Stormwater BMP/Facility Inspections

Post-Construction Stormwater Management (PCSM)

Southwest Pennsylvania Commission
Fisher Hall at the Burrell Lake Park Facility
Lower Burrell, PA
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Introduction - Agenda

Introduction and Background (10-15 minutes)

Permanent Facilities & BMPs (15-20 minutes)

O&M Requirements (10-15 minutes)

Ensuring long-term operations and maintenance (15-20 minutes)

PCSM Plan and implementation (30-40 minutes)

PCSM Plan support processes (10-15 minutes)

PCSM within the SWMP/MS4 Program (10-15 minutes)

Tailoring a program (10-15 minutes)

Documentation Considerations (through-out)

Additional Thoughts (10-15 minutes)

Discussion & Questions

Post-Construction Stormwater Management

Introduction & Background

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Clean Water Act (CWA)

Primary purpose of the CWA:

- Protect the beneficial uses of surface waters (recreational, drinking supply, habitat, etc.)…**Do not cause and/or contribute to an impairment of a receiving waterbody**.
- Purpose is carried out through NPDES Permits (e.g. MS4 Permit) that must adhere to specific requirements for water quality.

CWA Requirements for Water Quality Standards:

1. Designated Uses
2. Water Quality Criteria
3. Anti-degradation policy

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NPDES Permit – MS4

Any facility that discharges wastewater directly to surface water must obtain an NPDES Permit (from the USEPA or state) – such as an MS4

Requirements generally found in an MS4 Permit:

- Limitations (mostly narrative) on certain pollutants discharged via the MS4
  - **Why narrative?** Intent was to allow local conditions dictate numeric considerations
- Monitoring Requirements
- Reporting & Recordkeeping
  - "Pollution Prevention Programs"

An open system and discharge concerns need to be defined when considering the waterways use, WQ criteria, and anti-degradation.

Important regulatory and MS4 Permit language

Authorization to Discharge

- "2013 PAG-13" – Limitations on Coverage (part 2.j)
- "2018 PAG-13 (draft)" – Discharges Not Authorized (item 6)

"The discharge is not, or will not, result in compliance with an applicable effluent limitation or water quality standard."

The operator must, at a minimum, develop, implement, and enforce a SWMP designed to reduce the discharge of pollutants from the MS4:

- to the maximum extent practicable (MEP),
- to protect water quality, and
- to satisfy the appropriate water quality requirements of the Clean Water Act. [40 CFR 122.34(a)]

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MS4 Permit Program (SWMP) – Management and Elements

Stormwater Management for Small MS4s…are the following addressed?

- Applicability
- Limitations on Coverage
- Discharges to Water Quality Impaired Waters
- Stormwater Management Program (SWMP)
- Public Education and Outreach (MCM 1)
- Public Involvement/Participation (MCM 2)
- Illicit Discharge Detection & Elimination (MCM 3)
- Construction Site Stormwater Runoff Control (MCM 4)
- Post-Construction Stormwater Management in New Development and Redevelopment (MCM 5)
- Pollution Prevention/Good Housekeeping for Municipal Operations (MCM 6)
- Sharing Responsibility
- Reviewing and Updating SWMPs
- Monitoring
- Recordkeeping
- Reporting

SWMP Elements – MCMs

- MCM 1: Public Education & Outreach
- MCM 2: Public Involvement & Participation
- MCM 3: Illicit Discharge Detection & Elimination (IDD&E)
- MCM 4: Construction Site Runoff Control
- **MCM 5: Post-Construction SWM**
- MCM 6: Good Housekeeping

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What do we think “counts” under the heading of PCSM and MCM 5?

Post-Construction Stormwater Management (MCM 5)

REGULATORY LANGUAGE:

(5) Post-construction storm water management in new development and redevelopment.

(i) You must develop, implement, and enforce a program to address storm water runoff from new development and redevelopment projects that disturb greater than or equal to one acre, including projects less than one acre that are part of a larger common plan of development or sale, that discharge into your small MS4. Your program must ensure that controls are in place that would prevent or minimize water quality impacts.

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Post-Construction Stormwater Management (MCM 5)

REGULATORY LANGUAGE cont'd:

(ii) You must:

(A) Develop and implement strategies which include a combination of structural and/or non-structural best management practices (BMPs) appropriate for your community;

(B) Use an ordinance or other regulatory mechanism to address post-construction runoff from new development and redevelopment projects to the extent allowable under State, Tribal or local law; and

(C) Ensure adequate long-term operation and maintenance of BMPs.

Post-Construction Stormwater Management (MCM 5)

REGULATORY LANGUAGE cont'd:

(iii) Guidance: If water quality impacts are considered from the beginning stages of a project, new development and potentially redevelopment provide more opportunities for water quality protection. EPA recommends that the BMPs chosen:

- be appropriate for the local community;
- minimize water quality impacts; and
- attempt to maintain pre-development runoff conditions.

In choosing appropriate BMPs, EPA encourages you to participate in locally-based watershed planning efforts which attempt to involve a diverse group of stakeholders including interested citizens.

When developing a program that is consistent with this measure's intent, EPA recommends that you:

- adopt a planning process that identifies the municipality's program goals (e.g., minimize water quality impacts resulting from post-construction runoff from new development and redevelopment),
- implementation strategies (e.g., adopt a combination of structural and/or non-structural BMPs),
- operation and maintenance policies and procedures, and
- enforcement procedures.

Post-Construction Stormwater Management (MCM 5)

(iii) Guidance (cont'd)
In developing your program, you should consider assessing existing ordinances, policies, programs, and studies that address storm water runoff quality.

In addition to assessing these existing documents and programs, you should provide opportunities to the public to participate in the development of the program.

Non-structural BMPs are preventative actions that involve management and source controls such as:

- policies and ordinances that provide requirements and standards to
  - direct growth to identified areas,
  - protect sensitive areas such as wetlands and riparian areas,
  - maintain and/or increase open space (including a dedicated funding source for open space acquisition),
  - provide buffers along sensitive water bodies,
  - minimize impervious surfaces, and
  - minimize disturbance of soils and vegetation;
- policies or ordinances that encourage
  - infill development in higher density urban areas, and
  - areas with existing infrastructure;
- education programs for developers and the public about project designs that minimize water quality impacts; and
- measures such as minimization of percent impervious area after development and minimization of directly connected impervious areas.

Post-Construction Stormwater Management (MCM 5)

(iii) Guidance (cont'd)
Structural BMPs include:

- storage practices such as wet ponds and extended-detention outlet structures;
- filtration practices such as grassed swales, sand filters and filter strips; and
- infiltration practices such as infiltration basins and infiltration trenches.

EPA recommends that you ensure the appropriate implementation of the structural BMPs by considering some or all of the following:

- pre-construction review of BMP designs;
- inspections during construction to verify BMPs are built as designed;
- post-construction inspection and maintenance of BMPs; and
- penalty provisions for the noncompliance with design, construction or operation and maintenance.

Storm water technologies are constantly being improved, and EPA recommends that your requirements be responsive to these changes, developments or improvements in control technologies.

So what does all the legal jargon mean?

Post-Construction Stormwater Management (MCM 5)

Before diving into considerations associated with policies, procedures, etc. (e.g. inspections)…we will gain a better understanding of primary components of a PCSM program based on the regulations.

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Post-Construction Stormwater Management

Permanent Facilities & BMPs

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Remember this pic:

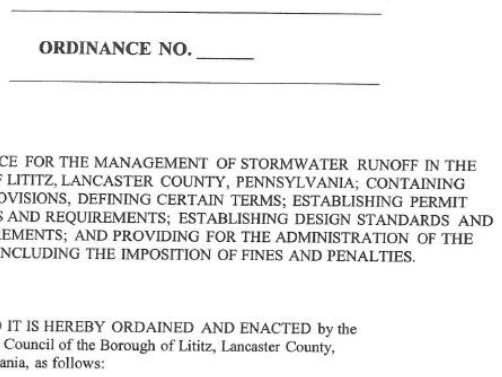
Structural and Non-Structural BMPs

Develop and implement strategies which include a combination of structural and/or non-structural best management practices (BMPs) appropriate for your community.

STRUCTURAL vs. NON-STRUCTURAL

Structural BMPs (facilities) are the physical and tangible (permanent) stormwater controls addressing water quality and/or water quantity.

Non-structural BMPs are generally intangible products such as strategies, approaches, policies, etc. addressing water quality and/or water quantity.



ORDINANCE NO. _____

AN ORDINANCE FOR THE MANAGEMENT OF STORMWATER RUNOFF IN THE BOROUGH OF LITITZ, LANCASTER COUNTY, PENNSYLVANIA; CONTAINING GENERAL PROVISIONS, DEFINING CERTAIN TERMS; ESTABLISHING PERMIT PROCEDURES AND REQUIREMENTS; ESTABLISHING DESIGN STANDARDS AND PLAN REQUIREMENTS; AND PROVIDING FOR THE ADMINISTRATION OF THE ORDINANCE INCLUDING THE IMPOSITION OF FINES AND PENALTIES.

BE AND IT IS HEREBY ORDAINED AND ENACTED by the Borough Council of the Borough of Lititz, Lancaster County, Pennsylvania, as follows:

Structural and Non-Structural BMPs

STRUCTURAL BMPS: Think of structural BMPs just as it is described…the physical and actual facilities handling and managing water quality and/or water quantity.

NON-STRUCTURAL BMPS: Think of non-structural BMPS as the mechanisms, related activities, and strategies in place that allow appropriate structural BMPs to be implemented and operate efficiently.

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Structural and Non-Structural BMPs

Types of Structural BMPs:

- Detention Basin
- Infiltration Trench
- Floodplain Restoration
- Wet Pond
- Constructed Wetland
- Vegetated Swale
- Bioretention / Bioswale
- Hydrodynamic Structures
- WQ Inlet*

Types of Non-Structural BMPs:

- Developer/contractor education programs
- Education/guidance program for structural BMP owners
- Establish restrictions for Environmentally Sensitive Areas (ESAs)
- Require preventative maintenance
- Preserve existing soils and vegetation during construction

SIDEBAR:
- Generally refer to MCM 5 BMPs as “Treatment Control BMPs”
- Whereas, MCM 6 BMPs are “Source Control BMPs”

“Common” Structural BMPs (in PA)

Non-Structural BMPs

Water Quality Treatment Facilities

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“King” of PCSM BMPs in Pennsylvania

Post-Construction Stormwater Management

O&M Requirements

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Remember this pic:

4. ONSITE STORMWATER MANAGEMENT FACILITIES SHALL BE PRIVATELY MAINTAINED BY OWNER.

PCSM Operation & Maintenance (O&M) Requirements

Ensure adequate long-term operation and maintenance of BMPs.

Why?

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PCSM Operation & Maintenance (O&M) Requirements

POLITICALLY CORRECT ANSWER…

There are generally two forms of substantial impacts of post-construction runoff.

The first is caused by an increase in the type and quantity of pollutants in stormwater runoff. As runoff flows over areas altered by development, it picks up harmful sediment and chemicals such as oil and grease, pesticides, heavy metals, and nutrients (e.g., nitrogen and phosphorus). These pollutants often become suspended in runoff and are carried to receiving waters, such as lakes, ponds, and streams. Once deposited, these pollutants can enter the food chain through small aquatic life, eventually entering the tissues of fish and humans.

The second kind of postconstruction runoff impact occurs by increasing the quantity of water delivered to the waterbody during storms. Increased impervious surfaces (e.g., parking lots, driveways, and rooftops) interrupt the natural cycle of gradual percolation of water through vegetation and soil. Instead, water is collected from surfaces such as asphalt and concrete and routed to drainage systems where large volumes of runoff quickly flow to the nearest receiving water. The effects of this process include streambank scouring and downstream flooding, which often lead to a loss of aquatic life and damage to property.

