Christina Watersheds Municipal Partnership

January 19, 2023

Agenda

1. Introduction to the Christina Watersheds Municipal Partnership (CWMP) and the Green Stormwater Infrastructure Guide – Brian Winslow

2. The Municipal Separate Storm Sewer System (MS4): What is it and what are municipalities obligated to do? – Seung Ah Byun

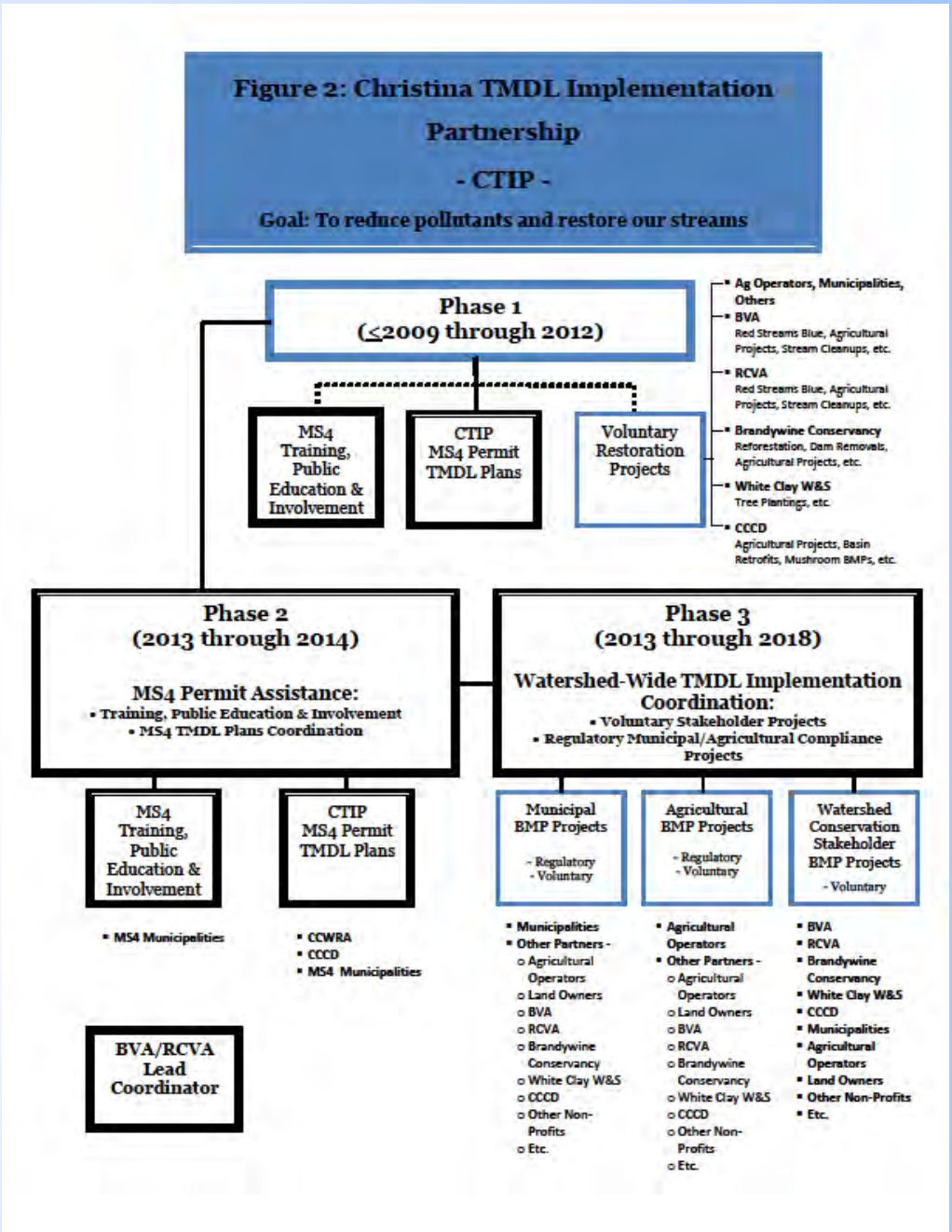
3. Conservation Design and Low Impact Development Site Design: Ordinance Approaches and Tools for Better Stormwater Management - John Gaadt
4. Tools and Resources for Preserving and Protecting Chester County Natural Features- Rachael Griffith and Kate Clark

