

Freshkills Park Lecture Series

January 25, 2011



Sustainable Urban Stormwater Management: The Bluebelt and Beyond

*Dana Gumb, Jr., Chief, Staten Island Bluebelt
Bureau of Water and Sewer Operations*

THE CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Michael Bloomberg, *Mayor*
Caswell F. Holloway, *Commissioner*

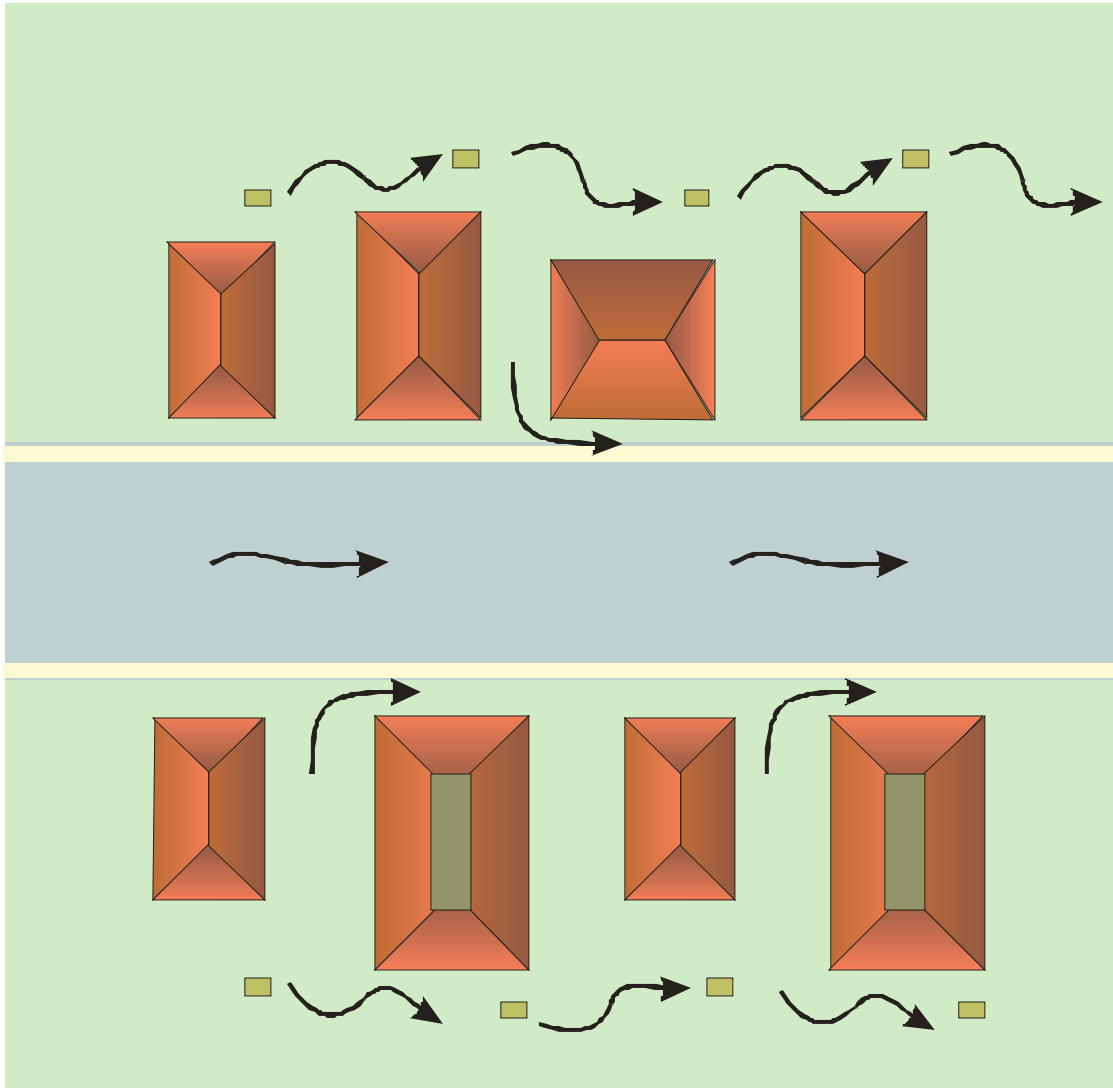


Outline of Bluebelt Presentation

1. **Stormwater Paradigms**
2. **Overall Strategies of Bluebelt**
3. **Best Management Practices**
 - **Constructed Stormwater Wetlands**
 - **Stream Corridor Restoration**
4. **Mid-Island Bluebelts**
5. **Bluebelt Flora and Fauna**
6. **Bluebelts in City Parks --
SI and beyond**
7. **Bluebelt Field Management**