PCSM Operation & Maintenance (O&M) Requirements

DIRECT ANSWER(S)…

- Aesthetics
- Can become costly for repairs if you don't stay ahead of monitoring a facility
- Unseen problems "brewing" (on-site and off-site)***
- Functionality in the grand "scheme of things"

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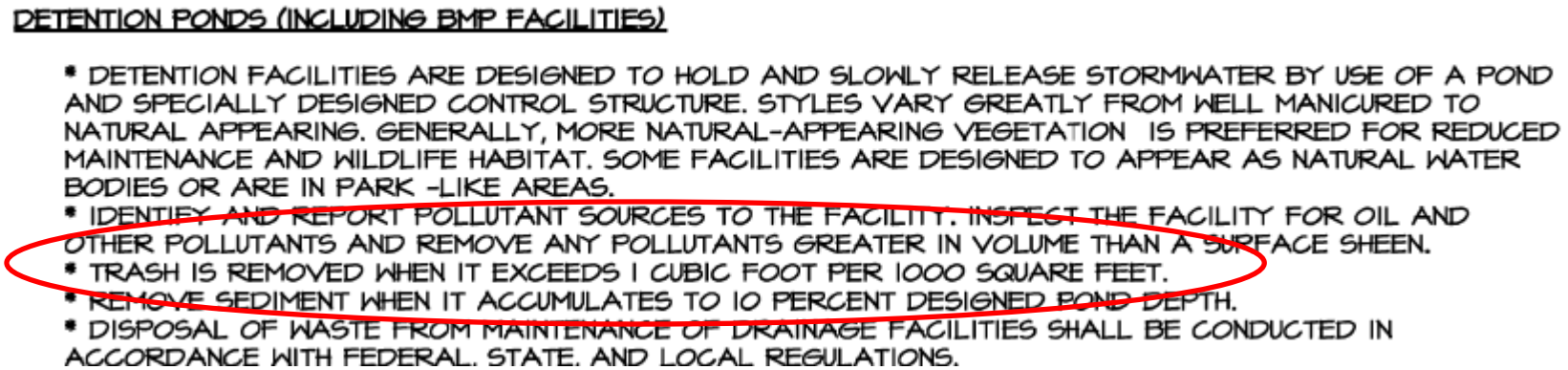
So how do we define O&M requirements?

PCSM Operation & Maintenance (O&M) Requirements

Not going to beat around the bush…

Need to translate what is provided and shown in a plan into an understandable O&M Plan for an owner/operator of a PCSM BMP/facility

…then implement processes that monitor the BMP/facility so it continues to operate as designed and intended to function.



DETENTION PONDS (INCLUDING BMP FACILITIES)

- DETENTION FACILITIES ARE DESIGNED TO HOLD AND SLOWLY RELEASE STORMWATER BY USE OF A POND AND SPECIALLY DESIGNED CONTROL STRUCTURE. STYLES VARY GREATLY FROM WELL MANICURED TO NATURAL APPEARING. GENERALLY, MORE NATURAL-APPEARING VEGETATION IS PREFERRED FOR REDUCED MAINTENANCE AND WILDLIFE HABITAT. SOME FACILITIES ARE DESIGNED TO APPEAR AS NATURAL WATER BODIES OR ARE IN PARK -LIKE AREAS.
- IDENTIFY AND REPORT POLLUTANT SOURCES TO THE FACILITY. INSPECT THE FACILITY FOR OIL AND OTHER POLLUTANTS AND REMOVE ANY POLLUTANTS GREATER IN VOLUME THAN A SURFACE SHEEN.
- TRASH IS REMOVED WHEN IT EXCEEDS 1 CUBIC FOOT PER 1000 SQUARE FEET.
- REMOVE SEDIMENT WHEN IT ACCUMULATES TO 10 PERCENT DESIGNED POND DEPTH.
- DISPOSAL OF WASTE FROM MAINTENANCE OF DRAINAGE FACILITIES SHALL BE CONDUCTED IN ACCORDANCE WITH FEDERAL, STATE, AND LOCAL REGULATIONS.

PCSM Operation & Maintenance (O&M) Requirements

Furthermore, need to translate what to look for into a format “we” can understand as well to ensure long-term functionality and performance of a PCSM facility/BMP…

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Post-Construction Stormwater Management

Ensuring long-term operations & maintenance

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APPENDIX A

OPERATION AND MAINTENANCE (O&M) AGREEMENT

STORMWATER MANAGEMENT BEST MANAGEMENT

PRACTICES (SWM BMPs)

THIS AGREEMENT, made and entered into this _____ day of _____, 20 _____, by and between _____, (hereinafter the "Landowner"), and _____, County, Pennsylvania, (hereinafter "Municipality");

WITNESSETH

WHEREAS, the Landowner is the owner of certain real property as recorded by deed in the land records of County, Pennsylvania, Deed Book at page , (hereinafter "Property").

WHEREAS, the Landowner is proceeding to build and develop the Property; and

WHEREAS, the SWM BMP Operation and Maintenance (O&M) Plan approved by the Municipality (hereinafter referred to as the "O&M Plan") for the property identified herein, which is attached hereto as Appendix A and made part hereof, as approved by the Municipality, provides for management of stormwater within the confines of the Property through the use of BMPs; and

WHEREAS, the Municipality, and the Landowner, his successors and assigns, agree that the health, safety, and welfare of the residents of the Municipality and the protection and maintenance of water quality require that on-site SWM BMPs be constructed and maintained on the Property; and

WHEREAS, the Municipality requires, through the implementation of the SWM Site Plan, that SWM BMPs as required by said SWM Site Plan and the Municipal Stormwater Management Ordinance be constructed and adequately operated and maintained by the

OVERVIEW OF BEST MANAGEMENT PRACTICE (BMP) FACILITY – MAINTENANCE & INSPECTION GUIDELINES

THE OPERATION AND MAINTENANCE OF THE BMP FACILITIES IS VERY SIMILAR TO TRADITIONAL STORMWATER MANAGEMENT FACILITIES. LIKE TRADITIONAL FACILITIES, SOME TURF GRASS SHALL BE UTILIZED ON THE TERRESTRIAL (UPLAND) AREAS OF THE BMP FACILITIES. THE EXCEPTION WOULD BE ANY SPECIALIZED MAINTENANCE INVOLVED WITH THE NATIVE HERBACEOUS PLANT SPECIES ESTABLISHED WITHIN THE AQUATIC AREAS OF BMP FACILITIES. BECAUSE OF THE PERIODIC INUNDATION OF STORMWATER AND THE ATTEMPT TO USE BIORETENTION, IT IS CRITICAL THAT SPECIALIZED PLANTS BE ESTABLISHED TO GUARANTEE THE FACILITIES DESIGNED INTENTION. THE FIRST TWO YEARS OF VEGETATIVE ESTABLISHMENT IN THE BASIN BOTTOM IS THE MOST IMPORTANT TO THE FUNCTION OF THE BMP FACILITIES. AFTER THIS TIME, MAINTENANCE WILL BE MINIMIZED TO THE REGULAR WEEKLY OPERATION INSPECTIONS AND THE OCCASIONAL NEED TO REMOVE WEEDS AND EXOTIC PLANTS.

AFTER CONSTRUCTION HAS CEASED AND THE BMP IS STABILIZED TO ITS DESIGNED CONDITION, CAREFUL MONITORING DURING INSPECTIONS SHALL VERIFY IF THE FILTRATION/INFILTRATION BASINS ARE FUNCTIONING PROPERLY. IF INFILTRATION OF WATER IS NOT TAKING PLACE AFTER A PERIOD OF USE, THE SEDIMENT MUST BE REMOVED FROM THE BASIN BOTTOM, DISPOSED OF PROPERLY AND THE AREA NEEDS TO BE IMMEDIATELY REESTABLISHED TO ITS ORIGINAL SPECIFIED DESIGN INCLUDING THE SOIL MIX AND PLANTINGS. THE USE OF STRAW MULCH OR SECURING APPROVED BIODEGRADABLE EROSION CONTROL MATTING AS NEEDED IS RECOMMENDED WHEN NEW SEEDING IS PERFORMED.

WEEKLY MAINTENANCE WOULD INCLUDE SCHEDULED INSPECTIONS AND TURF MOWING AS APPROPRIATE IN AND AROUND THE BMP FACILITIES. REGULAR TURF MOWING TO A HEIGHT OF NOT LESS THAN THREE (3) INCHES INVOLVES MAINLY THE FACILITY BERMS AND SIDE SLOPES AND PREVENTING THE GROWTH OF WEEDS. AFTER TWO YEARS, REGULAR TURF MOWING AND OPERATION INSPECTIONS WILL GOVERN MOST OF THE MAINTENANCE INVOLVED WITH THE BMP'S. CAREFUL OBSERVATION IS NECESSARY TO ENSURE UNWANTED PLANTS DO NOT ESTABLISH THEMSELVES AND DOMINATE THE DESIRED VEGETATIVE COMMUNITY, ESPECIALLY IN THE DESIGNATED BMP PLANTING AREAS. MOST OF THE BMP AREAS THAT HAVE BEEN DESIGNED TO BE PERIODICALLY INUNDATED WITH WATER DURING STORM EVENTS. THESE ZONES ARE ESPECIALLY IMPORTANT TO THE ESTABLISHMENT AND MAINTENANCE OF THE BIO-RETENTION PLANTINGS. THESE ZONES ARE NOT MOWED REGULARLY. HOWEVER, THEY NEED TO BE MOWED AT LEAST ONCE ANNUALLY IN THE EARLY SPRING AT A HEIGHT LESS THEN THREE (3) INCHES. THE CONTROL OF WEEDS AND EXOTIC PLANTS IN THESE ZONES ARE OF THE UTMOST IMPORTANCE. THE MANUAL REMOVAL OF INVASIVE WEEDS AND EXOTIC VEGETATION MOST ADEQUATELY ACHIEVE THIS TASK. THIS IS ESPECIALLY CRITICAL IN THE FIRST TWO YEARS FOR PLANT ESTABLISHMENT AND WILL ENSURE THE EFFECTIVENESS OF THE FACILITY AND REDUCE MAINTENANCE COSTS IN THE LONG RUN. IF MANUAL REMOVAL IS NOT PRACTICAL, THEN "HIGH MOWING" IS ADVISABLE. WHEN WEEDS DOMINATE THE "ZONE" AND BECOME TWELVE TO EIGHTEEN INCHES (12"-18") HIGH, IT IS RECOMMENDED THAT THE "ZONES" BE MOWED DOWN TO SIX TO EIGHT INCHES (6"-8"). THIS WILL HELP WARM UP THE SOIL AND WEAKEN THE COOL SEASON WEEDS TO DETER EXCESSIVE GROWTH AND WILL ENCOURAGE THE SPECIFIED PLANTS IN THE BIO-RETENTION AREA TO BECOME PROPERLY ESTABLISHED. CHEMICAL WEED CONTROL IS NOT RECOMMENDED BUT MAY BE USED IF FEDERAL, STATE AND LOCAL REGULATIONS ARE MET.

DURING AND AFTER CONSTRUCTION ALL BMP FACILITIES SHALL BE MONITORED FOR ESTABLISHMENT PROGRESS AND VERIFY THEIR FUNCTIONALITY ON A DAILY BASIS. WHEN VEGETATION HAS ESTABLISHED ITSELF, WEEKLY INSPECTIONS SHOULD BE ADEQUATE. A REGULAR PROGRAM OF INSPECTING THE TERRESTRIAL (UPPER) AND AQUATIC (LOWER) BENCHES OF THE BMP FACILITIES SHOULD BE ESTABLISHED. ADDITIONAL INSPECTIONS SHALL OCCUR AFTER ANY MAJOR STORM EVENT TO ENSURE THE INTEGRITY OF THE STORMWATER & BMP FACILITIES. THE PURPOSES FOR THE INSPECTIONS ARE NOT ONLY TO ENSURE THE FACILITIES ARE FUNCTIONING PROPERLY BUT MORE IMPORTANTLY THAT THE FACILITIES ARE OPERATING SAFELY.

TURF

ANY TURF THAT NEEDS TO BE REPAIRED OR REPLACED BEYOND ITS NORMAL MAINTENANCE CARE SHOULD BE CAREFULLY INVESTIGATED PRIOR TO OVER-SEEDING OR APPLYING FERTILIZERS. SEEDING SPECIFICATIONS ARE AVAILABLE ACCORDING TO THE APPROVED EROSION AND SEDIMENTATION CONTROL PLANS. THE USE OF LOW-GROWING, STOLONIFEROUS, TURF TYPE COOL SEASON GRASSES IS RECOMMENDED. FERTILIZATION OF THE TURF AREA SHOULD BE IN LIMITED AMOUNTS AND BE APPLIED ONLY AS NECESSARY TO OVOID CONTRIBUTING TO STORM AND GROUND WATER POLLUTION.

