



Storm Water Program Technical Quarterly

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Web Links of Interest:

- [Shrinking Cities Institute - KSU](#)
- [Cleveland Urban Design Collaborative](#)
- [USEPA Webcast Training](#)
- [OEPA-OCAPP](#)
- [Soil Sampling Field Book](#)
- [Cuyahoga SWCD 60th Annual Meeting & Election](#)
- [Aerials Now Online](#)
- [If you have additional training information, let us know.](#)

Objectives of the Ohio EPA Storm Water Management Program for Small MS4s

(A) Storm water runoff continues to harm Ohio's waters. Runoff from lands modified by human activities can harm surface water resources in several ways, including the changing of natural hydrologic patterns and elevating pollutant concentrations and loadings. Storm water runoff may contain or mobilize high levels of contaminants, such as sediment, suspended solids, nutrients, heavy metals, pathogens, toxins, oxygen-demanding substances and floatables.

(B) The purpose of the Ohio EPA storm water management program for small municipal separate storm sewer systems (MS4s) is to regulate sources to protect water quality and to establish a comprehensive storm water management program. In this program, small MS4s have flexibility to determine the best management practices and measurable goals that are most appropriate for their

system, for each of the six minimum control measures described in paragraph (C) of rule 3745-39-03 of the Administrative Code.

(C) What constitutes a municipal separate storm sewer system is often misinterpreted and misunderstood. The term does not solely refer to municipally owned storm sewer systems, but rather is a term of art with a much broader application that can include, in addition to local jurisdictions, state and federal facilities, public universities, local sewer districts, public hospitals, federal installations, military bases and prisons. The municipal separate storm sewer system is not just a system of underground pipes - it can include roads with drainage systems, gutters and ditches.

**~OEPA 3745-39-02
Effective:R.C. 119.032**

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Many of our articles include the use of hyperlinks. If you are reading a paper copy and would like to take advantage of the Technical Quarterly hyperlinks, visit: <http://www.cuyahogaswcd.org/services-stormwater-publications.html>

Soil Structure: An Indicator of Urban Soil Quality

Soil structure refers to the arrangement of sand, silt and clay-sized particles and soil organic matter into aggregates. Good soil structure is one of the most important soil properties to manage because of its great influence on: infiltration and movement of water and air through the soil, habitat for soil critters and biodiversity, minimizing erosion, depth of rooting and garden & crop productivity, and maintaining soil

organic carbon. As soil structure is degraded (granular to platy), many beneficial soil functions are lost. This results in lower overall soil quality and its ability to function as we would like it.

Poor soil quality is common in most urban areas. Most natural soils have either been completely buried or compacted by land leveling, paving, and construction. Since we have degraded most of the soil structure in urban areas, we must

restore soil function whenever we depend on its ability to provide the benefits that we desire.

This requires alleviating soil compaction and building soil organic carbon through proper plantings and maintenance of vegetative treatments. In moderate to severe cases, mechanically loosening compacted soil by using a subsoil ripper and blending in compost will be a necessary first step.

Level Spreader: An Underutilized BMP

Ohio EPA's Construction General Permit (OHC00003) states that "Concentrated storm water runoff from BMPs to natural wetlands shall be converted to diffuse flow before that runoff enters the wetlands" (Part III.G.2.f). A good way to do this is to use a level spreader to turn a concentrated discharge into sheet flow. Spreading water out minimizes flow velocity and depth which results in less erosive energy to detach and transport soil. A

study by Ryan Joseph Wilson of North Carolina State University indicates that there are significant benefits to using a level spreader with a grass filter strip when the level spreader and the receiving slope are each level. It is critical to understand that a level spreader has to be constructed on the level. Likewise, keeping water sheet flowing until it reaches a safe and adequate outlet, such as a rock-lined channel or storm inlet, is as important as getting the BMP

installed level.

The long-term operation and maintenance plan for the practice needs to include removing sediment and other debris from the level spreader in maintaining sheet flow to the outlet area. This is critical to keeping discharges from concentrating as it flows around the sediment and other debris. More information can be found at "Rainwater and Land Development".



Bio-Retention At Work In Seven Hills

Long-Term Operation & Maintenance: Part II

All post-construction water quality Best Management Practices (BMPs), structural and non-structural, have long-term operation & maintenance needs to ensure that they are in good working order and serving their intended water quality function.

The type and frequency of maintenance needs are going to vary depending on the kind of water quality feature that is present. For an example, infiltration-type water quality facilities (e.g. bio-retention, enhanced swale, filter strip, infiltration basin) that have a manufactured soil medium, may have depositional crusting or develop a water repellent (hydrophobic) film that will limit its infiltration capacity. These will need to be removed from the surface periodically. Another example are natural areas, such as riparian and wetland setbacks, that have been placed in a conservation easement to protect natural functions. Such areas will need to be maintained as well-vegetated natural areas and monitored regularly.

