



Stormwater Workshop

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The background image shows a residential development with several large, modern houses with grey siding and dark roofs. In the foreground, there is a pond surrounded by lush green wetlands and tall grasses. A wooden walkway or bridge crosses the pond. The sky is blue with some light clouds.

Sediment & Stormwater Presentation

Program Overview

Delegation

Plan Review

Inspection

Maintenance

Types of Facilities
Function & Maintenance

Maintenance Inspection

Successful Maintenance

Resources

In Delaware, you are never very far from water when land is developed.

The potential for impacts to ecosystems and natural areas is significant.



DNREC Sediment & Stormwater Program

Established by Law and Regulation Statewide 1991.

Requires all land disturbing activities over 5,000 square ft. to operate under an approved plan.

Program is delegated to local municipalities, conservation districts, and DelDOT.

Delaware Department of Natural Resources and Environmental Control (DNREC) responsible for program performance statewide.

Sediment & Stormwater Delegation



- Sediment & Erosion Control
- Stormwater Management Review
- Construction Inspection
- Maintenance Inspection
- Outreach & Education
- Technical Assistance

Sediment & Stormwater Plan Review



- Conceptual Design Meeting
- Pre-application Meeting
- Plan Review
 - Stormwater Management
 - Erosion & Sediment Control
 - Downstream Analysis
 - Pollution Prevention
 - As-Built Review
- Technical Assistance

Sediment & Stormwater Inspection

- Pre-construction Meeting
- Routine Site Inspection
- Stormwater Maintenance Inspection
 - Including follow-up inspection
 - Meetings with contractors/HOA
- Technical Assistance
- Drainage Complaints
- Outreach & Education



Sediment & Stormwater Maintenance

- SCD is required to inspect all “closed out” projects and generate an inspection report.
- Approximately 2,000 closed out projects.
- SCD is required to follow-up on maintenance reports and inspect repairs.



Types of Stormwater Management Facilities

- Wet Ponds
- Dry Ponds
- Infiltration Ponds
- Bioswales
- Bioretention
- Filter Strips
- Constructed Wetlands
- Vegetated Roofs
- Underground Stormwater Systems



A photograph of a wet pond with a central fountain spraying water. The pond is surrounded by lush greenery, including tall yellow iris flowers in the foreground. In the background, there are trees, a white fence, and a dark car parked near a building. The sky is overcast.

