

MS-FORE!

Stormwater Management Retrofit Projects Provide Multiple Stakeholder Benefits

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OUTLINE

- Project Background
- Retrofit Design Basis and Common Elements
- Projects
- Stakeholders
 - Concerns
 - Partnership
 - Challenges
 - Additional Project Benefits

BACKGROUND

- Stormwater Retrofits for Phosphorus removal required for NYC watershed protection.
- Projects Administered by East of Hudson Watershed Corporation (Multi Stakeholder Organization).
- Some 250 potential projects/sites identified in Watershed Protection Plan (by others)
- Design Services Bid by Project Groups
- “Retroactive” BMP’s for existing development
- Many Stakeholders

RETROFIT DESIGN BASIS

- Phosphorus Removal for 90% Percentile Design Storm
- Phosphorus Load Determination
 - Runoff studies identified Phosphorus concentrations in runoff by cover type
- BMP Removal Performance (by retrofit type)
 - Identified by City through other studies
- NYSDEC CHAPTER 10 (Phosphorus Removal Design Guidance)
 - Water Quantity Controls not Required
 - Chapter 10 Requires Retrofits to be Sized for 1-year Storm Event
 - Two foot separation between seasonal high groundwater and rock is permitted

RETROFIT DESIGN BASIS

ESTIMATED PHOSPHORUS REMOVAL

Simple Method: $L = 0.103(R)(C)(A)$

L = Annual load (kg/yr.)

R = Annual Runoff (inches)

C = Pollutant Concentration (mg/l)

A = Contributing Area (acres)

Land Use Phosphorus Concentration (C)

Residential 0.41

Impervious 0.50

Commercial 0.34

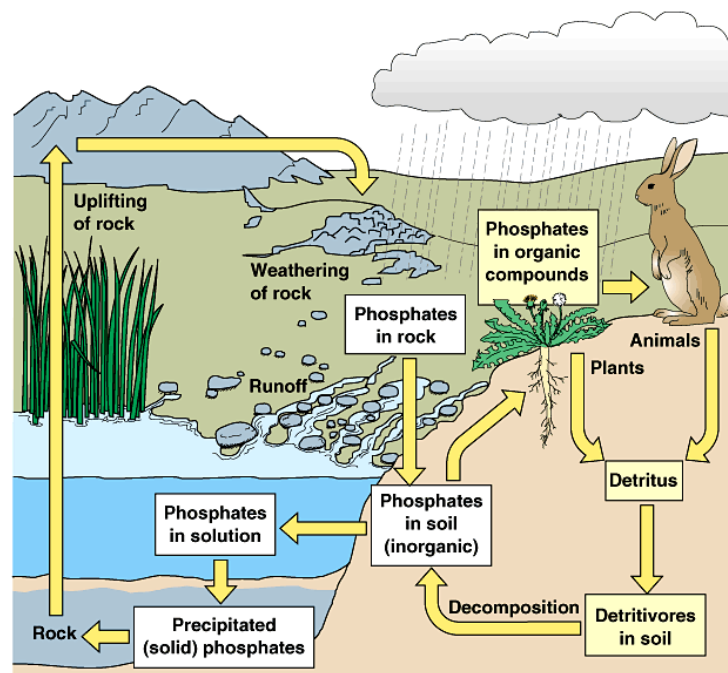
Industrial 0.45

Actively Grazed Pasture 0.40

Forest 0.15

Developed Open Space* 0.59

* e.g. golf courses, parks, cemeteries, single houses with large lawns.