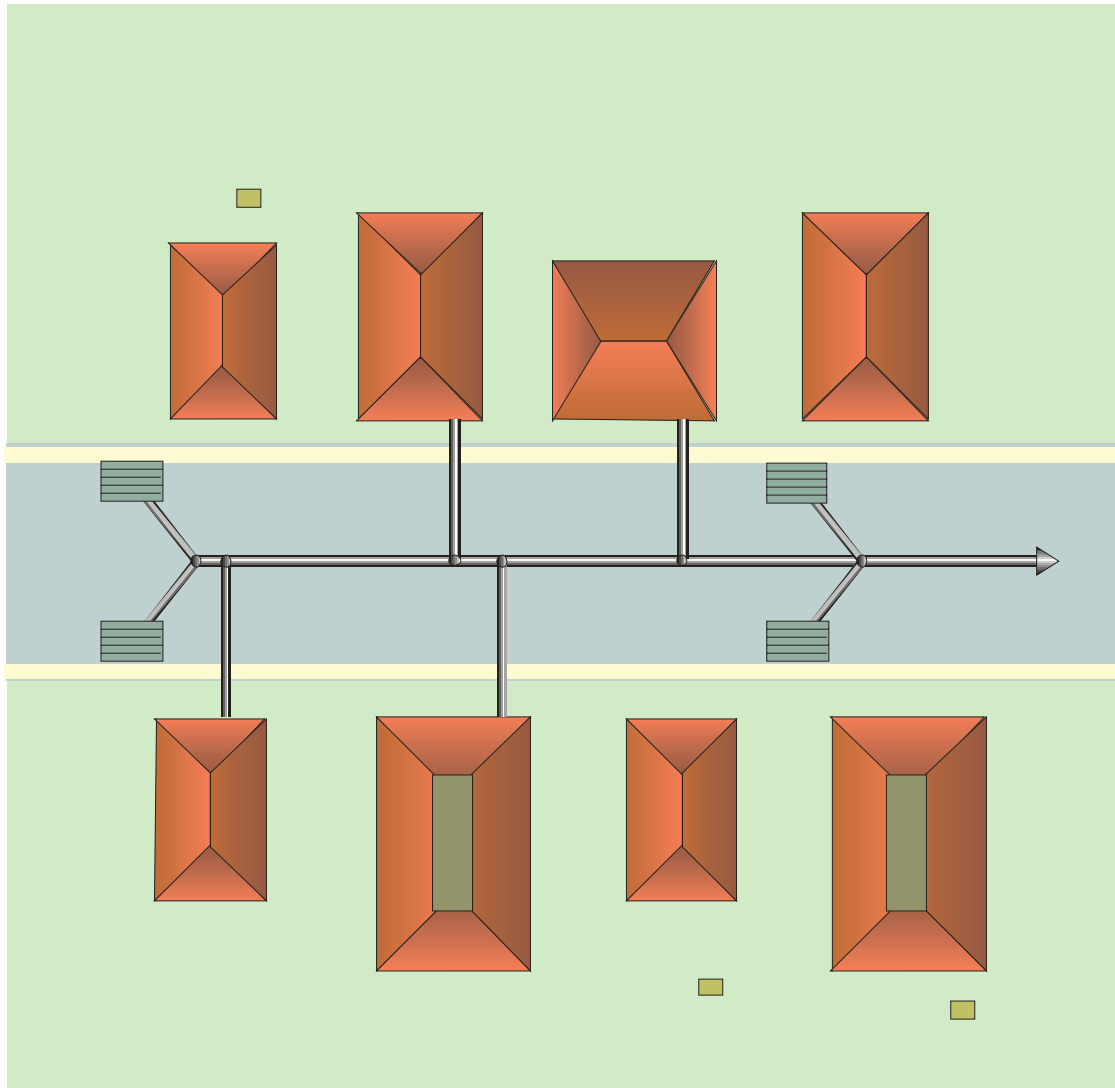


Evolution of Paradigms for Storm Water Management



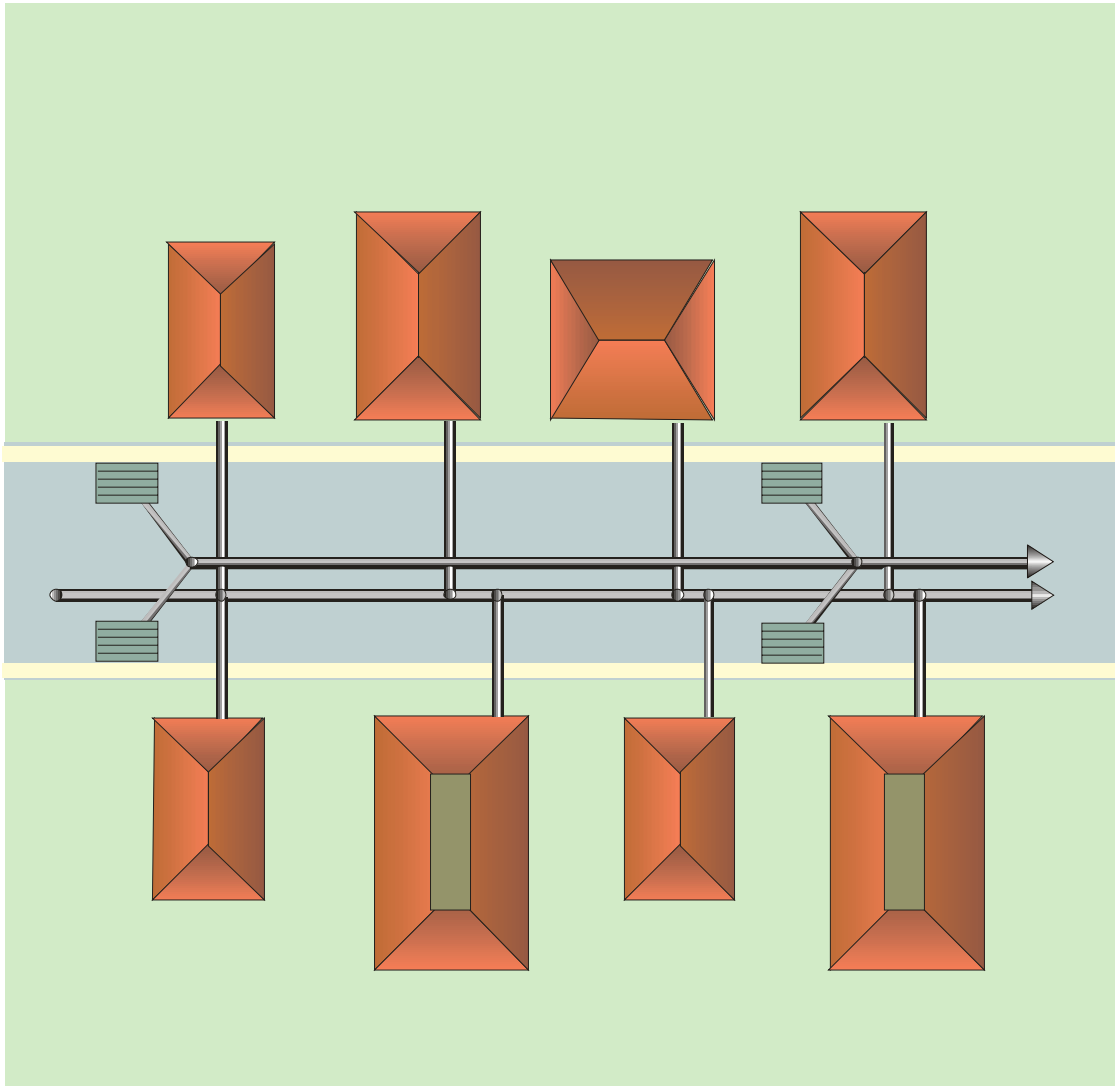
**Run it
in the
Ditches**

Paradigm Shift # 1



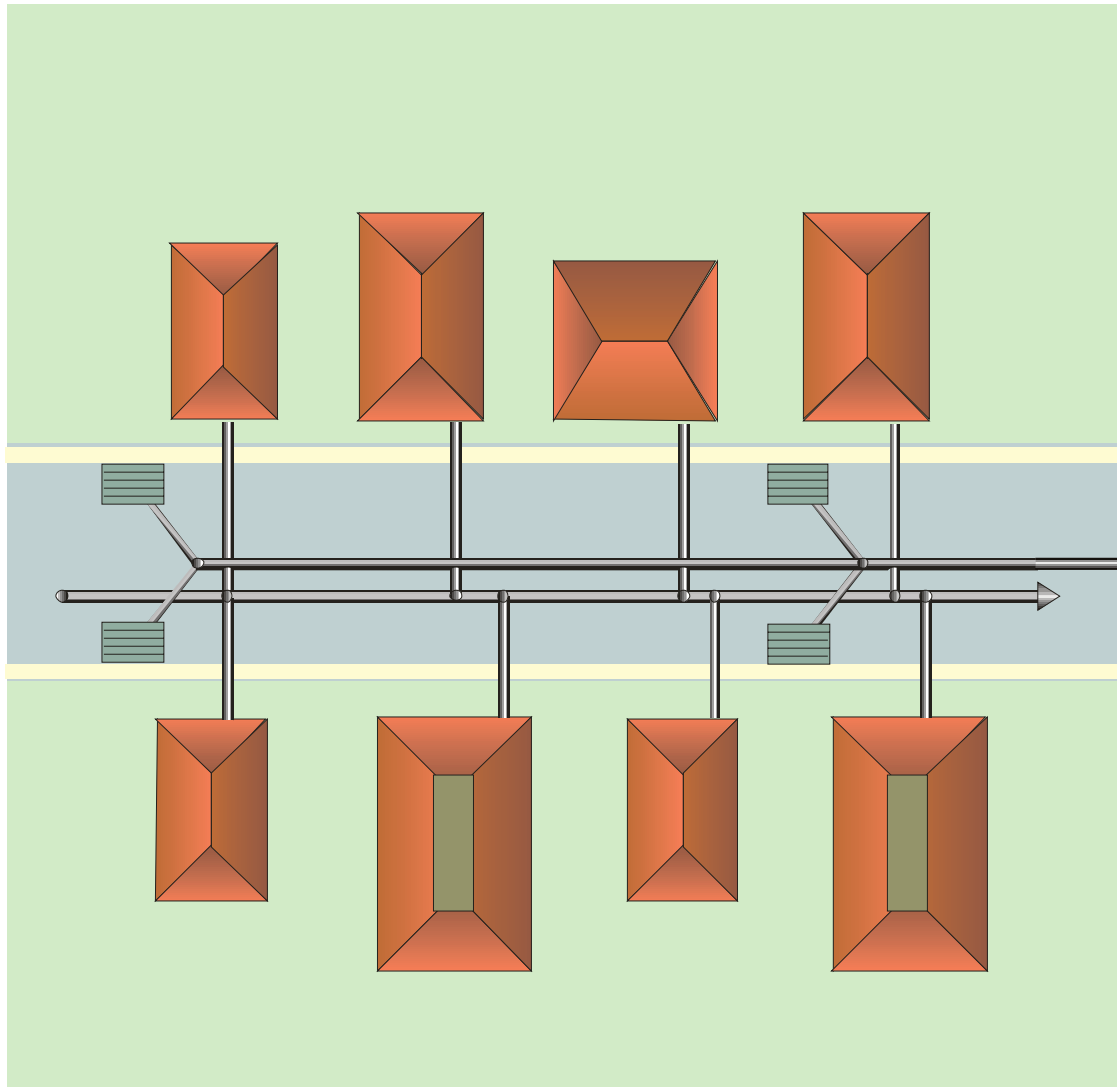
**Run it
in the
Combined
Sewers**

Paradigm Shift # 2

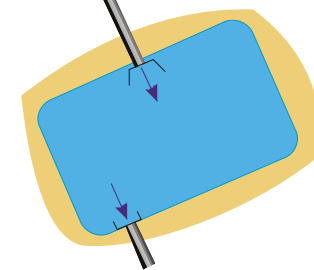


**Run it in
Separate
Sewers**

Paradigm Shift # 3

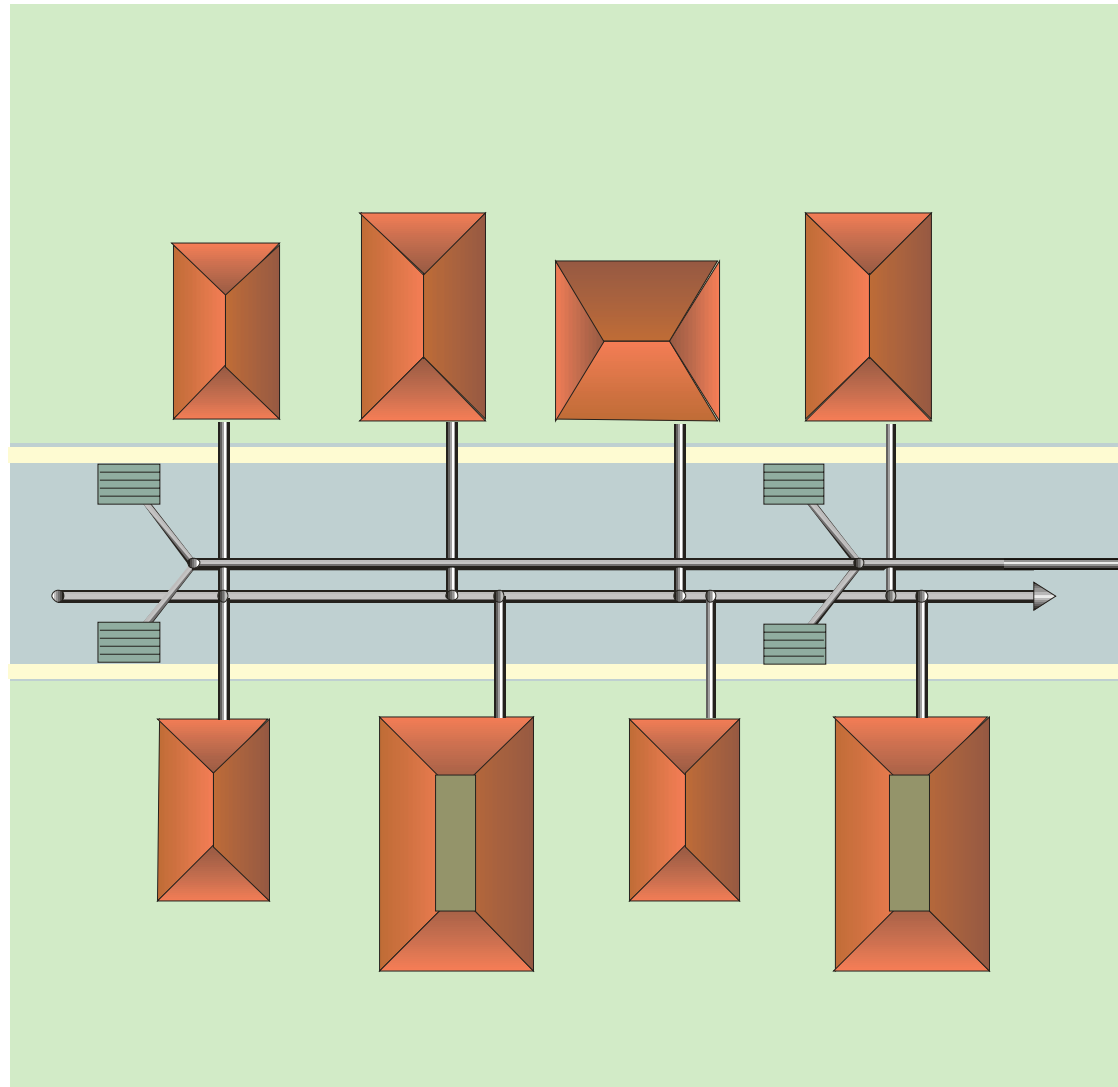


**...Oh, and
Control
Downstream
Flooding**



**Storm Water
Pond**

Paradigm Shift # 4



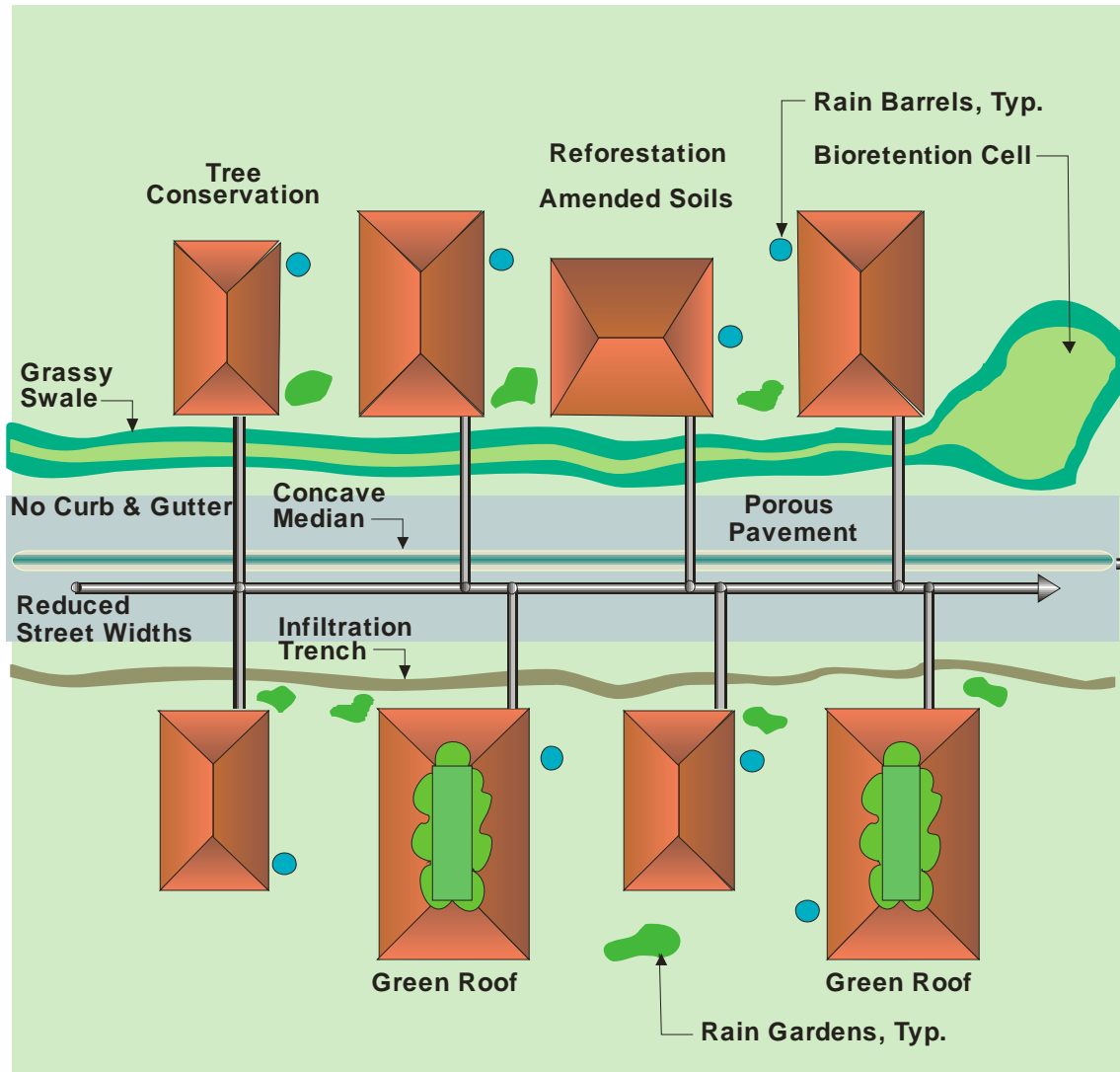
**Also... Don't
Pollute and
Protect
Natural
Resources**

