

# Nonpoint Source Program

Envirothon Training

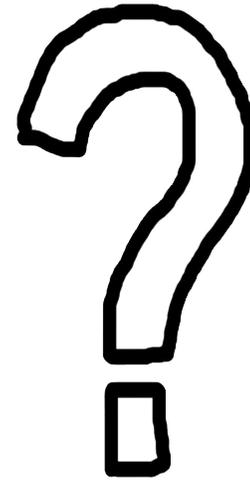
January 24, 2026

*Catie Soriano & Ben Coverdale*



DELAWARE DEPARTMENT OF  
NATURAL RESOURCES AND  
ENVIRONMENTAL CONTROL

# What is Nonpoint Source Pollution?



Pollution that originates from a diffuse source (ex. open field or a road) and is transported to surface or ground waters through leaching or runoff.

# What is Point Source Pollution?

EPA defines point source pollution as “any single identifiable source of pollution from which pollutants are discharged, such as a pipe, ditch, ship or factory smokestack.”



# Major Types of NPS Pollution



Toxic Substances



Bacteria & Pathogens



Sediment



Pesticides



Nutrients



# Nonpoint Source Pollution – *What we are trying to address...*



# How do we contribute to NPS Pollution?



Applying Fertilizers



Land Disturbance /  
Construction



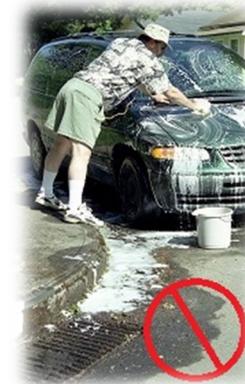
Operating Vehicles



Leaving Pet Waste



Improperly Maintaining  
Septic Systems



Washing Vehicles

# Effects of Land Use Types on NPS Pollution

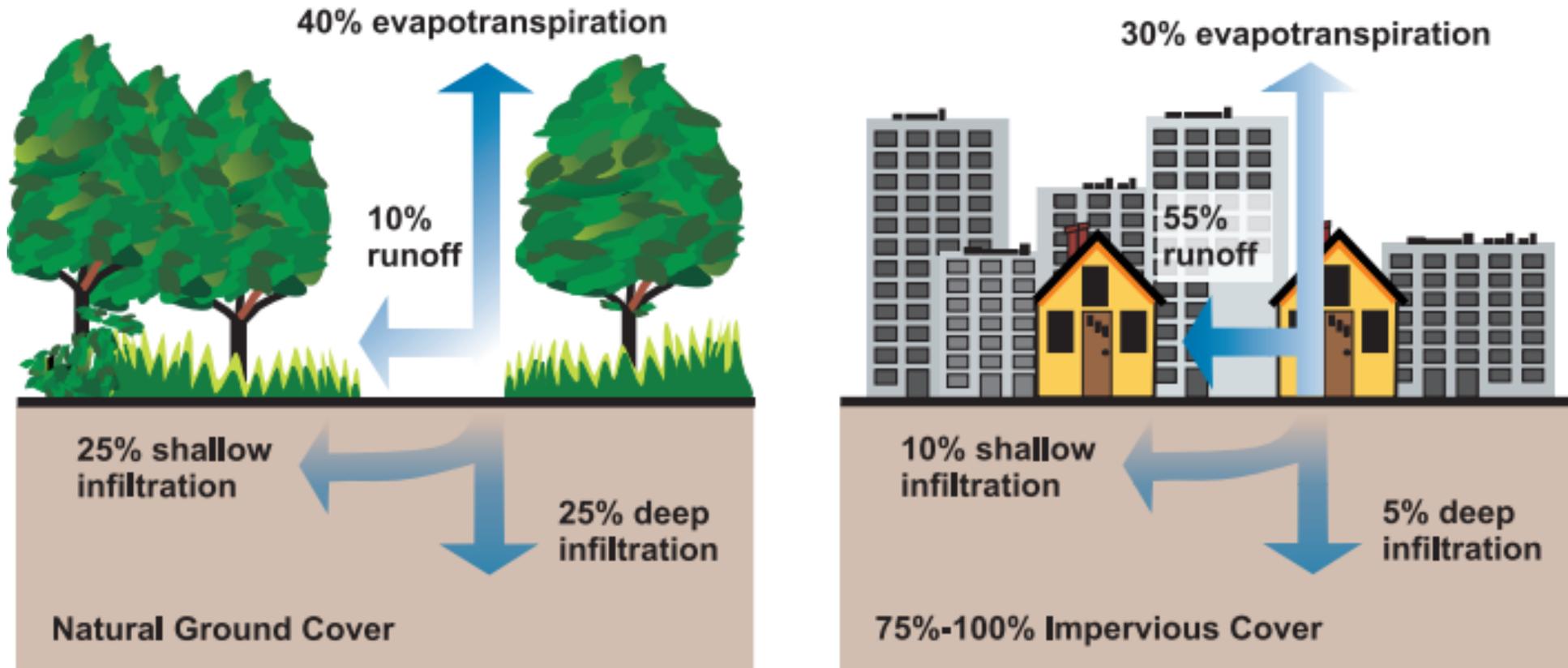
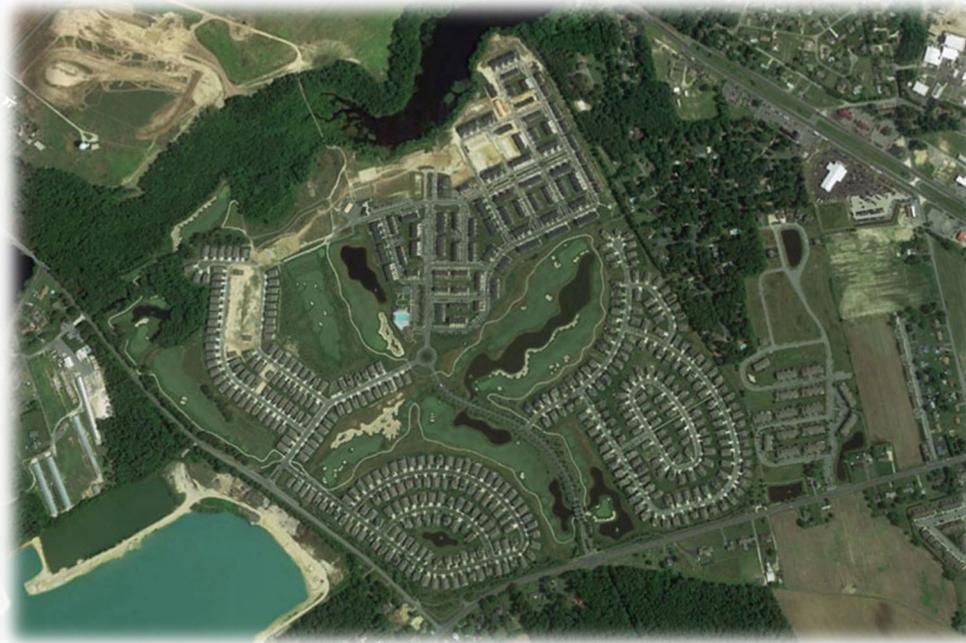