SHRUBS, PERENNIALS & ORNAMENTAL GRASSES

IN ADDITION TO THE PLANTING SPECIFICATIONS PROVIDED IN THE APPROVED PLANS, THE FOLLOWING GUIDELINES MAY ALSO BE UTILIZED FOR THE REPLACEMENT OF PLANTING MATERIALS:

- ALL PLANT MATERIAL SHALL BE INSTALLED IN CONFORMANCE WITH AND MEET THE SPECIFICATIONS OF "THE AMERICAN NURSERY ASSOCIATION" GUIDELINES.
- ROOTSTOCK OF THE PLANT MATERIAL SHALL BE KEPT MOIST DURING TRANSPORTATION FROM NURSERY TO JOB SITE AND UNTIL PLANTING. IF NECESSARY, LARGER MATERIAL SUCH AS TREES MAY BE "HEALED IN" IN A DESIGNATED TEMPORARY HOLDING AREA FOR NO MORE THAN TWO (2) MONTHS.
- WALLS OF THE PLANTING HOLE SHALL BE DUG VERTICAL.
- THE DIAMETER OF THE PLANTING HOLE SHALL BE SIX INCHES (6") LARGER ON ALL SIDES THAN THAT OF THE PLANT'S ROOT BALL.
- THE ROOT BALL CROWN SHALL BE PLANTED FLUSH IF NOT SLIGHTLY ABOVE ADJACENT GRADE.
- BACKFILL AROUND ROOT BALL BY HAND WITH SPECIFIED AMENDED SOIL MEDIUM. BACKFILL IN FOUR INCH (4") LIFTS AND TAMP BY HAND TO ENSURE PROPER COMPACTION.
- NEVER COVER THE TOP OF THE ROOT BALL WITH SOIL. MOUND SOIL SLIGHTLY AROUND HOLE TO CREATE A WATERING BOWL.
- COVER PLANTING AREA WITH TWO TO THREE INCHES (2"-3") OF AGED WOOD MULCH AS SPECIFIED.
- WATER THOROUGHLY.
- PLANTS IN GENERAL RECEIVE NEEDED NUTRIENTS FROM GOOD SOIL MEDIUM AND DO NOT REQUIRE ADDITIONAL FERTILIZATION. IF FERTILIZER IS USED, ONLY A NATURAL BIODEGRADABLE FERTILIZER IS RECOMMENDED SUCH AS PROCESSED COW MANURE.

Soon time to “replace” turf

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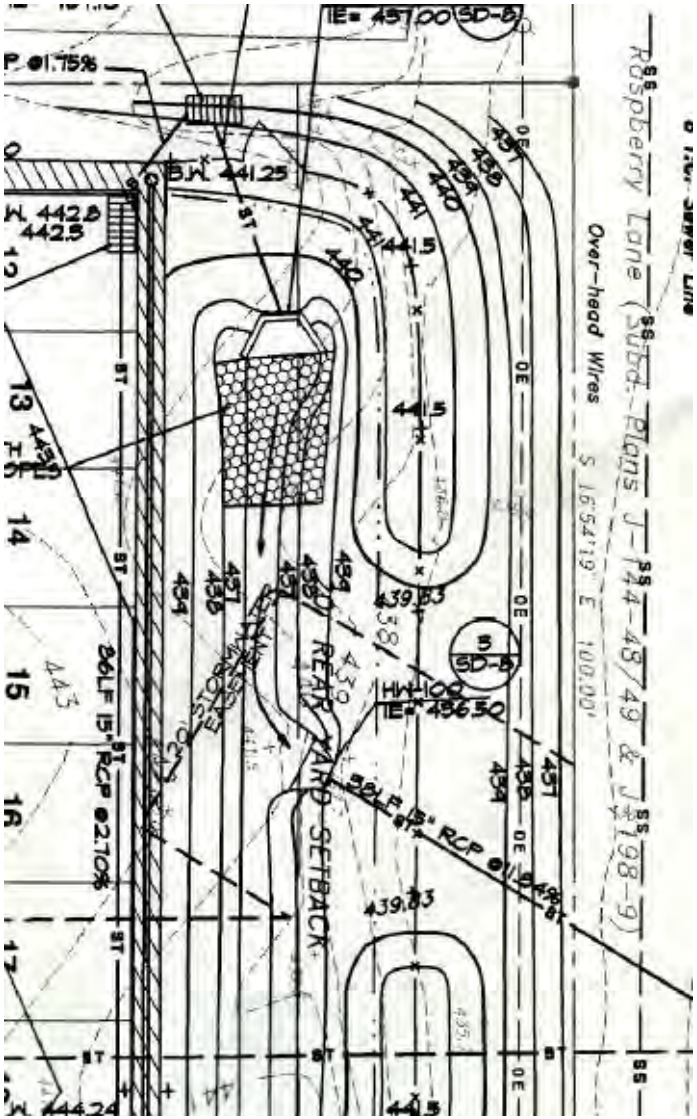
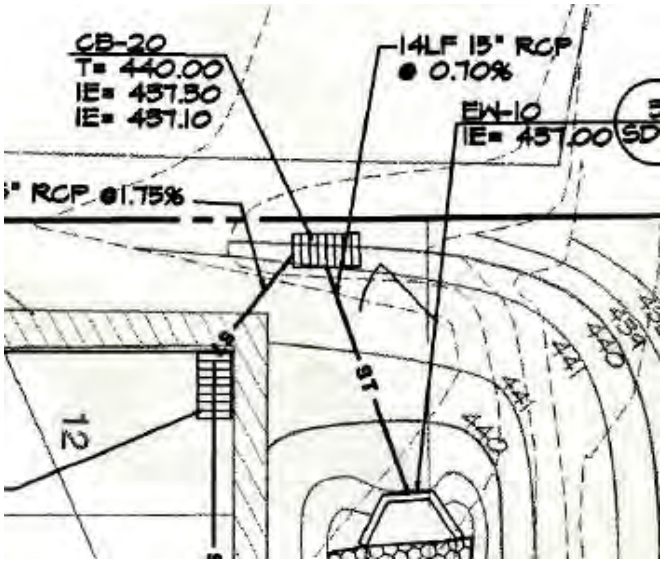
Remember this pic:

4. ONSITE STORMWATER MANAGEMENT FACILITIES SHALL BE PRIVATELY MAINTAINED BY OWNER.



Detention Basin

Detention Basin



SEEDING

Upon completion of final grading and topsoiling of entire site or portions thereof, permanent seeding mixture shall be applied and mulched immediately.

The permanent seed mixture shall be as follows:

Proportion By Weight	Common Name	Min. % Germ.	Min. % Pure Sd.
30%	Baron Kentucky Bluegrass	75%	95%
30%	Fylking Kentucky Bluegrass	75%	95%
40%	Manhattan II or Pennfine Perennial Ryegrass	90%	98%

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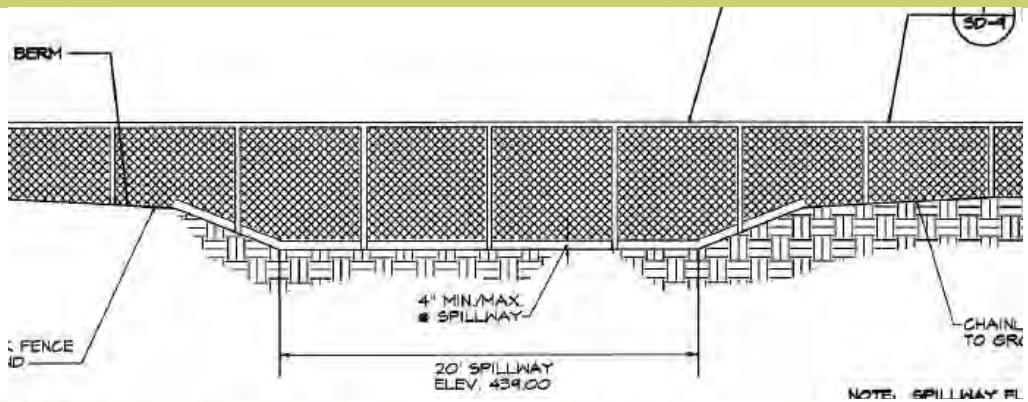
Detention Basin



PLANT LIST

SYMBOL	QTY.	KEY	BOTANICAL NAME	COMMON NAME	SPACING	SIZE	COMMENTS
DECIDUOUS TREES							
	5 1	AR CF	Acer rubrum Cornus florida	Red Maple Flowering Dogwood	5' o.c. 5' o.c.	4" CAL. 4" CAL.	B&B B&B
DECIDUOUS SHRUB							
	1	LB	Lindera benzoin	Common Spicebush	5' o.c.	30"	B&B
EVERGREEN SHRUBS							
	17 6	JC TM	Juniperus conferta Taxus x media 'Flemer'	Shore Juniper Flemer Compact Yew	5' o.c. 5' o.c.	15" 15"	B&B B&B
GROUNDCOVERS							
	525	PT	Pachysandra terminalis	Japanese Spurge	8" o.c.		FLATS

Detention Basin

DETENTION BASIN
INSPECTION AND MAINTENANCE CHECKLIST

Facility/BMP Name: ASIAN GARDEN Facility Score: 37/57

DEFECT	CONDITIONS WHEN MAINTENANCE IS NEEDED	SCORE	COMMENTS	RESULTS EXPECTED
General				
Trash & Debris	Trash and debris accumulated in basin. Visual evidence of dumping.	2	No evidence of dumping. Minor trash present.	Trash and debris cleared from site and disposed of properly.
Invasive/poisonous vegetation, noxious weeds	Poisonous or nuisance vegetation (including noxious weeds) (e.g. English ivy, Japanese knotweed,	3	Definite invasives, appears to be Porcelain Berry, etc.	Use integrated pest management techniques or similar to control weeds or invasive

0 No deficiencies identified.

1 **Monitor** – Although maintenance may not be required at this time, a potential problem exists that will most likely need to be addressed in the future. This can include items like minor erosion, concrete cracks/spalling, or minor sediment accumulation. This item should be revisited at the next inspection.

2 **Routine Maintenance Required** – Some inspection items can be addressed through the routine maintenance program. This can include items like vegetation management or debris/trash removal.

3 **Immediate Repair Necessary** – This item needs immediate attention because failure is imminent or has already occurred, or facility is not functioning as designed. This could include items such as structural failure of a feature (outlet, weir, manhole, etc.), significant erosion, or significant sediment accumulation. This score should be given to an item that can significantly affect the function of the facility.

Detention Basin-Example 2

General
-Trash & debris
-Invasives
-Contaminants
-Rodent Holes
-Tree/Brush growth
-General vegetation
-Outfall structure
-Drainage time

Side Slopes
-Erosion

Storage Area
-Sediment
-Liner

Emergency Overflow
-Settlement
-Tree/Brush growth
-Spillway

Inlet/Outlet Pipes/Openings
-Trash & debris
-Debris barrier
-Flow control devices
-Fences & gates
-Miscellaneous

Vegetated Swale

General

-Sediment accumulation
-Standing water
-Flow spreader
-Baseflow
-Poor vegetation coverage
-General vegetation
-Excessive shading
-Inlet/outlet
-Trash & debris
-Erosion/scouring
-Miscellaneous

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Post-Construction Stormwater Management