***Best
Management
Practice for
Quantity and
Quality
Control***

***Protected
Side Buffer***

Stream

Paradigm Shift # 5

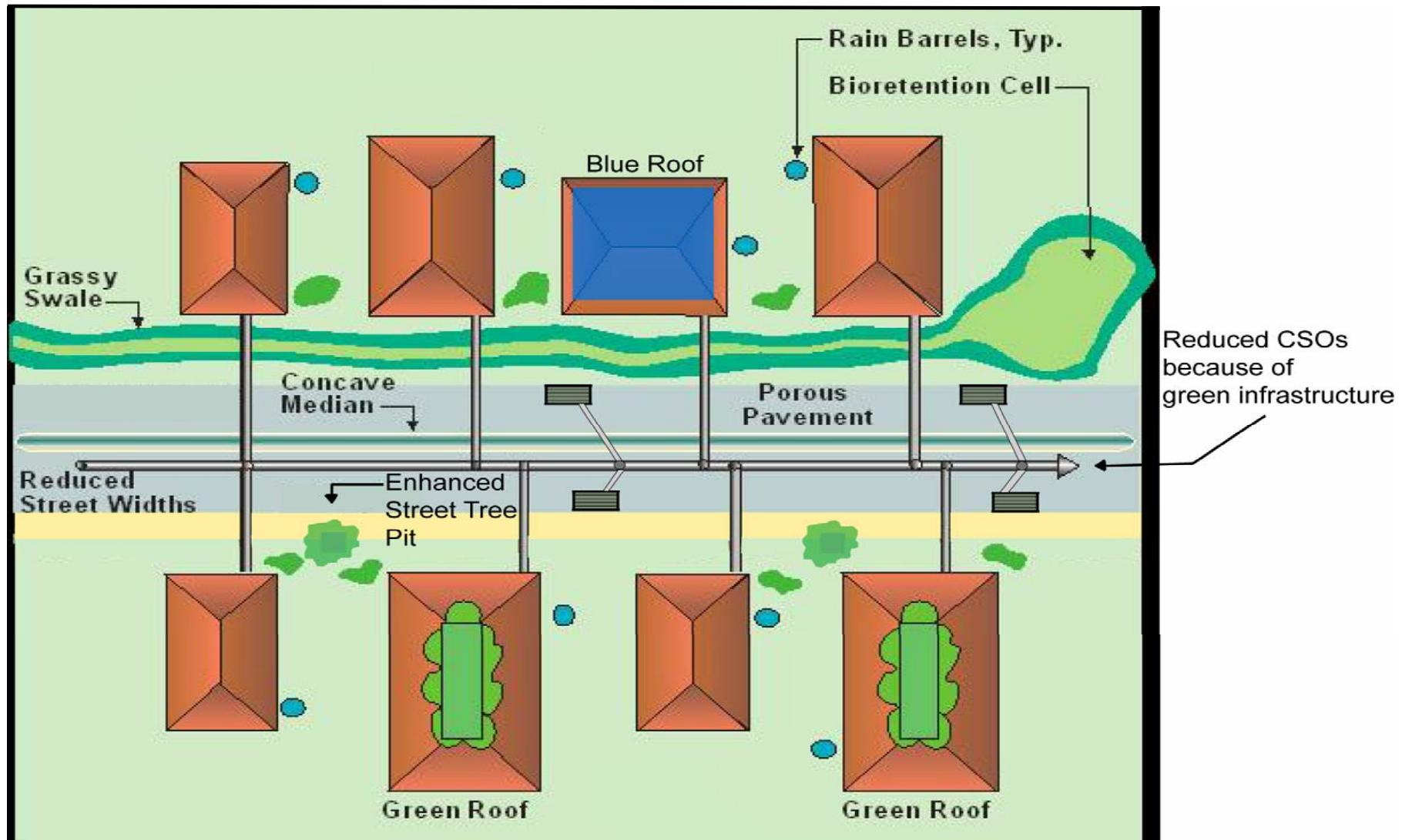


Low Impact Development

- **Green Infrastructure**
- **Soft Path for Storm Water**
- **Use Integrated Management Practices to Achieve Source Control**

**Stable Stream in
Natural Riparian
Corridor**

NYC Paradigm: Green Infrastructure in Areas with Combined Sewers



Outline of Bluebelt Presentation

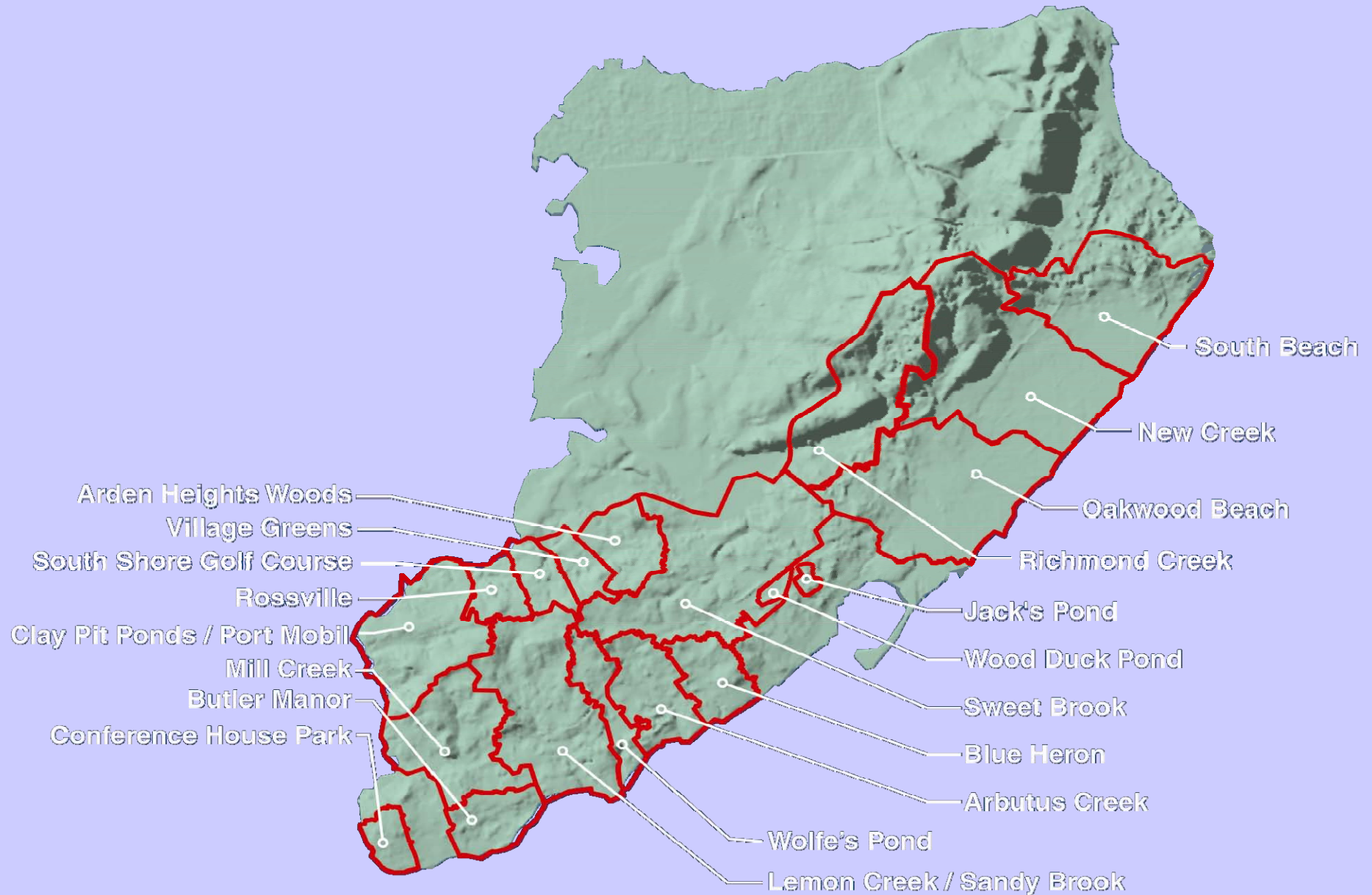
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SI and beyond
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Staten Island Bluebelt



Staten Island Bluebelt Watersheds



Staten Island Advance

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Mother Nature dumps on Island 2.6-inch downpour within hair of 99-year-old rainfall record

By MICHAEL MCGARRY
ADVANCE STAFF WRITER

A fierce thunderstorm ravaged Staten Island yesterday as flood waters cut off train service, washed away cars and a bridge, stranded hundreds, invaded homes and stores, and left one woman dead after a crash on the West Shore Expressway.

The fast-moving storm dumped just over 2 inches of rain on Staten Island between 1 and 5 p.m., according to the Advance's Grasmere weather station. Heavy thunderstorms resumed at about 9:30 p.m., bringing the 24-hour total to 2.6 inches, just under the 99-year-old record of 2.65 inches.

Staten Island Rapid Transit service was interrupted for seven hours when the Great Kills and Annadale train stations were closed due to flood waters as high as the waiting platform. Full service was restored shortly after 9 p.m.

An overflowing Moravian Brook washed out a wooden bridge that is part of Idlease Place near Hunter Avenue in Midland Beach. Police roped off the bridge and blocked the path leading to the washed-out span.

Over 3,700 homes and businesses in various Island communities were without power last night due to lightning strikes and downed electrical lines, according to Sondi Johnson, spokeswoman for Consolidated Edison.

The scattered outages affected Eltingville, Totenville, New Springville, Concord, Oakwood, Great
(See STORM, Page A 13)

Flood waters sweep through Great Kills

By BRIAN LARKIN



Project Background

South Richmond, Staten Island:

- *Last large unsewered part of New York City.*
- *Last significant stand of wetlands.*
- *Failing septic systems and street flooding.*
- *Need for new drainage plans that:*
 - *Provide necessary infrastructure.*
 - *Preserve wetlands.*



Project Background

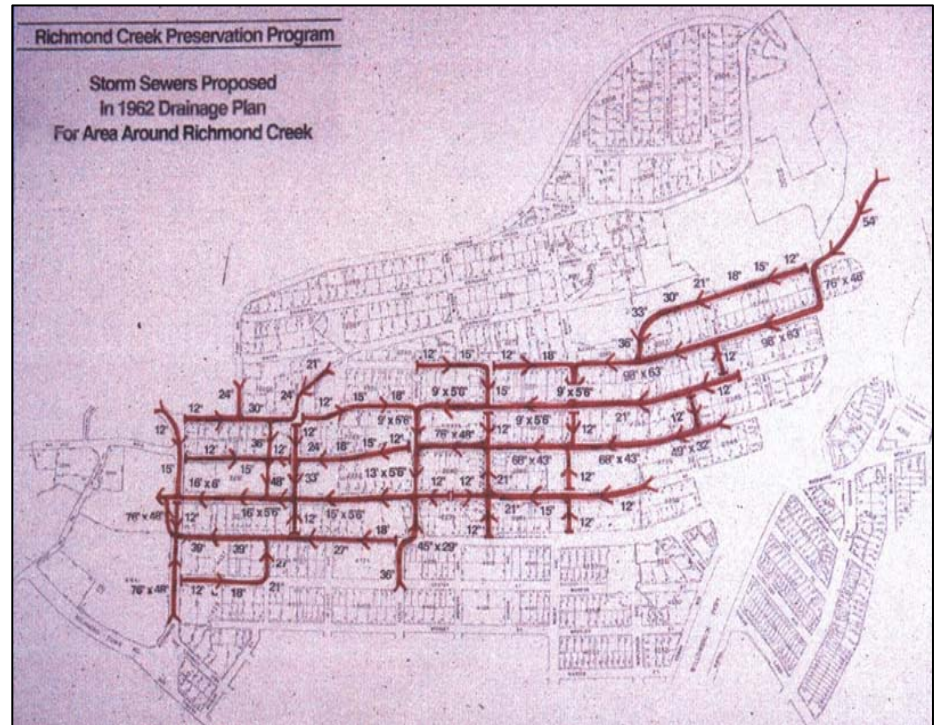
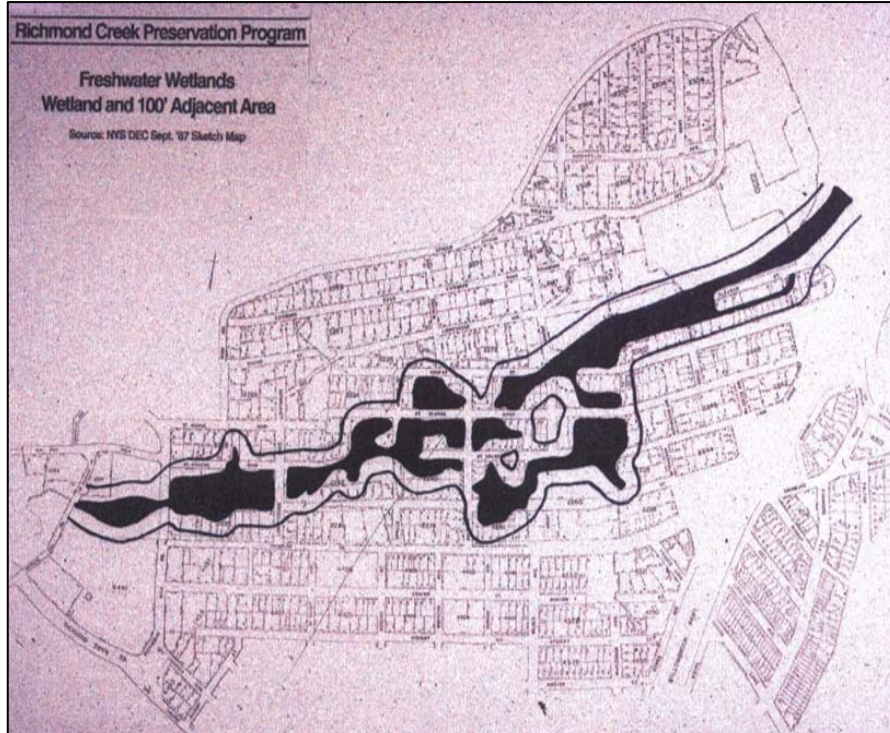
South Richmond, Staten Island:

- *Drainage plans dating from the 1960's assumed full sewerage eliminating all wetlands.*
- *Public policies to protect wetlands:*
 - *NYSDEC freshwater and tidal wetland regulations.*
 - *SSRDD enacted Open Space Network.*
 - *City and state parks created.*
- *How to preserve wetlands while providing drainage infrastructure?*



Drainage Plans from 1960's by Alexander Potter

- Assumed full sewerage
- Thereby eliminating all wetlands



Staten Island Bluebelt Program: Overall Strategies



- Develop storm water management system utilizing existing wetlands.
- Collect street runoff in storm sewers; improve capacity of hydraulic structures.
- At sewer-wetland interface, use BMPs to mitigate impacts of urban runoff and local flooding.
- Build separate sanitary sewer system.