Photo Credit: [EPA](#)

# Changing Land Uses – Influences on NPS Pollution



# Clean Water Act (CWA) - Overview

- Basis of the CWA was enacted in 1948 and was called the Federal Water Pollution Control Act.
- Was significantly reorganized and expanded in 1972 where it took on the name “Clean Water Act.”
- Establishes the basic structure for regulating discharges of pollutants into waters of the U.S. and regulating quality standards for surface waters.
- Environmental Protection Agency (EPA) implements programs under the CWA while the Department of Justice (DOJ) handles enforcement actions.



# Clean Water Act (CWA) – Key Goals & Provisions

- **Restore Water Integrity** – A fundamental goal is to restore and maintain the chemical, physical, and biological integrity of all U.S. waters.
- **Permit System** – Makes it illegal to discharge pollutants without a permit, setting up the National Pollutant Discharge Elimination System (NPDES).
- **Water Quality Standards** – Requires states and tribes to set standards for surface waters and identify impaired waters needing cleanup.
- **Wetlands Protection** – Section 404 regulates the discharge of dredged or fill material into "waters of the United States," including wetlands, managed by the Army Corps of Engineers.
- **Funding for Treatment** – Provides financial assistance for building and upgrading municipal sewage treatment plants.
- **State Role** – Recognizes and supports states' primary responsibility for managing water pollution.

# Clean Water Act (CWA) – Section 303 & Total Maximum Daily Loads

- **Section 303** – Requires states to 1) Establish water quality standards for surface waters, 2) Assess waters to see if they meet those standards, and 3) List impaired waters on the Section 303(d) list.
- **Total Maximum Daily Load (TMDL)** – pollution diet for an impaired waterbody. Allocates pollutant loads among 1) point sources, 2) nonpoint sources, and 3) margin of safety.
  - One of the few enforceable planning tools that directly address NPS pollution through implementation of BMPs, land-use changes, and voluntary or regulatory programs
- These establish the framework toward...

# Clean Water Act (CWA) – Section 319 & State Implementation

- **Section 319** – core federal program to address NPS pollution
- **States must** – 1) Develop a NPS Management Program, 2) Identify major NPS pollution sources, 3) Describe strategies to control them, and 4) Develop nine element (A-I) watershed implementation plans.
- **Section 319 Grants** – EPA provides Section 319(h) grants to states to:
  - 1) Implement water quality-based BMPs to help achieve goals identified in the TMDLs
  - 2) Restore impaired waters
  - 3) Conduct education and outreach
  - 4) Support watershed planning

