

# Stormwater 101 Workshop

Oct. 13, 2022

## Agenda

10:15 – 10:30

**Welcome**

10:30 – 11:15

### **Stormwater 101 Workshop**

Jessica Watson, sediment and stormwater program manager

Sussex Conservation District

[jessica.watson@sussexconservation.org](mailto:jessica.watson@sussexconservation.org)

1. History of Sediment and Stormwater Regulations in Delaware
2. Stormwater Facilities and Function
3. Maintenance
4. Best Management Practices

11:15 – 12:00

**Questions**

12:00

**Nutrient Management CEUs**

Presented by:





# Stormwater 101 Workshop

Jessica Watson  
Stormwater Program Manager  
Sussex Conservation District  
Oct. 13, 2022



The background image shows a residential development with several houses and a wooden deck overlooking a pond. The pond is surrounded by lush green vegetation, including tall grasses and reeds. The sky is blue with some clouds. The text is overlaid on a semi-transparent white box.

# 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

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



# Sediment & Stormwater Plan Review

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- 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

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- 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

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- 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.

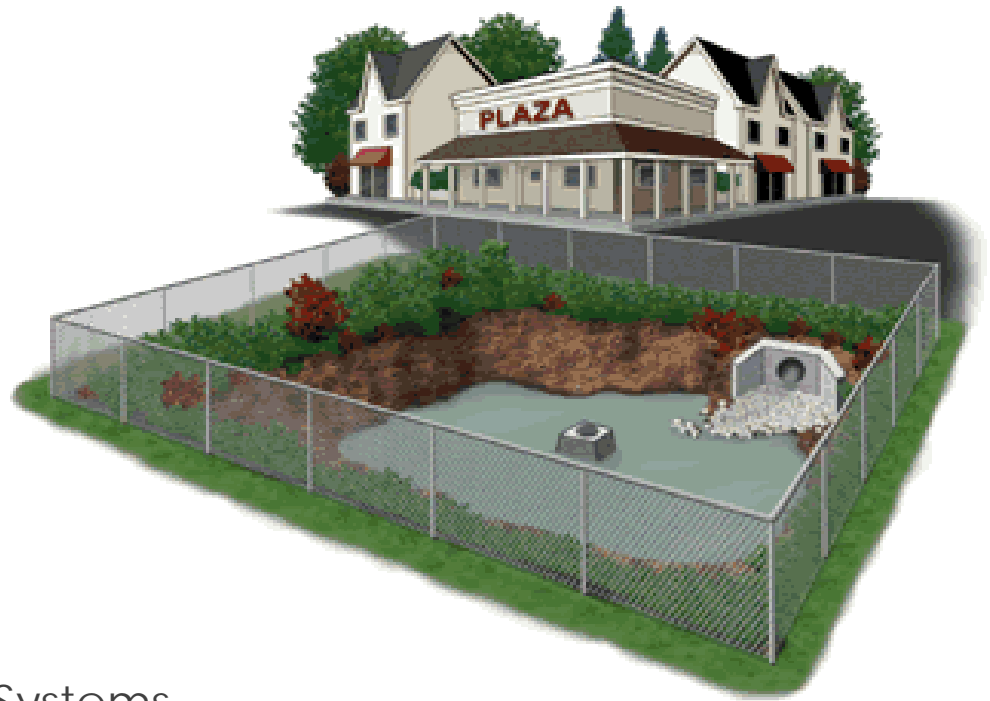




# Types of Stormwater Management Facilities

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- 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 grasses and 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