Wet Ponds

Provide quantity management

Improve water quality

Aesthetic appeal

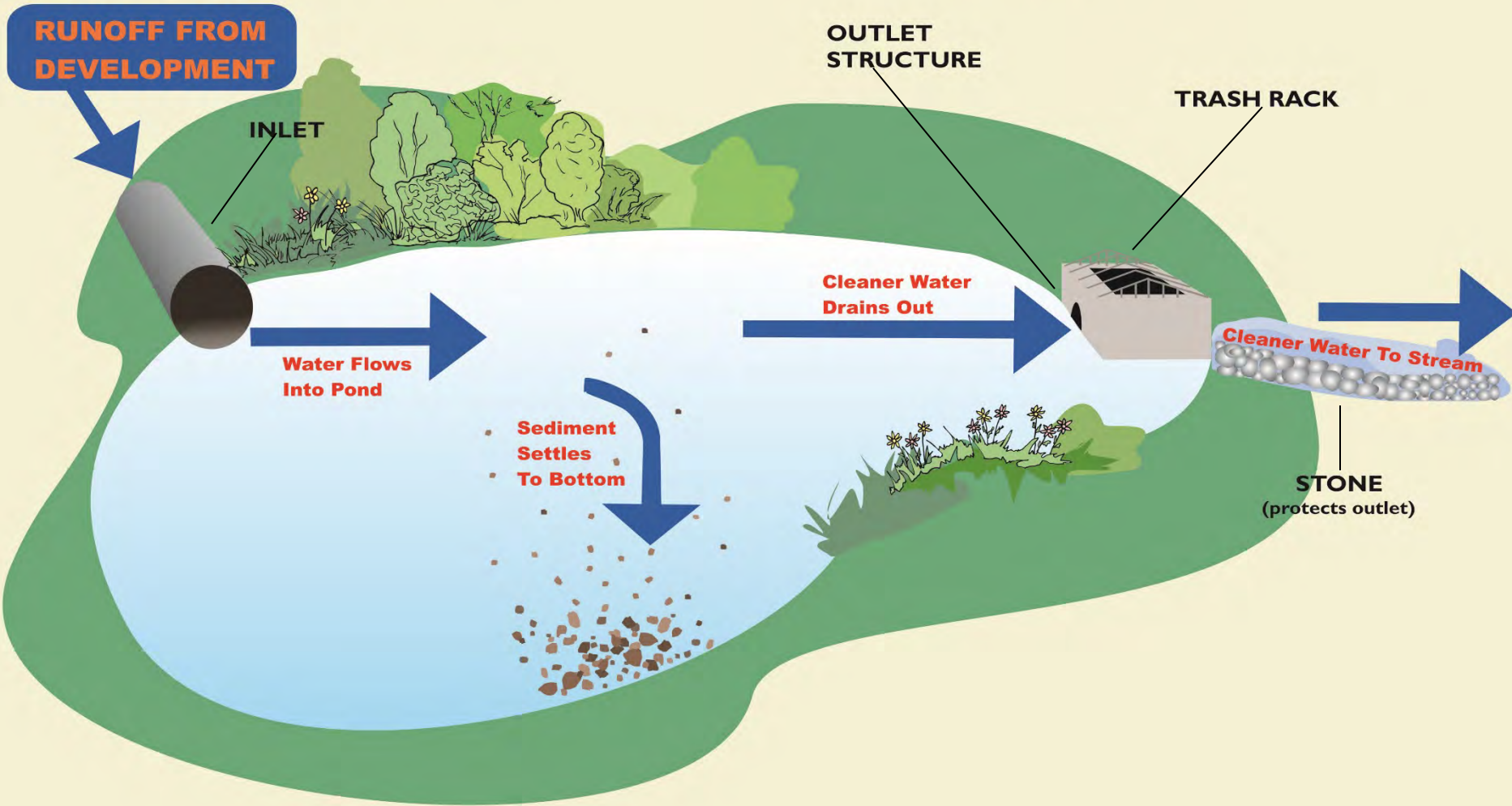
Increase biodiversity

Wildlife habitat

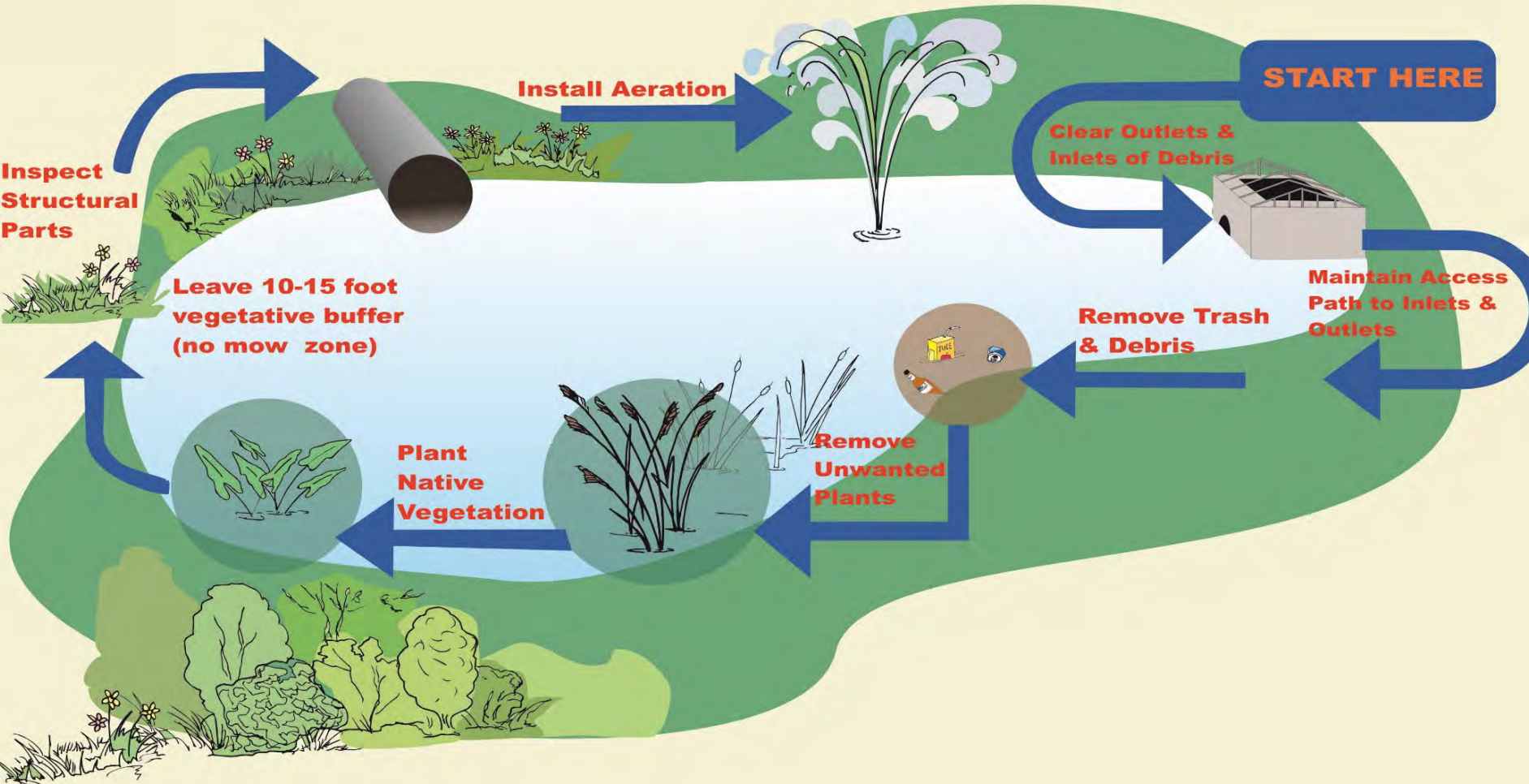
Flood prevention

Minimize erosion

Stormwater Pond Function



Stormwater Pond Maintenance



Routine Maintenance



- Remove trash and debris
- Check for erosion
- Inspect structures
- Monitor vegetation growth
- Inspect water level after rain events
- Monitor overall function

Remove Debris

Remove trash

Remove debris from inlets and outlet structures