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RETROFIT DESIGN BASIS

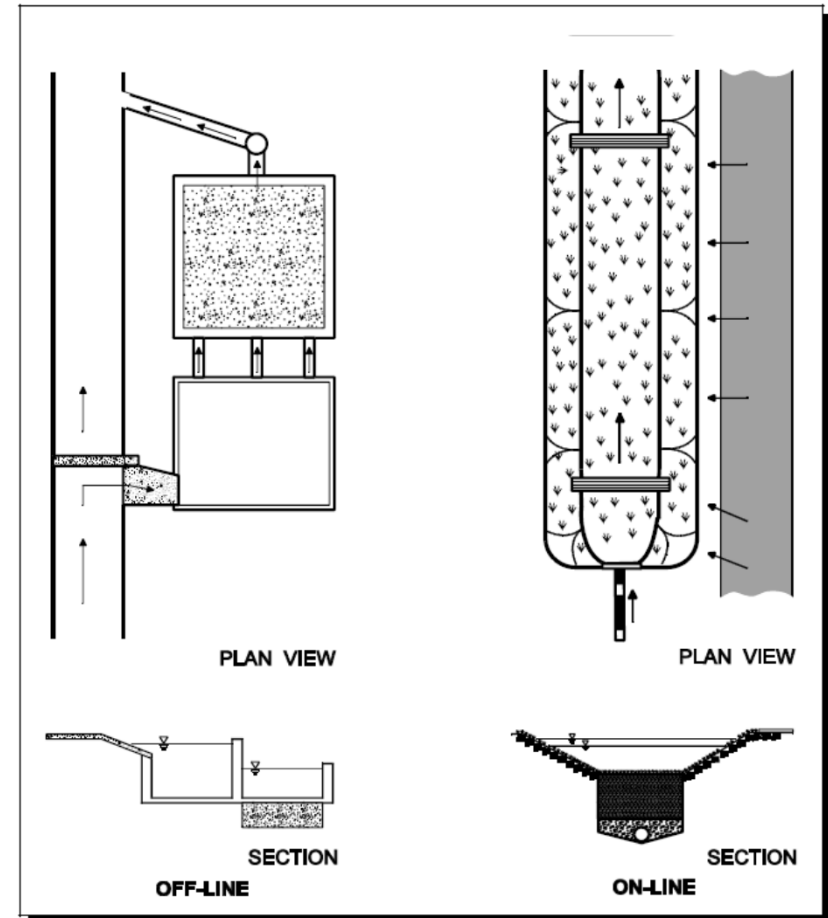
PHOSPHORUS REMOVAL TECHNOLOGIES

Retrofit Type Phosphorus Reduction (%)

- Micropool Extended Detention Pond - 40
- Wet Pond - 49
- Wet Extended Detention Pond - 55
- Multiple Pond System - 76
- Pocket Pond - 67
- Shallow Wetland - 43
- ED Shallow Wetland - 39
- Pond/Wetland System - 56
- Pocket Wetland - 57
- Infiltration Trench - 68
- Infiltration Basin - 50
- Dry Well - 50
- Surface Sand Filter - 59
- Underground Sand Filter - 59
- Perimeter Sand Filter - 41
- Organic Filter - 61
- Bioretention - 65
- Dry Swale - 50
- Wet Swale - 28
- Green Infrastructure
- Cartridge System - 40
- Hydrodynamic Separators** 10

COMMON RETROFIT DESIGN ELEMENTS

- Collection System
- “Offline Storage/Treatment”
- Diversion Structures
- Pretreatment Devices



PROJECTS

Austin Road Elementary School

- 18,900 c.f. Pond with Forebay
- 11.27 lbs.... /year Phosphorus removal



PROJECTS

Mahopac Middle School

- 8,000 c.f. Subsurface Infiltrator with Storage Tank
- 5.61 lbs./year Phosphorus removal



PROJECTS

Putnam County Golf Course Parking Lot

- 7,200 c.f. Subsurface Infiltrator
- 9.63 lbs./year Phosphorus removal



PROJECTS

Putnam County Golf Course Pond

- 55,000 c.f. Extended Detention Pond with Forebay
- 13.86 lbs./year Phosphorus removal



STAKEHOLDERS

- East of Hudson Watershed Corporation
- New York State Department of Environmental Conservation
- New York City Department of Environmental Protection
- Putnam County
- Mahopac Central School District



STAKEHOLDER CONCERNS

Mahopac Central School District

- Sites Owned by the Mahopac Central School District
- District was Unaware of Projects
- Work to be Conducted While School Was Out of Session
- Site Safety

STAKEHOLDER CONCERNS

Putnam County Golf Course Projects

- Site Owned by Putnam County
- Maintain Operation of the Golf Course Facilities
- Existing Impervious Pavement Agreement with NYCDEP
- Not all Improvements were SRP Related
- Safety of Patrons and Workers

STAKEHOLDER PARTNERSHIP

Mahopac Central School District

- Provided Record Maps for Design
- Preformed Test Digs for Preliminary Evaluation

EOHWC

- Retrofits Addressed Site Drainage Issues
- Preliminary Site Evaluation Provided Clarification on Existing Infrastructure

STAKEHOLDER PARTNERSHIP

Putnam County

- Preformed Test Digs for Preliminary Evaluation
- Constructed an Access Roadway for the Pond Project
- Provided Swale Rehabilitation to Reduce Cost Construction Costs

EOHWC

- Retrofits Addressed Site Drainage Issues
- Upgraded the Appeal of the Facility

STAKEHOLDER CHALLENGES

Putnam County Golf Course Parking Lot

- Existing Impervious Pavement Agreement
- Asphalt pavement / Permeable Paver Offset
- 10,900 sf of impervious cart path to be removed



STAKEHOLDER CHALLENGES

Putnam County Golf Course Pond

- Existing Unmarked Irrigation and Drainage Systems
- Maintain Course Playability



ADDITIONAL STAKEHOLDER BENEFITS

Austin Road School

- Improved Site Drainage
- Pond to be Used for Biology Lessons
- Repaved Parking Lot



ADDITIONAL STAKEHOLDER BENEFITS

MAHOPAC MIDDLE SCHOOL

10,000 s.f. Playground/Overflow Parking Area



ADDITIONAL STAKEHOLDER BENEFITS

Putnam County Golf Course Parking Lot

- Retaining Wall with Decorative Railing
- New LED Lighting



ADDITIONAL STAKEHOLDER BENEFITS

Putnam County Golf Course Pond

- Course Flooding
- Erosion of Cart Paths
- Increased Access for Course Maintenance



QUESTIONS?

