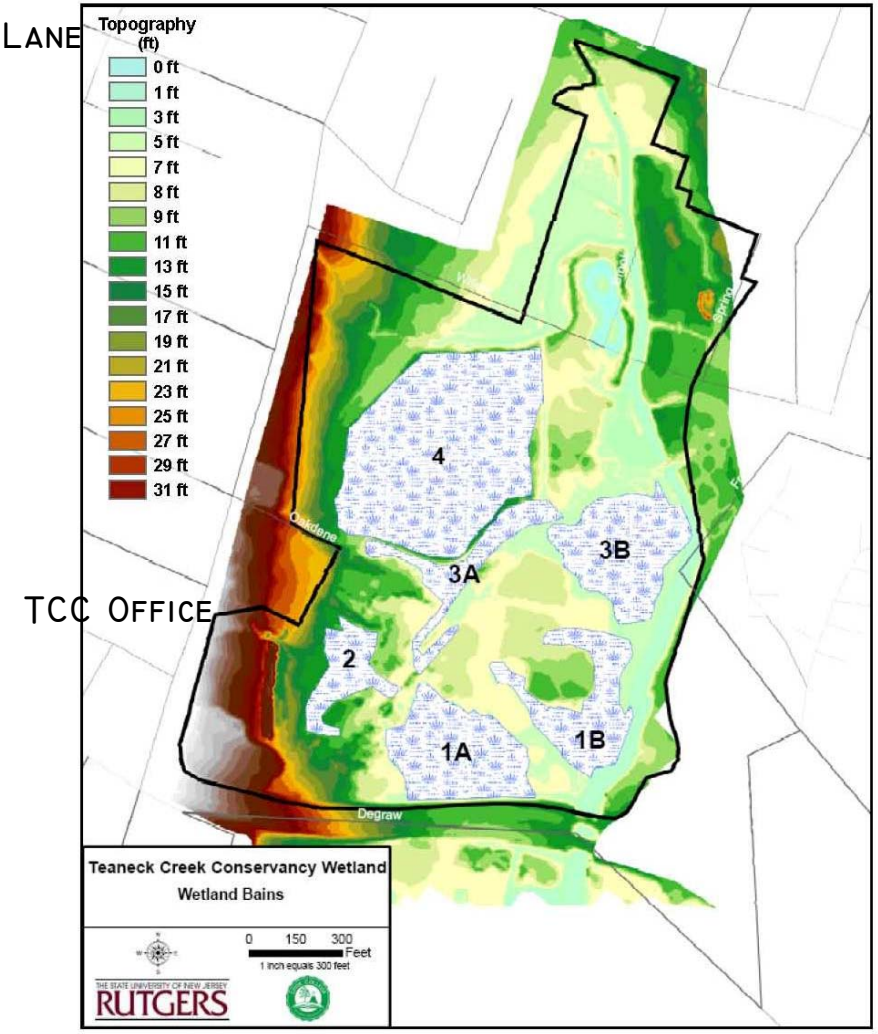


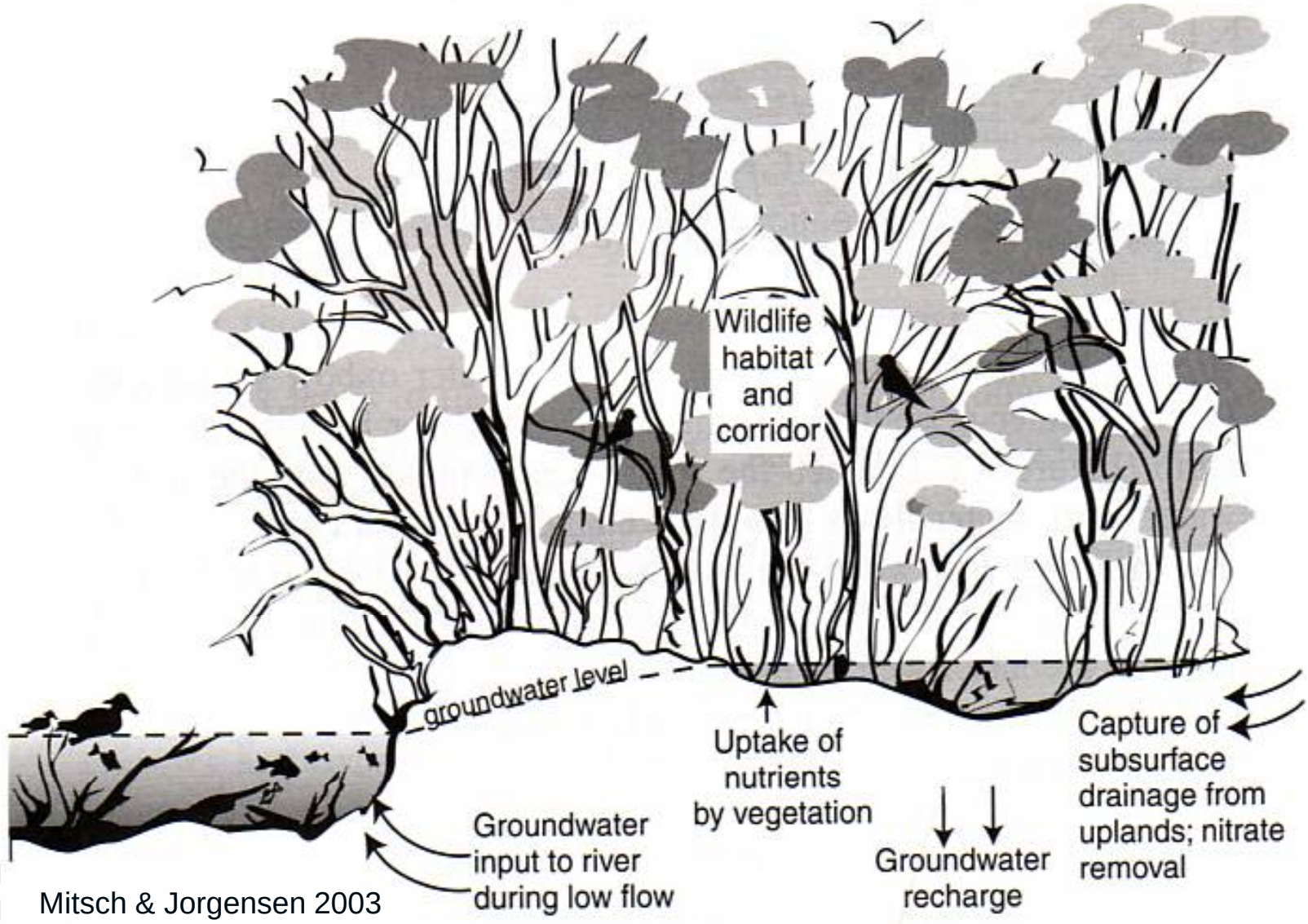

Fig. 3. Teaneck Creek Wetland Areas



# Wetlands Applied Research
# Project Outputs - Hydrology

- Calibrated and validated SWMM model of the urban stormwater inputs (included 6 storm drains) to the system
- Future simulations using the SWMM model to demonstrate effective water budget for proposed wetlands
- Identified major sources of nutrients to the wetlands
- Used SWMM model to identify best areas for restoration to maximize wetland creation

# The Riparian Wetland System




Mitsch & Jorgensen 2003

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# Wetlands Applied Research
# Hydrologic Characterization – Existing Conditions

- Identified clay lens layer underlying wetlands that severely limits interaction between groundwater and surface water wetlands
- Primary source of water to the wetland is direct precipitation and stormwater runoff from surrounding urban areas (functioning as a “perched bog”)
- Surrounding urban development more than 90% impervious, which creates flashy hydrology (Fycke Lane) resulting in high erosive flows into the wetlands
- Tidegate closure during high tide creates ‘bathtub’ effect in southern portion of Teaneck Creek (Glenpointe)
- Developed accurate predictions of runoff from surrounding areas using calibrated model
- Due to the limited groundwater interaction, wetlands experience a ***net loss of water volume during dry summer months and gains during spring and fall wet seasons***

# Wetlands Applied Research
## Soil Characterization – Existing Conditions

- Native hydric organic soils limited to northern reaches of Zone A near Fycke Lane
- Dredge fill clay berms along Teaneck Creek limit groundwater and surface water interactions between the creek and wetland system
- Extensive areas of existing wetlands are underlain with a heavy clay soil layer
- Extensive areas of site filled with unconsolidated soils/dredge spoils
- Wetland system functions as a “perched bog” rather than a typical riparian wetland

# Wetlands Applied Research
# Plant Characterization – Existing Conditions

- Diverse wetland plant communities observed in areas with undisturbed soils and tree canopy cover
- Identified areas of limited diversity resulting from summer drought conditions
- Dominant stands of invasive species (*Phragmites, Japanese Knotweed, Porcelain Berry, Mile-a-Minute, Multiflora Rose, Garlic mustard*) are predominantly located on dredge/fill soils
- Floristic quality mapping used to generate site-specific planting regime for the restoration
  - Minimize land disturbance in areas that had high floristic quality scores

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# Wetlands Restoration Design Objectives