PCSM Plan Implementation

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BMP Inventory

BMP #	Plan Name	BMP Type	Owner	Owner Phone	Owner Address	Date Inspected	Maintenance Required	Insp Letter Sent	Maintenance Complete	DEP BMP #	Form	NPDES #	Location	BMP ID	RAV Plan #	Township Plan #	LID
BMP00001	5100 Main Street Lots 1 & 2	Rain Garden/Bioretention	5100 Main Realty, LP	717-569-4519	5260 Main Street PO box 404 East Petersburg PA 17520	3/18/2015	No	2/16/2015		6.4.5	Form E	PAG02003611094 (1)			EH-218-FP-2011	11-24-FP	
BMP00002	5100 Main Street Lots 1 & 2	Vegetated Swale	5100 Main Realty, LP	717-569-4519	5260 Main Street PO box 404 East Petersburg PA 17520	3/18/2015	No	2/16/2015		6.4.8	Form G	PAG02003611094 (1)			EH-218-FP-2011	11-24-FP	
BMP00003	5100 Main Street Lots 1 & 2	Water Quality Inserts/Inlets	5100 Main Realty, LP	717-569-4519	5260 Main Street PO box 404 East Petersburg PA 17520	4/13/2015	No	2/16/2015		6.6.4	Form M	PAG02003611094 (1)			EH-218-FP-2011	11-24-FP	
BMP00004	5100 Main Street Lots 1 & 2	Restoration : Floodplain	5100 Main Realty, LP	717-569-4519	5260 Main Street PO box 404 East Petersburg PA 17520	N/A	No	2/16/2015		6.7.4		PAG02003611094 (1)			EH-218-FP-2011	11-24-FP	
BMP00005	5100 Main Street Lots 1 & 2	Restoration: Buffer	5100 Main Realty, LP	717-569-4519	5260 Main Street PO box 404 East Petersburg PA 17520	N/A	No	2/16/2015		6.7.1		PAG02003611094 (1)			EH-218-FP-2011	11-24-FP	
BMP00006	5100 Main Street Lots 1 & 2	Restoration: Landscape	5100 Main Realty, LP	717-569-4519	5260 Main Street PO box 404 East Petersburg PA 17520	N/A	No	2/16/2015		6.7.2		PAG02003611094 (1)			EH-218-FP-2011	11-24-FP	
BMP00007	5100 Main Street Lots 1 & 2	Soil Amendment	5100 Main Realty, LP	717-569-4519	5260 Main Street PO box 404 East Petersburg PA 17520	N/A	No	2/16/2015		6.7.3		PAG02003611094 (1)			EH-218-FP-2011	11-24-FP	
BMP00008	Air Products and Chemicals Inc	Dry Extended Detention Basin	Air Products and Chemicals Inc. (APC)	610-481-4911	7201 Hamilton Blvd. Allentown PA 18195	6/4/2015	Yes	5/13/2015		6.6.3	Form L	PAG2003609057	3250 Hempland Road		EH180 09-29-GW	09-29-SW	
BMP00009	Aqua Premier Auto Wash	Infiltration pasin	Vehicle Cleaning Lancaster, LF (Craig Womeldorf)	717-870-9744	341 Royal Hunt Way Lititz 17543	Under Const				6.4.2	Form B	PAG02003614059	2907 Columbia Ave.		EH-275-FP-2014	14-13-FP	
BMP00010	Aqua Premier Auto Wash	Infiltration Trench	Vehicle Cleaning Lancaster, LF (Craig Womeldorf)	717-870-9744	340 Royal Hunt Way Lititz 17543	Under Const				6.4.4	Form D	PAG02003614059	2907 Columbia Ave.		EH-275-FP-2014	14-13-FP	
BMP00011	Aqua Premier Auto Wash	Soil Amendment	Vehicle Cleaning Lancaster, LF (Craig Womeldorf)	717-870-9744	342 Royal Hunt Way Lititz 17543	Under Const				6.7.3		PAG02003614059	2907 Columbia Ave.		EH-275-FP-2014	14-13-FP	
BMP00222	B&B Yamaha	Detention Basin	Champ Properties, LP	717-681-9532	343 Champ Blvd. Manheim PA 17545	6/4/2015	No	5/13/2015	09/08/15	6.6.3	Form L	PAG2003605066	Spooky Nook Road and Champ Blvd.		EH-051-FLD-04		
BMP00156	B&B Yamaha	Vegetated Swale	Champ Properties, LP	717-681-9532	343 Champ Blvd. Manheim PA 17545	6/4/2015	No	5/13/2015		6.4.8	Form G	PAG2003605066	Spooky Nook Road and Champ Blvd.	Vegetated Swale 1	EH-051-FLD-04		
BMP00157	B&B Yamaha	Vegetated Swale	Champ Properties, LP	717-681-9532	343 Champ Blvd. Manheim PA 17545	6/4/2015	No	5/13/2015		6.4.8	Form G	PAG2003605066	Spooky Nook Road and Champ Blvd.	vegetated Swale 2	EH-051-FLD-04		
BMP00158	B&B Yamaha	Water Quality Forebay	Champ Properties, LP	717-681-9532	343 Champ Blvd. Manheim PA 17545	6/4/2015	No	5/13/2015				PAG2003605066	Spooky Nook Road and Champ Blvd.		EH-051-FLD-04		
BMP00018	Ben and Robin Kauffman	Disconnect from Storm Sewers	Ben Kauffman	717-471-9803	623 Breneman Road Manheim PA 17545	Under Const				5.8.2		PAG02003612034-R	Intersection of Church Street & Nolt Road		EH-228-FP-2012	12-06-FP	
BMP00012	Ben and Robin Kauffman	Infiltration Trench	Ben Kauffman	717-471-9803	623 Breneman Road Manheim PA 17545	Under Const				6.4.4	Form D	PAG02003612034-R	Intersection of Church Street & Nolt Road	Infiltration Facility #1	EH-228-FP-2012	12-06-FP	
BMP00013	Ben and Robin Kauffman	Infiltration Trench	Ben Kauffman	717-471-9803	623 Breneman Road Manheim PA 17545	Under Const				6.4.4	Form D	PAG02003612034-R	Intersection of Church Street & Nolt Road	Infiltration Facility #2	EH-228-FP-2012	12-06-FP	
BMP00014	Ben and Robin Kauffman	Infiltration Trench	Ben Kauffman	717-471-9803	623 Breneman Road Manheim PA 17545	Under Const				6.4.4	Form D	PAG02003612034-R	Intersection of Church Street & Nolt Road	Infiltration Facility #3	EH-228-FP-2012	12-06-FP	
BMP00015	Ben and Robin Kauffman	Infiltration Trench	Ben Kauffman	717-471-9803	623 Breneman Road Manheim PA 17545	Under Const				6.4.4	Form D	PAG02003612034-R	Intersection of Church Street & Nolt Road	Infiltration Facility #4	EH-228-FP-2012	12-06-FP	
BMP00016	Ben and Robin Kauffman	Infiltration Trench	Ben Kauffman	717-471-9803	623 Breneman Road Manheim PA 17545	Under Const				6.4.4	Form D	PAG02003612034-R	Intersection of Church Street & Nolt Road	Infiltration Facility #5	EH-228-FP-2012	12-06-FP	
BMP00019	Ben and Robin Kauffman	Soil Amendments	Ben Kauffman	717-471-9803	623 Breneman Road Manheim PA 17545	Under Const				6.7.3		PAG02003612034-R	Intersection of Church Street & Nolt Road		EH-228-FP-2012	12-06-FP	
BMP00017	Ben and Robin Kauffman	Vegetated Swale	Ben Kauffman	717-471-9803	623 Breneman Road Manheim PA 17545	Under Const				6.4.8	Form G	PAG02003612034-R	Intersection of Church Street & Nolt Road		EH-228-FP-2012	12-06-FP	
BMP00021	Bethel Commons	Detention Basin	Longleaf Development Company (Greg Bardell)		1821 Oregon Pike Ste 6 Lancaster PA 17601	Under Const				6.6.3	Form L	PAG2003607004	South side at the end of Bethel Drive		EH-119-FP-2006		
BMP00020	Bethel Commons	Infiltration Basin	Longleaf Development Company (Greg Bardell)		1821 Oregon Pike Ste 6 Lancaster PA 17601	Under Const				6.4.2	Form B	PAG2003607004	South side at the end of Bethel Drive		EH-119-FP-2006		
BMP00236	Campus Plaza	Detention Basin	Campus Plaza, LLC		PO Box 551 East Petersburg PA 17520					6.6.3	Form L	PAG2003609036		Detention Basin	EH174-09-13-FP		
BMP00032	Church of Jesus Christ of Latter Day Saints	Subsurface Infiltration Bed	Presiding Bishop of Church of LDS (John Forsberg)	201-998-1260	PO Box 318 Ramsey NJ 07446					6.4.3	Form C	PAG2003606117	1136 Sunwood Lane, Lancaster		EH-123-FP-2009		
BMP00223	CVS Centerville Square Expansion	Detention Basin	James Stauffer (STOBRO Company, LP)	717-626-4771	PO Box 1500 813 Lititz Pike, Lititz PA 17543	6/4/2015	No	5/13/2015		6.6.3	Form L	PAG02003612003	Int. of Marietta ave. and Centerville Rd.	Basin B	EH-221-FP-2011	11-29-FP	
BMP00023	CVS Centerville Square Expansion	Infiltration Basin	Centerville Development Co. with Kevin Lahn	610-388-6600	200 Old Forge Lane Suite 201 Kennett Square PA 19348	6/4/2015	No	5/13/2015		6.4.2	Form B	PAG02003612003	int. of Marietta ave. and Centerville Rd.		EH-221-FP-2011	11-29-FP	
BMP00225	CVS Centerville Square Expansion	Infiltration Basin	Vietnamese Christian Alliance Church	610-388-6600	200 Old Forge Lane Suite 201 Kennett Square PA 19348	6/4/2015	No	5/13/2015		6.4.2	Form B	PAG02003612003	int. of Marietta ave. and Centerville Rd.		EH-221-FP-2011	11-29-FP	
BMP00224	CVS Centerville Square Expansion	Vegetated Swale	Ben Kauffman	610-388-6600	200 Old Forge Lane Suite 201 Kennett Square PA 19348	6/4/2015	No	5/13/2015		6.4.2	Form B	PAG02003612003	int. of Marietta ave. and Centerville Rd.		EH-221-FP-2011	11-29-FP	
BMP00024	Cyrsco LLC	Infiltration Basin	Cyrsco LLC (Kim Brown)	952-941-9391	6400 W. 105th Street Bloomington MN 55438	Under Const				6.4.2	Form B	PAG02003613085	Intersection of Running Pump Road and Noll Drive		EH-259-FP-2013	13-24-FP	
BMP00025	Cyrsco LLC	Infiltration Basin	Cyrsco LLC (Kim Brown)	952-941-9391	200 Old Forge Lane Suite 201 Kennett Square PA 19348	Under Const				6.4.2	Form B	PAG02003613085	Intersection of Running Pump Road and Noll Drive		EH-259-FP-2013	13-24-FP	
BMP00026	Cyrsco LLC	Rain Garden/Bioretention	Cyrsco LLC (Kim Brown)	952-941-9391	200 Old Forge Lane Suite 201 Kennett Square PA 19348	Under Const				6.4.5	Form E	PAG02003613085	Intersection of Running Pump Road and Noll Drive		EH-259-FP-2013	13-24-FP	
BMP00027	Cyrsco LLC	Rain Garden/Bioretention	Cyrsco LLC (Kim Brown)	952-941-9391	200 Old Forge Lane Suite 201 Kennett Square PA 19348	Under Const				6.4.5	Form E	PAG02003613085	Intersection of Running Pump Road and Noll Drive		EH-259-FP-2013	13-24-FP	
BMP00028	Cyrsco LLC	Vegetated Swale	Cyrsco LLC (Kim Brown)	952-941-9391	200 Old Forge Lane Suite 201 Kennett Square PA 19348	Under Const				6.4.8	Form G	PAG02003613085	Intersection of Running Pump Road and Noll Drive		EH-259-FP-2013	13-24-FP	
BMP00033	Diller Tract	Constructed Wetland	Greystone Construction (Peter Alexcih)	717-285-0549	2372 Franklin Road, Columbia PA 17512					6.6.1	Form J	PAG02003609012	East side of Roherstown Rd. north of int. with Harrisburg Pike		EH-172-FP-2009	09-05-FP	
BMP00034	Diller Tract	Disconnection from Storm Sewers	Greystone Construction (Peter Alexcih)	717-285-0549	2372 Franklin Road, Columbia PA 17512					5.8.2		PAG02003609012	East side of Roherstown Rd. north of int. with Harrisburg Pike		EH-172-FP-2009	09-05-FP	
BMP00029	Diller Tract	Infiltration Basin	Greystone Construction (Peter Alexcih)	717-285-0549	2372 Franklin Road, Columbia PA 17512					6.4.2	Form B	PAG02003609012	East side of Roherstown Rd. north of int. with Harrisburg Pike		EH-172-FP-2009	09-05-FP	
BMP00035	Diller Tract	Protect Sensitive and Special Value Features	Greystone Construction (Peter Alexcih)	717-285-0549	2372 Franklin Road, Columbia PA 17512					5.4.1		PAG02003609012	East side of Roherstown Rd. north of int. with Harrisburg Pike		EH-172-FP-2009	09-05-FP	
BMP00036	Diller Tract	Protect/Conserve/Enhance Riparian Areas	Greystone Construction (Peter Alexcih)	717-285-0549	2372 Franklin Road, Columbia PA 17512					5.4.2		PAG02003609012	East side of Roherstown Rd. north of int. with Harrisburg Pike		EH-172-FP-2009	09-05-FP	
BMP00030	Diller Tract	Vegetated Swale	Greystone Construction (Peter Alexcih)	717-285-0549	2372 Franklin Road, Columbia PA 17512					6.4.8	Form G	PAG02003609012	East side of Roherstown Rd. north of int. with Harrisburg Pike	Swale A	EH-172-FP-2009	09-05-FP	
BMP00031	Diller Tract	Vegetated Swale	Greystone Construction (Peter Alexcih)	717-285-0549	2372 Franklin Road, Columbia PA 17512					6.4.8	Form G	PAG02003609012	East side of Roherstown Rd. north of int. with Harrisburg Pike	Swale B	EH-172-FP-2009	09-05-FP	
BMP00032	Diller Tract	Vegetated Swale	Greystone Construction (Peter Alexcih)	717-285-0549	2372 Franklin Road, Columbia PA 17512					6.4.8	Form G	PAG02003609012	East side of Roherstown Rd. north of int. with Harrisburg Pike	Swale C	EH-172-FP-2009	09-05-FP	
BMP00037	Donald & Jacquelyn Herman	Disconnection from Storm Sewers	Donald G Herman	717-662-1800	1068 Steeplechase Drive Lancaster PA 17601					5.8.2		PAG02003614018	1059 Sylvan Road, Lancaster		EH-256-FP-2013	13-21-FP	
BMP00039	Dutch Gold Honey	Constructed Filter	Dutch Gold Honey	717-393-1716	2220 Dutch Gold Drive Lancaster PA 17601	3/17/2015	No	2/16/2015		6.4.7	Form F	PAG02003613088 (1)	2220 Dutch Gold Drive		EH-262-FP-2013	13-27-FP	
BMP00040	Dutch Gold Honey	Detention Basin	Dutch Gold Honey	717-393-1716	2220 Dutch Gold Drive Lancaster PA 17601	3/17/2015	Yes	2/16/2015	07/20/15	6.6.3	Form L	PAG02003613088 (1)	2220 Dutch Gold Drive		EH-262-FP-2013	13-27-FP	
BMP00038	Dutch Gold Honey	Rain Garden/Bioretention	Dutch Gold Honey	717-393-1716	2220 Dutch Gold Drive Lancaster PA 17601	3/17/2015	Yes	2/16/2015	07/20/15	6.4.5	Form E	PAG02003613088 (1)	2220 Dutch Gold Drive		EH-262-FP-2013	13-27-FP	
BMP00041	Dutch Gold Honey	Vegetated Swale	Dutch Gold Honey	717-393-1716	2220 Dutch Gold Drive Lancaster PA 17601	3/17/2015	No	2/16/2015		6.4.8	Form G	PAG02003613088 (1)	2220 Dutch Gold Drive	Swale A	EH-262-FP-2013	13-27-FP	
BMP00042	Dutch Gold Honey	Vegetated Swale	Dutch Gold Honey	717-393-1716	2220 Dutch Gold Drive Lancaster PA 17601	3/17/2015	Yes	2/16/2015	07/20/15	6.4.8	Form G	PAG02003613088 (1)	2220 Dutch Gold Drive	Swale B	EH-262-FP-2013	13-27-FP	
BMP00240	Earl P. Kegel, Inc.	Detention Basin	Kegel Produce		2850 Old Tree Dr. Lancaster PA 17603					6.6.3	Form L	PAG2003603031			EH-021-FLD-02		
BMP00241	Earl P. Kegel, Inc.	Swale	Kegel Produce		2850 Old Tree Dr. Lancaster PA 17603					6.4.8	Form G	PAG2003603031			EH-021-FLD-02		
BMP00045	Genesys Control Corp.	Detention Basin	Genesys Control Corp. (Attn: Matthew Anater)	717-239-5502	PO Box 5117 Lancaster PA 17606	Under Const				6.6.3	Form L	PAG02003614081	1908 McFarland Drive, Landisville		EH-198-FP-2011	11-02-FP	
BMP00043	Genesys Control Corp.	Rain Garden/Bioretention	Genesys Control Corp. (Attn: Matthew Anater)	717-239-5502	PO Box 5117 Lancaster PA 17606	Under Const				6.4.5	Form E	PAG02003614081	1909 McFarland Drive, Landisville		EH-198-FP-2011	11-02-FP	
BMP00044	Genesys Control Corp.	Vegetated Swale	Genesys Control Corp. (Attn: Matthew Anater)	717-239-5502	PO Box 5117 Lancaster PA 17606	Under Const				6.4.8	Form G	PAG02003614081	1910 McFarland Drive, Landisville		EH-198-FP-2011	11-02-FP	
BMP00046	Golden Meadows Park	Constructed Wetlands	Healthy Lifestyle Properties, LLC	717-392-8676	161 Ridgewood Court, Columbia PA 17512	6/4/2015	No	5/13/2015	12/01/15	6.6.1	Form J	PAG2003609032			EH-171-FP-2009	09-03-FP	
BMP00047	Golden Meadows Park	Underground detention	Healthy Lifestyle Properties, LLC	717-392-8676	161 Ridgewood Court, Columbia PA 17512	6/4/2015	No	5/13/2015		6.4.3	Form D	PAG2003609032			EH-171-FP-2009	09-03-FP	
BMP00226	Golden Meadows Park	Water Quality Inserts/Inlets	Healthy Lifestyle Properties, LLC	717-392-8676	161 Ridgewood Court, Columbia PA 17512	6/4/2015	No	5/13/2015	12/01/15	6.6.1	Form J	PAG2003609032			EH-171-FP-2009	09-03-FP	
BMP00048	Haydn Manor	Dry Extended Detention Basin	New Generation at Hadyn Manor, LLC (John Hogan)	717-560-6540	616 Paxton Place, Suite 100 Lititz 17543	Under Const				6.6.3	Form L	PAG02003614024	Miller Road, west of Int. with Cottage Ave.		EH-059-FP-2005		
BMP00162	Hempfield Commons	Underground Detention	Jay Provanzo, Heartland Builders,Inc.	717-898-7973	3115 Nolt Road Suite 700 Lancaster Pa 17601	6/10/2015	No	5/13/2015		6.6.3	Form O	PAG02003607793	North Side of Nolt Rd, West of Nissley Road		EH-137-FP-07		
BMP00163	Hempfield Commons	Water Quality Inserts/Inlets	Jay Provanzo, Heartland Builders,Inc.	717-898-7973	3115 Nolt Road Suite 700 Lancaster Pa 17601	6/10/2015	No	5/13/2015		6.6.4	Form M	PAG02003607793	North Side of Nolt Rd, West of Nissley Road		EH-137-FP-07		
BMP00228	Hempfield Commons	Water Quality Inserts/Inlets	Jay Provanzo, Heartland Builders,Inc.	717-898-7973	3115 Nolt Road Suite 700 Lancaster Pa 17601	6/10/2015	No	5/13/2015		6.6.4	Form M	PAG02003607793	North Side of Nolt Rd, West of Nissley Road	Inlet 7	EH-137-FP-07		
BMP00053	Hempfield Crossing (Phase 1)	50% Peak rate Reduction	EG Stoltzfus Land LLC (Lester Weaver)	717-393-0212	474 Mt. Sidney Road Lancaster PA 17602	Under Const						PAG02003614031	Also EH-116-FP2-06		EH-116-FP-2006		
BMP00051	Hempfield Crossing (Phase 1)	Detention Basin	EG Stoltzfus Land LLC (Lester Weaver)	717-393-0212	474 Mt. Sidney Road Lancaster PA 17602	Under Const				6.6.3	Form L	PAG02003614031	474 Mt. Sidney Road	Basin A	EH-116-FP-2006		
BMP00052	Hempfield Crossing (Phase 1)	Detention Basin	EG Stoltzfus Land LLC (Lester Weaver)	717-393-0212	474 Mt. Sidney Road Lancaster PA 17602	Under Const				6.6.3	Form L	PAG02003614031	474 Mt. Sidney Road	Basin B	EH-116-FP-2006		
BMP00049	Hempfield Crossing (Phase 1)	Vegetated Swale	EG Stoltzfus Land LLC (Lester Weaver)	717-393-0212	474 Mt. Sidney Road Lancaster PA 17602	Under Const				6.4.8	Form G	PAG02003614031	474 Mt. Sidney Road	Swale A	EH-116-FP-2006		
BMP00050	Hempfield Crossing (Phase 1)	Vegetated Swale	EG Stoltzfus Land LLC (Lester Weaver)	717-393-0212	474 Mt. Sidney Road Lancaster PA 17602	Under Const				6.4.8	Form G	PAG02003614031	474 Mt. Sidney Road	Swale B	EH-116-FP-2006		
BMP00054	Hempshade Partners		Hempshade Partners (Kevin Lapp)	717-393-3838	255 Buter Avenue Lancaster PA 17601							PAR10-O-518-R	(Chadosford Estates) (plans dated 1996)	Basins (1-5)	EH-095-FP-0077		
BMP00055	Homestead Village Retirement Community	Constructed Wetland	Homestead Village (Douglas Motter)		1800 Village Circle Lancaster 17603	Under Const				6.6.1	Form J	PAG02003611040	1800 Village Circle Lancaster	EH199 11-03-RFP1	EH-189-FP-2011	11-03-FP	
BMP00244	Hospice of Lancaster County	Bioretention Area	Lancaster General Hospital		2100 Harrisburg Pike Lancaster PA 17603					6.4.5	Form E	PAG2003603038			EH-022-FLD-02		
BMP00243	Hospice of Lancaster County	Bioretention Area	Lancaster General Hospital		2100 Harrisburg Pike Lancaster PA 17603					6.4.5	Form E	PAG2003603038		Lot 2	EH-022-FLD-02		
BMP00242	Hospice of Lancaster County	Infiltration Trench	Lancaster General Hospital		2100 Harrisburg Pike Lancaster PA 17603					6.4.4	Form D	PAG2003603038			EH-022-FLD-02		
BMP00057	Jacobson Companies	Amended Soils	Hager Pacific 14 LP		18027 VENTURA BOULEVARD, Encino CA 91436* (1700 Cloister Drive, La	6/4/2015	No	5/13/2015		6.7.3	Form R	PAG02003612061	1700 & 1800 Cloister Drive		EH-231-FP-2012	12-10-SW	
BMP00056	Jacobson Companies	Infiltration Basin	Hager Pacific 14 LP		18028 VENTURA BOULEVARD, Encino CA 91436* (1700 Cloister Drive, La	6/4/2015	No	5/13/2015	09/28/15	6.4.2	Form B	PAG02003612061	1700 & 1800 Cloister Drive		EH-231-FP-2012	12-10-SW	
BMP00127	Jacobson Companies	Water Quality Inserts/Inlets	Hager Pacific 15 LP	717-898-5847	18029 VENTURA BOULEVARD, Encino CA 91436* (1700 Cloister Drive, La	6/4/2015	No	5/13/2015	09/28/15	6.6.3	Form M	PAG02003612061	1700 & 1800 Cloister Drive	Snout (2)	EH-231-FP-2012	12-10-SW	
BMP00059	Kirby Feed Mill	Dry Extended Detention Basin	Kirby Agri Inc	717-299-2541	500 Running Pump Road PO Box 6277 Lancaster PA 17607	3/18/2015	No	2/16/2015		6.6.3	Form L	PAG02003611059	500 Running Pump Road Lancaster		EH-205-FP-2011	11-10-FP	
BMP00058	Kirby Feed Mill	Infiltration Basin	Kirby Agri Inc	717-299-2541	500 Running Pump Road PO Box 6277 Lancaster PA 17607	3/23/2015	No	2/16/2015		6.4.2	Form B	PAG02003611059	500 Running Pump Road Lancaster		EH-205-FP-2011	11-10-FP	
BMP00060	Kirby Feed Mill	Water Quality Inserts/Inlets	Kirby Agri Inc	717-299-2541	500 Running Pump Road PO Box 6277 Lancaster PA 17607	4/15/2015	No	2/16/2015		6.6.4	Form M	PAG02003611059	500 Running Pump Road Lancaster		EH-205-FP-2011	11-10-FP	
BMP00062	Kline Family Partnership	Detention Basin	David M Kline	717-898-8188 x 122	1732 Long Level Road Wrightsville PA 17368	6/11/2015	No	5/13/2015	09/29/15	6.6.3	Form L	PAG2003608043	5 Holland Street Saluega		EH-161-FP-2007		