# Delaware's Section 319 Grant Program

State of DE submits grant application to EPA every year

Receives an annual federal allocation

Non-federal match requirement

Follow federal fiscal year (October – September) schedule

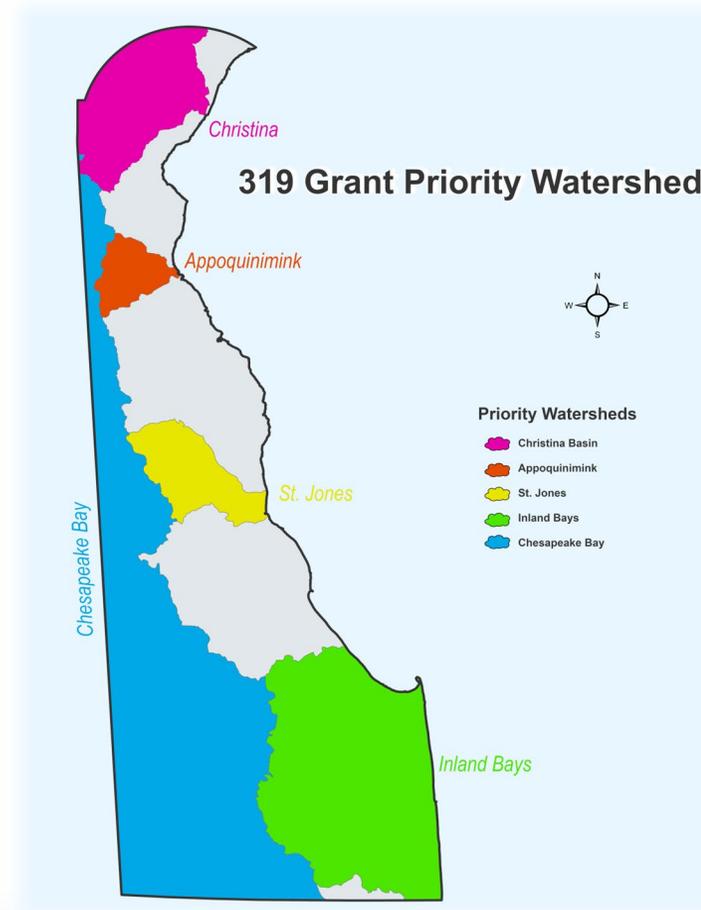
EPA accepted watershed implementation plans (WIPs)

Focus on BMP implementation in priority watersheds



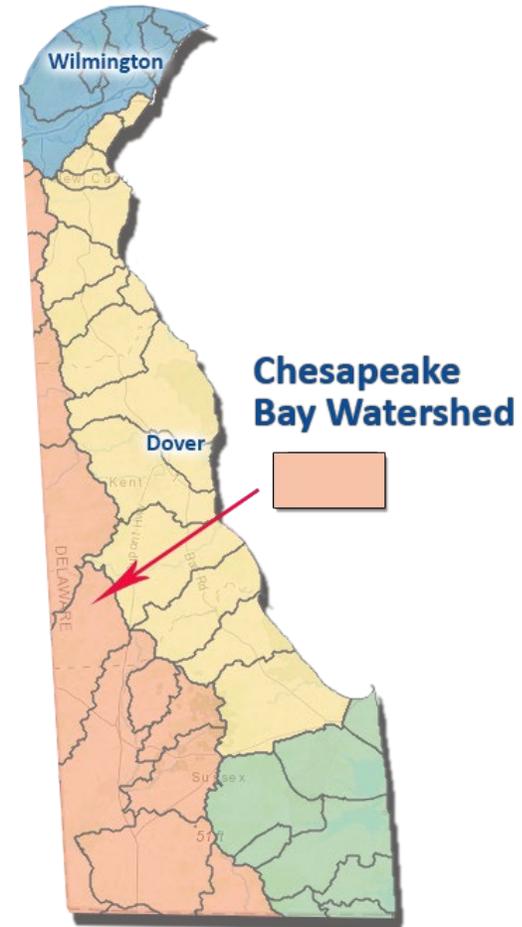
# Delaware Priority Watersheds – CWA Section 319 Grant

- Appoquinimink River
- Broadkill River
- Chester & Choptank River
- Christina Basin
- Inland Bays
- Nanticoke River
- Pocomoke & Wicomico River
- St. Jones River
- Upper Chesapeake



# Chesapeake Bay Program

- Regional partnership that has coordinated the restoration of the Chesapeake Bay since 1983.
  - The 1987 Chesapeake Bay Agreement set the first numeric goals to reduce pollution and restore the Bay ecosystem.
  - In 2010, the EPA established the landmark Chesapeake Bay Total Maximum Daily Load (TMDL).
  - Includes: Maryland, Pennsylvania, Virginia, Delaware, West Virginia, District of Columbia, and New York
- Each of the seven Bay jurisdictions created a Watershed Implementation Plan (WIP) that spells out detailed, specific steps each jurisdiction will take to meet pollution reductions by 2040.