- Enhance/restore 20 acres of wetlands on public land in the most populous NJ county
- Reestablish Wetland Hydrology:
  - Stormwater runoff, groundwater
  - Periodic inundation from Teaneck Creek
  - Tidal “pulsing” from creek
- Provide flood buffering and water storage
- Naturally filter stormwater runoff
- Provide wildlife habitat

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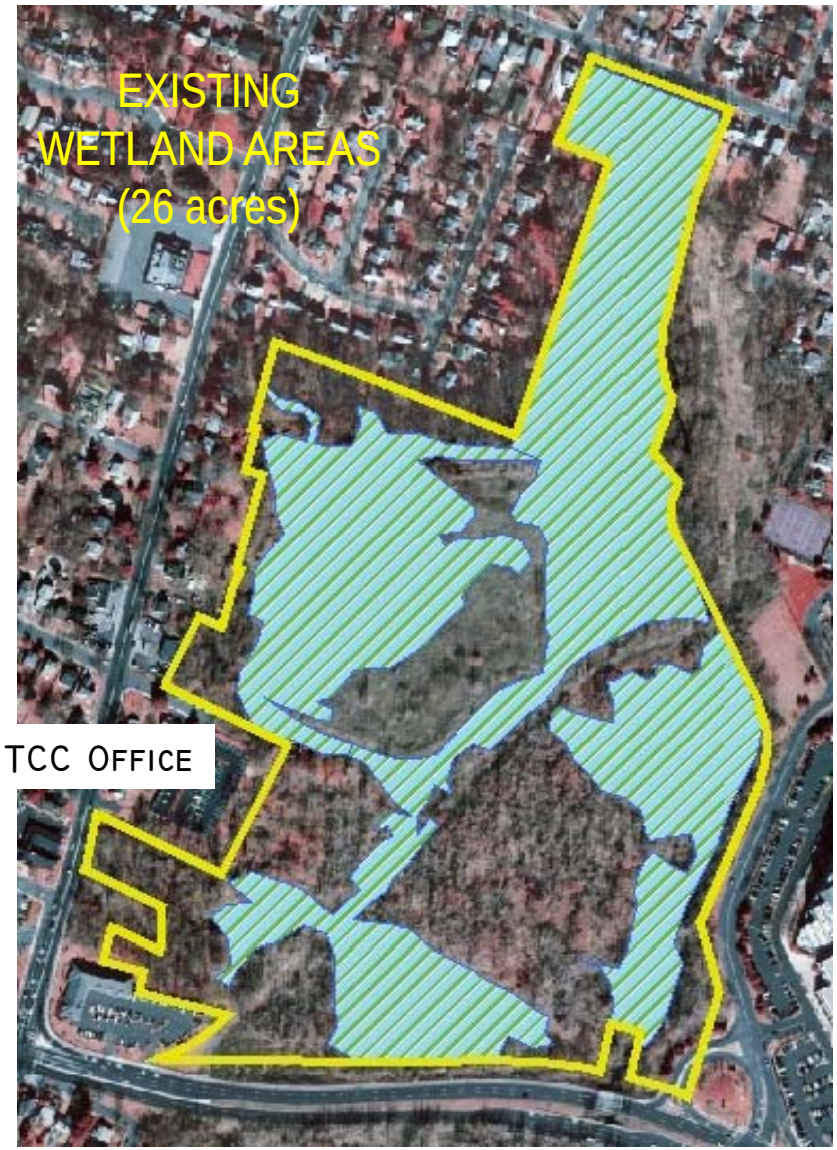
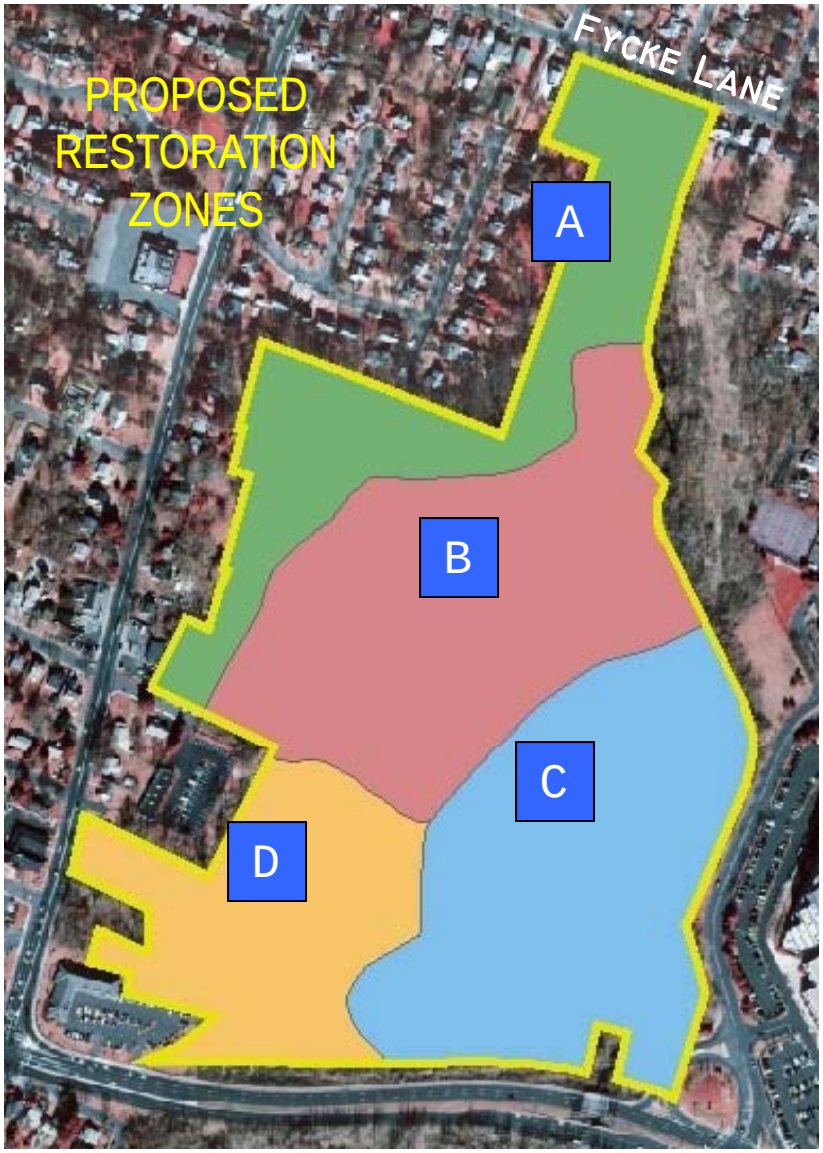
# Wetlands Restoration Design  Restoration Design