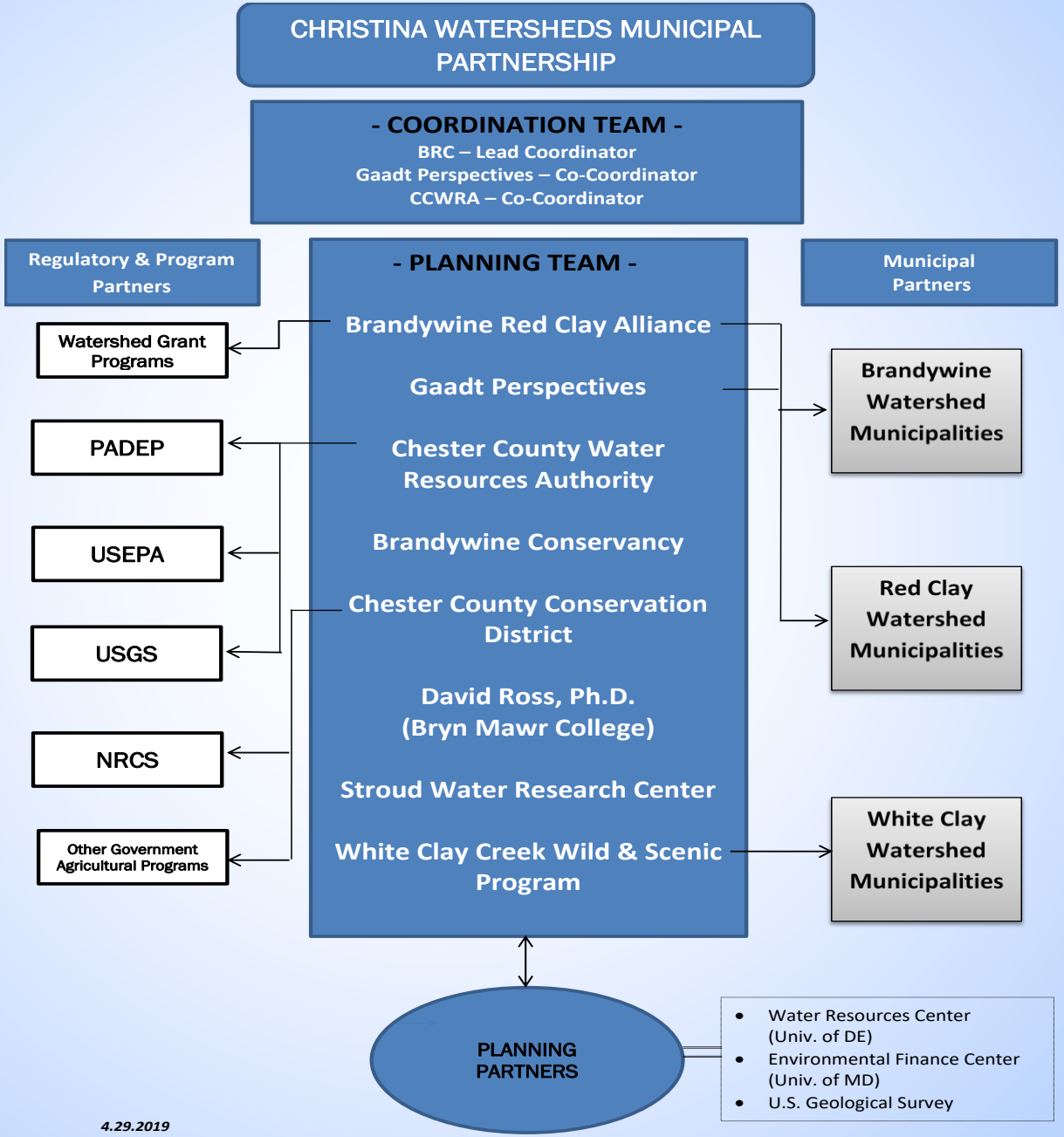
5. Q&A

CWMP Mission

- The Christina Watersheds Municipal Partnership (CWMP) is a long-term partnership of Pennsylvania municipalities, county agencies, and watershed conservation organizations. The mission of CWMP is *to facilitate and support engagement and collaboration of Pennsylvania municipalities, landowners, and other stakeholders to restore and protect the water quality of streams in the Brandywine Creek, Red Clay Creek and White Clay Creek watersheds*.

