



Chester County Stormwater BMP Tour Guide

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BMP:	Rain Garden and Wet Pond
Site Name:	Pocopson Township Public Works Depot
Location:	Pocopson Township, ADC Map Coordinates: 40-F7 <i>Directions: Route 52 4-6 miles south of Brandywine Creek</i>
Watershed:	Brandywine Creek (Stream Designation: TSF, MF)
Land Use:	Light Industrial

Description: A **rain garden** is a shallow earthen stormwater basin planted with native vegetation that infiltrates accumulated stormwater. The rain garden receives overland flow from parking areas, vehicle wash areas, and from the roof. Roof runoff flows off a roof ledge and directly into a stone embankment into the rain garden. Vegetation planted in the structure must tolerate variable soil moisture conditions, including periodic inundation of stormwater following storm events and standing water. Soils in this structure must remain uncompacted and permeable to ensure stormwater infiltration into the subsurface.

This rain garden is designed to infiltrate runoff from a 2-year storm. Overflow from the rain garden flows through a grass-lined surface channel into a surface inlet and then through subsurface conveyance pipes into the nearby the wet pond.

Wet pond at this site is a constructed basin with earthen embankments that maintains standing water and moist soils year-round. Wetland vegetation has established itself in and around this structure and has been supplemented by plantings. This pond receives runoff water via a subsurface conveyance pipe from the rain garden and provides further opportunity for pollutant removal. Together, these structures filter pollutants from site runoff and manage stormwater from a 100-year storm.

Function: The rain garden and wet pond manage both the quantity and quality of stormwater runoff. The two structures work in concert to remove pollutants with the rain garden serving as a natural pre-treatment and the second wet pond providing final removal of remaining pollutants. The combined action of the vegetation in both structures provides a system capable of removing runoff pollutants expected from the depot site. The ponds can filter suspended solids and oil and grease resulting from vehicle washing. Efforts are made on site to prevent polluting stormwater in runoff, for example, site operators minimize chemical use when washing vehicles and performing other site activities.

- Wetland vegetation removes pollutants present through both physical and biological processes
- The process of stormwater infiltrating into the ground removes pollutants present in the stormwater
- Combined the rain garden and the wet pond have the potential to filter expected pollutants including dirt, sand, grit; nutrients; oil and grease; and heavy metals
- Promotes stormwater infiltration which recharges groundwater and helps stabilize base flow in nearby streams

- Vegetation in the rain garden and wet pond provides aesthetic value
- Vegetation dissipates energy of entering stormwater
- Provides wildlife habitat
- Provides a low-maintenance BMP provided it remains free of excessive dirt, sand and debris

Functioning as designed, wet ponds, which also infiltrate standing water, can be expected to achieve higher pollutant removal efficiencies than a non-infiltrating wet pond. The pollutant-removal efficiencies provided reflect a range for wet ponds and infiltration structures.

- Total Suspended Solids (TSS): 80 % - 95 %
- Total Phosphorus: 51 % - 70 %
- Total Nitrogen: 33 % - 51 %
- Metals: 62 % - 99 %
- Bacteria: 70 %

Operation and Maintenance: The Chester County Conservation District considers the operation and maintenance of this system to be low to moderate. Maintenance requirements are largely dependent upon sediment accumulation and the success of vegetation. Operation and maintenance requirements include the following:

- Routine inspection to ensure the components are functioning properly
- Avoid running heavy equipment into the ponds to prevent soil compaction
- Only initial planting is required assuming plants get successfully established
- Structural components (i.e., inlet and outfall structures) should be inspected periodically to ensure they are not impeded by debris (i.e., litter) or overgrown vegetation (including stems or roots)
- Remove invasive plants as necessary since they can potentially out-compete and eliminate desirable plants (remove shoots and roots)
- Periodically plants should be manually clipped to ensure their growth does not impede the flow of water through the inlet and outfall pipes (wet ponds should not be mowed)
- Routinely remove accumulated trash and debris from the structures

Cost Factors: Factors influencing the cost of rain garden and pond construction at this site include cost to purchase and plant plants, cost to purchase stone and install stone beds. The cost to maintain wetland plants depends largely on the need to remove invasive plants, which require manual trimming. (Invasive plants need to be controlled since they can out-compete desirable wetland plants.)

Other Site BMPs

Disconnected roof downspouts. Disconnected downspouts at this site permit stormwater from roof to enter downspouts and discharge directly onto the ground. Downspouts from the roof direct stormwater into stone banks that gradually slope toward the rain garden. Pollutants present in roof runoff have the opportunity to be filtered by vegetation in the rain garden. Roof stormwater can infiltrate into the ground near where it is generated. The basin banks are stabilized with both rock and vegetation to prevent channel formation, which could potentially occur in these areas of concentrated flow.

For More Information

Designer: LandStudies Inc. www.landstudies.com (717) 627-4440 email: land@landstudies.com, (Kelly Gutshall)

Owner: Pocopson Township, Bill Harwood, Public Works Director, (610) 793-2387

Township: Engineer: Vandemark & Lynch, John Finn, (302) 764-7635

References

Center for Watershed Protection, *Approaches to Stormwater Treatment*, Copyright 2001.

Pennsylvania Handbook of Best Management Practices for Developing Areas, Prepared by CH2MHILL, Spring 1998.

Site 17 - Pocopson Public Works Depot – Rain Garden



Vegetation in the Rain Garden (upper left) was cut back in the fall; rip rap bank along building receives runoff flowing directly off the roof. **Upper right:** downspout directs runoff into a grass-lined channel around cinder block wall. **Below:** Wetland vegetation thriving in and around wet pond pictured below.