BMP Inventory

BMP #	Plan Name	BMP Type	Owner	Owner Phone
BMP00001	5100 Main Street Lots 1 & 2	Rain Garden/Bioretention	5100 Main Realty, LP	717-569-4519
BMP00002	5100 Main Street Lots 1 & 2	Vegetated Swale	5100 Main Realty, LP	717-569-4519

Owner Address	Date Inspected	Maintanence Required	Insp Letter Sent	Maintanence complete
5260 Main Street PO box 404 East Petersburg PA 17520	3/18/2015	No	2/16/2015	
5260 Main Street PO box 404 East Petersburg PA 17520	3/18/2015	No	2/16/2015	

DEP BMP #2	Form	NPDES #	Location
6.4.5	Form E	PAG02003611094 (1)	
6.4.8	Form G	PAG02003611094 (1)	

BMP ID2	RAV Plan #	Township Plan #	LID
	EH-218-FP-2011	11-24-FP	
	EH-218-FP-2011	11-24-FP	

VEGETATED SWALE

INSPECTION AND MAINTENANCE CHECKLIST

Facility/BMP Name: _____ Facility Score: _____

DEFECT	CONDITIONS WHEN MAINTENANCE IS NEEDED	SCORE	COMMENTS	RESULTS EXPECTED
General				
Sediment Accumulation	Sediment accumulating near culverts and/or in channels builds up to > 3 inches at any spot, or it covers vegetation.			When finished, swale should be level from side to side and drain freely toward outlet. There should be no areas of standing water once inflow has ceased and sediment is disposed of properly.
Standing Water	When water stands in the swale between storms and does not drain within 5 days			There should be no areas of standing water once inflow has ceased. Any of the following may apply: sediment or trash blockages removed, improved grade from

SWM/PCSM FACILITY-BMP O&M - FIELD INSPECTION CHECKLIST

Cover Sheet

GENERAL INFORMATION

Facility/BMP Name		ID#	
Location		MS3 ID	
Facility/BMP Owner/Operator			
Inspector's Name			
Inspector's Title			
Signature			
Date of Inspection			
Inspection Type (check all applicable)	☐ Regular schedule inspection ☐ Complaint-driven	☐ Follow-up inspection ☐ Other: _____	
Weather			

FACILITY/BMP INFORMATION

Facility/BMP Type(s)	
Other notes	

MAINTENANCE SCORE REFERENCE

N/A - indication a component may not exist in a facility/BMP.

