Surviving Detailed MS4 Managed Construction & Post-Construction Program Audits

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Surviving MS4 Construction & Post-Construction Program Audits

I. Construction Site Stormwater Runoff Control Program Requirements

II. Post-Construction Stormwater Runoff Control Program Requirements

III. State Audit Form

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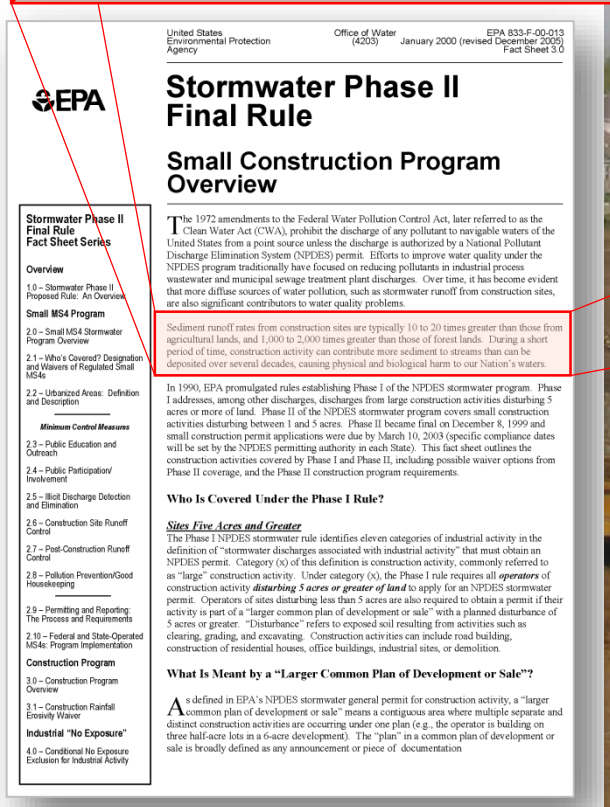
- ❖ Part 1: Audit Preparation
- ❖ Part 2: Office Audit
- ❖ Part 3: Construction Site Audit
- ❖ Part 4: Post-Audit Actions

Let’s not forget our mission: Reducing Pollution in Stormwater Runoff

Sediment runoff rates from construction sites are typically 10 to 20 times greater than those from agricultural lands, and 1,000 to 2,000 times greater than those of forest lands. During a short period of time, construction activity can contribute more sediment to streams than can be deposited over several decades, causing physical and biological harm to our Nation’s waters.



United States Environmental Protection Agency | Office of Water (4203) | EPA 833-F-00-013 January 2000 (revised December 2005) Fact Sheet 3.0

EPA

Stormwater Phase II Final Rule

Small Construction Program Overview

Stormwater Phase II Final Rule Fact Sheet Series

Overview

1.0 – Stormwater Phase II Proposed Rule: An Overview

Small MS4 Program

2.0 – Small MS4 Stormwater Program Overview

2.1 – Who’s Covered? Designation and Waivers of Regulated Small MS4s

2.2 – Urbanized Areas: Definition and Description

Minimum Control Measures

2.3 – Public Education and Outreach

2.4 – Public Participation/ Involvement

2.5 – Illicit Discharge Detection and Elimination

2.6 – Construction Site Runoff Control

2.7 – Post-Construction Runoff Control

2.8 – Pollution Prevention/Good Housekeeping

2.9 – Permitting and Reporting: The Process and Requirements

2.10 – Federal and State-Operated MS4s: Program Implementation

Construction Program

3.0 – Construction Program Overview

3.1 – Construction Rainfall Erosivity Waiver

Industrial “No Exposure”

4.0 – Conditional No Exposure Exclusion for Industrial Activity

The 1972 amendments to the Federal Water Pollution Control Act, later referred to as the Clean Water Act (CWA), prohibit the discharge of any pollutant to navigable waters of the United States from a point source unless the discharge is authorized by a National Pollutant Discharge Elimination System (NPDES) permit. Efforts to improve water quality under the NPDES program traditionally have focused on reducing pollutants in industrial process wastewater and municipal sewage treatment plant discharges. Over time, it has become evident that more diffuse sources of water pollution, such as stormwater runoff from construction sites, are also significant contributors to water quality problems.