Mowing

Mostly done by landscapers

10' access path to pond

Mow around inlets and outlets

Leave a buffer
(optional, but strongly encouraged)



Buffers

"No mow zone"

Work with landscaper

Must be group decision

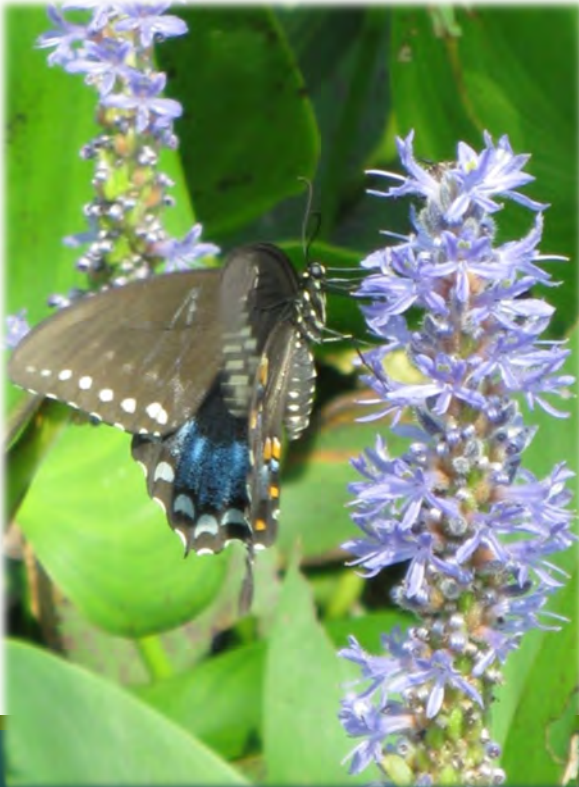
Width optional



Buffer Benefits

Controls geese
Uptakes nutrients

Less erosion
Better wildlife habitat



Maintain Vegetation

Remove small saplings

- Inlets
- Outlets
- Embankments

The longer you wait to remove a tree, the more expensive it becomes.