Staten Island Bluebelt Planning Process

- Undertake wetland acquisition
 - Cost / Benefit studies
 - 335 acres acquired to create drainage corridors
 - Create assemblages
- Prepare new drainage plans
- Complete Environmental Impact Statements
- Proceed to detailed construction documents
- Secure permits
- Put shovel in the ground

Typical Schematic of Bluebelt Drainage Plan with BMPs

1. Outlet Stilling Basin
2. Retrofit of Existing Pond
3. Extended Detention Basin
4. Sand Filter
5. Pocket Wetland
6. Stream Restoration
7. Culvert Reconstruction
8. Meandering Stream



Bluebelt Construction Program

- First capital project initiated in 1997 in Richmond Creek watershed.
- To date, 50 BMPs completed:
 - 21 constructed storm water wetlands,
 - 5 stream restorations,
 - 14 outlet stilling basins,
 - 6 culvert reconstructions,
 - 1 sand filter, and
 - 3 wetland enhancements.

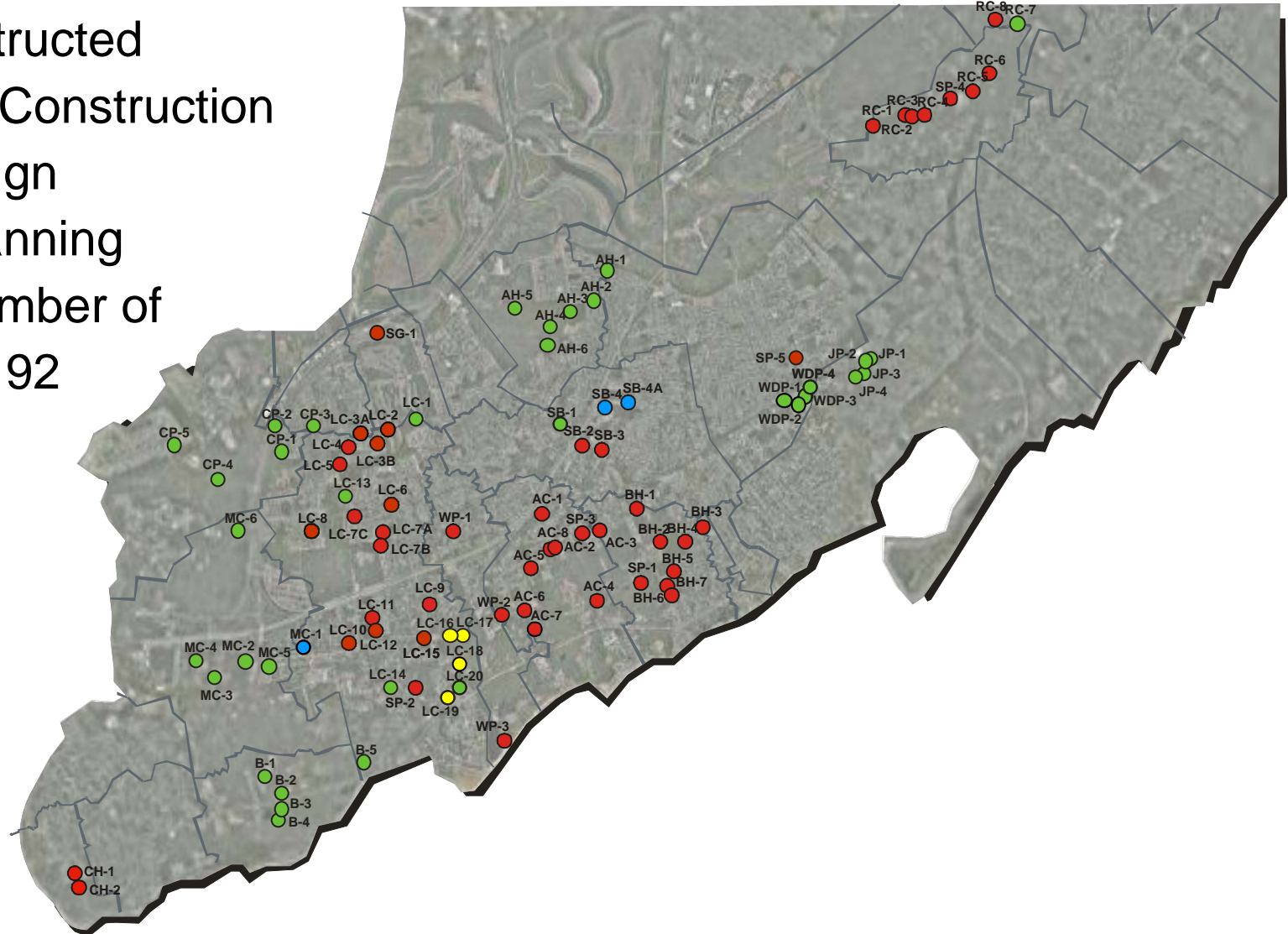


BMP Construction Progress In South Richmond

Status of BMP's:

- 50 Constructed
- 3 Under Construction
- 4 In Design
- 35 In Planning

Total Number of
BMP's = 92



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BMP BH-2 : Extended Detention Basin



BMP BH-2 : Extended Detention Basin



Construction work in progress.

BMP BH-2 : Extended Detention Basin



Aerial view of functioning constructed wetland.

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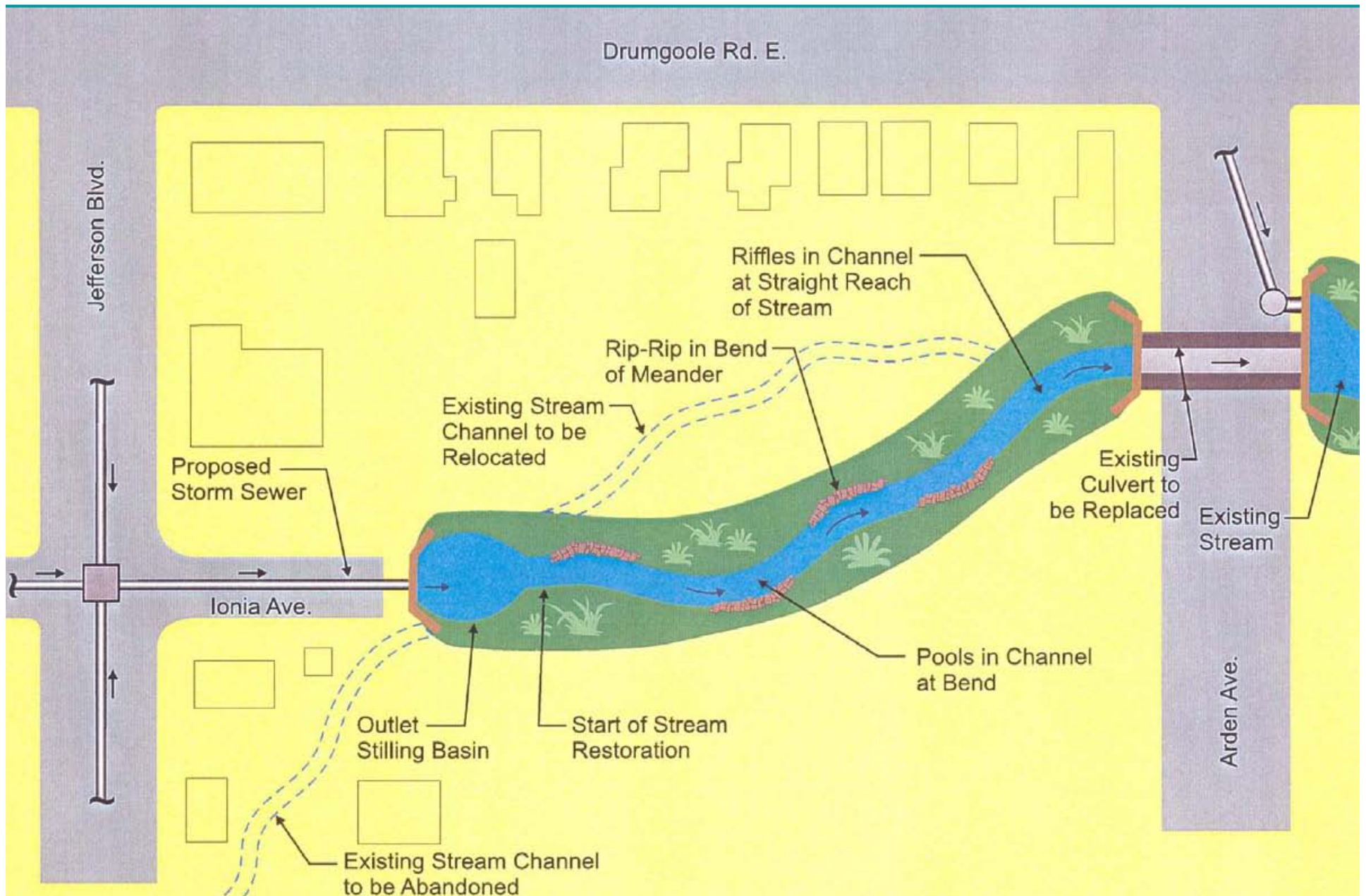
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BMP SB-4 Stream Restoration at Ionia Ave