- CWMP History
  - Formed as CTIP in 2003
  - Assisted in MCM's 1&2 for municipalities public participation and education
  - Developed a TMDL plan template
  - Developed calculation methods for loading rates and reductions in TMDL plans
  - Provided GIS land use layers to allow comparison of land use for base line load calculations.
  - Developed spreadsheet Urban BMP Load Reduction Calculation Tool
  - Served as communication channel with DEP




CHRISTINA WATERSHEDS MUNICIPAL PARTNERSHIP
- COORDINATION TEAM -
BRC – Lead Coordinator
Gaadt Perspectives – Co-Coordinator
CCWRA – Co-Coordinator
Regulatory & Program Partners
- PLANNING TEAM -
Municipal Partners
Watershed Grant Programs
PADEP
USEPA
USGS
NRCS
Other Government Agricultural Programs
Brandywine Red Clay Alliance
Gaadt Perspectives
Chester County Water Resources Authority
Brandywine Conservancy
Chester County Conservation District
David Ross, Ph.D. (Bryn Mawr College)
Stroud Water Research Center
White Clay Creek Wild & Scenic Program
Brandywine Watershed Municipalities
Red Clay Watershed Municipalities
White Clay Watershed Municipalities
PLANNING PARTNERS
Water Resources Center (Univ. of DE)
Environmental Finance Center (Univ. of MD)
U.S. Geological Survey

The following municipalities participated in the 2021/22 CWMP Cost Share

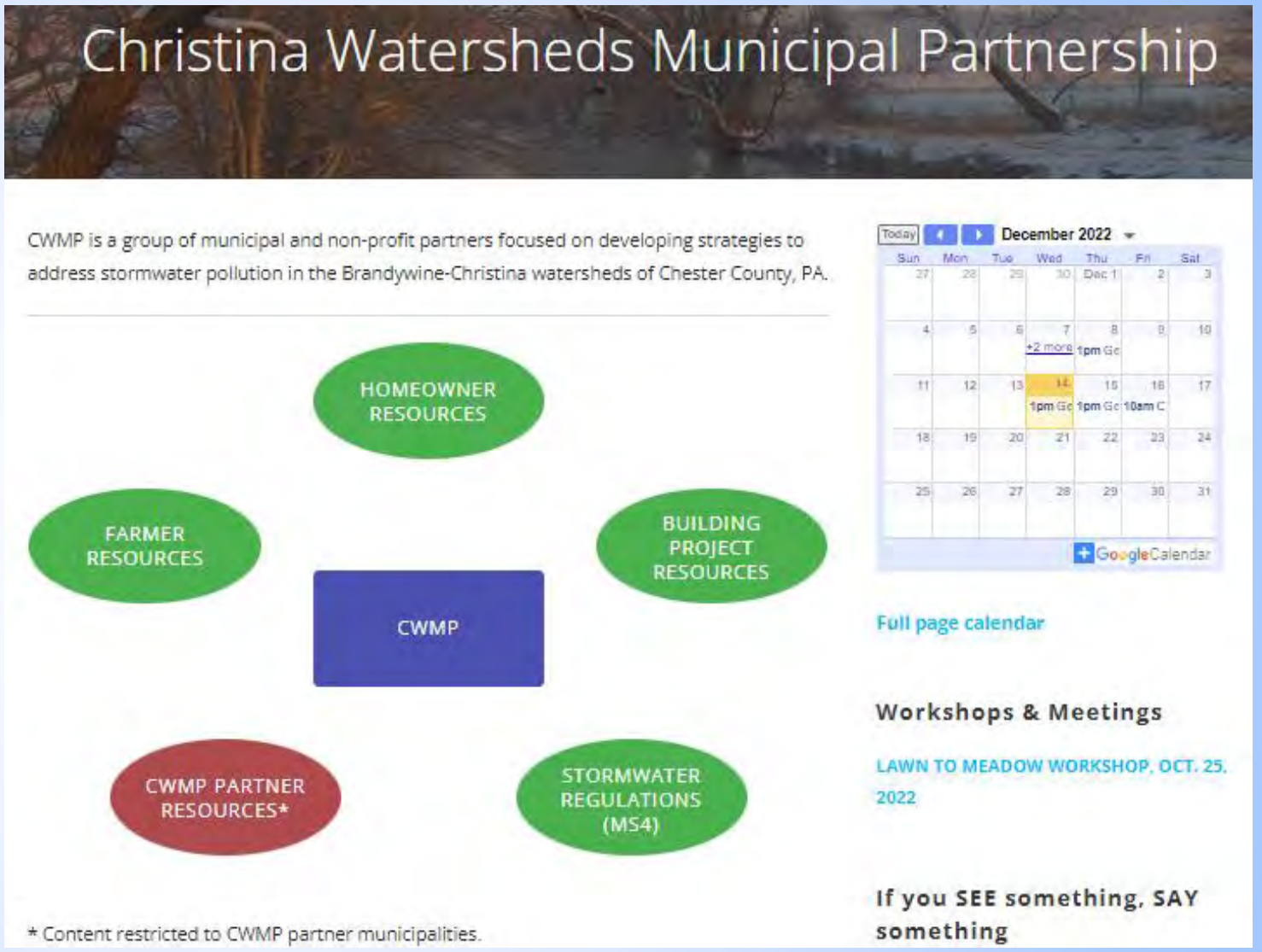
- Avondale Borough
- Birmingham Township
- Caln Township
- City of Coatesville
- Downingtown Borough
- East Bradford Township
- East Brandywine Township
- East Caln Township
- East Fallowfield Township
- East Marlborough Township
- East Whiteland Township
- Franklin Township
- Honey Brook Borough
- Honey Brook Township
- Kennett Square Borough
- Kennett Township
- London Grove Township
- Londonderry Township
- Modena Borough
- New Garden Township
- New London Township
- Parkesburg Borough
- Penn Township
- Pocopson Township
- Sadsbury Township
- South Coatesville Borough
- Thornbury Township
- Upper Uwchlan Township
- Uwchlan Township
- Valley Township
- Wallace Township
- West Bradford Township
- West Chester Borough
- West Goshen Township
- West Grove Borough
- West Pikeland Township
- West Whiteland Township
- Westtown Township