# Approaches to Controlling NPS Pollution - Regulatory

- Sediment and Stormwater Law and Regulations
- Local Government Ordinances, Rules, Policies
  - New Castle County's Open Space Ordinance
  - Sussex County's Perimeter Buffer Ordinance
  - Rehoboth Beach's Tree Ordinance
- Delaware Nutrient Management Law and Regulations
  - Turf Nutrient Management
  - Ag. operations meeting minimum thresholds require a Nutrient Management Plan
- Delaware Pesticide Law and Regulations
  - Certification to apply pesticides
- Septic Design, Installation, and Operation

# Approaches to Controlling NPS Pollution – Voluntary

- Composting
- Cover crops
- Tree plantings
- Managed turf grass conversion (pollinator meadows)
- Minimize pesticide & fertilizer usage and make applications correctly
- Proper storage and disposal of household chemicals
- Rain barrels
- Rain gardens / bioretention
- Riparian buffers
- Wetland creation / restoration / enhancement



# How can individuals and families mitigate NPS pollution?



Photo Credit: Clark County

# How Can Communities Mitigate NPS Pollution?

- Pet waste stations
- Open Space Management
  - Not overfertilizing
  - Limiting intensively managed turf grass
  - Meadows / Native Grasses
- Native plants in landscapes
- Riparian Buffers (grass and/or tree)
- Incorporating green infrastructure
  - Bioretention
  - Bioswales
  - Stormwater capture & reuse
  - Stormwater retrofits
- Citizen education



# How do Federal and State Agencies support local Communities?



# Funding Opportunities

- **Federal Agencies**
  - Cost-Share Programs
    - USDA (EQIP, CREP / CRP)
  - Easement Programs
    - USDA (Wetland Reserve Easement Program)
  - Competitive Grants (Planning, Implementation, Monitoring)
    - EPA (CWA Section 319 Grant Program, Chesapeake Bay Implementation Grant - CBIG)
- **State Agencies**
  - Cost-Share Programs
    - DDA (Cover-Crop Program)
  - Easement Programs
    - DDA (Ag. Land Preservation Easement)
  - Competitive Grant Programs
    - DNREC (Community Water Quality Improvement Grant and Surface Water Matching Planning Grant)
  - Conservation Programs
    - Riparian Buffer Incentive Program
    - Delaware Community Conservation Assistance Program (DeCAP)
    - Tree for Every Delawarean Initiative (TEDI)





# Example – CWA Section 319 Funded Project

Stormwater BMP Enhancements – Rhyne Garden at Delaware Botanic Gardens



*Photo Credits: Delaware Botanic Gardens  
Enhancement Plantings to Stormwater BMP*



DELAWARE  
BOTANIC  
GARDENS  
AT PEPPER CREEK

# The Rhyne Garden



Photos by Ray Bajanski

## Ecological Benefits of Best Management Practices

- Reduced volume and flow of runoff for the capture and absorption of parking area pollutants (e.g. oil, gas) and sediments
- Improved water quality due to uptake and biofiltration of excess nutrients and chemical pollutants by root systems
- Minimized maintenance with aesthetically attractive native plantings
- Increased and more diverse native



## A Model for Stormwater Management

The Rhyne Garden serves as a model of Best Management Practices used for coastal stormwater management and flood control in residential and commercial development. Mass groupings of native perennials along the slope, with buffering trees and shrubs, define the Rhyne conveyance with color and texture. This design slows and captures storm flow, promoting slope stabilization and treatment of runoff.

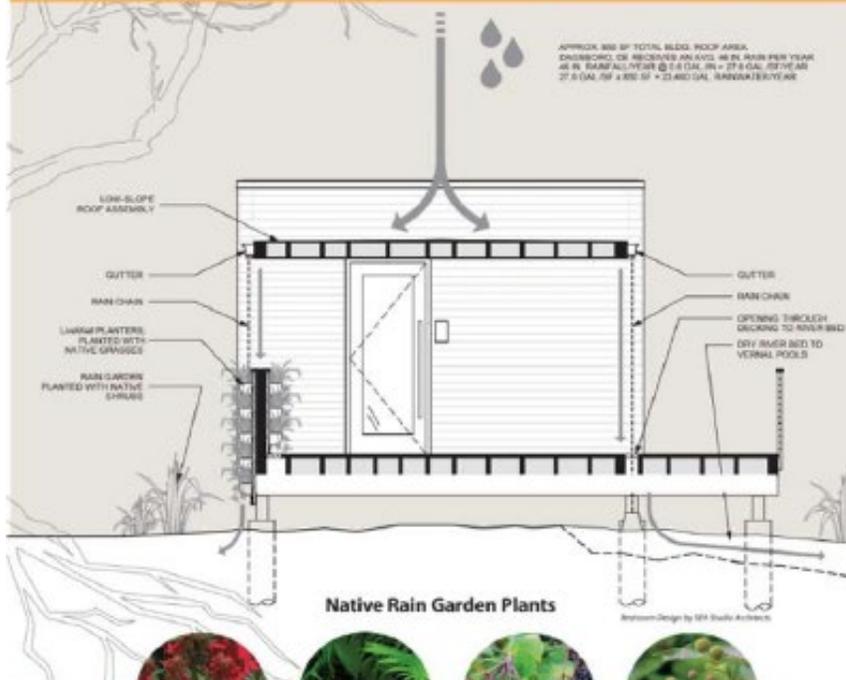
Planted by DBG volunteers and staff, this garden includes over 12,000 native perennials, shrubs and trees. Selected for water tolerance and heat resistance, these plants also provide natural beauty to the garden and ecological services for pollinators and birds.