BMP SB-4 Stream Restoration at Ionia Ave



BMP SB-4 Reconstructed Arden Ave Culvert



BMP SB-4 Stream Reconstruction



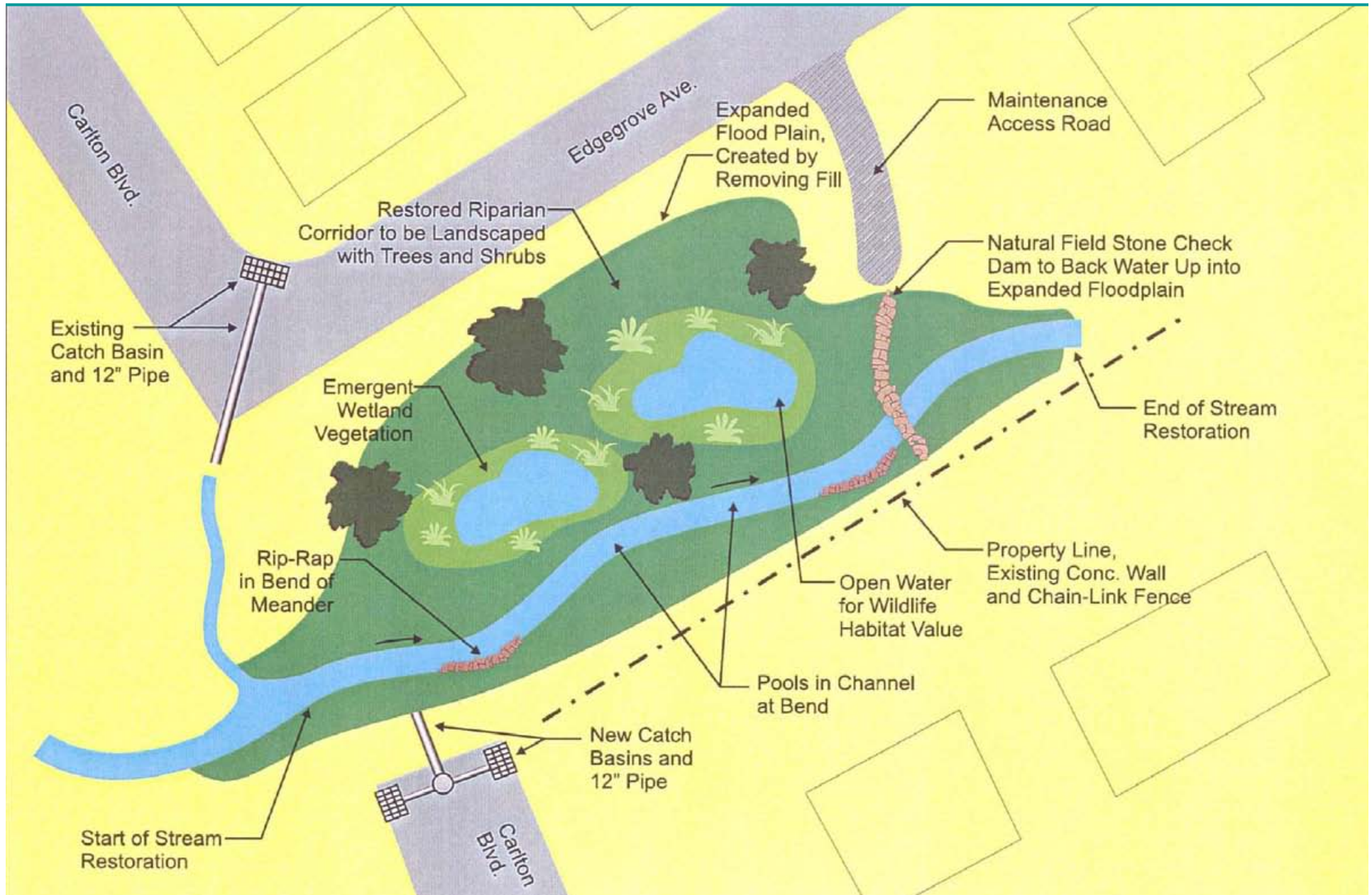
BMP SB-4 Stream Reconstruction



BMP SB-4A Stream Restoration at Ionia Ave



BMP SB-4A Stream Restoration at Ionia Ave



BMP SB-4A Carlton Blvd and Edgegrove Ave



BMP SB-4A: Construction Complete



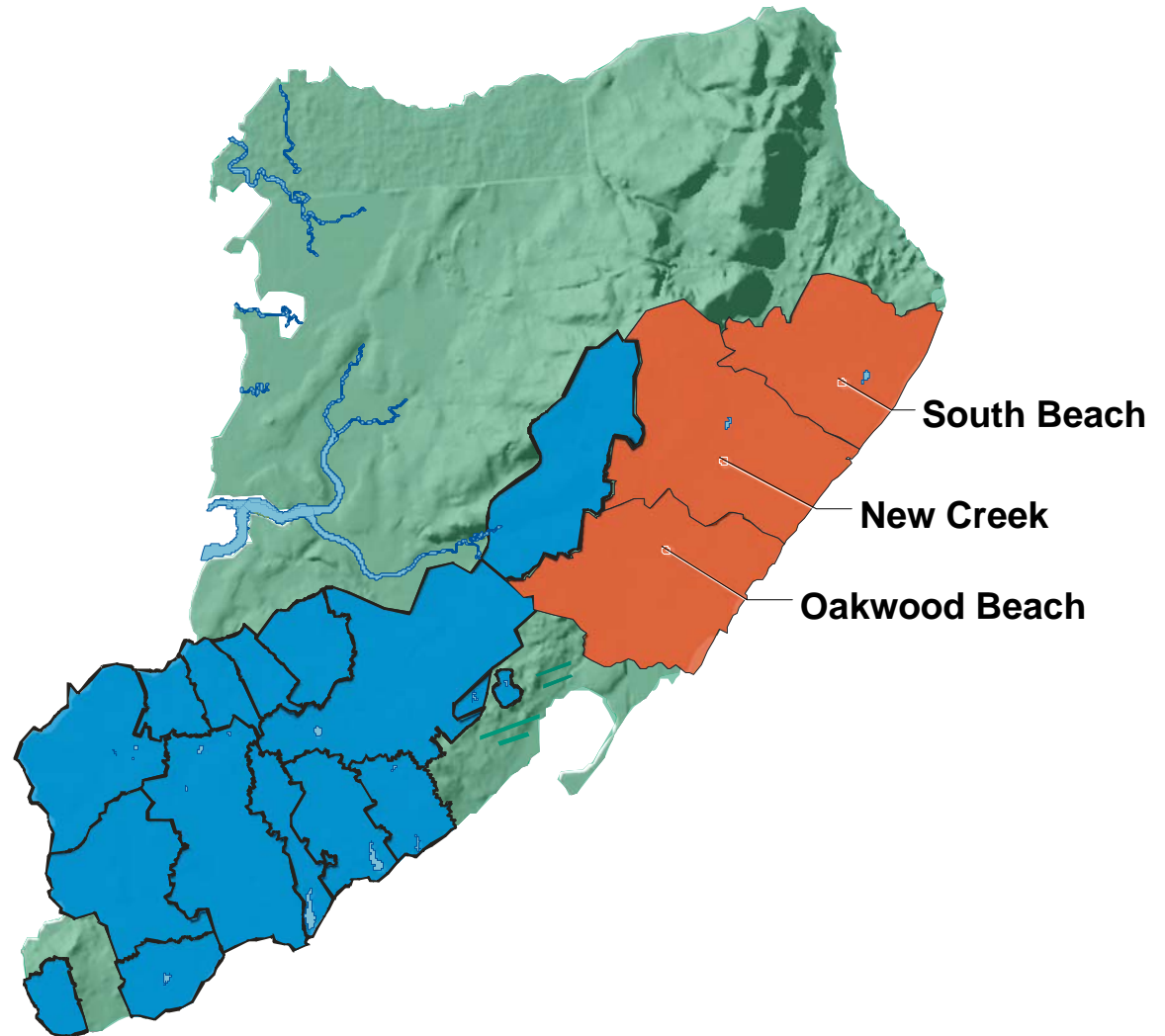
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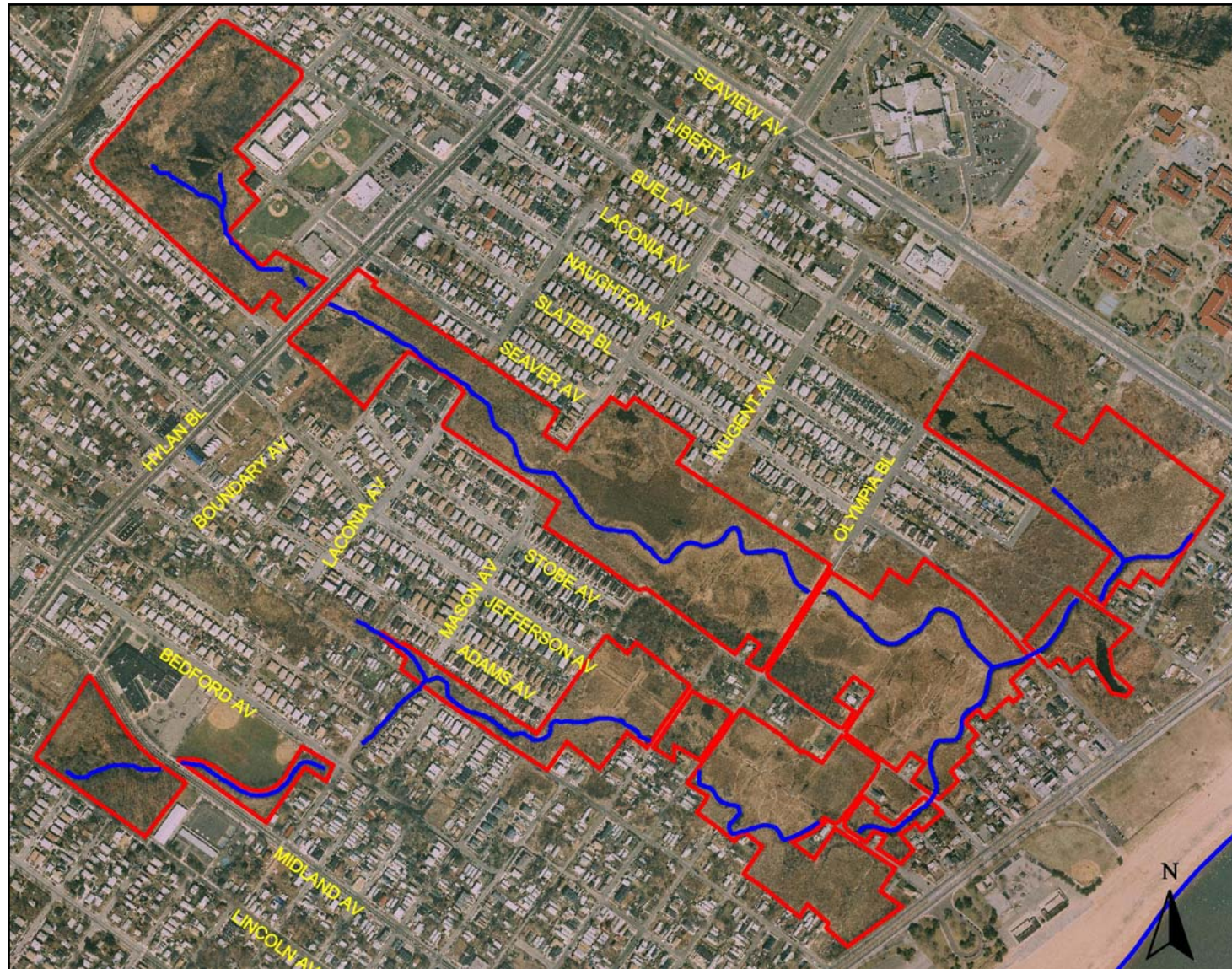


Proposed Mid-Island Bluebelt Program

- **New Creek Watershed**
- **South Beach Watershed**
- **Oakwood Beach Watershed**

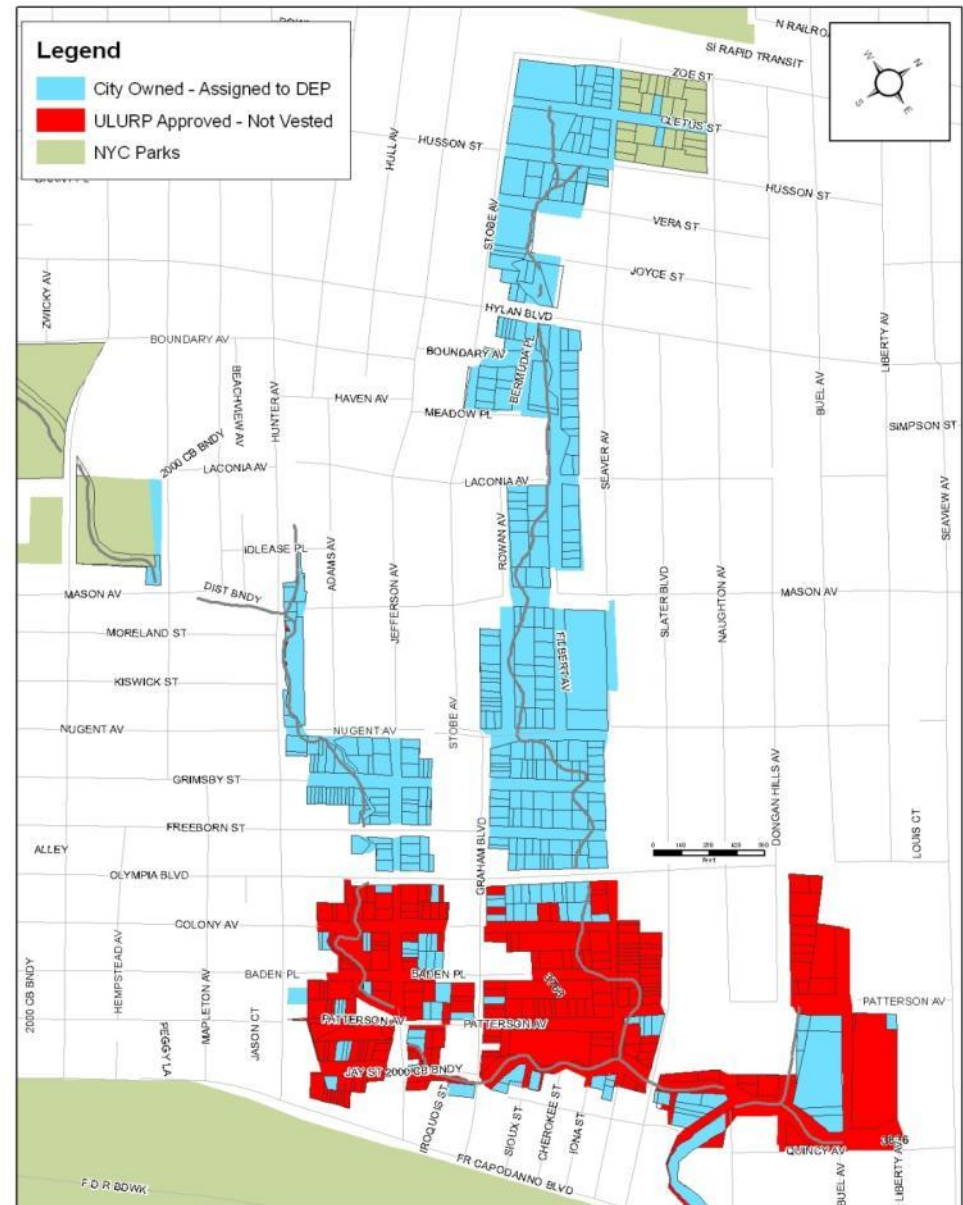


New Creek Bluebelt: Drainage Corridor & Property Acquisition



New Creek Bluebelt – Acquisition

- Phases 1-4 Complete
- Acquisition done to Olympia Blvd
- 47.6 privately owned acres acquired including street beds