Stabilize Banks

Buffers reduce erosion of side slopes

Overseed and stabilize as needed

Major stabilization
(hire a consultant)

- Erosion control matting
- Choosing durable grass species



Fencing

Not Required

Not Recommended



Hire a Professional

Removal of sediment (Forebay cleanout)



Hire a Professional

Structural Stabilization
Pipe Failure
(Sinkhole)
Riprap

Vegetative Stabilization



Hire a Professional

Mosquito Control
(DNREC)

Kent & Sussex
(302) 422-1512



Hire a Professional

Major vegetation removal

- Algae
- Non-native species
- Invasive species



Hire a Professional

Cracked or broken structural components





Hire a Professional



Hire a Professional



Hire a Professional



Hire a Professional



Hire a Professional

A photograph of a calm pond surrounded by dense green trees and foliage. The water reflects the surrounding greenery and the sky. The text "Hire a Professional" is overlaid at the bottom in a white, serif font.

Hire a Professional

I wish I hired
a professional



Dry Ponds

Ponds are designed to drain 48 hours after a rain event

Maintenance Challenges

- Invasive plant management
- Soggy pond bottoms
- Difficult to mow

If the pond is holding water

- Possible blockage
- Downstream obstruction
- Seasonal groundwater



Infiltration Basin

Ponds typically do not have a discharge outlet

Rely on permeable soils for infiltration

Low groundwater table



Infiltration Basin Maintenance

Crust forms over time

- Scrape topsoil surface to encourage/revitalize infiltration

Failure due to poor drainage and improper soils

- Hire a professional
- \$\$\$



Green Technology: Bioswale

Provides water quality treatment by removing sediment and nutrients

Low Maintenance

Provide routine maintenance

Inspect for drainage obstructions/holding water

Maintain grass height 6-8 inches – for increased water quality





12/02/2009

Do not mow
in the swale flow line



Bioswale enhanced
with native plants



Bioretention Maintenance

Maintain as a landscape feature

- Provide routine maintenance
- Inspect for erosion, reseed as needed
- Management of vegetation (No large trees)
- Remove trash & debris
- Add triple shredded hardwood mulch as needed



Bioretention Maintenance

If facility does not drain within 48 hours:

- Remove accumulated sediment
- Replace biosoil mix (every 15-20 years)
- Must use DNREC certified soil media supplier





Maintenance Inspection

Maintenance Inspection Report
Stormwater Facility Erosion
Before & After

Maintenance Inspection Report

Pond Components:

Embankment + Emergency Spillway

- Vegetation and ground cover adequacy
- Embankment erosion
- Animal burrows
- Unauthorized plantings
- Cracking, bulging or sliding of dam
- Slope protection or riprap failures
- Emergency spillway clear of obstructions and debris



Maintenance Inspection Report

Pond Components:

Riser + Principal Spillway

- Low flow orifice obstructed
- Weir trash rack maintenance
- Debris removal necessary
- Excessive sediment accumulations inside riser
- Pipe condition
- Outfall channels functioning



Maintenance Inspection Report

Dry Ponds

- Adequacy of vegetation
- Undesired vegetative growth
- Woody vegetation
- Low flow channels clear of obstructions
- Standing water or wet spots
- Sediment and or trash accumulation
- Erosion problems
- Forebay – status of sediment
- Pond functionality
- Encroachments on pond



Maintenance Inspection Report

Infiltration Ponds

- Adequacy of vegetation
- Undesired vegetative growth
- Woody vegetation
- Infiltrating between storms
- Sediment/trash accumulation
- Erosion problems
- Forebay – status of sediment
- Pond functionality
- Encroachments on pond
- Upstream areas stabilized



Maintenance Inspection


Debris & Cleanout



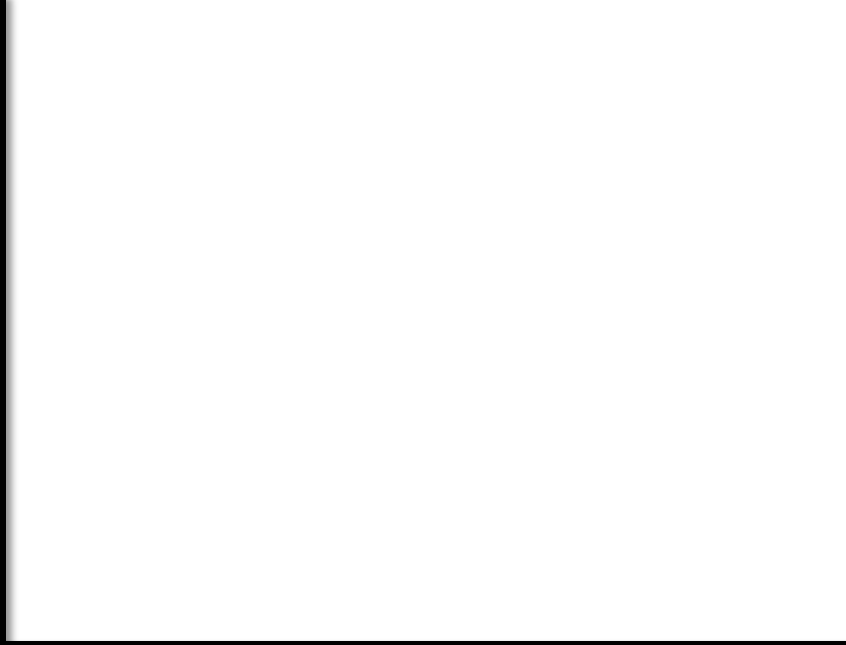
Ponds are overgrown with invasive species and woody vegetation which obstructs drainage.