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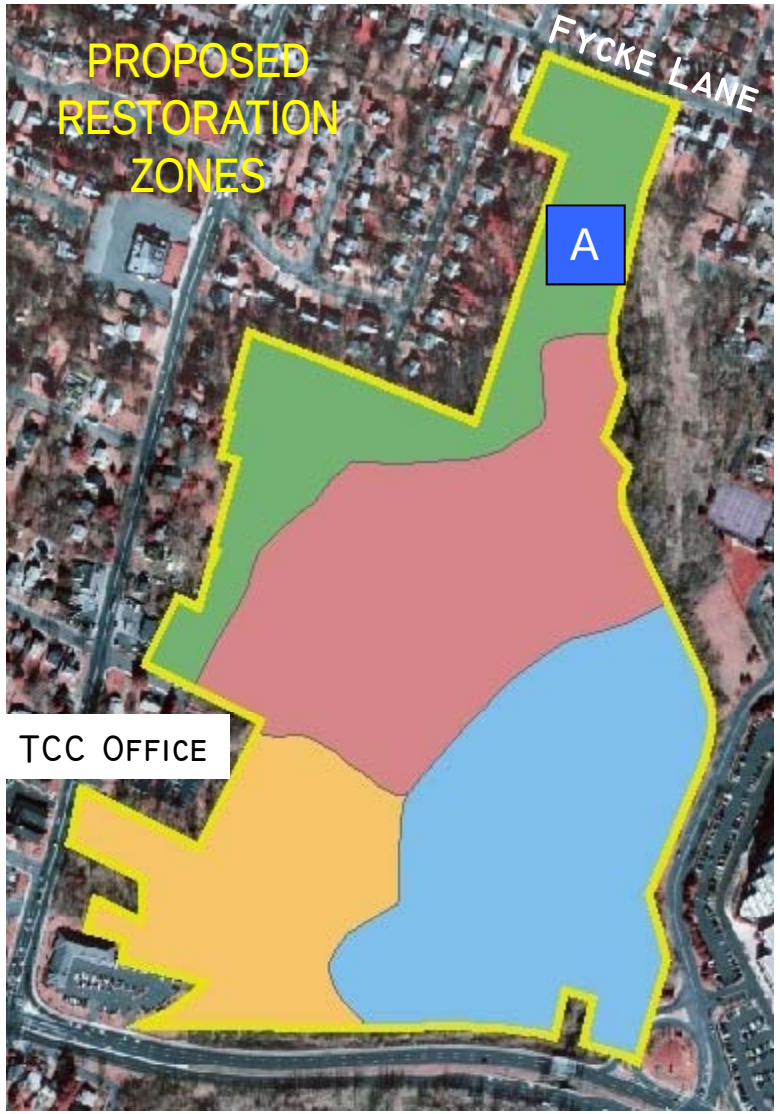
# Teaneck Creek Restoration Zone A