0 No deficiencies identified.

1 **Monitor** – Although maintenance may not be required at this time, a potential problem exists that will most likely need to be addressed in the future. This can include items like minor erosion, concrete cracks/spalling, or minor sediment accumulation. This item should be revisited at the next inspection.

2 **Routine Maintenance Required** – Some inspection items can be addressed through the routine maintenance program. This can include items like vegetation management or debris/trash removal.

3 **Immediate Repair Necessary** – This item needs immediate attention because failure is imminent or has already occurred, or facility is not functioning as designed. This could include items such as structural failure of a feature (outlet, weir, manhole, etc.), significant erosion, or significant sediment accumulation. This score should be given to an item that can significantly affect the function of the facility.

Score Reference

MAINTENANCE SCORE REFERENCE

N/A - indication a component may not exist in a facility/BMP.

0 No deficiencies identified.

1 **Monitor** – Although maintenance may not be required at this time, a potential problem exists that will most likely need to be addressed in the future. This can include items like minor erosion, concrete cracks/spalling, or minor sediment accumulation. This item should be revisited at the next inspection.

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Detention Basin

The following components included conditions that require **immediate repairs** and/or attention to restore accessibility and functionality associated with the detention basin:

- Removal of the excessive overgrown invasive/nuisance vegetation (weeds) and trees/brush inhibiting (see Pictures 1 and 2):
  - The ability to perform proper maintenance activities across the entire facility,
  - The ability for the designed groundcover to establish and eliminate erosion potential,
  - Emergency Overflow/Spillway functionality, and
  - The functionality of the facility in general and overall.
- Reestablish non-existent groundcover to reduce erosion and performance (see Picture 3).
- Remove the excessive and accumulated sediment, silt, debris, etc. within the storage area and side slopes of the facility, and return elevations to designed basin depth and shape.
- Emergency Overflow/Spillway (see Picture 3)
  - An emergency overflow/spillway could not be visually confirmed based on the design layout, profile, and details of the component. In turn, it is reasonable to

3 **Immediate Repair Necessary** – This item needs immediate attention because failure is imminent or has already occurred, or facility is not functioning as designed. This could include items such as structural failure of a feature (outlet, weir, manhole, etc.), significant erosion, or significant sediment accumulation. This score should be given to an item that can significantly affect the function of the facility.

General Vegetation	Overgrown or lack of appropriate vegetation is observed.	3	-No designed ground cover present - overgrown

Process for PCSM facility/BMP selection

- Selection of PCSM facilities for inspection
  - Follows the PCSM Plan update with the date(s) selected denoted in the SWMP schedule.
    - The date may be selected during the PCSM Plan update process. However, the SWMP defaults to a later selection date to allow any set-up activities that may be required prior to date selection (e.g. PCSM Plan review required updates to the inventory prior to selection of facilities and BMPs for inspection).
  - The outline generated for the PCSM Plan update during the Annual SWMP Review and Assessment will include notes regarding carrying over or establishing new activities for PCSM inspections or focus areas and will include considerations associated with:
    - Changes to a priority area classification for an MS3
      - PCSM facilities and BMPs in newly listed High Priority and Problem Area classified areas are listed for inspection.

LandStudies

Process for PCSM facility/BMP selection (cont'd)

- Facilities and BMPs installed three years or less are selected for inspection.
- Facilities and BMPs "flagged" for deficient maintenance are inspected for two years following remediation and/or corrective actions.
- Facilities and BMPs where the O&M Verification Form was not returned are selected for inspection.
- Remaining facilities and BMPs are distributed between five (5) groups. The groups are rotated during each permit year for inspection to allow all PCSM facilities and BMPs inspections to occur in a permit cycle.

- The SWMP schedule is updated to reflect timeframe of PCSM facility and BMP inspections.
- The SWMP schedule is updated to reflect distribution of the O&M Requirements Notice (and applicable O&M Verification Forms). The schedule includes a denotation of the last day for receipt of verification forms.
  - Notice is provided to owners/operators of PCSM facilities and BMPs of scheduled inspections.

Process for PCSM facility/BMP inspections

- PCSM facility and BMP inspections
  - Checklist(s) used corresponding to facility and BMP type (e.g. separate checklists used for detention basins, rain gardens, etc.), and based on the intended design and function of the facility and/or BMP.
  - Inspections are conducted during dry-weather.
  - Results of inspections are summarized and forwarded to the owner/operator of the facility and/or BMP.
  - The SWMP schedule is updated with follow-up actions that are required and a result of an inspection.

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Process for PCSM facility/BMP inspection notifications

- O&M requirements notice to owners/operators of PCSM facilities and BMPs.
  - Notice regarding expected and required maintenance of PCSM facilities and/or BMPs (including water quality treatment facilities and/or BMPs) are provided annually to all owners/operators.
    - Notices will provide a denotation if the specific facility and/or BMP will be inspected by the borough during the permit year.
  - For PCSM facilities and/or BMPs not scheduled for inspection during the permit year, an O&M Verification Form will be provided with the notice.
    - The owner/operator is required to return the form verifying the PCSM facility and/or BMP is operating as intended and maintenance is being performed.
  - Owners/operators of new PCSM facilities and/BMPs are provided a more detailed summary of the PCSM Plan and corresponding obligations and requirements of the new owner/operator to maintain the facility and/or BMP.

Inspection Checklists

- Inlet Structures/Catch Basins*
- Bioretention Areas
- Vegetated Buffer Strip
- Constructed Wetlands (Basin)
- Detention Basin
- “Flow-through” Planter
- Hydrodynamic Separators/Structures
- Infiltration Trench
- Infiltration Basin
- Media Filter (WQ treatment facility)
- Pervious Pavement
- Tree Well
- Vegetated Swale
- Wet Pond (Basin)
- Wetland
- Riparian Buffer
- Stream Restoration/Stablization
- Floodplain Restoration
- *Plus more*

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PCSM Plan is set…time to implement

- Have your inventory “complete” (and back-up)
- Checklists are set and ready to go
- O&M Verification Forms
- Facilities/BMPs selected
- Notifications distributed and inspections scheduled

Time to head out into the field

Head out to inspect a detention basin…

Discharge Point (outfall-type structure)

Outfall Structure	Debris, silt, or sediment build-up obstructs the outfall structure.

Remove debris, silt, and/or sediment build-up and dispose of properly.

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Head out to inspect another detention basin…

Initiate IDD&E processes

IDD&E Enforcement Levels and Actions		
Enforcement Level	Details	**Responsibility**
Level I - Education	• Provide educational outreach materials (general IDD&E outreach material(s), discharge specific information (e.g. BMP Fact Sheet)) • Encourage voluntary compliance • Provide summary letter setting expected compliance date • Additional staff support or technical assistance • Request evidence of corrected problem (if applicable) • Site visit to verify compliance	**Public Works Superintendent;** **Environmental Resource Manager**
Level II – Written Warning	• Send "Notice of Violation" letter to property owner regarding unresolved issue(s) or repeat violation • Set second compliance date (determined on individual incident basis) • Provide additional voluntary compliance encouragement (assistance may be offered based on the nature of the issue) • Site visit to verify compliance	**Public Works Superintendent;** **Planning & Engineering Manager (Code Enforcement Officer)**
Level III – Ordinance Provisions	• **Send second "Notice of Violation" letter indicating that unresolved issues will be referred to the Solicitor** • **The borough may correct problems and re-capture costs from the property owner** • **Issue monetary penalties based on the SWMO provisions** • **Outline additional future considerations and timelines associated with continued non-compliance (determined on individual incident basis)**	**Planning & Engineering Manager (Code Enforcement Officer)**

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Basic items to look for (almost every PSCM BMP)…

- Dumping
- Overgrown or lack of vegetation
- Erosion (e.g. gullies forming?)
- Blockage of inlet/outlet structures AND openings
- “Emergency” components present
- Stains and discoloration (including dying vegetation)
- Structural integrity of applicable components
- Trash & debris
- Sediment accumulation
- Settlement/Subsidence
- **Stable system*****

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Bump-out (flow-through planter)

- Vegetation
- “Debris” build-up
- Erosion
- Structural integrity (if applicable)
- “Downstream” observations

Detention Basin

- Vegetation
- Sediment deposition
- Rodent Holes, settlement
- Gully erosion
- Structural integrity

Rain Garden

- Vegetation
- Sediment deposition
- Erosion
- “Discolored” components
- Forebay

Post-Construction Stormwater Management

PCSM Plan Support Processes

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O&M Verification Process

result of an inspection.

- O&M requirements notice to owners/operators of PCSM facilities and BMPs.
  - Notice regarding expected and required maintenance of PCSM facilities and/or BMPs (including water quality treatment facilities and/or BMPs) are provided annually to all owners/operators.
    - Notices will provide a denotation if the specific facility and/or BMP will be inspected by the borough during the permit year.
  - For PCSM facilities and/or BMPs not scheduled for inspection during the permit year, an O&M Verification Form will be provided with the notice.
    - The owner/operator is required to return the form verifying the PCSM facility and/or BMP is operating as intended and maintenance is being performed.
  - Owners/operators of new PCSM facilities and/BMPs are provided a more detailed summary of the PCSM Plan and corresponding obligations and requirements of the new owner/operator to maintain the facility and/or BMP.

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O&M Verification Form

PRIVATE TREATMENT CONTROL BMP
OPERATION AND MAINTENANCE VERIFICATION FORM

BIORETENTION FACILITIES, VEGETATED SWALES & HIGHER RATE BIOFILTERS

1. Transcribe the following information from your notification letter and make corrections as necessary:

Permit No.: _____

BMP Location: _____

Responsible Party: _____

Phone Number: ( ) _____ **Email:** _____

Responsible Party Address: _____

Number Street Name & Suffix City/Zip

☐ *Check here for Address or phone number change*

2. Using the Table below, please describe the inspections and maintenance activities that have been conducted during the fiscal year (July 1 – June 30), and date(s) maintenance was performed. Under "Results of Inspection," indicate whether maintenance was required based on each inspection, and if so, what type of maintenance. If maintenance was required, provide the date maintenance was conducted and a description of the maintenance. ***REFER TO THE BACK OF THIS SHEET FOR MORE INFORMATION DESCRIBING TYPICAL MAINTENANCE INDICATORS AND MAINTENANCE ACTIVITIES.*** *If no maintenance was required based on the inspection results, state "no maintenance required."*

O&M Verification Form (cont'd)

What To Look For?	Date Inspected	Results of Inspection: Work needed? (Yes/No)	Date Maintenance Completed and Description of Maintenance Conducted
Accumulation of Sediment, Litter, Grease			
Standing Water			
Erosion			
Overgrown Vegetation			
Poor Vegetation Establishment			
Structural Damage			

O&M Verification Form (cont'd)

PRIVATE TREATMENT CONTROL BMP
OPERATION AND MAINTENANCE VERIFICATION FORM

BIORETENTION FACILITIES, VEGETATED SWALES & HIGHER RATE BIOFILTERS-SIDE 2

This guide sheet provides general indicators for maintenance only and for a wide array of treatment control BMPs. Your developer prepared maintenance plans specifically for your treatment control BMP as an appendix to the Stormwater Management Plan. Also, if you have a manufactured structure, please refer to the manufacturer's maintenance instructions.