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BOTANIC  
GARDENS  
AT PEPPER CREEK

# Green Technology Best Management Practices



APPROX. 300 SF TOTAL BLDG. ROOF AREA.  
ENGINEERING OF RECEIVED RAINFALL: 46 IN. RAIN PER YEAR  
46 IN. RAIN ALL YEAR @ 2.8 GAL. IN. = 27.8 GAL. (27.8 IN.)  
27.8 GAL. (27.8 IN.) @ 2.8 SF = 21,480 GAL. RAINWATER/YEAR

DBG is protecting the water quality of our natural resources using best management practices in Green Technology.

The Restroom Pavilion has its own rainwater harvesting and processing system based on Green Technology "Best Management Practices." Let's follow the rain as it lands on the roof and is collected, stored, and redirected through the Green Technologies—rain chains, a 1000-gallon stainless steel cistern, a living wall, a dry creek bed and several rain gardens.

The rain traverses across the roof but doesn't come alone. It picks up hitchhikers like salts, oil, metals, resins and other pollutants. Droplets have several avenues to take, depending on where they land. The roof's gutters collect and transport droplets and their hitchhikers to a funneling 'scupper' with an attached rain chain or through openings in the gutters that lead to four other rain chains. Rain chains eliminate the need for downspouts. Did you know that downspouts can send over 12 gallons of stormwater per minute to drains and sewer systems? Eliminating them reduces overflow, flooding, and erosion.

The raindrops fall through the rain chain links to collecting agents: directly into the cistern or into channels that lead to the cistern, the dry creek bed or the living wall for reuse. The cistern has a hose bib connection that leads to irrigation spouts for the rain gardens. The rain garden plants uptake and filter pollutants through their root systems and trap excess sediments in their foliage. Green technologies process rainwater along its journey, resulting in slowed flow, reduced volume, and cleaner water entering the ground and tidal Pepper Creek.

### Native Rain Garden Plants



*Lobelia cardinalis*  
Cardinal flower



*Matteuccia struthiopteris*  
Ostrich fern



*Sambucus canadensis*  
Elderberry

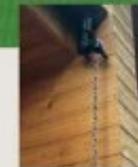
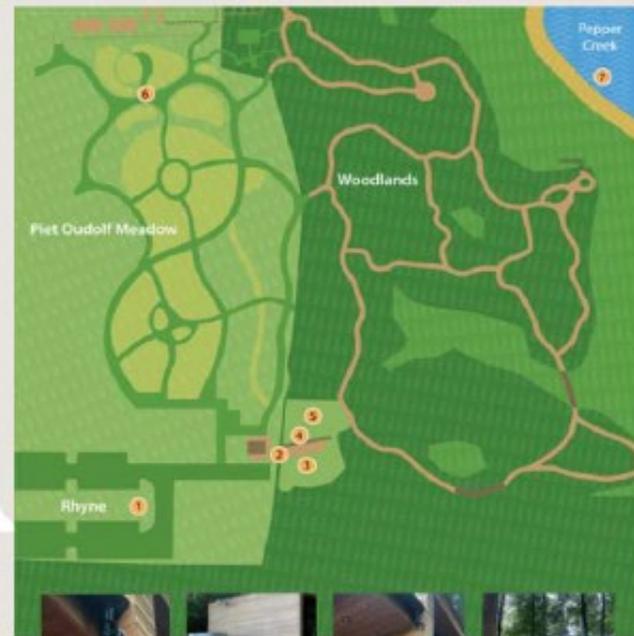


*Cephalanthus occidentalis*  
Buttonbush



### Map of Green Technology at Delaware Botanic Gardens

- 1 Rhyne Stormwater Conveyance
- 2 Rainwater Cistern
- 3 Living Wall
- 4 Downspout Rain Chains
- 5 Rain Gardens
- 6 Wetland Classroom
- 7 Living Shoreline



Downspout Rain Chain



Cistern



Living Wall



Rain Garden

# Education & Technical Assistance

- **Education –**

- Workshops, public outreach events, field days, social media posts and videos, and content creation and distribution

- **Technical Assistance –**

- Grant writing and budget development
- Site visits to assess BMP implementation viability
- Leveraging financial resources
- Connecting partner organizations that share common interests and goals.





## DNREC PHOTOGRAPHY CONTEST

**YOUTH ENTRIES**

Those under 18 can enter in any of the four categories:

- Watersheds: Landscapes and Waterways
- People Enjoying Nature
- Wildlife and Aquatic Life
- Hunting and Fishing

**Prize Pack**  
 \$500 Visa gift card, a Delaware State Parks annual pass, a gift bag and a signed certificate

# Agricultural BMPs to Address NPS Pollution Impacts



Cover Crops



Grass & Tree Buffers



Wetlands

# Wetland Creation – Chesapeake Bay Watershed



- Hydric soil conditions – BMP used for marginal and/or unproductive cropland
- Water quality benefit + habitat creation for wildlife
- Site Assessment – soil types (NRCS Websoil Survey), topography / elevation, tax ditch ROWs, landowner requests, etc.