Grass clippings or lack of maintenance can restrict drainage causing temporary flooding



Temporary sediment and erosion controls inadvertently left on catch basins restrict drainage



Trash racks and low flow orifices are blocked by debris and overgrown vegetation





Stormwater Facility Erosion

Riprap outlet is designed to convey 100-year storms non-erosively.

Events that exceed “design storms” have the potential to erode.





Stormwater Facility Erosion

Change in upstream watershed

Highly erodible soils

Improper installation

Significant rain event



Erosion of Stormwater Facilities

Can compromise the storage capacity

Added maintenance costs

Creates instability around the outlet structure

Down stream impacts



Maintenance: Before



Maintenance: After



Maintenance: Before

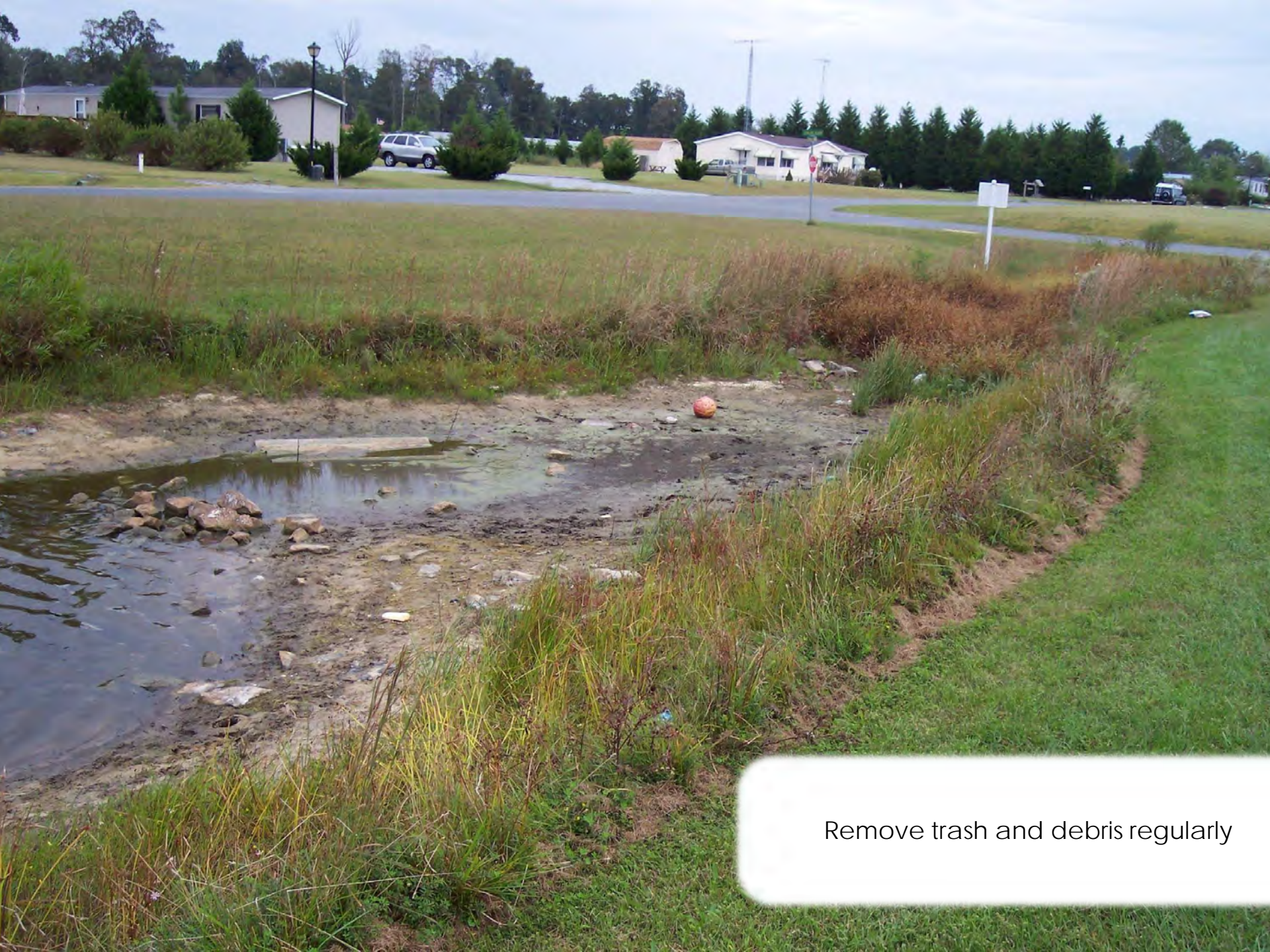


Maintenance: After





Sediment-laden runoff into stormwater pond increases future maintenance costs



Remove trash and debris regularly



Overgrown and invasive vegetation is difficult to manage.



Overgrown vegetation increases maintenance costs.



Successful Maintenance



Buffer, bird boxes,
flowering vegetation



Buffer, inlet and outlet structures clear, trash and debris removed.



Buffer, flowering vegetation,
trash and debris removed.



Aeration, buffer, flowering vegetation,
trash and debris removed.



Aeration, buffer, flowering vegetation,
trash and debris removed.



Infiltration basins improve water quality and provide wildlife habitat.

Homeowner Technical Resources



[SERVICES](#) ▾ [EVENTS](#) [RESOURCES](#) ▾ [COOPERATORS](#) ▾ [CONTACT US](#) ▾ [ONLINE STORE](#)



HOMEOWNERS & HOA'S



Once stormwater projects are completed, routine maintenance is needed to ensure quantitative and qualitative function. The District is available to provide technical assistance on the operation of the stormwater system.