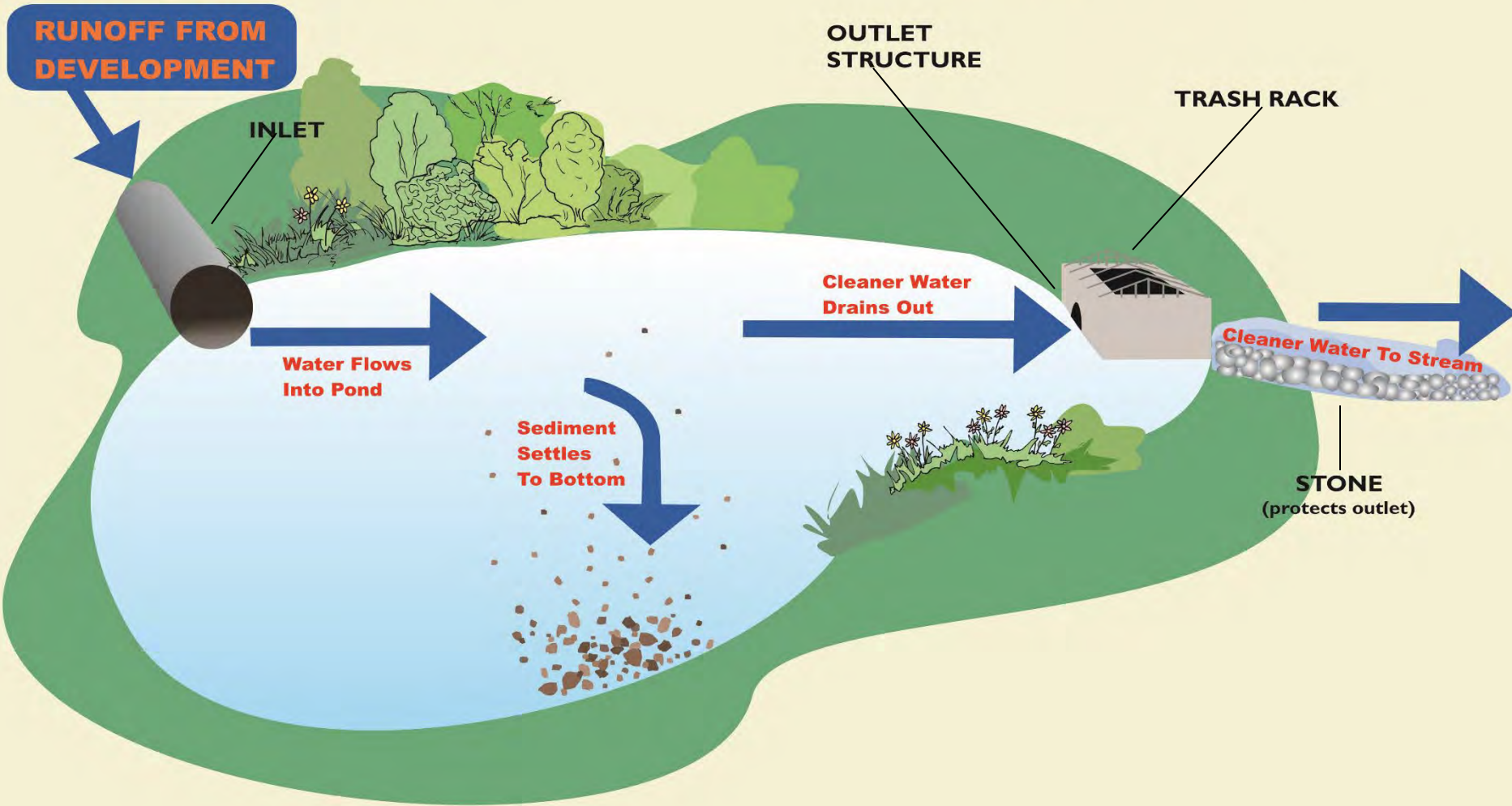
Wildlife habitat

Flood prevention

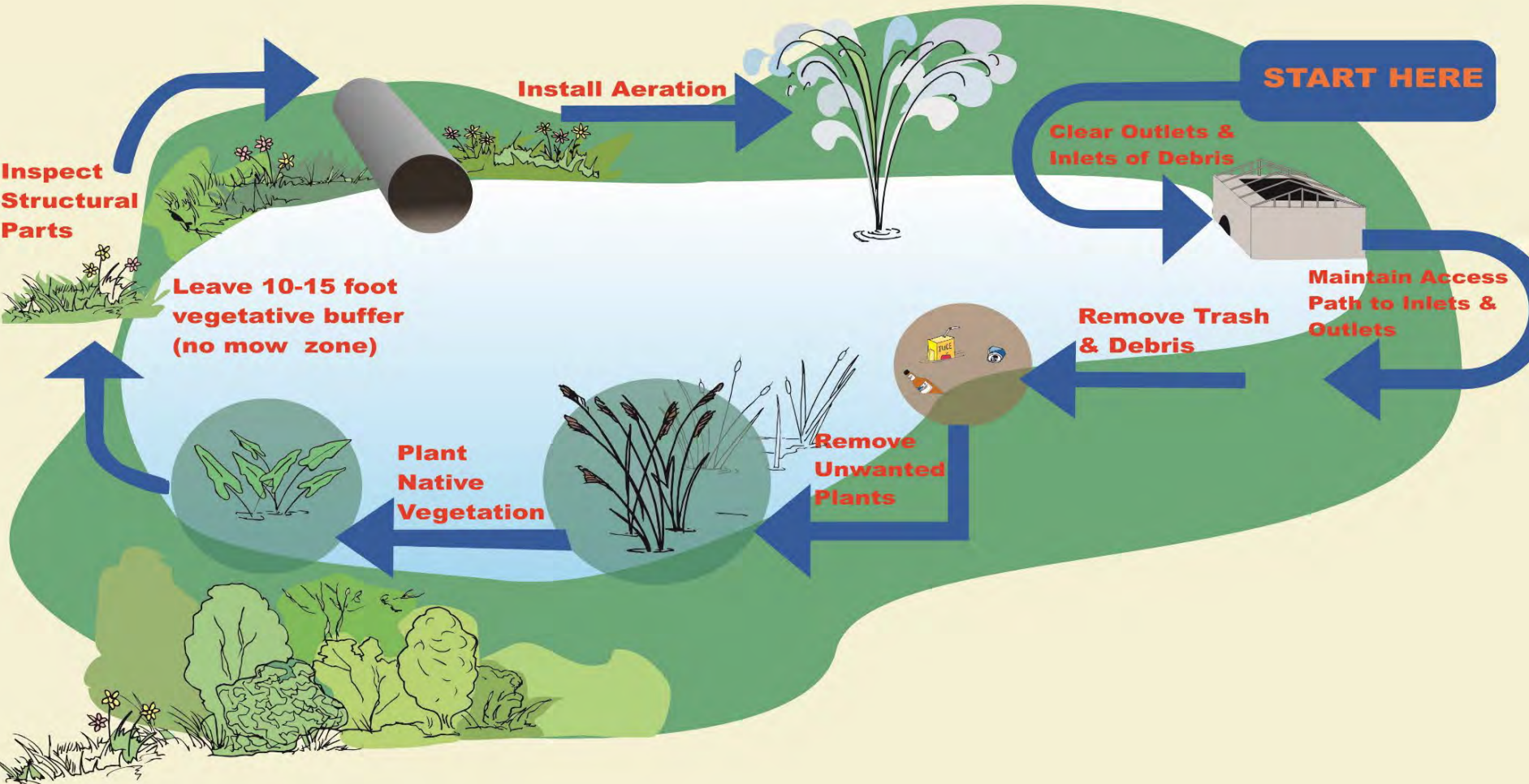
Minimize erosion



# Stormwater Pond Function



# Stormwater Pond Maintenance





# Routine Maintenance

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

# Remove Debris

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Remove trash

Remove debris from inlets and outlet structures









# Mowing

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Mostly done by landscapers

10' access path to pond

Mow around inlets and outlets

Leave a buffer  
(optional, but strongly encouraged)





# Buffers

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“No mow zone”

Work with landscaper

Must be group decision

Width optional



# Buffer Benefits

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Controls geese  
Uptakes nutrients



Less erosion  
Better wildlife habitat





# Maintain Vegetation

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Remove small saplings

- Inlets
- Outlets
- Embankments

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





# Stabilize Banks

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Buffers reduce erosion of side slopes

Overseed and stabilize as needed

Major stabilization  
(hire a consultant)

- Erosion control matting
- Choosing durable grass species





# Fencing

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Not Required

Not Recommended



# Hire a Professional

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Removal of sediment (Forebay cleanout)





# Hire a Professional

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Structural Stabilization  
Pipe Failure  
(Sinkhole)  
Riprap

Vegetative Stabilization





# Hire a Professional

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Mosquito Control  
(DNREC)

Kent & Sussex  
(302) 422-1512





# Hire a Professional

Major vegetation removal

- Algae
- Non-native species
- Invasive species





# Hire a Professional

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Cracked or broken structural components







Hire a Professional





Hire a Professional





Hire a Professional





Hire a Professional





Hire a Professional





Hire a Professional



I wish I hired  
a professional





# Dry Ponds

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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

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Ponds typically do not have a discharge outlet

Rely on permeable soils for infiltration

Low groundwater table





# Infiltration Basin Maintenance

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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

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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









Do not mow  
in the swale flow line



Bioswale enhanced  
with native plants





# Bioretention Maintenance

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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

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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

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## 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

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## 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

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## 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

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## 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

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

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









# Stormwater Facility Erosion

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Change in upstream watershed

Highly erodible soils

Improper installation

Significant rain event





# Erosion of Stormwater Facilities

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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