New and Improved CWMP Services- 2021- 2024

- Respond to Municipal and Focus Group Input
- Sustainable CWMP Funding
- CWMP.org website to provide Public Education and Outreach
- Schedule Workshops and Mtgs.
- Continued MS4 Support
- Liaison to DEP
- Assist with Funding & Implementation of MS4 Plans

CWMP New Services- MCM1 & 2 Stormwater Resources- www.cwmp.org

- New website includes resources for residents:
  - Shareable Calendar of events
  - Resource tabs for Homeowners, Farmers and Building Projects
  - MS4 Regulatory information
- Use of webpage has grown since launch in January 2020
- Do you share links to website and calendar on your municipal pages?



CWMP New Services- MCM1 & 2 Stormwater Resources- www.cwmp.org

- CWMP Partner web pages include:
  - List of Grants and funding sources
  - MS4 Technical Assistance/Load & Reduction Calculations
  - Stormwater Training Resources
  - Stormwater Articles for Newsletters
  - Outreach Tool Box includes; template flyers, social media posts and shareable resources
  - Annual Water Ad- print/digital
  - CWMP Newsletter emails

Celebrate World Water Day, March 22, 2022
You Can Help Reduce Flooding and Improve Water Quality

BEFORE

AFTER
Catch the Rain installation

TREES SHADE HOUSE AND PAVEMENT

LAWN AREA IS REDUCED

RAIN GARDENS CATCH ROOF RUNOFF

PERVIOUS PAVERS ABSORB RAIN

Graphic created by Beth Burnam, provided by Brandywine Conservancy

Learn how at www.cwmp.org:

- **Plant a tree or shrub** to help absorb stormwater and provide shade
- **Reduce lawn areas** with conservation plantings of native vegetation
- **Catch rainwater from downspouts** by installing a rain barrel or rain garden
- **Reduce impervious paving** or replace with pervious pavers
- **Volunteer** at litter clean-up or tree planting event
- **Learn more** at a workshop or virtual program at https://cwmp.org/cwmp-calendar/

Sponsored and Paid for by:

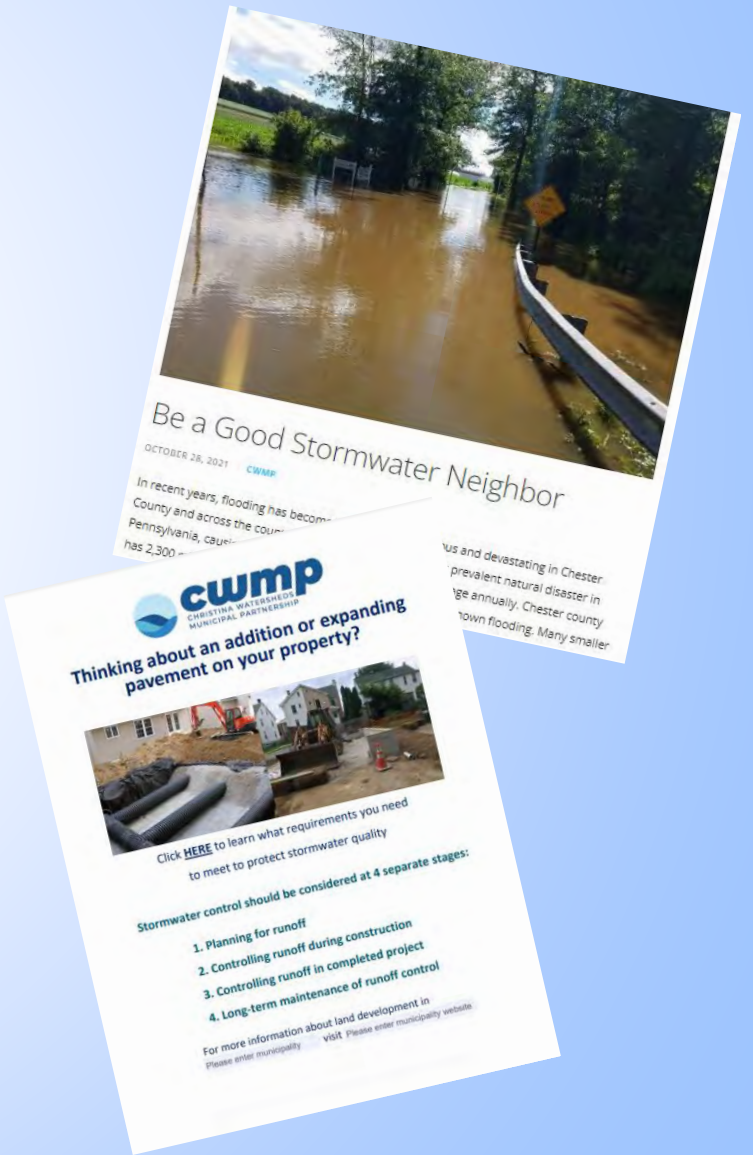
Did you know that in Pennsylvania, every municipality with an urbanized area and impaired stream must develop and implement a municipal stormwater management plan? Learn more by visiting your municipality's web site.

Birmingham Township
Caln Township
City of Coatesville
Downingtown Borough
East Bradford Township
East Brandywine Township
East Caln Township
East Fallowfield Township
East Marlborough Township
East Whiteland Township
Franklin Township
Honey Brook Borough
Honey Brook Township
Kennett Square Borough
Kennett Township
London Grove Township
Londonderry Township
Modena Borough
New Garden Township
New London Township
Parkesburg Borough
Penn Township
Pocopson Township
Sadsbury Township
South Coatesville Borough
Thornbury Township
Upper Uwchlan Township
Uwchlan Township
Valley Township
Wallace Township
West Bradford Township
West Chester Borough
West Goshen Township
West Grove Borough
West Pikeland Township
West Whiteland Township

cwmp
CHRISTINA WATERSHEDS MUNICIPAL PARTNERSHIP

Watershed Conservation | Environmental Education
1760 Unionville-Wawaset Rd I West Chester, PA 19382
610-793-1090 x103 I www.brandywineredclay.org

CWMP is a partnership of municipalities, county agencies, and watershed conservation organizations to restore and protect the water quality of streams in the Brandywine Creek, Red Clay Creek and White Clay Creek watersheds. For a list of all partners visit: www.cwmp.org/about/



Be a Good Stormwater Neighbor

OCTOBER 28, 2021 CWMP

In recent years, flooding has becom-
County and across the cou-
Pennsylvania, caus-
has 2,300 -

-us and devastating in Chester
prevalent natural disaster in
-ge annually. Chester county
-own flooding. Many smaller

cwmp
CHRISTINA WATERSHEDS MUNICIPAL PARTNERSHIP

Thinking about an addition or expanding pavement on your property?