[ONLINE RESIDENTIAL APPLICATION](#)

WORKSHOPS

PowerPoint presentations for all events linked below.

Recordings available for events marked "webinar" at the bottom of the page, or watch them on [YouTube](#).

OCT. 8, 2021 (WEBINAR)

- [Turfgrass Best Management Practices](#) (updated 10/8/2021)

CONTACT US

For more information about the Stormwater Program, please click [Request More Information](#) below and provide your contact information. Someone from the District will be in touch.

[REQUEST MORE INFO](#)

LEARN MORE

[Design & Construction](#)

[Developers](#)

[Residential Standard Plan Application](#)

[Homeowners & HOA's](#)

[Conservation Stewardship Award](#)



www.sussexconservation.org

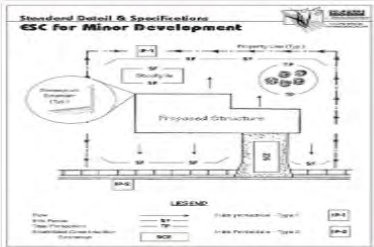
Shop: Plants + Signage



WELCOME TO THE SUSSEX CONSERVATION DISTRICT'S ONLINE STORE

Visit our applications tab for Residential Stormwater Standard Plans or browse through the variety of plants we offer for sale.

CATEGORIES



APPLICATIONS

1 Product



CONSERVATION SIGNAGE

1 Product



GIFT CARD - FOR PLANTS ONLY

0 Products



GRASSES

3 Products



Homeowner Technical Resources

Sussex Conservation District

302-856-2105
www.sussexconservation.org

**University of Delaware
Cooperative Extension**

302-856-7303
<https://www.udel.edu/canr/cooperative-extension/>

DNREC

<https://dnrec.delaware.gov/>

Division of Watershed Stewardship

<https://dnrec.alpha.delaware.gov/watershed-stewardship/>

Division of Fish & Wildlife – Mosquito Control

<https://dnrec.alpha.delaware.gov/fish-wildlife/mosquito-control/>

302-422-1512

**Sussex County
Public Works**

302-855-7703
<https://www.sussexcountyde.gov/public-works>



Sussex
conservation
district

PREPARE • PROTECT • PRESERVE

Thank you

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www.sussexconservation.org