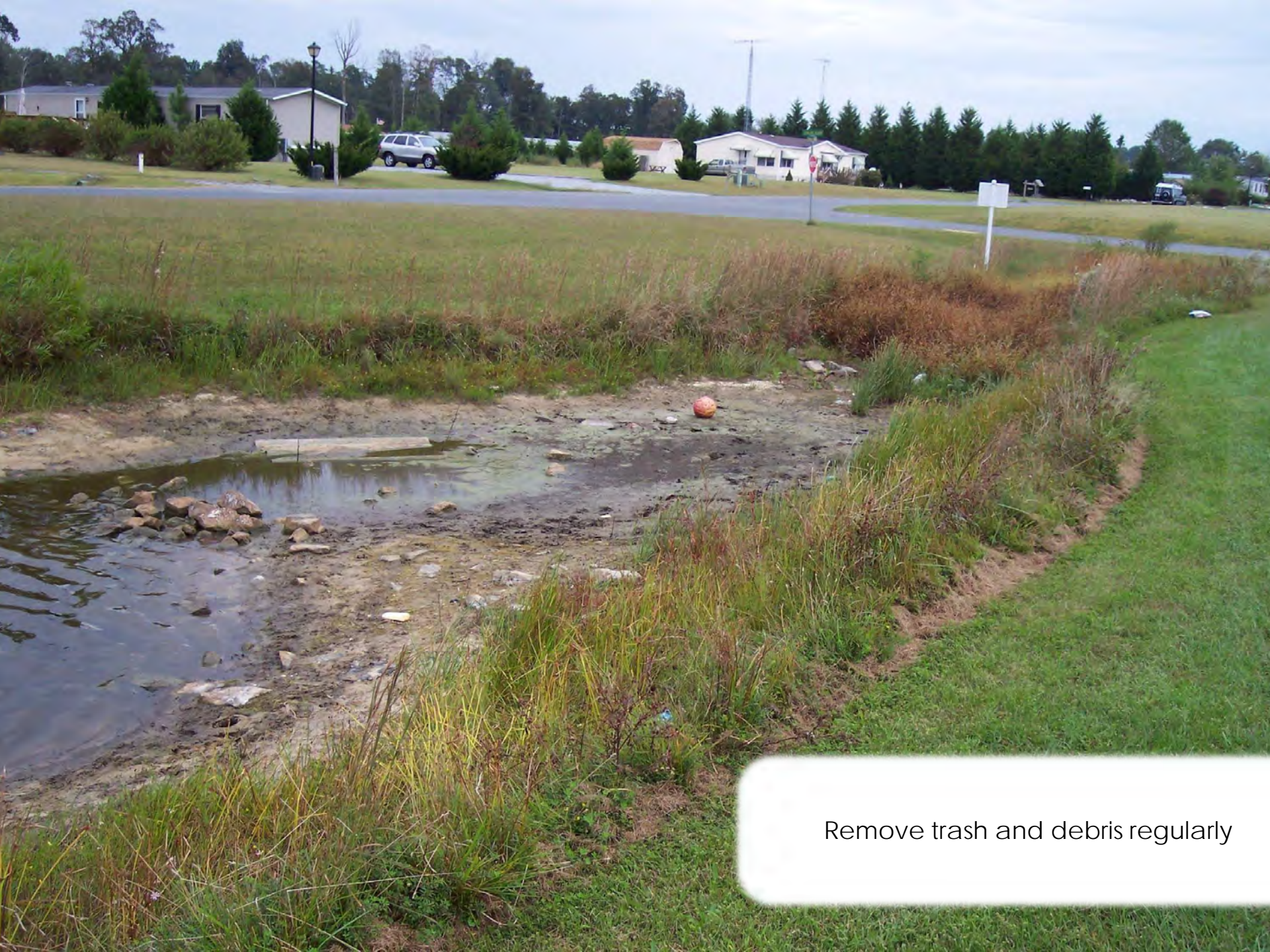






Sediment-laden runoff into stormwater pond increases future maintenance costs





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



## 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](#)





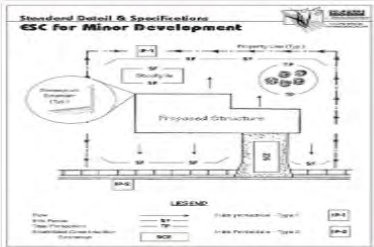
# Shop: Plants + Signage



## 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](http://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>





2023



CONSERVATION  
STEWARDSHIP

*Sussex*  
conservation  
district

## CERTIFIED CONSTRUCTION REVIEWER

Residential or Commercial

## DESIGN TEAM

Engineer, Surveyor, or Other

## DEVELOPER

Residential and Commercial

## GREEN CONSERVATION

Residential, Commercial, Municipal,  
Agricultural, or Other

## HOME BUILDER

1-50 and 51+ homes per year

## PROJECT MANAGER

Residential and Commercial

## SITE CONTRACTOR

Residential and Commercial

**DEADLINE: DEC. 15, 2022**





*Sussex*  
conservation  
district

PREPARE • PROTECT • PRESERVE

*Thank you*

**Jessica Watson**

Stormwater Program Manager  
Sussex Conservation District

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