New Creek Bluebelt



New Creek Bluebelt



South Beach Bluebelt



South Beach Bluebelt Project Area



South Beach Bluebelt Project Area



BMP SBE-1: South Beach



BMP SBE-1: South Beach

- SBE-1A: 566 acre drainage area, 18 acre footprint
- SBE-1B: 384 acre drainage area, 23 acre footprint
- SBE-1C: 1.5 acre drainage area, 0.6 acre footprint



Outline of Bluebelt Presentation

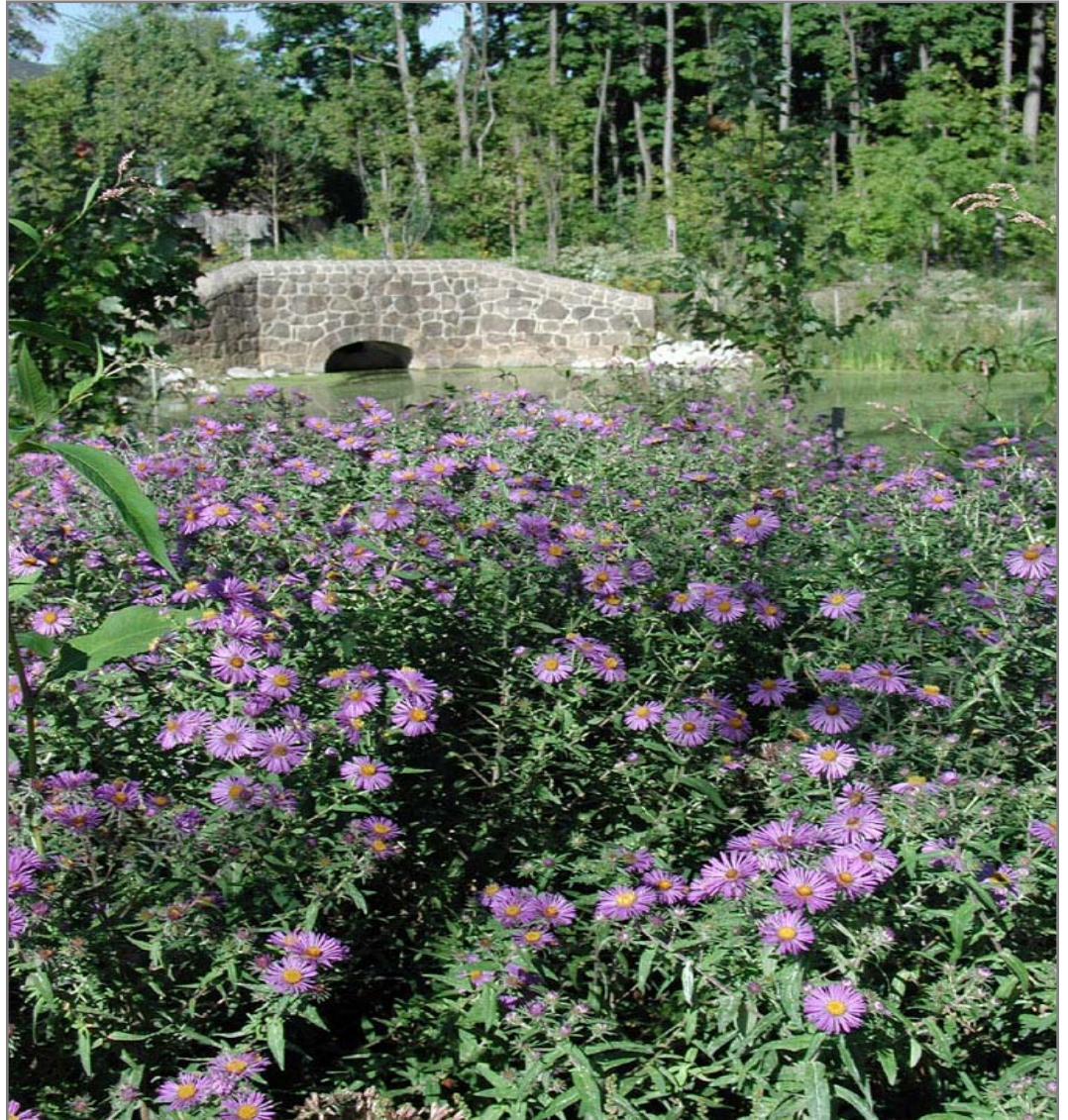
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Native Plants

Benefits:

- Best Suited to Site
- Treat Water
- Stabilize Soil
- Increase Diversity
- Attract Wildlife



Native Wetland Plants

Yellow Pond Lily

Cattail

Arrow Arum

Pickerel Weed

Lizard's Tail

Soft Rush

Bulrush

Blue Flag Iris

Rose Mallow



Rare and Extirpated Plants



Trailing Arbutus, the namesake of Arbutus Creek, was re-established.

Plant Salvage – Removal from Donor Site



Plant Salvage – Receptor Site



Sod Salvage – Summer Following Installation

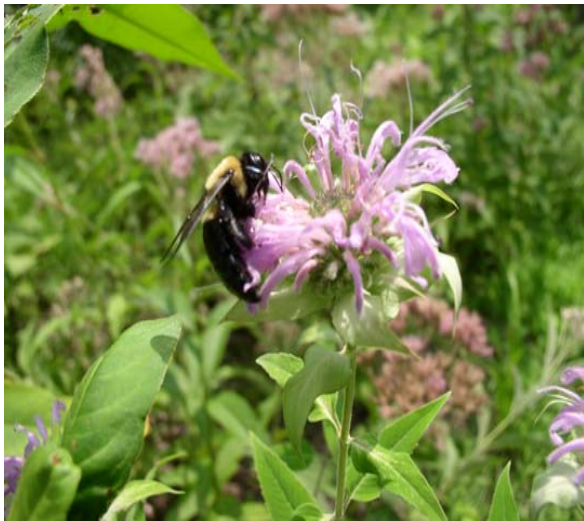


Bioengineering – Installation of Live Stakes



Wildlife Habitat Improvement

- Promote habitat complexity with the use of natural structures
- Habitat complexity = more faunal diversity



Wildlife Habitat Improvement – Root Wads

- Basking and hibernacula sites for turtles
- Hiding sites for juvenile fish
- Feeding sites for predatory fish
- Perch sites for ducks/waterfowl



Mill Pond, Historic Richmond Town

Wildlife Habitat Improvement – Root Wads



Wildlife Habitat Improvement – Fish Ladder



Weirs obstruct the upstream movement of tidal and migratory fish. The bypass allows eels and other species to move upstream.

Habitat Improvement

Ephemeral Amphibian Breeding Pools

- Ephemeral pools do not contain predatory fish.
- Important amphibian breeding habitat.
- Waterfowl, herons, muskrats, turtles and frogs observed in constructed pools.



Habitat Improvement – Dead Standing Trees

- Dead standing trees have significantly more insects and fungi than live trees.
- 1/3 of woodland birds nest in tree cavities.
- Only considered in non-hazard areas.



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BMP RC-1: Mill Pond Restoration



Historic Richmond Town

BMP WP-1: Extended Detention Basin



Wolfe's Pond Park

BMP SG-1: Outlet Stilling Basin



South Shore Golf Course

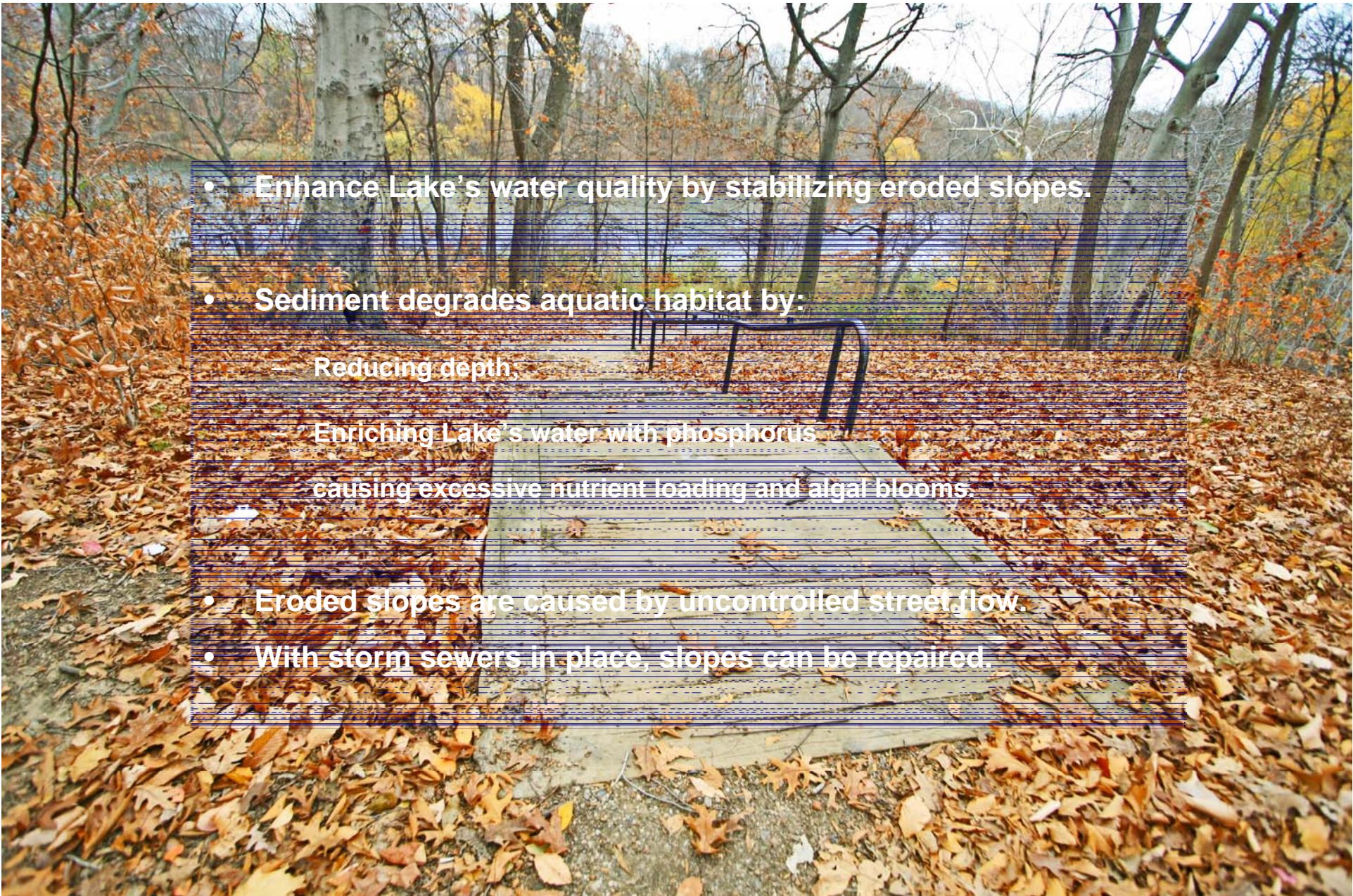
BMP CH-2: Extended Detention Basin and Wetland