Sediment runoff rates from construction sites are typically 10 to 20 times greater than those from agricultural lands, and 1,000 to 2,000 times greater than those of forest lands. During a short period of time, construction activity can contribute more sediment to streams than can be deposited over several decades, causing physical and biological harm to our Nation’s waters.

In 1990, EPA promulgated rules establishing Phase I of the NPDES stormwater program. Phase I addresses, among other discharges, discharges from large construction activities disturbing 5 acres or more of land. Phase II of the NPDES stormwater program covers small construction activities disturbing between 1 and 5 acres. Phase II became final on December 8, 1999 and small construction permit applications were due by March 10, 2003 (specific compliance dates will be set by the NPDES permitting authority in each State). This fact sheet outlines the construction activities covered by Phase I and Phase II, including possible waiver options from Phase II coverage, and the Phase II construction program requirements.

Who Is Covered Under the Phase I Rule?

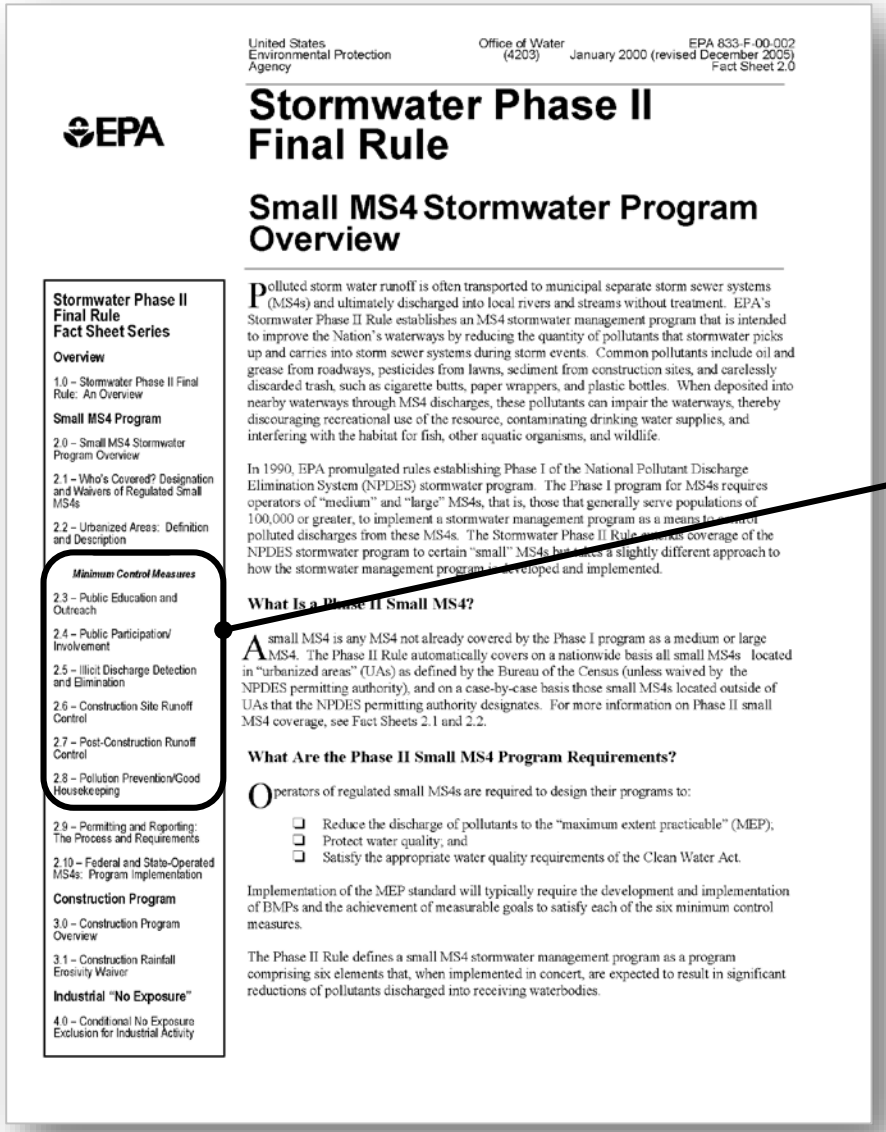
Sites Five Acres and Greater

The Phase I NPDES stormwater rule identifies eleven categories of industrial activity in the definition of “stormwater discharges associated with industrial activity” that must obtain an NPDES permit. Category (x) of this definition is construction activity, commonly referred to as “large” construction activity. Under category (x), the Phase I rule requires all ***operators*** of construction activity ***disturbing 5 acres or greater of land*** to apply for an NPDES stormwater permit. Operators of sites disturbing less than 5 acres are also required to obtain a permit if their activity is part of a “larger common plan of development or sale” with a planned disturbance of 5 acres or greater. “Disturbance” refers to exposed soil resulting from activities such as clearing, grading, and excavating. Construction activities can include road building, construction of residential houses, office buildings, industrial sites, or demolition.

What Is Meant by a “Larger Common Plan of Development or Sale”?

As defined in EPA’s NPDES stormwater general permit for construction activity, a “larger common plan of development or sale” means a contiguous area where multiple separate and distinct construction activities are occurring under one plan (e.g., the operator is building on three half-acre lots in a 6-acre development). The “plan” in a common plan of development or sale is broadly defined as any announcement or piece of documentation

Construction Site Stormwater Runoff Program Requirements



United States Environmental Protection Agency | Office of Water (4203) | EPA 833-F-00-002 January 2000 (revised December 2005) Fact Sheet 2.0