Click **HERE** to learn what requirements you need to meet to protect stormwater quality

Stormwater control should be considered at 4 separate stages:

1. Planning for runoff
2. Controlling runoff during construction
3. Controlling runoff in completed project
4. Long-term maintenance of runoff control

For more information about land development in
Please enter municipality visit Please enter municipality website

CWMP New Services- MCM6 Staff Training Resources

- CWMP Meeting Presentations:
  - Landscapes 3 Overview
  - CCWRA Watershed Plan/Act 167
  - Stormwater Infrastructure Inspection and Compliance
  - PADEP/MS4 Updates
  - Understanding MS4 Regulations
  - Water Quality Data
  - Riparian buffers
  - Salt Impacts on Water Quality and best practices
  - EPA FITS funding tool
  - Stormwater Infrastructure funding
- Elected Officials Breakfast meeting

CWMP New Services-MCM6 –Staff Training Resources

- CWMP Workshops (1/2 day)
  - Budgeting for Municipal Stormwater _ cancelled low enrollment
  - Rain Garden Installation and maintenance
  - HOA Stormwater Infrastructure Maintenance workshop
  - Stormwater and Roads/ Dirt and Gravel Road program funding
  - Lawn to Meadow Workshop

Upcoming workshops:

- ✓ Stormwater Infrastructure Maintenance for Public Works staff
- ✓ Reducing Salt Use to reduce costs and improve water quality

Green Stormwater Infrastructure (GSI) is a form of stormwater management that mimics the natural water cycle by promoting infiltration at the source of stormwater runoff.

- Purpose is to educate about GSI practices and promote their implementation.
- Reduces impact of flooding and erosion
- Applicable to new and existing development
- Many practices may help meet municipal MS4 pollution reductions
- GSI Guide Developed in 2022 and distributed to municipalities, extra copies avail and PDF electronically
- CWMP may be able to provide technical assistance and direction to funding sources

Rain Garden Systems

A rain garden design collects rain from roofs, driveways, sidewalks, roads, and other areas that contribute to runoff. Unlike bioretention areas and bioswales, rain gardens are used for smaller sites, yet a series of rain gardens can be used for larger areas. Rain gardens are close to stormwater sources on the ground level, allowing water to pool and infiltrate the soil. They use native plants that effectively absorb and filter water. Depending on the type of storm, rain gardens typically take between 12 to 72 hours to drain and remain dry, to prevent mosquito breeding, until the next storm.

Rain Garden at Avon Grove Library, West Grove Borough, PA.

Benefits

- Maintains clean rainwater
- Creates habitat
- Prevents local flooding
- Filters pollution
- Improves community aesthetics

Applications

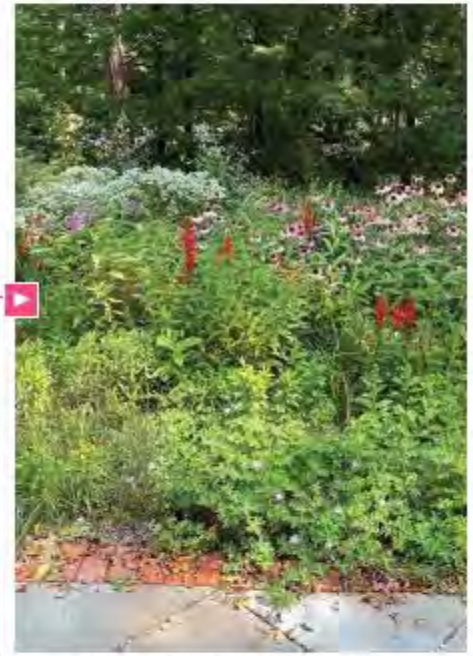
- Private residences
- Cultural and community facilities
- Small lots
- Urban areas
- Parking lots

Operation and Maintenance

- Water new plants every other day for the first two weeks
- Fertilizers are not necessary; maintain the mulch until establishing vegetated groundcover
- Minimal weeding after the first summer of growth
- Cut back growth after each winter
- Inspect inlets, outlets, and invasive plants at least twice a year

Steps

- Identify a low-lying area at least 10' away from foundations
- Evaluate soil conditions for permeability
- Create a depression at least 6" deep
- Direct runoff to the site by redirecting downspouts and creating curb cuts
- Create an outlet for overflow during storm events
- Select a variety of native plants, grasses, and wildflowers to ensure a strong root system to prevent erosion



Mature rain garden at private residence.

Newly planted rain garden collecting stormwater, West Grove Borough, PA.