- Approximately 9 acres
- Existing high quality forested wetland vegetation matrix
- Restoration efforts to focus solely on:
  - Protecting existing native vegetation
  - Preventing future invasive species incursion
  - Removal/management of existing colonies of invasive species
  - Reestablishing additional native forested wetland plant communities



# Teaneck Creek Zone A – Restoration Activities

- Restore 2.5 acres of Flood Plain Forest, canopy trees, understory shrubs and forbs
- Plant 48 trees; 1,100 shrubs; 2,000 herbaceous plugs
- Ongoing maintenance of invasive species, with specific focus on Japanese Knotweed along Teaneck Creek, *Multiflora Rose* in existing wooded areas, and invasive vines in the Outdoor Classroom restoration area
- Includes approximately 1/3 acre of *Phragmites* removal and wetland restoration in Outdoor Classroom area near native wetlands
- Managed and maintained by TCC Weed Warrior volunteers

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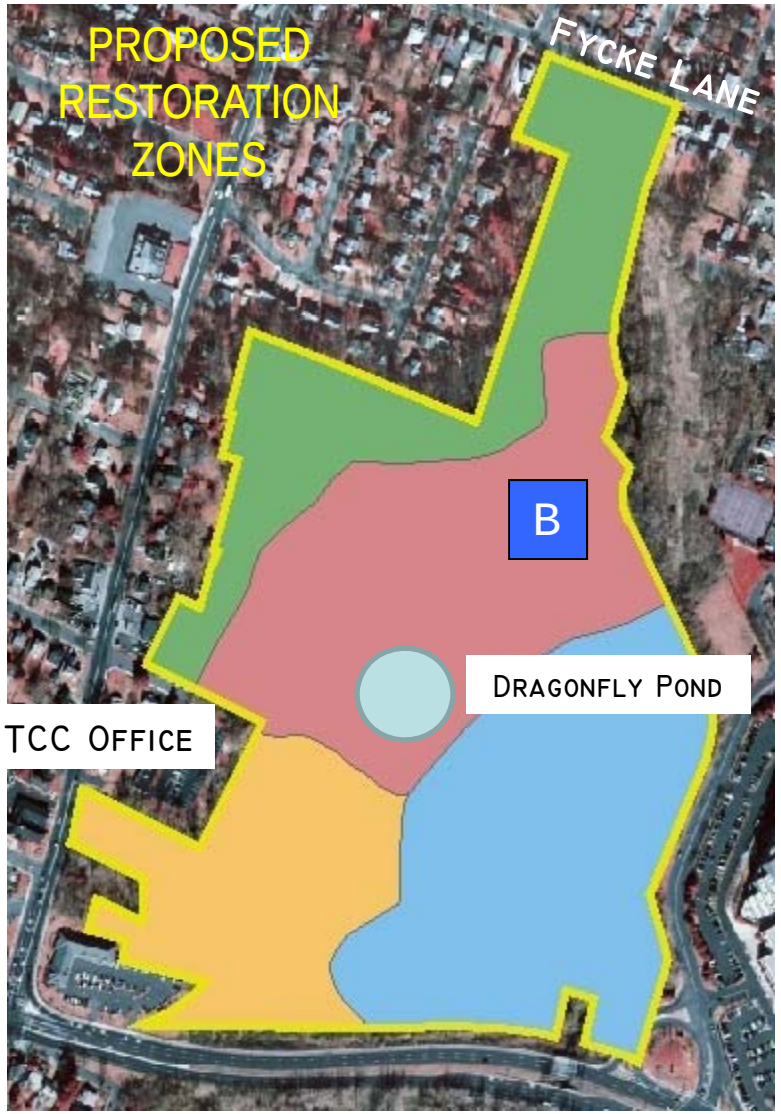
# Teaneck Creek Restoration Zone B

- Approximately 15 acres
- Area dominated by *Phragmites australis*
- Restoration efforts to target:
  - Containing and preventing the spread of *Phragmites australis*
  - Use existing *Phragmites* to improve stormwater quality
  - Minimal earth disturbance due to limited access without extensive disturbance to adjacent high quality habitat
  - Management focus on cutting and herbicide application (final approach and extent of use to be discussed with NJWMC)