EPA

Stormwater Phase II Final Rule

Small MS4 Stormwater Program Overview

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Industrial "No Exposure"

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Polluted storm water runoff is often transported to municipal separate storm sewer systems (MS4s) and ultimately discharged into local rivers and streams without treatment. EPA's Stormwater Phase II Rule establishes an MS4 stormwater management program that is intended to improve the Nation's waterways by reducing the quantity of pollutants that stormwater picks up and carries into storm sewer systems during storm events. Common pollutants include oil and grease from roadways, pesticides from lawns, sediment from construction sites, and carelessly discarded trash, such as cigarette butts, paper wrappers, and plastic bottles. When deposited into nearby waterways through MS4 discharges, these pollutants can impair the waterways, thereby discouraging recreational use of the resource, contaminating drinking water supplies, and interfering with the habitat for fish, other aquatic organisms, and wildlife.

In 1990, EPA promulgated rules establishing Phase I of the National Pollutant Discharge Elimination System (NPDES) stormwater program. The Phase I program for MS4s requires operators of "medium" and "large" MS4s, that is, those that generally serve populations of 100,000 or greater, to implement a stormwater management program as a means to control polluted discharges from these MS4s. The Stormwater Phase II Rule extends coverage of the NPDES stormwater program to certain "small" MS4s but takes a slightly different approach to how the stormwater management program is developed and implemented.

What Is a Phase II Small MS4?

A small MS4 is any MS4 not already covered by the Phase I program as a medium or large MS4. The Phase II Rule automatically covers on a nationwide basis all small MS4s located in "urbanized areas" (UAs) as defined by the Bureau of the Census (unless waived by the NPDES permitting authority), and on a case-by-case basis those small MS4s located outside of UAs that the NPDES permitting authority designates. For more information on Phase II small MS4 coverage, see Fact Sheets 2.1 and 2.2.

What Are the Phase II Small MS4 Program Requirements?

Operators of regulated small MS4s are required to design their programs to:

- Reduce the discharge of pollutants to the "maximum extent practicable" (MEP);
- Protect water quality; and
- Satisfy the appropriate water quality requirements of the Clean Water Act.

Implementation of the MEP standard will typically require the development and implementation of BMPs and the achievement of measurable goals to satisfy each of the six minimum control measures.