Conference House Park

This aerial map of Oakland Lake Park shows a large lake at the top center. To the left of the lake is a residential area with streets labeled 213 ST, 215 ST, 217 ST, 219 ST, 221 ST, 223 ST, 225 ST, 227 ST, 229 ST, 231 ST, 233 ST, 235 ST, 237 ST, 239 ST, 241 ST, 243 ST, 245 ST, 247 ST, 249 ST, 251 ST, 253 ST, 255 ST, 257 ST, 259 ST, 261 ST, 263 ST, 265 ST, 267 ST, 269 ST, 271 ST, 273 ST, 275 ST, 277 ST, 279 ST, 281 ST, 283 ST, 285 ST, 287 ST, 289 ST, 291 ST, 293 ST, 295 ST, 297 ST, 299 ST, 301 ST, 303 ST, 305 ST, 307 ST, 309 ST, 311 ST, 313 ST, 315 ST, 317 ST, 319 ST, 321 ST, 323 ST, 325 ST, 327 ST, 329 ST, 331 ST, 333 ST, 335 ST, 337 ST, 339 ST, 341 ST, 343 ST, 345 ST, 347 ST, 349 ST, 351 ST, 353 ST, 355 ST, 357 ST, 359 ST, 361 ST, 363 ST, 365 ST, 367 ST, 369 ST, 371 ST, 373 ST, 375 ST, 377 ST, 379 ST, 381 ST, 383 ST, 385 ST, 387 ST, 389 ST, 391 ST, 393 ST, 395 ST, 397 ST, 399 ST, 401 ST, 403 ST, 405 ST, 407 ST, 409 ST, 411 ST, 413 ST, 415 ST, 417 ST, 419 ST, 421 ST, 423 ST, 425 ST, 427 ST, 429 ST, 431 ST, 433 ST, 435 ST, 437 ST, 439 ST, 441 ST, 443 ST, 445 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Oakland Lake Park Improvement Program

- 
- Enhance Lake's water quality by stabilizing eroded slopes.
 - Sediment degrades aquatic habitat by:
 - Reducing depth;
 - Enriching Lake's water with phosphorus causing excessive nutrient loading and algal blooms.
 - Eroded slopes are caused by uncontrolled street flow.
 - With storm sewers in place, slopes can be repaired.