Cost

- Prices for Rain Gardens vary based on size, site conditions, soil, and selected plants. General cost estimates range between $1 to $16 per square foot depending on installation by a landscaper or a landowner*
- Maintenance cost would be equivalent to other forms of landscaping, approximately $0.31 to $0.61 per square foot*
- Green Values Stormwater Management Calculator (cnt.org)

Additional Resources: Penn State Extension's An Introduction to Rain Gardens
https://extension.psu.edu/an-introduction-to-rain-gardens

Dry Well and Small-Scale Infiltration Trenches

These practices are a small-scale version of an underground storage and infiltration system that temporarily stores and then infiltrates stormwater runoff from roofs and other surfaces. Rainwater is directed from the roof or other surfaces into an underground gravel pit with a prefabricated plastic container or into a linear trench lined with geotextile fabric. These underground pits or trenches drain stormwater into the surrounding soil slowly. If designed properly, these should drain within 72 hours of a rain event. These features may require a pretreatment system to prevent clogging and potential groundwater contamination.

Benefits

- Reduces stormwater runoff
- Increase groundwater recharge
- Can help reduce the size of downstream stormwater management structures
- Save above ground space, especially on small lots because the system is located underground

Applications

- Residential lots (<5 acres)
- Commercial sites and schools (<5 acres)

Cost

- Average costs range between $1.19-$2.68 per square foot*
- Approximately $250 for a 50-gallon dry well/ additional costs for perforated pipe in trench applications*

Operation and Maintenance

- Inspect after every major storm for the first few months after installation
- Semi-annually inspect pretreatment devices for sediment build up and damage
- Semi-annually check drainage three days after a storm to ensure proper percolation

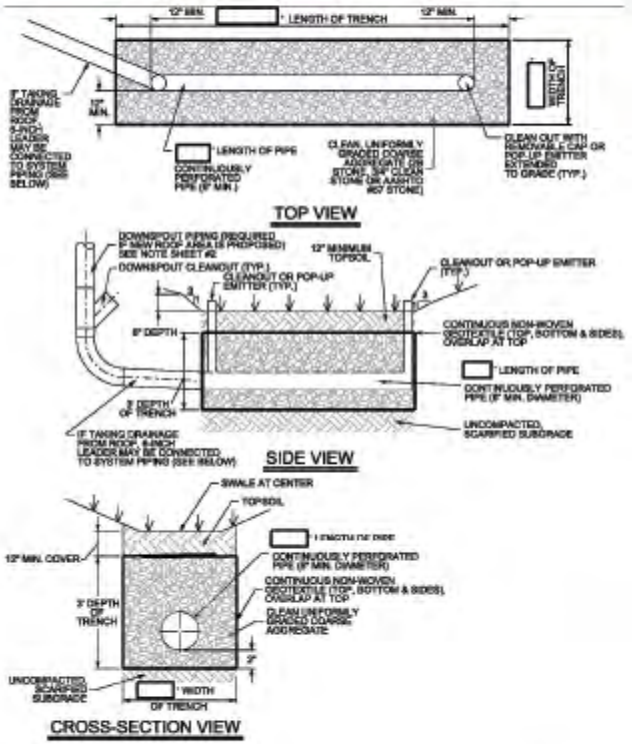
Steps

- Hire engineering company, landscape company or you may be able to complete installation yourself
- Measure surface area of new impervious surfaces and calculate size of pit/ trench for infiltration
- Identify and mark off the location of the dry well/trench to ensure no soil compaction occurs from heavy equipment
- Begin dry well/trench installation after site construction is completed or protect the location with a berm, silt fence, or compost sock to prevent sediment build-up in the area
- Install dry well/trench, line with geotextile fabric and stone
- Replace topsoil, seed and stabilize topsoil
- Connect dry well/trench to the downspout

Additional Resources: New Jersey Department of Environmental Protection's Stormwater Best Management Practices Manual, Chapter 9.2: Dry Wells.

https://www.nj.gov/dep/stormwater/bmp_manual/NJ_SWBMP_9.2-dry-wells.pdf

Infiltration trench design and concept developed by CEDARVILLE Engineering Group, LLC (CEG) and included in the Chester County Act 167 Stormwater Management Model Ordinance, Appendix A.



Simple infiltration design that can be installed by homeowner or landscape company.

Permeable Pavement

The permeable or porous pavement design allows water to filter quickly and infiltrate the underlying soil. Some examples of permeable pavement include pervious asphalt or concrete, interlocking concrete pavers, or permeable lattice pavers. Unlike pervious asphalt and concrete, which allows water to percolate through, concrete pavers provide gaps in or between the pavers to allow water to pass between those gaps and infiltrate into the ground. Project sites require permeable soils and a deeper stone base to store water while infiltrating.