# Teaneck Creek Restoration Zone B

- Management and containment of *Phragmites* through select cutting and herbicide treatment in approximately 5 acres of perimeter and habitat island areas of existing wetland basin
- Restore 5 acres of Flood Plain Forest, canopy trees,  understory shrubs and forbs
- Planting 248 trees; 3,400 shrubs; 4,000 herbaceous plugs in perimeter and habitat island areas
- Ongoing invasive species management in restoration planting areas to monitor and contain spread of *Phragmites*

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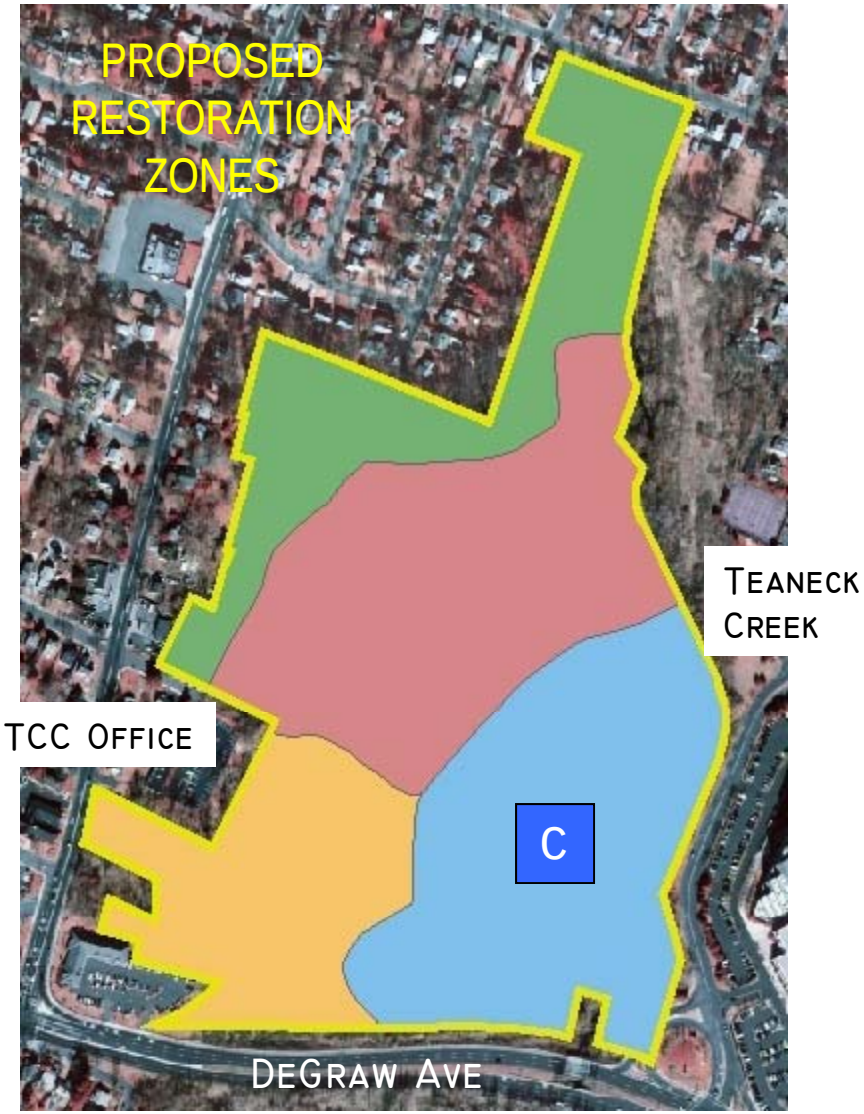
# Teaneck Creek Restoration Zone C

- Approximately 14 acres
- Borders on Teaneck Creek
- Restoration efforts to include:
  - Excavate connections through the existing berm along Teaneck Creek
  - Reestablish hydrologic connections to provide flushing of wetland areas during small, frequent storm events
  - Connect wetland areas in Zones B & D to Teaneck Creek



# Teaneck Creek Restoration Zone C

- Remove *Phragmites* through select cutting and herbicide treatment in approximately 1.5 acres of perimeter and habitat island areas of existing wetland basin
- Create 5 acres of wetland basins
- Restore 1.5 acres Flood Plain Forest
- Restore 1 acre of Shrub Swamp understory in wetland restoration areas
- Restore 1.25 acres of Shrub Swamp grass and forb community in wetland restoration areas
- Restore 1.25 acres of Emergent Freshwater Marsh in wetland restoration areas
- Plant 70 native Flood Plain Forest trees; 4,000 shrubs; 22,000 herbaceous plugs