Most water quality features share similar maintenance needs. Some of which include:

- **Sediment Accumulation**
Forebays, micropools, and

permanent pools will collect sediment and should be cleaned when they become 25-50% full.

- **Invasive Aquatic Plant Removal**

Cattails and common reeds can crowd out other, more desirable plants and form thickets for mosquitoes. When the quantity of these plants become undesirable, they will need to be controlled.

- **Pest Control**

Muskrats and beavers can create burrow holes around and through dams that may potentially lead to dam failure.

- **Orifice Clogging**

Floating trash and debris can clog the water quality orifice in the outlet structure and thereby cause loss of storage and flooding.

Additional maintenance needs include, but are not limited to:

- (i) maintaining flow-length and permanent baffles;
- (ii) ensuring constructed swales and emergency spillways are clear of obstructions and debris;
- (iii) maintaining perennial vegetative cover and other protective measures (rip rap, turf reinforcement matting, etc.); and,

(iv) controlling woody vegetation on earthen dams.

Water quality ponds and storm water wetlands have a high potential of becoming nutrient enriched. Too much phosphorus in an aquatic system can lead to floating mats of filamentous algae and choke the aquatic system. An easy and affordable way to minimize this common occurrence is to perform a [Soil Fertility Analysis](#) on upland areas and apply fertilizer only as needed.

Other water quality BMPs that are being implemented and proposed across Cuyahoga County include underground sand filters, compost trenches, and reducing impervious surfaces by way of green roofs, permeable pavers, and perennial vegetation.

With each and every water quality BMP put on the ground comes its own specific operation and maintenance guidelines. Adhering to these guidelines and performing regular monitoring and maintenance, will help guarantee a functioning and aesthetic water quality feature.

True or false

Raindrop impact can move soil particles as high as 3 feet and as far as 5 feet to the side?

True...

During a typical storm, millions of drops can fall at velocities up to 30 feet per second and pulverize soil structure into crust.



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Pillars of BMP Selection for Water Quality

- 1) water quality services/ functions provided
- 2) accessibility/maintainability
- 3) site and soil compatibility

Post-Construction Checklist

As a construction project nears completion, it is a good time to ensure that everything is on track for converting temporary sediment basins into a post-construction water quality Best Management Practices (BMP).

A comprehensive Storm Water Pollution Prevention Plan (SWP3) must include an implementation schedule that details the necessary steps and time-frames that are critical to follow.

While the planning involved in preparing a thorough implementation schedule is a site and BMP-specific task, there are some planning steps that are helpful.

Next time you're involved in SWP3 implementation, check the following steps to completing a good project:

- 100% of project area has been permanently stabilized. Where vegetative cover is intended, a minimum of 70% uniform vegetative density should be achieved.
- Accumulated sediment has been removed and the water quality feature is at final grade.
- The temporary sediment control outlet (e.g. [Faircloth Skimmer](#)) has been removed and the water quality outlet (e.g. [minimal](#)

[clogging outlet](#), page 32) has been installed and is functioning as intended.

- Channel and outlet protected areas are constructed to proper size and with planned materials.
- Wetland plants and/or seeds added to wetted perimeter of a wet-type water quality feature and other suitable areas.
- A copy of the long-term operation and maintenance plan has been furnished to the post-construction property owner or user who has the responsibility of permanent maintenance.

Soil Amendment: Gypsum (CaSO₄·2H₂O)

From downtown gardens to hill-country mined lands, gypsum (calcium sulfate dihydrate) has been demonstrated to be an effective soil amendment. Gypsum works by promoting formation of soil structure which permits improved water

infiltration and allows for greater plant root penetration. View the OSU Extension [Fact Sheet ANR-20-05](#) for more information. So, whether you are working on constructing an urban garden or

rehabilitating soil function for storm water management, consider the benefits of gypsum as a soil amendment. Gypsum soil amendments can be found in most garden and landscape supply stores.

2009 Schedule of Training Opportunities

Find details on our website's [Calendar of Events](#) for the most up-to-date information.

Date	Event
September TBD	OEPA—OCAPP Developing Your Long-Term Maintenance Program for Post-Construction BMPs
September 28 & 29	Exam Review and Exam for Certified Erosion, Sediment and Storm Water Inspector (CESSWI) - Registration deadline Sept. 4, 2009, Richfield, OH
November 5	Implementing Planning Tools for Better Development – Non-Structural BMP Case Studies
November 12 & 14	Review and Exam Certified Professional in Storm Water Quality (CPSWQ) - Registration deadline October 23, 2009, Mansfield, OH