Benefits

- Stormwater volume control
- Groundwater recharge
- Cost-effective

Applications

- Parking lots
- Overflow parking
- Residential driveways
- Sidewalks
- Sports courts
- Must have permeable soils, on flat or gradual surfaces

Operation and Maintenance

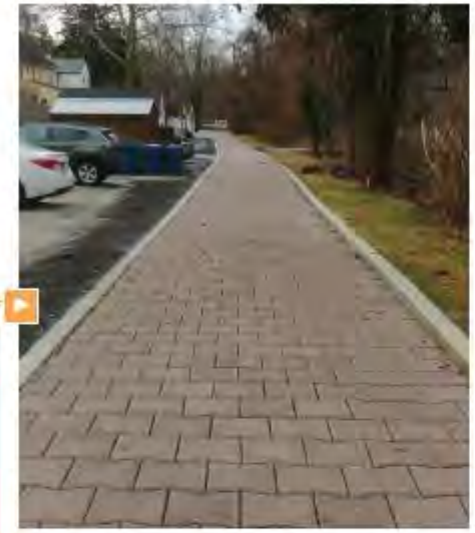
- Clean outlets
- Vacuum or sweep debris depending on the type of surface
- Keep soil and sediment off permeable paving

Steps

- Determine if the site has permeable soils
- Requires design by a landscape architect or engineer
- Install porous pavement
- Maintain and inspect annually

Cost

- Installation Cost: between $5 to $15 per square foot, with infiltration bed*
- Maintenance Cost: between $400 to $500 per year for vacuuming a half-acre lot (only for porous asphalt and concrete*
- Green Values Stormwater Management Calculator (cnt.org)



Permeable paving in West Chester Borough, PA.

Installing permeable paving at West Chester University, West Chester Borough, PA.

Pervious overflow grassed parking area at Dansko Company store and outlet, Penn Township, PA.

Pervious paver parking spaces at Chadds Ford, Chadds Ford Township, PA.

Additional Resources: Penn State Extension's guidence on porous and permeable paving.
https://extension.psu.edu/roadside-guide-to-clean-water-porous-and-permeable-paving-materials

Local Resources and Funding

A wide variety of public and private funding sources may assist in planning and implementing these GSI practices. Many require matching funds from the landowner, local municipality, or other partners. Funding sources include:

- Chester County Planning Commission
- Chester County Conservation District
- City of Newark
- Delaware Department of Natural Resources and Environmental Control (DNREC)
- Local municipalities, park authorities
- National Fish and Wildlife Foundation (Both private and federal funds from US Fish and Wildlife)
- New Castle County,(DE) Conservation District
- PADEP Growing Greener program
- PADCED Watershed Restoration Program
- PA DCNR grant programs
- Water Utilities and other businesses with an interest in clean water
- TreeVitalize Watershed Grants (Tree planting)
- US EPA and other federal funding programs

Brandywine Conservancy and Brandywine Red Clay Alliance prepared this booklet as part of our participation in the Brandywine Christina Cluster of the Delaware River Watershed Initiative (DRWI). Funding provided by William Penn Foundation. The opinions expressed in this publication are those of the authors and do not necessarily reflect the views of the William Penn Foundation.

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For more information about addressing stormwater pollution, practices, and funding, visit the Christina Watersheds Municipal Partnership (CWMP) website at www.cwmp.org

If your property is in the White Clay Creek, Red Clay Creek or Plum Run watersheds, additional resources may be available through the Catch the Rain program, which is a voluntary program for suburban homeowners in these watersheds.

For more information about these Green Stormwater Infrastructure Practices and sources of technical assistance and funding, contact:

Brandywine Conservancy
www.brandywine.org/conservancy
conservancy@brandywine.org
610-388-2700

Brandywine Red Clay Alliance
www.brandywineredclay.org
info@brandywineredclay.org
610-793-1090

The Brandywine-Christina Cluster of the DRWI is working to improve the water quality in our watershed through land preservation, agricultural best practices, stream restoration, and addressing stormwater impacts. Members are:

- Brandywine Conservancy
- Brandywine Red Clay Alliance
- Natural Lands
- Stroud Water Research Center
- The Nature Conservancy of Pennsylvania and Delaware
- University of Delaware Water Resources Center

Brandywine Red Clay Alliance

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