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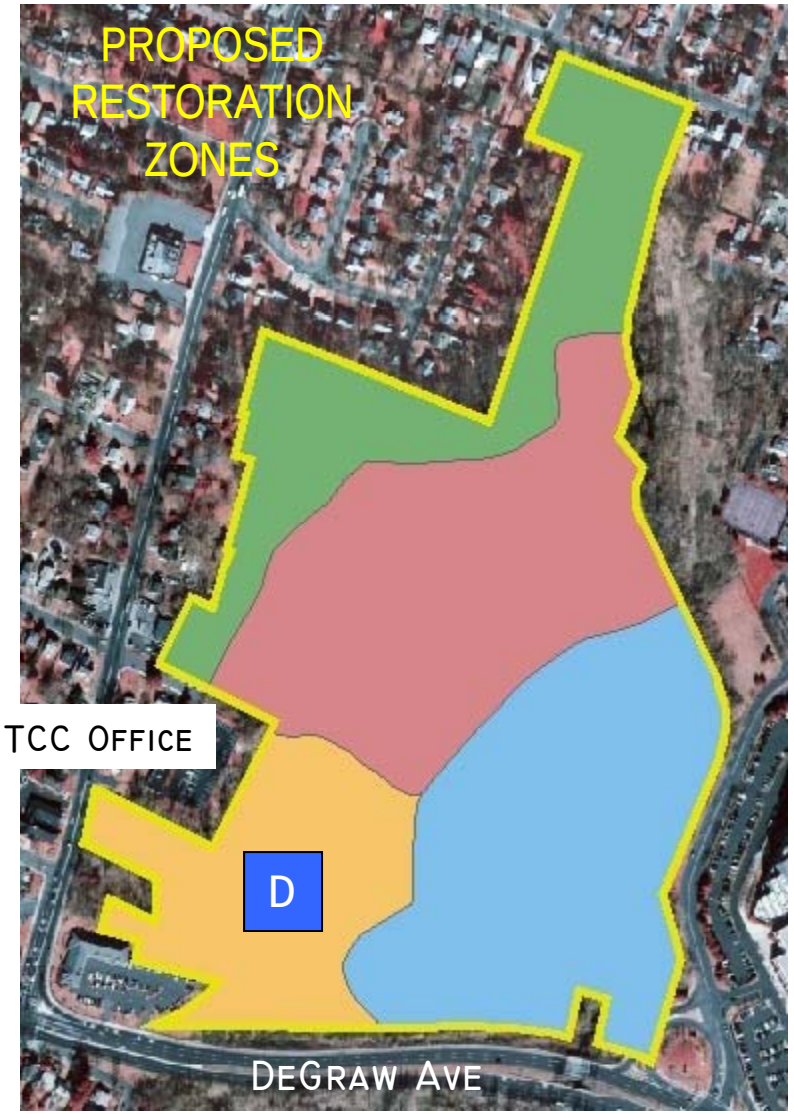
# Teaneck Creek Restoration Zone D

- Approximately 8 acres
- Construct ~5 acres of additional wetland storage and supporting habitat areas
- Restoration efforts to include:
  - Widen and deepen disturbed/filled channels and basin areas to provide hydrology needed to support wetlands vegetation matrix
  - Excavate approximately 3,000 to 6,000 cubic yards of debris from existing wetlands areas
  - Reestablish hydrologic connections to Teaneck Creek
  - Extend residence time of surface water flows into the area to provide necessary hydrology to support desired wetland system



# Teaneck Creek Restoration Zone D

- Create 4.25 acres of wetlands and native flood plain habitat
- Restore 1.5 acres Flood Plain Forest trees and shrubs
- Restore 1 acre of Shrub Swamp understory in wetland restoration areas
- Restore 0.5 acres of Shrub Swamp grass and forb community in wetland restoration areas
- Restore 1.25 acres of Emergent Marsh in wetland restoration areas
- Plant 78 native trees; 3,500 shrubs; 12,000 herbaceous plugs

# TCC Volunteer Activities

- Since completion of the Conceptual Wetlands Restoration Plan TCC volunteers have continued to implement onsite improvements:
  - Butterfly Garden
  - Audubon Native Planting Garden
  - Renovated Peace Labyrinth
- ***These improved areas must be protected during the restoration activities***