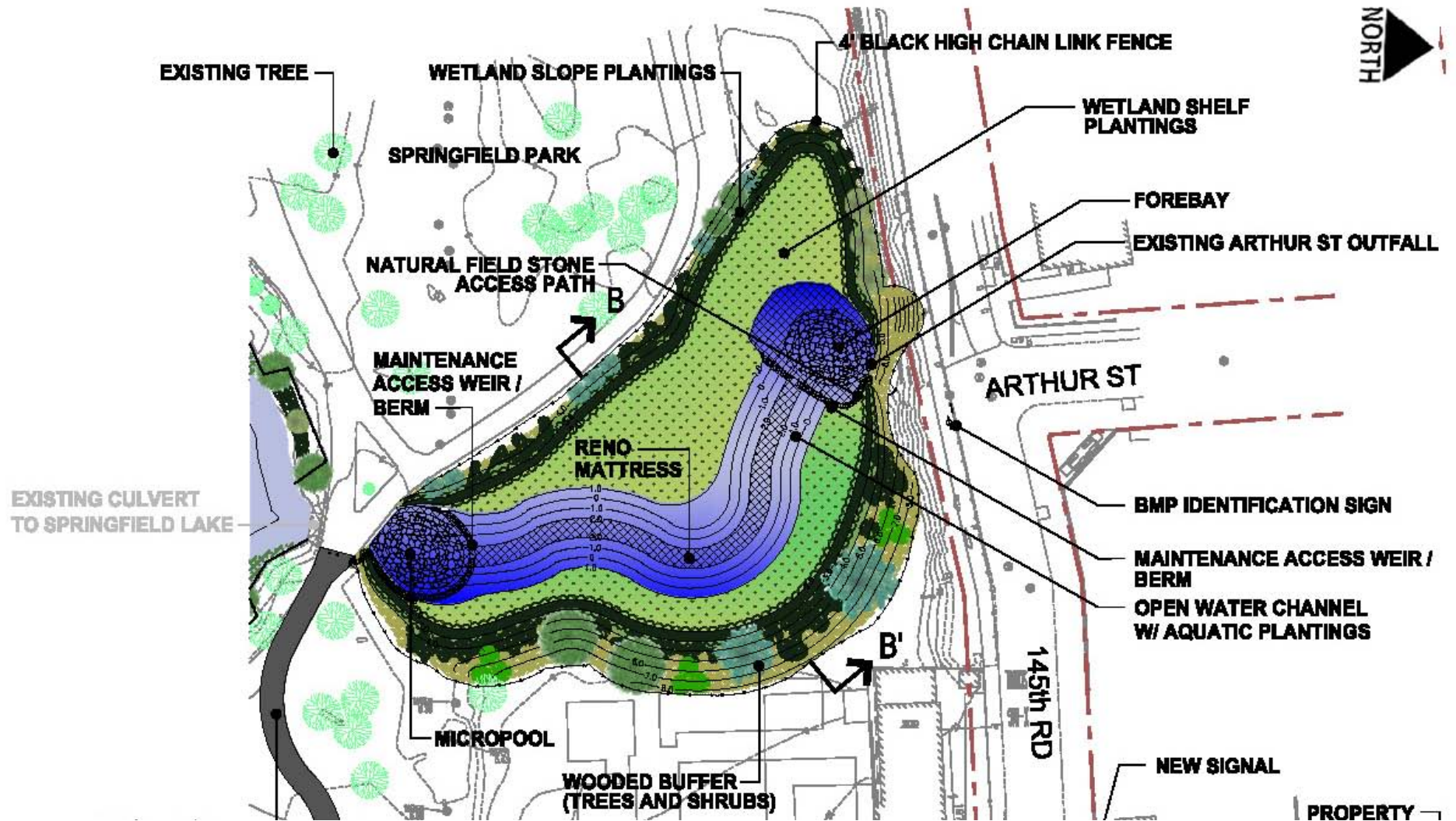


Erosion Gully

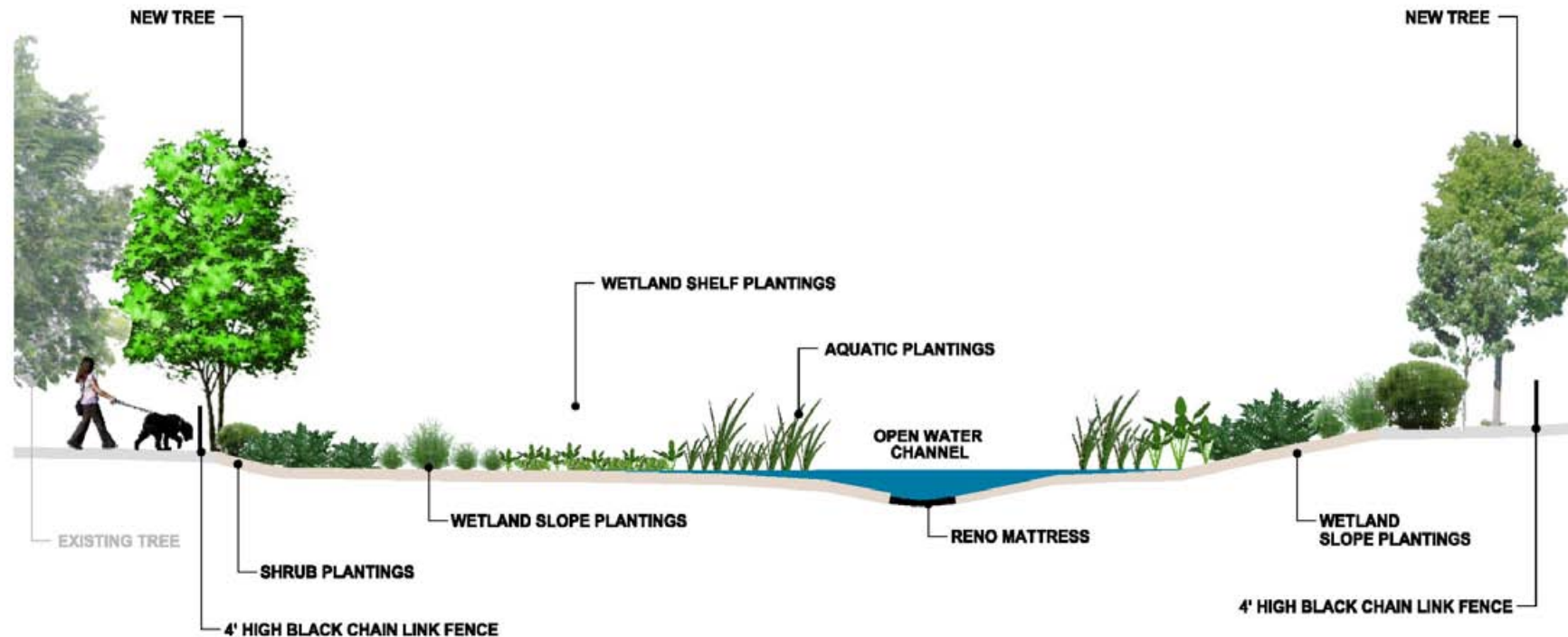
Slope Stabilization



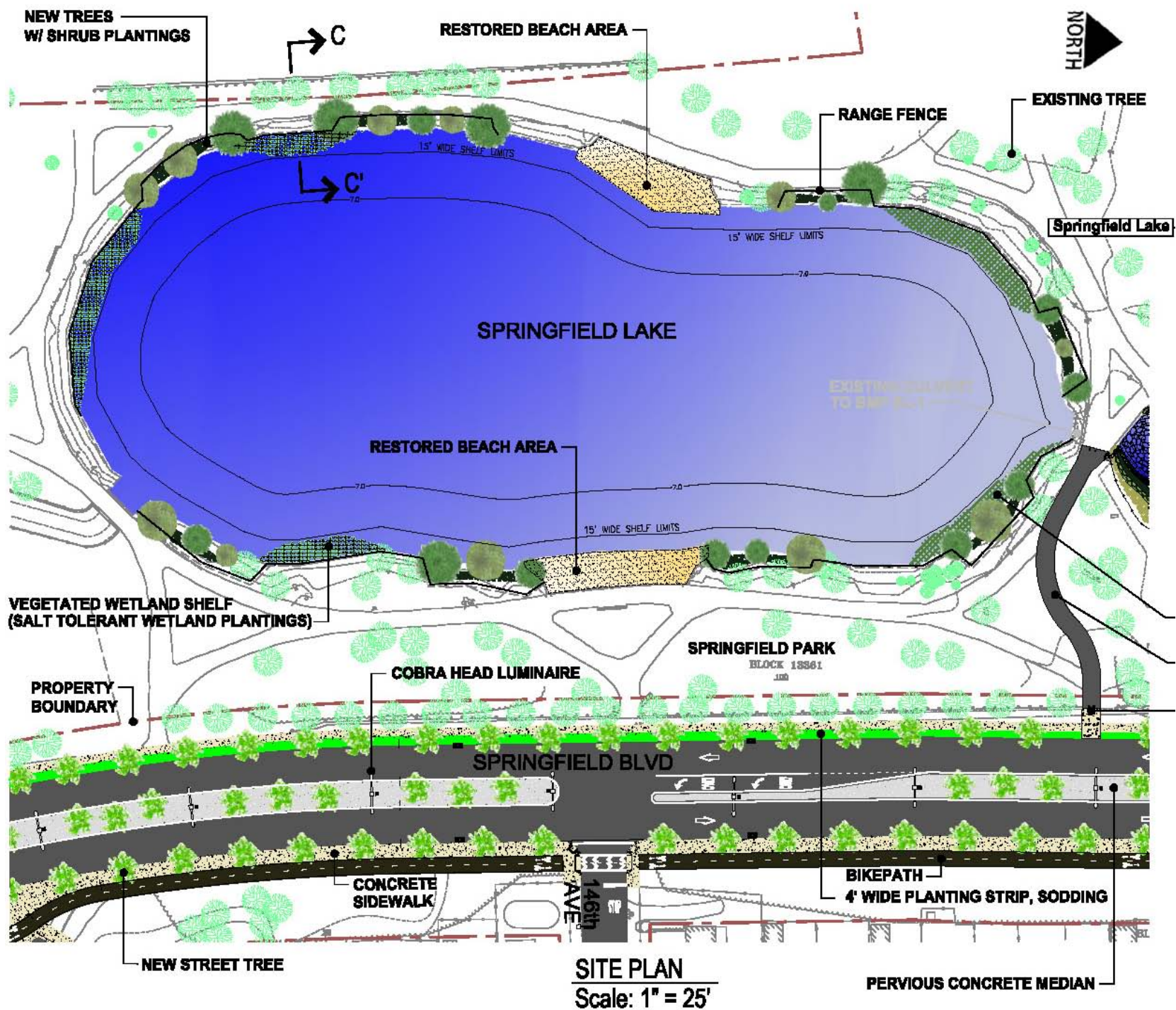


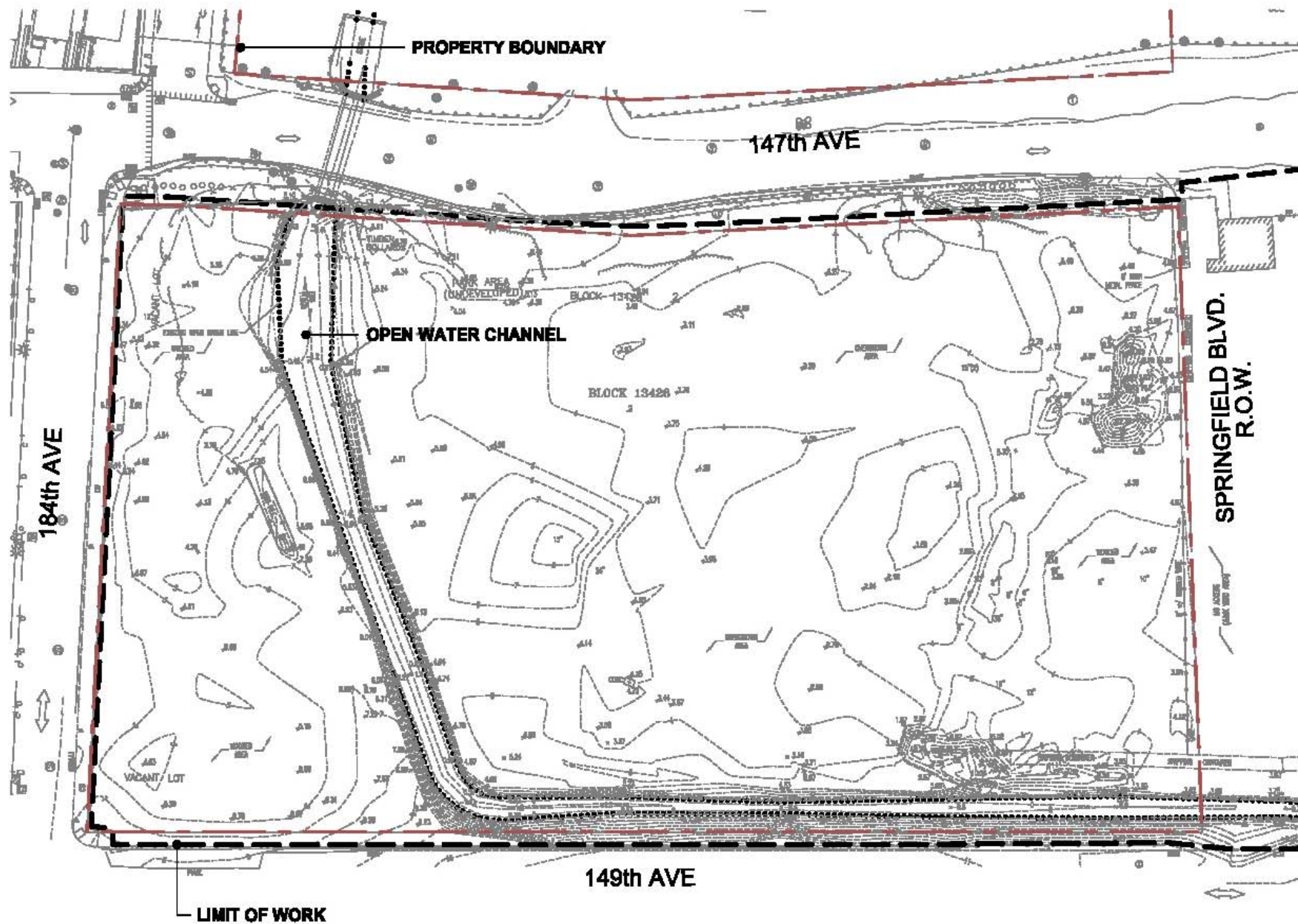


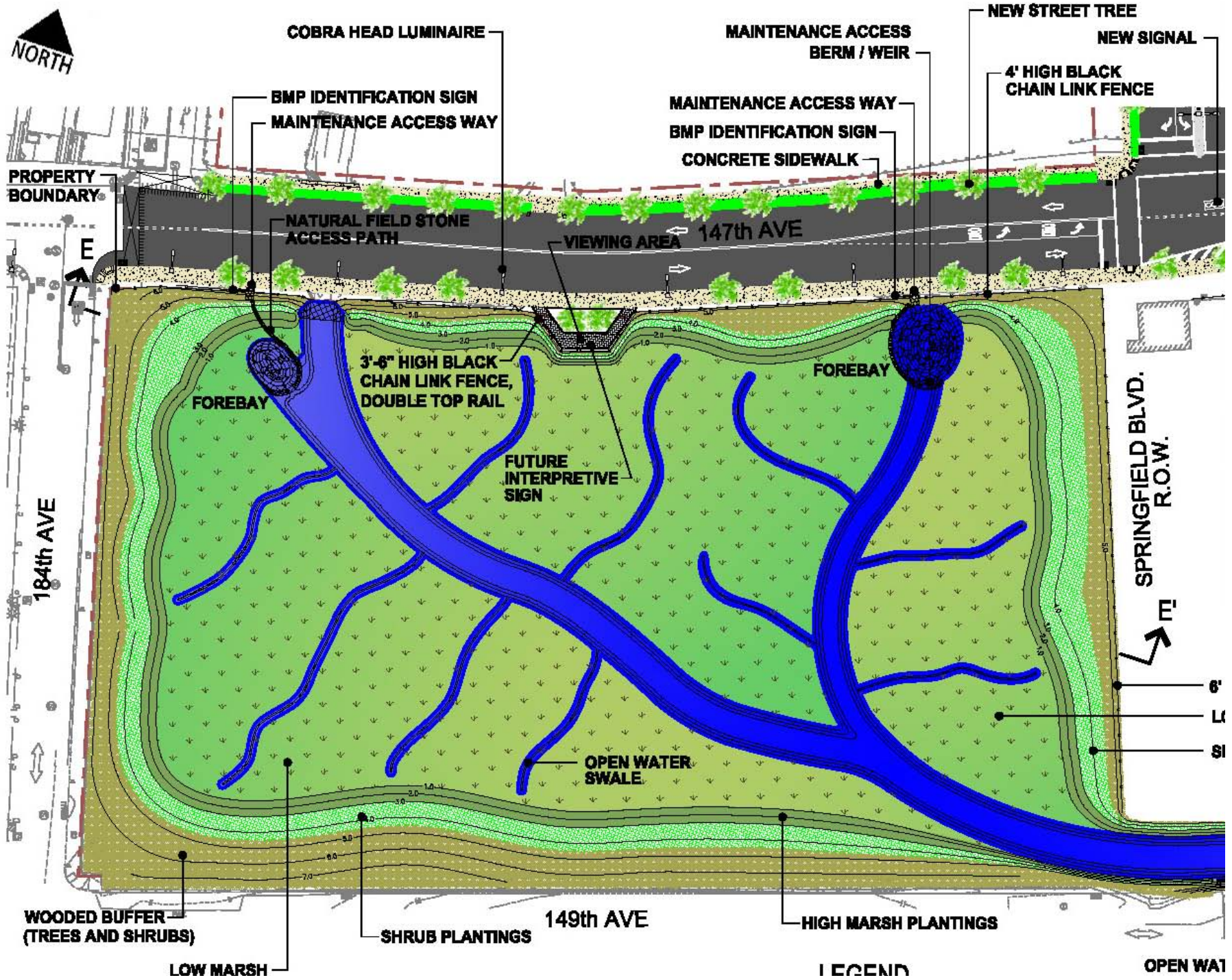
SPRINGFIELD
PARK



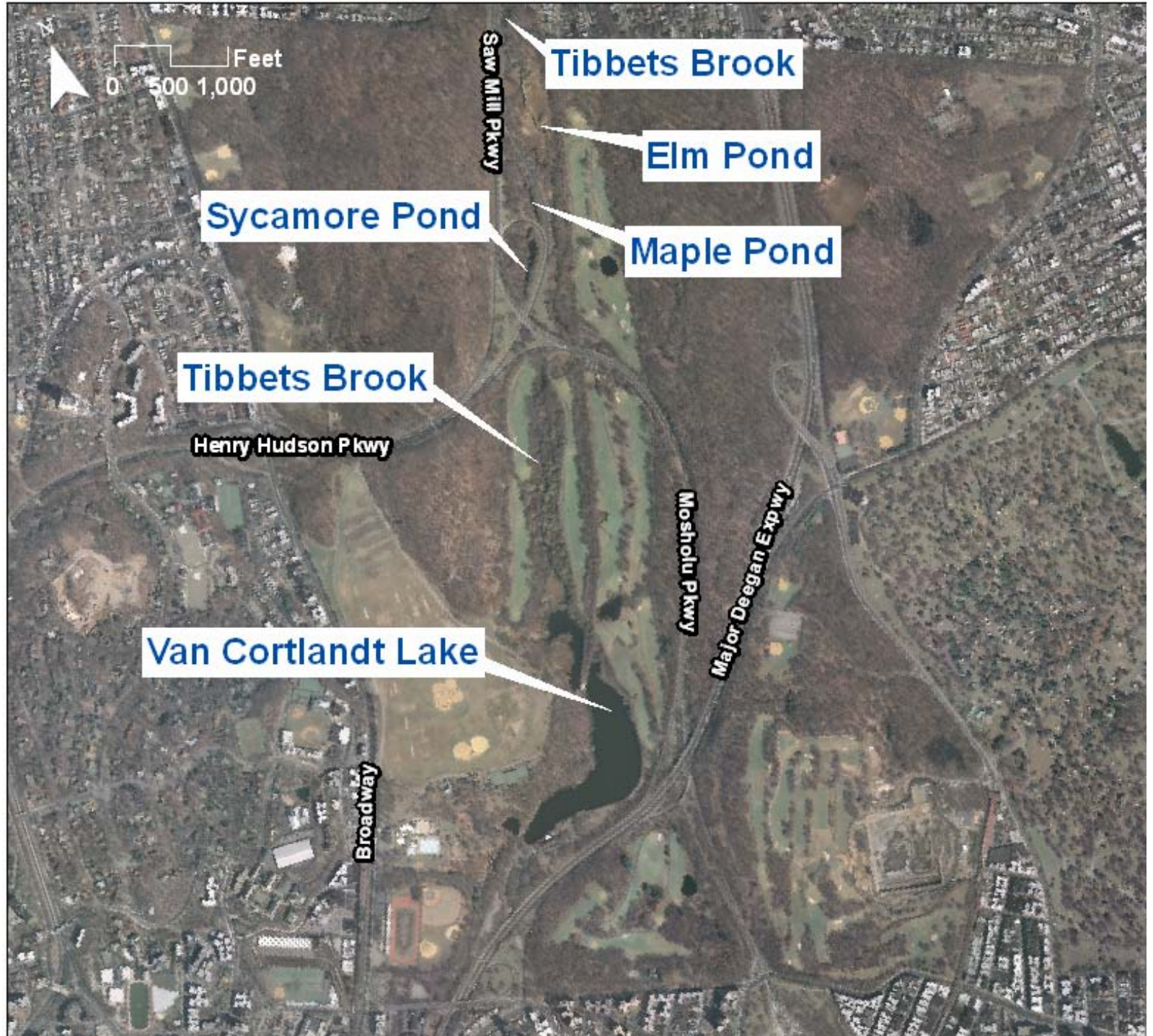
CROSS SECTION B - B'
LOOKING NORTHWEST IN BMP SL-1







Van Cortlandt Park Bronx, NY



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Determining Sediment Accumulation in BMPs



With measuring rod



With sonar gun









Field Operations



Perimeter Treatments: Post Property with Signs



Curb Marking at Catch Basin



Field Operations



Volunteers

Adopt-A-Bluebelt Program



Bluebelt Science Fair at St. Clare's School



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Upgraded one family hi-ranch on a great block nestled in Arbutus Blue Belt. Three Bedrooms, two baths, family room, garage, sliders to private yard. ASKING \$529,900.

Questions ?