Biofilters include the following :

☐ **Vegetated Filter Strip/Swale** ☐ **Bioswale** ☐ **Bioretention Facility** ☐ **Planter Boxes**
☐ **Manufactered Higher-Flow-Rate Biofilters, such as Tree-Pit-Style Units.**

Routine maintenance is needed to ensure that flow is unobstructed, that erosion is prevented, and that soils are held together by plant roots and are biologically active. Typical maintenance consists of the following:

O&M Verification Form (cont'd)

Bioretention BMPs Inspection and Maintenance Checklist	
Typical Maintenance Indicators	**Typical Maintenance Actions**
Accumulation of sediment (over 2 inches deep or covers vegetation), litter, or debris	Remove and properly dispose of accumulated materials, without damage to the vegetation. Confirm that soil is not clogging and that the area drains after a storm event. Till or replace soil as necessary.
Poor vegetation establishment	Ensure vegetation is healthy and dense enough to provide filtering and to protect soils from erosion. Replenish mulch as necessary (if less than 3 inches deep), remove fallen leaves and debris, prune large shrubs or trees, and mow turf areas.
Overgrown vegetation—woody vegetation not part of design is present and grass excessively tall (greater than 10 inches)	Mow or trim as appropriate, but not less than the design height of the vegetation (typically 4-6 inches for grass). Confirm that irrigation is adequate and not excessive and that sprays do not directly enter overflow grates. Replace dead plants and remove noxious and invasive weeds.
Erosion due to concentrated irrigation flow	Repair/re-seed eroded areas and adjust the irrigation.
Erosion due to concentrated stormwater runoff flow	Repair/re-seed eroded areas and make appropriate corrective measures such as adding erosion control blankets, adding stone at flow entry points, or re-grading where necessary.Remove obstructions and sediment accumulations so water disperses.
Standing water (BMP not draining) . If mosquito larvae are present and persistent, contact the San Diego County Vector Control Program at (858) 694-2888. Mosquito larvicides should be applied only when absolutely necessary and then only by a licensed individual or contractor.	Where there is an underdrain, such as in planter boxes and manufactured biofilters, check the underdrain piping to make sure it is intact and unobstructed. Abate any potential vectors by filling holes in the ground in and around the biofilter facility and by insuring that there are no areas where water stands longer than 96 hours following a storm .
Obstructed inlet or outlet structure	Clear obstructions.
Damage to structural components such as weirs	Repair or replace as applicable

A Citizen's Guide to Maintaining Stormwater Best Management Practices

For Homeowners Associations and Property Owners

Types of BMPs ▪ Signs of a Degraded BMP ▪ Who Should Carry Out Maintenance

Signs of a Degraded BMP


Algae blooms


Poorly designed dry detention facility


No pollutant filtering capabilities


Broken outfall pipe


Eroding bank and Canada geese


Bank failure

O&M Guide

Appropriate to partner up to create a guide to help with costs, unify the message, etc.

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Post-Construction Stormwater Management

PCSM within the SWMP

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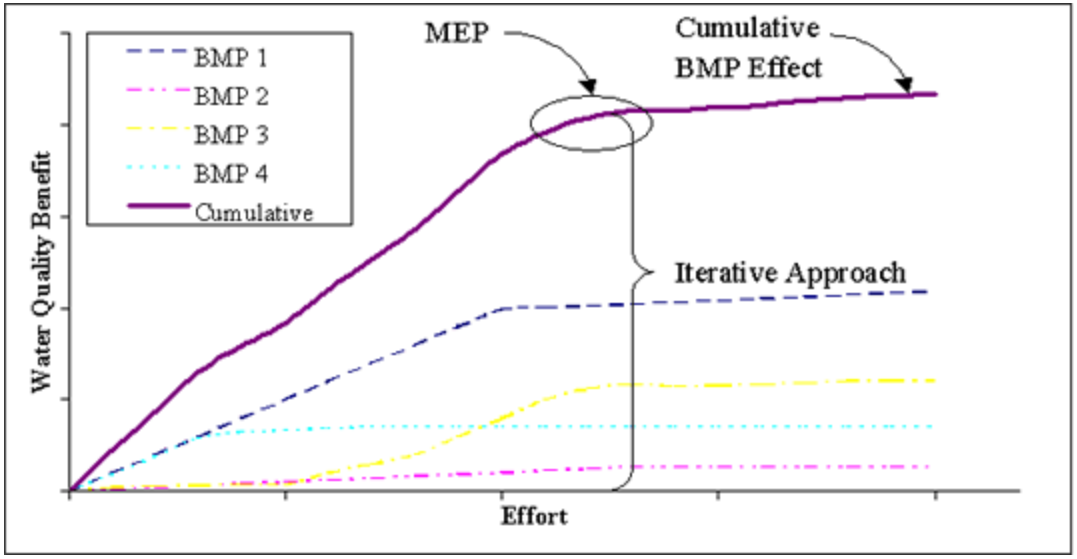
Maximum Extent Practicable (MEP)

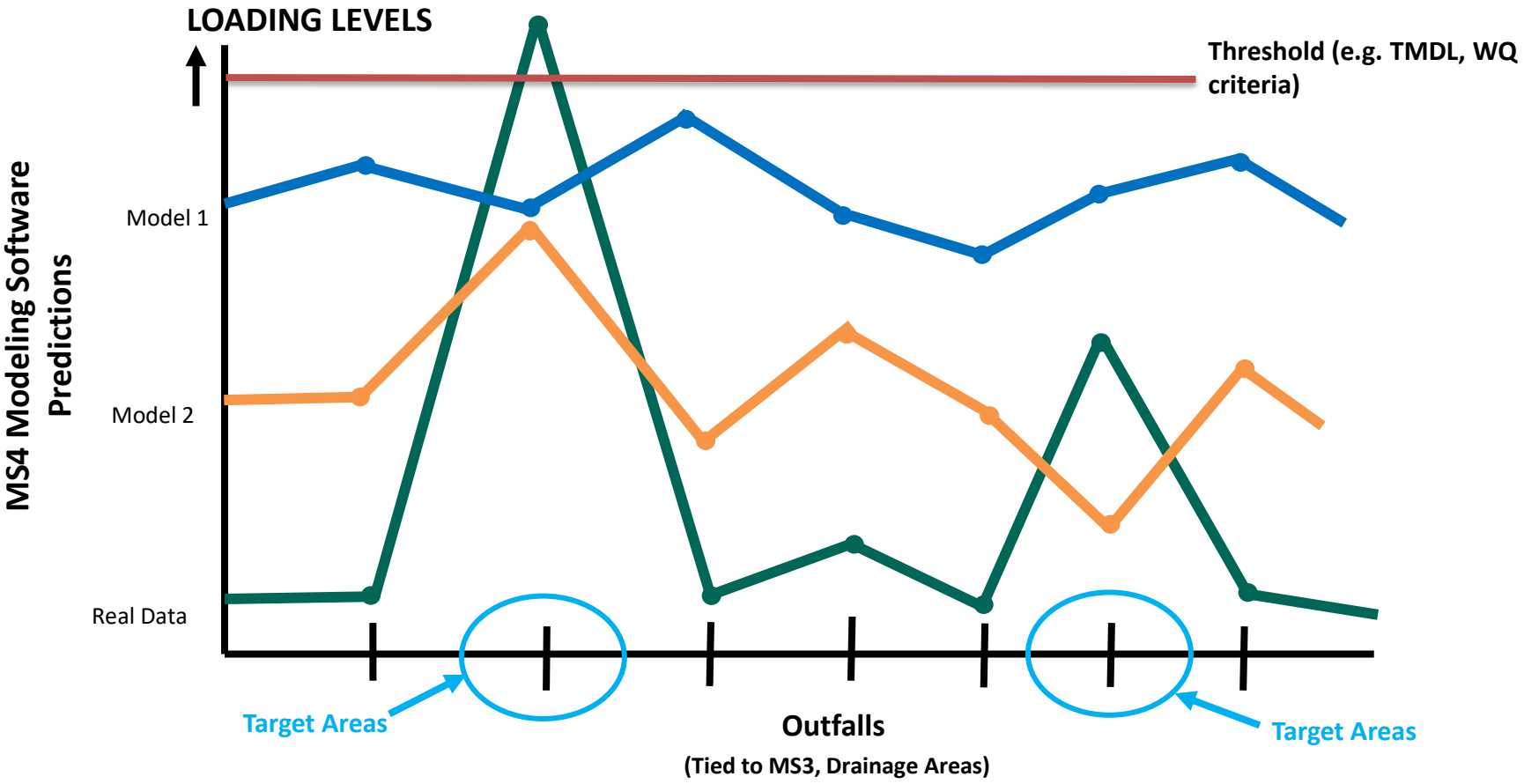
It is recognized that "pollutant reductions that represent MEP may be different for each small MS4, given the unique local hydrologic and geologic concerns that may exist and the differing possible pollutant control strategies. Therefore, each permittee will determine appropriate BMPs to satisfy each of the six minimum control measures through an evaluative process" (Federal Register, Volume 64, No. 235, page 68754, December 8, 1999.).



Source: CA.gov

The preamble to the Federal Register states: "EPA has intentionally not provided a precise definition of MEP to allow maximum flexibility in MS4 permitting. MS4s need the flexibility to optimize reductions in storm water pollutants on a location-by-location basis…"

Targeting Areas based on real data



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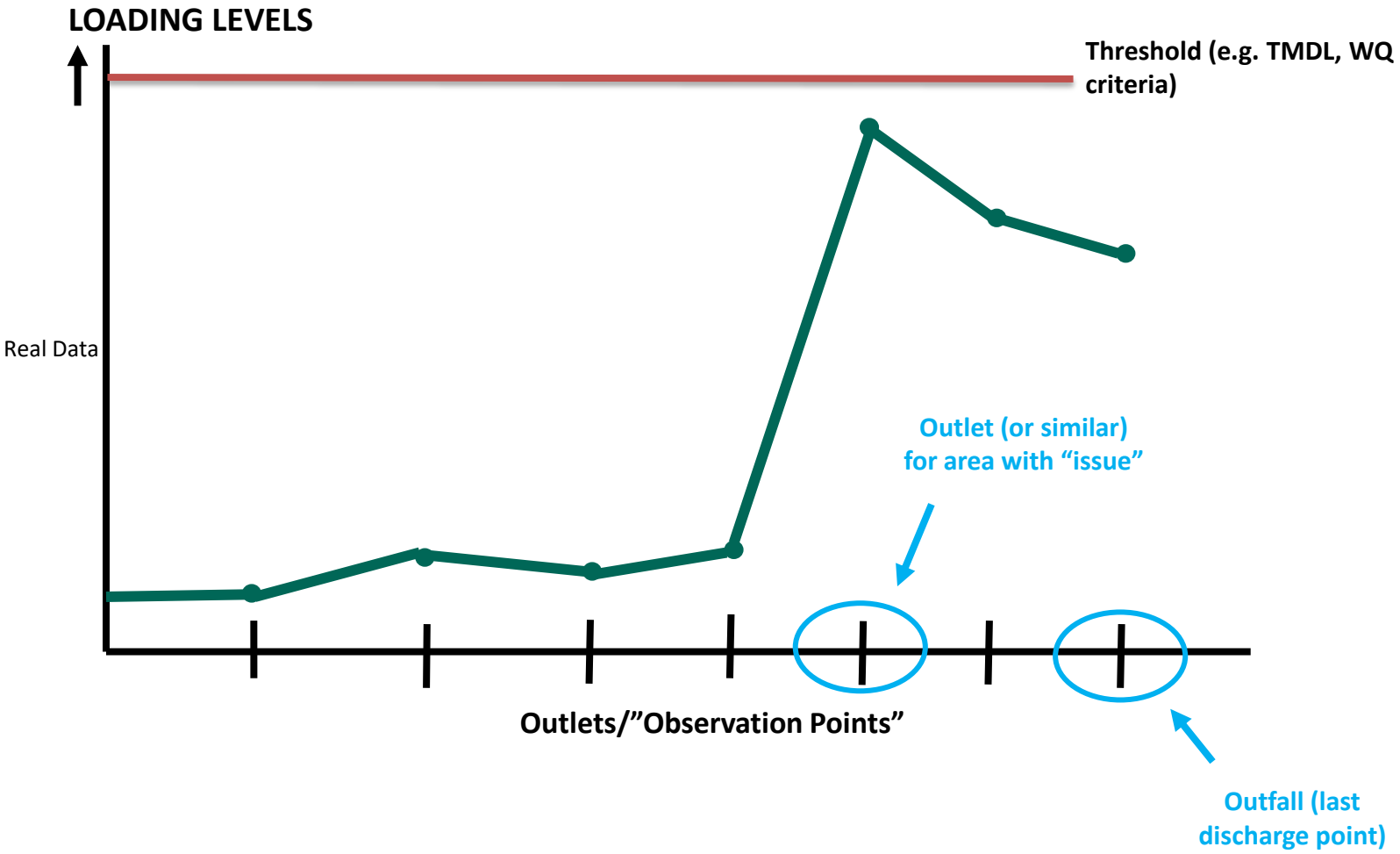
Quantifying to locate where to “right-size” BMPs