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# Wetlands Restoration Design

| PROPOSED RESTORATION ACTIVITY | Zone A | Zone B | Zone C | Zone D | TOTALS |
|---|---|---|---|---|---|
| *Phragmites* Management/Removal Areas (Acres) | | 5.00 | 1.50 | | 6.50 |
| | | | | | |
| Wetlands Restoration Areas (Acres) | | | | | |
| Flood Plain Forest | 2.50 | 5.00 | 1.50 | 1.50 | 10.50 |
| Shrub Swamp (Shrubs) | 0.00 | 0.00 | 1.00 | 1.00 | 2.00 |
| Shrub Swamp (Herbaceous) | 0.00 | 0.00 | 1.25 | 0.50 | 1.75 |
| Emergent Marsh (Herbaceous) | 0.00 | 0.00 | 1.25 | 1.25 | 2.50 |
| TOTAL ACRES | 2.50 | 5.00 | 5.00 | 4.25 | 16.75 |
| | | | | | |
| Wetland Plantings | | | | | |
| Trees | 48 | 248 | 70 | 78 | 444 |
| Shrubs | 1100 | 3400 | 4000 | 3500 | 12000 |
| Herbaceous | 2000 | 4000 | 22000 | 12000 | 40000 |

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# Wetlands Restoration Design Cost Estimate*

| Preliminary Estimate of Restoration Costs | | | |
|---|---|---|---|
| Restoration Activity | Approximate Acreage | Cost per Acre | Total Cost |
| Phragmites/Invasives Management | 14 | $ 12,500.00 | $ 175,000.00 |
| Emergent Wetland Plantings | 6 | $ 20,000.00 | $ 120,000.00 |
| Forested Wetland Plantings | 10 | $ 32,500.00 | $ 325,000.00 |
| Wetland Enhancement | 4 | $ 14,000.00 | $ 56,000.00 |
| Mobilization and Construction Activity | 20 | $ 14,000.00 | $ 280,000.00 |
| Monitoring and Maintenance | 20 | $ 2,000.00 | $ 40,000.00 |
| 25% Contingency | | | $ 249,000.00 |
| TOTALS | | | $ 1,245,000.00 |

***Costs originally developed in 2007; does <u>not</u> include debris removal or landfill closure remediation activities (to be completed by Bergen County)***

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# Current Project Status

- Debris removal activities required to finalize landfill closure
- Updating and finalizing the Wetlands Restoration Plan
- Securing funding for freshwater wetlands restoration


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# Funding Opportunities

- Public Grant Programs
  - NJDEP
  - USEPA
  - USFWS
  - HEP (Harbor Estuary Program designated priority restoration site)
  - NRCS
- Private Foundation Funding
- NJWMC

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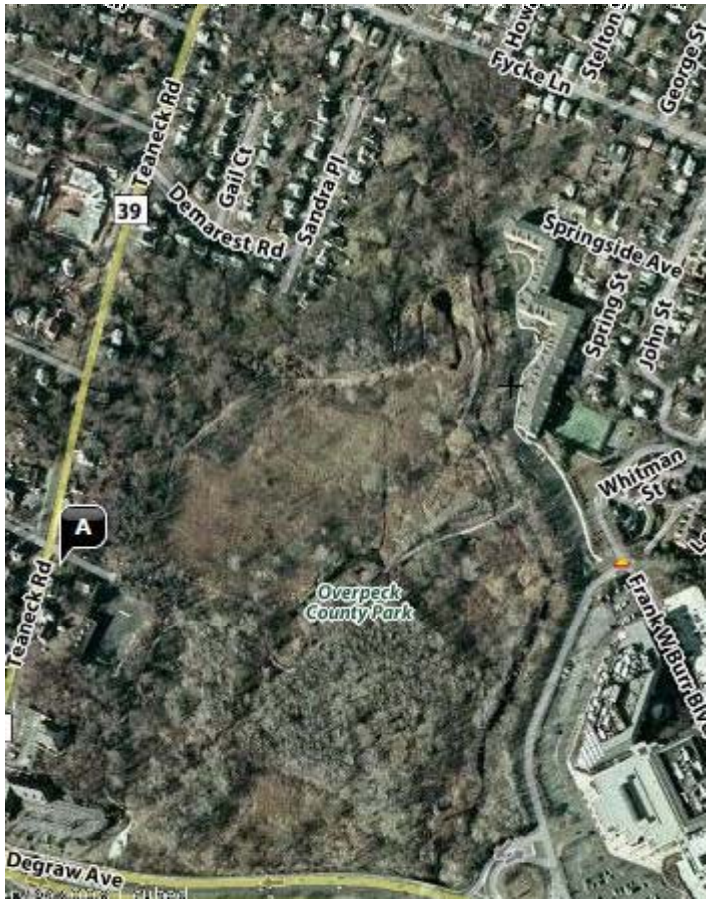
# Summary

- A freshwater wetland mitigation project could provide the significant revenues needed to complete the proposed restoration activities at Teaneck Creek Conservancy Area 1
- The Final Restoration Plan needs to be completed
- Funders must be identified and grant applications submitted

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