# Wetland Restoration & Riparian Forest Buffers

February 12, 2026



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# Farming Practices – Conservation Tillage



# Structural Ag BMPs – Examples



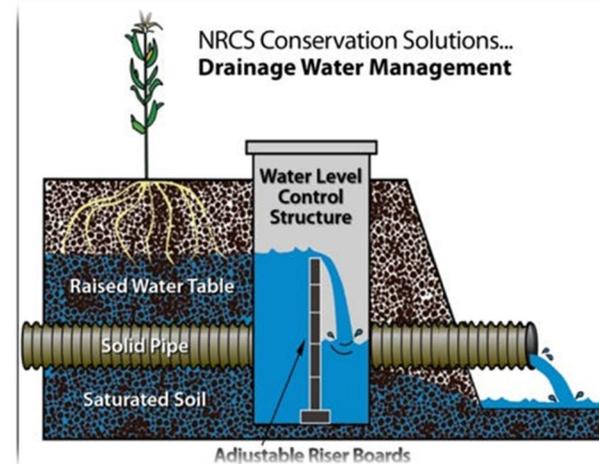
Manure Shed, Composter, HUAP



Freezer Units



Ecodrum - Composter



Water Control Structure

# Urban BMPs to Address NPS Pollution Impacts



Rain Gardens / Bioretention



Rain Barrels



Permeable Pavers



# Vegetated Filter Strips – Pollinator Meadows

February 12, 2026



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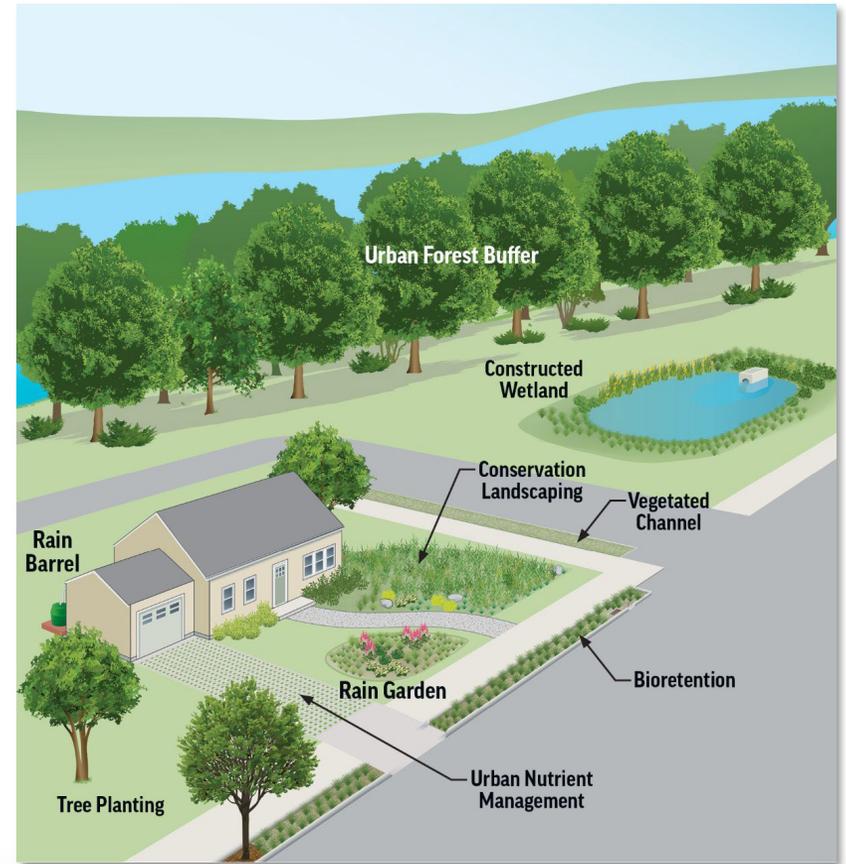
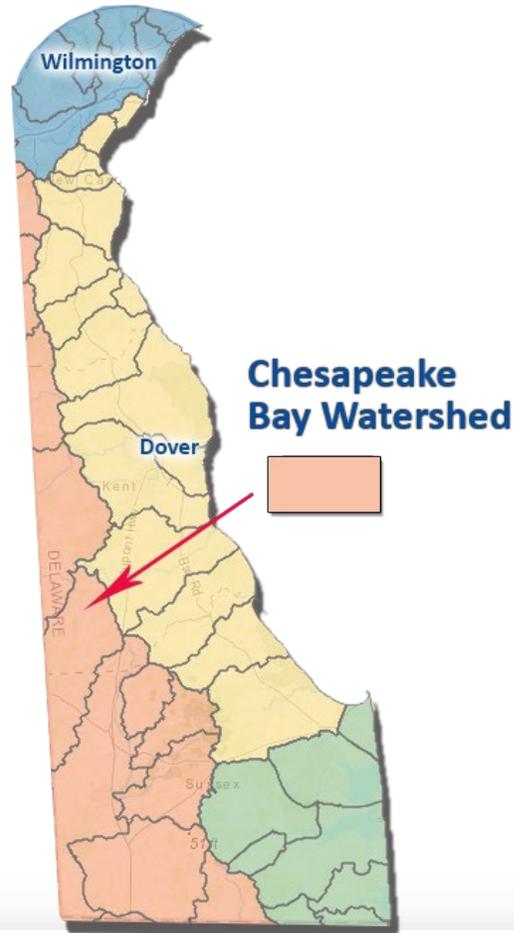
Stormwater Collection & Recycling