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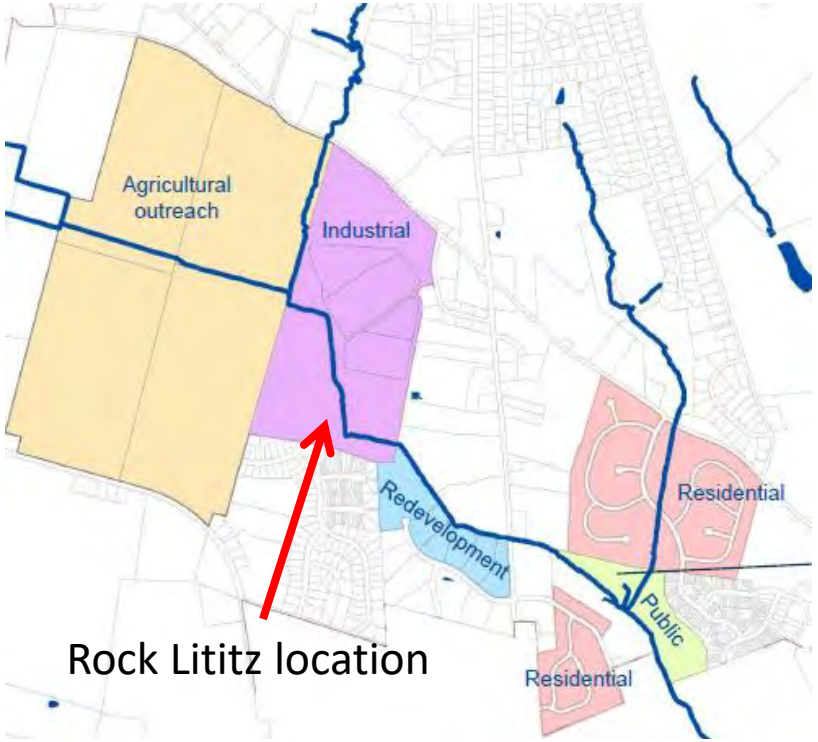
Locations and Strategies



- Stream & discharge issues
- Discharge issues
- Stream issues

When pursuing “right-sizing” exercises, solutions and strategies do not need to be limited to the MS4 permittee.

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Basic example relationships with other MCMs

- MCM 1 (public education)
  - PCSM facility owners/operators are an identified Target Audience Group, and passive outreach materials are tailored towards the group.
  - Part of developer educational outreach includes a component regarding training new PCSM facility owners/operators in proper O&M.

- MCM 2 (public involvement)
  - Regional group or local business sponsors and conducts workshop targeting proper PCSM facility/BMP maintenance practices.

- MCM 3 (IDD&E)
  - Evidence of dumping and/or illicit discharges is a component of PCSM facility inspections.

- MCM 4 (construction)
  - Requires its' own workshop

- MCM 6 (good housekeeping)
  - Municipality observes O&M requirements and processes with its own PCSM facilities, and "advertises" it.

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Post-Construction Stormwater Management

Tailoring a Program

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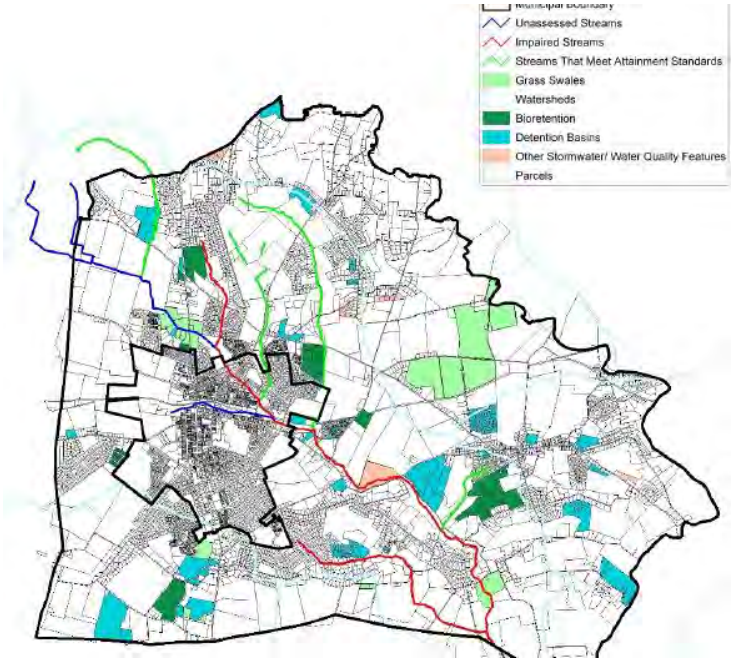
Tailoring a PCSM program

Tailoring a PCSM program essentially sends you down a pathway to identify, develop, and implement non-structural BMPs

BOROUGH OF LITITZ
Lancaster County, Pennsylvania

ORDINANCE NO. _____

AN ORDINANCE FOR THE MANAGEMENT OF STORMWATER RUNOFF IN THE BOROUGH OF LITITZ, LANCASTER COUNTY, PENNSYLVANIA; CONTAINING GENERAL PROVISIONS, DEFINING CERTAIN TERMS; ESTABLISHING PERMIT PROCEDURES AND REQUIREMENTS; ESTABLISHING DESIGN STANDARDS AND PLAN REQUIREMENTS; AND PROVIDING FOR THE ADMINISTRATION OF THE ORDINANCE INCLUDING THE IMPOSITION OF FINES AND PENALTIES.



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A Citizen's Guide to Maintaining Stormwater Best Management Practices

For Homeowners Associations and Property Owners

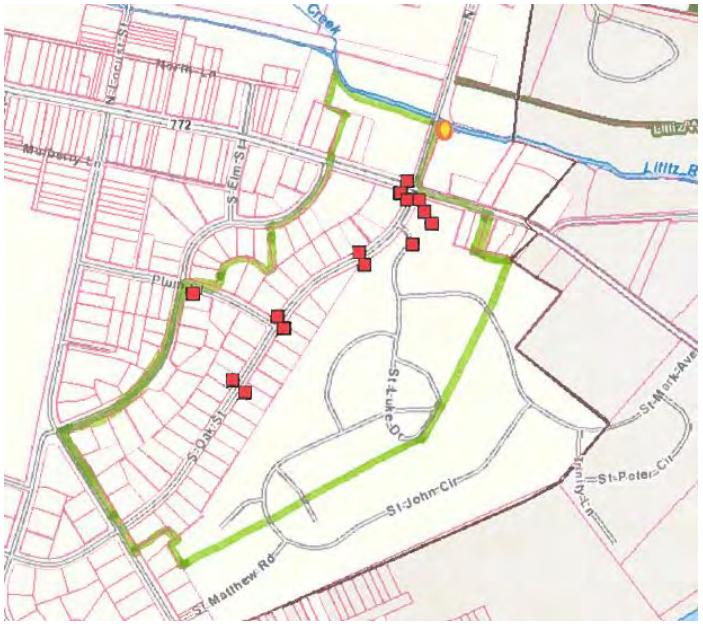
Types of BMPs ▪ Signs of a Degraded BMP ▪ Who Should Carry Out Maintenance

Non-Structural BMPs

- Comprehensive Plan(s) support
  - A reference to watershed and/or local issues (based on information generated out of the SWMP/MS4 program) should be a “layer” of consideration for establishing goals and strategies.

- Zoning Ordinance(s) support
  - Overlay districts with a water quality component/consideration based on information generated out of the SWMP/MS4 program (**based on MS3s**)

- Building permit requirement(s)
  - A condition for issuing a ‘Certificate of Occupancy’ includes delivery of an O&M manual for each PCSM facility/BMP for use by the owner/operator.



Other Non-Structural BMPs

- Riparian Buffer Zones (requirements via ordinance)
- Incorporate Low Impact Development (LID) approaches via Open Space Requirements
- The “Homeowner’s Guide” idea presented previously (as part of an overall support process for ensuring long-term O&M of PCSM facilities/BMPs

The processes and procedures themselves, that define your PCSM Plan are non-structural BMPs as well (O&M verification process, inspection processes, checklists, etc.)

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Post-Construction Stormwater Management

Additional Thoughts

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BRUBAKER RUN FLOODPLAIN RESTORATION
PLAN SET
EAST HEMPFIELD TOWNSHIP, LANCASTER COUNTY, PENNSYLVANIA

SITE MAP
1" = 600'

TABLE OF CONTENTS

LOCATION MAP
1" = 2,000'

IN COOPERATION WITH:

EAST HEMPFIELD TOWNSHIP
1700 NISSLEY ROAD
LANDISVILLE, PA 17538
PHONE: (717) 898-3103

and

RGS ASSOCIATES
35 W. JAMES ST #101
LANCASTER, PA 17603
PHONE: (717) 715-1396
JOB #20140844-005

CLIENT ADDRESS:

OAK TREE DEVELOPMENT GROUP
2450 MARIETTA AVE.
LANCASTER, PA 17601
PHONE: (717) 299-9172

PREPARED BY:

717-627-4440
fax: 717-627-4660
landstudies.com
land@landstudies.com
315 North Street | Lititz, PA 17543

PROJECT:	BRUBAKER RUN FLOODPLAIN RESTORATION
PROJECT #:	DAS13-16
PLAN DATE:	8/26/2016
COUNTY:	LANCASTER
REVISION:	---

Worksheet 13 - Pollutant Reduction Through BMP Applications*

*Fill this worksheet out for each BMP type with different pollutant removal efficiencies. Sum pollutant reduction achieved for all BMP types on final sheet.

BMP Type: Floodplain Restoration

Disturbed Area Controlled by this BMPs (AC)	97.73

Disturbed Area Controlled by this BMPs:

		Pollutant					Pollutant Load**		
	Land Cover Classification	TSS EMC (mg/l)	TP EMC (mg/l)	Nitrate- Nitrite EMC (mg/l as N)	Cover (Acres)	Runoff Volume (AF)	TSS** (LBS)	TP** (LBS)	NO_3 (LBS)
Pervious Surfaces	Forest	39	0.15	0.17					
	Meadow	47	0.19	0.30	12.57	0.1446	18.34	0.07	0.12
	Fertilized Planting Area	55	1.34	0.73					
	Native Planting Area	55	0.40	0.33					
	Lawn, Low-Input	180	0.40	0.44	35.36	0.0499	24.27	0.05	0.06
	Lawn, High-Input	180	2.22	1.46					
	Golf Course Fairway/Green	305	1.07	1.84					
	Grassed Athletic Field	200	1.07	1.01					
Impervious Surfaces	Rooftop	21	0.13	0.32	15.00	3.1248	177.18	1.10	2.70
	High Traffic Street/Highway	261	0.40	0.83	4.80	0.9999	704.65	1.08	2.24
	Medium Traffic Street	113	0.33	0.58					
	Low Traffic/Residential Street	86	0.36	0.47					
	Res. Driveway, Play Courts, etc.	60	0.46	0.47					
	High Traffic Parking Lot	120	0.39	0.60	30.00	6.2496	2,024.87	6.58	10.12
	Low Traffic Parking Lot	58	0.15	0.39					
						TOTAL LOAD TO THIS BMP TYPE	**2,949.31**	**8.89**	**15.24**
						POLLUTANT REMOVAL EFFICIENCIES FROM APPENDIX A. STORMWATER MANUAL (%)	N/A	N/A	N/A
						POLLUTANT REDUCTION ACHIEVED BY THIS BMP TYPE (LBS)	**169,779.00**	**88.80**	**5,077.00**

POLLUTANT REDUCTION ACHIEVED BY ALL BMP TYPES (LBS)			
REQUIRED REDUCTION from WS12 (LBS)	**2,506.91**	**7.55**	**7.62**

*Pollutant Load = [EMC, mg/l] X [Volume, AF] X [2.7, Unit Conversion]

**TSS and TP calculations only required for projects not meeting CG1/CG2 or not controlling less than 90% of the disturbed area

Lime Spring Farm Development

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Rock Lititz & Landis Homes

Final Thoughts and Questions?

Michael T. LaSala, CPMSM, CSI
mike@landstudies.com
717-627-4440

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