Drainage Swale Enhancements – Pollinator Friendly Species (Grasses, Forbs)

# Applying Field Protocols to Evaluate Land Use & Physical Features – Example...

- Cost-share program to implement urban BMPs
- Chesapeake Bay watershed only
- Process – initial contact, site visit, design, review, approval, & implementation
- Five-year maintenance agreement
- Annual inspection





# Conservation Landscaping – Pollinator Meadow (tall grass)

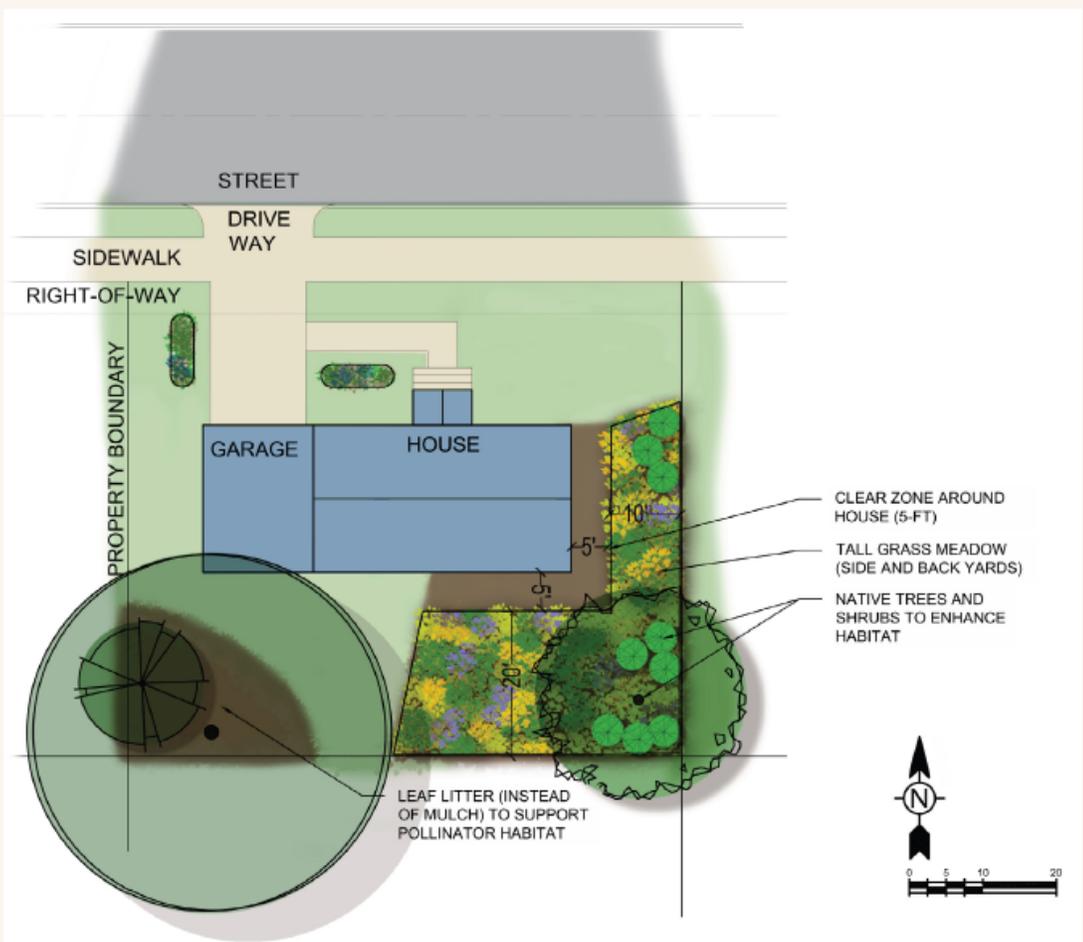
March 2024

About this template:

- Best for a residential neighborhood (such as a subdivision)
- Goal is to reduce turf grass areas to improve pollinator habitat
- Suitable for low visibility areas, away from main house
- Connected meadow areas between houses provides a beneficial wildlife corridor for birds and other wildlife to move about safely away from roads
- Maintain minimum 5-foot clear zone around all buildings
- Maintain minimum 2-foot clear zone around walkways, sidewalks and driveways
- Include native trees and shrubs at edges of meadow and in non-meadow areas for enhanced habitat for birds
- Use leaf litter instead of purchased mulch in planting beds and around trees to support pollinator habitat
- Plant a cover crop of crimson clover to support soil stabilization and honeybees
- Must remove existing turf grass before installing the meadow
- Meadow plantings should include a seed mix and plugs (small, low-cost container plants)

Example Plant List:

Native Grasses	Minimum of 3 species	Height
Canada Wild Rye	<i>Elymus canadensis</i>	Tall (5ft)
Coastal Switchgrass	<i>Panicum amarum</i>	Tall (5ft)
Indiangrass	<i>Sorghastrum nutans</i>	Tall (5ft)
Herbaceous/Perennials	Minimum of 5 species	Height
Grass-leaved Goldenrod	<i>Euthamia graminifolia</i>	Tall (5ft)
Heart-leaved Aster	<i>Symphotrichum cordifolium</i>	Short (3ft)
Crimson Clover	<i>Trifolium incarnatum</i>	Short (3ft)
New York Ironweed	<i>Vernonia noveboracensis</i>	Tall (5ft)
Golden Alexanders	<i>Zizia aurea</i>	Short (3ft)
Shrubs		Height
Winged Sumac	<i>Rhus copallinum</i>	Large (15-30ft)
Chinquapin	<i>Castanea pumila</i>	Large (15-30ft)
Northern Bayberry	<i>Morella pensylvanica</i>	Medium (8-10ft)
Trees - Understory		Height
Chickasaw Plum	<i>Prunus angustifolia</i>	Small (10-15ft)
Hawthorn	<i>Crataegus spp.</i>	Medium (15-25ft)
Trees - Midstory		Height
Eastern Red Cedar	<i>Juniperus virginiana</i>	Medium (up to 50ft)
Black Willow	<i>Salix nigra</i>	Large (up to 80ft)
Trees - Overstory		Height
Sweetgum	<i>Liquidambar styraciflua</i>	Large (up to 100ft)
Loblolly Pine	<i>Pinus taeda</i>	Large (up to 100ft)



PLANT KEY

- SHORT GRASS MEADOW (3')
- TALL GRASS MEADOW (5')
- SHRUBS (5'-8' WIDTH)
- UNDERSTORY TREES (10'-25' CROWN)
- MIDSTORY TREES (25'-45' CROWN)
- OVERSTORY TREES (45'-75' CROWN)

## DeCAP – Pollinator Meadow / Conservation Landscaping BMP Specs



# Cost / Benefit Analysis



- Ex.: Rain garden in Inner City Wilmington
- Cost:
  - Very costly; engineers required for design; large equipment mobilized.
- Benefit:
  - Load reductions, but small compared to dollars spent.
  - Neighboring community directly benefits
  - Open to the public/education opp.
  - Lifespan of BMP
- Feasibility:
  - Permitting
  - Multiple funding sources and partners required
  - Maintenance
  - Buy-in from community

- Ex.: Tree Plantings in Community Open Space
- Cost:
  - Mid to low costs, depending on size and number of trees; zero engineer costs.
  - Large equipment sometimes needed
- Benefit:
  - Load reductions sometimes can be small compared to dollars spent.
  - Neighboring community directly benefits
  - Open to the public/education opp.
  - Lifespan of BMP
- Feasibility:
  - Maintenance
  - Buy-in from community

- Ex.: Cover Crops on Ag. Lands
- Cost:
  - Low costs; quick establishment
- Benefit:
  - Load reductions are reasonable for the costs of implementation.
  - Annual practice – limitation on continued benefits.
- Feasibility:
  - Landowner(s) Buy-In, Weather & Soil Conditions, Economic Considerations, Crop Rotation, etc.



# Designing a Local Outreach Project

- Identify an audience
  - Who are you trying to reach? And how are you reaching them?
  - Municipalities, homeowners, school-aged youth, landowners, etc.; Social Media, door to door, listservs, etc.
- Identify what issue you want to address (yes, NPS, but that could be wide ranging)
  - What is the area you would like to focus on?
  - Stormwater runoff, pollution prevention, individual actions – like rain barrel installation, community actions - like turf grass conversion
- Identify a call to action/message
  - What do you want the audience to do after getting involved?
  - Inspect their septic tanks, plant native vegetation, properly store house-hold chemicals, etc.
- Identify partners for collaborative efforts
  - What networks do you have that could support this initiative?
  - Partners with contacts for the targeted audience, partners with previous outreach experience, partners with available funding, partners that share a common goal – like WQ improvement.
- Create a budget/create outreach materials





# Ex.: Stormwater and Rain Barrel Workshop

- Audience: Homeowners in Kent County - interest generated through a list serv and social media posts
- Issue to Address: Urban Stormwater Runoff
- Call to Action: Implement BMPs on property to reduce stormwater runoff – specifically rain barrels
- Partners: DNREC, Nonpoint Source Program and University of Delaware, Cooperative Extension
- Materials: PowerPoint presentations, brochures, and rain barrels





# Rain Barrel Workshop – June 10, 2025

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# In Summary...

- NPS pollution is a significant impairment to water quality, and is ultimately hard to pinpoint the originating source(s)
- Watershed planning approach is a guide to help restore water quality to their designated uses through BMP implementation
- Wide array of BMPs can be implemented depending on varying factors and goals
- Education & outreach can be an effective tool





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