The Phase II Rule defines a small MS4 stormwater management program as a program comprising six elements that, when implemented in concert, are expected to result in significant reductions of pollutants discharged into receiving waterbodies.

6 MINIMUM CONTROL MEASURES (MCMs):

MCM 1: Public Education and Outreach

MCM 2: Public Participation and Involvement

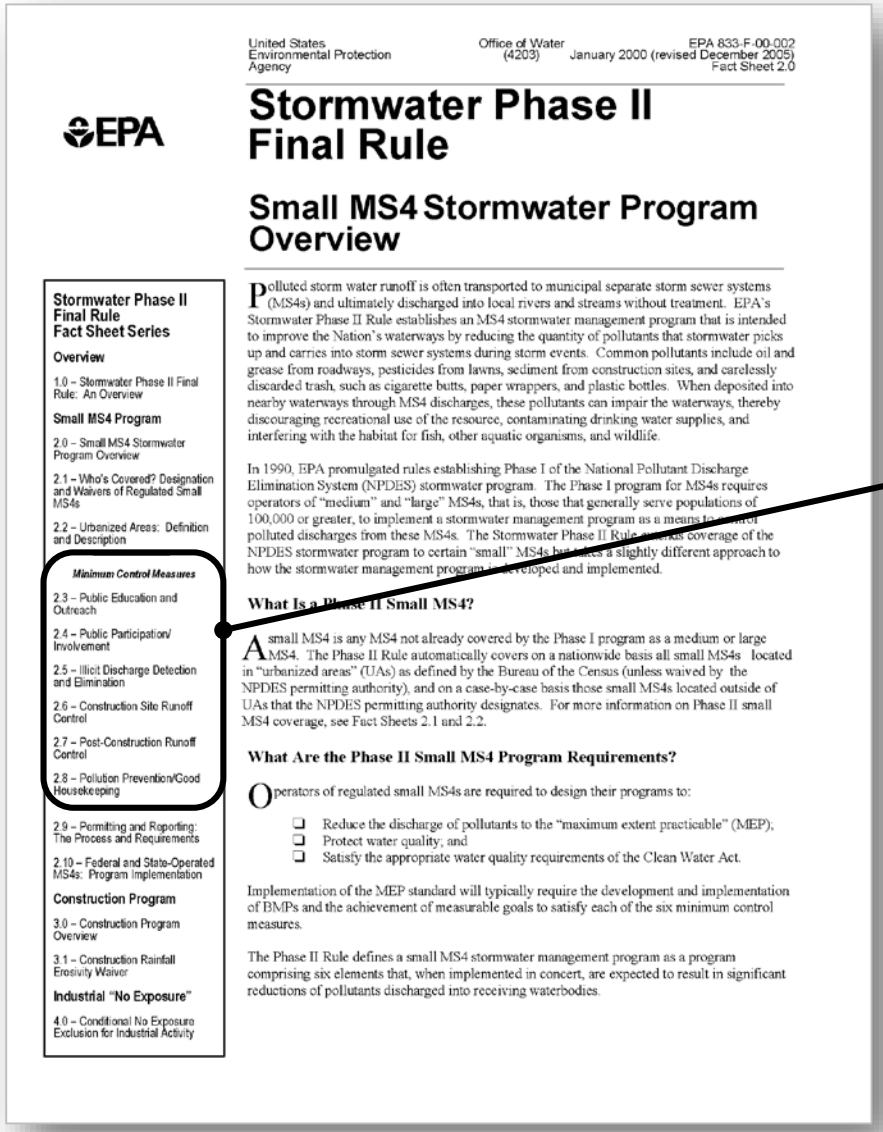
MCM 3: Illicit Discharge Detection and Elimination

MCM 4: Construction Site Runoff Control

MCM 5: Post-Construction Runoff Control

MCM 6: Pollution Prevention & Good Housekeeping

Construction Site Stormwater Runoff Program Requirements



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MCM 2: Public Participation and Involvement

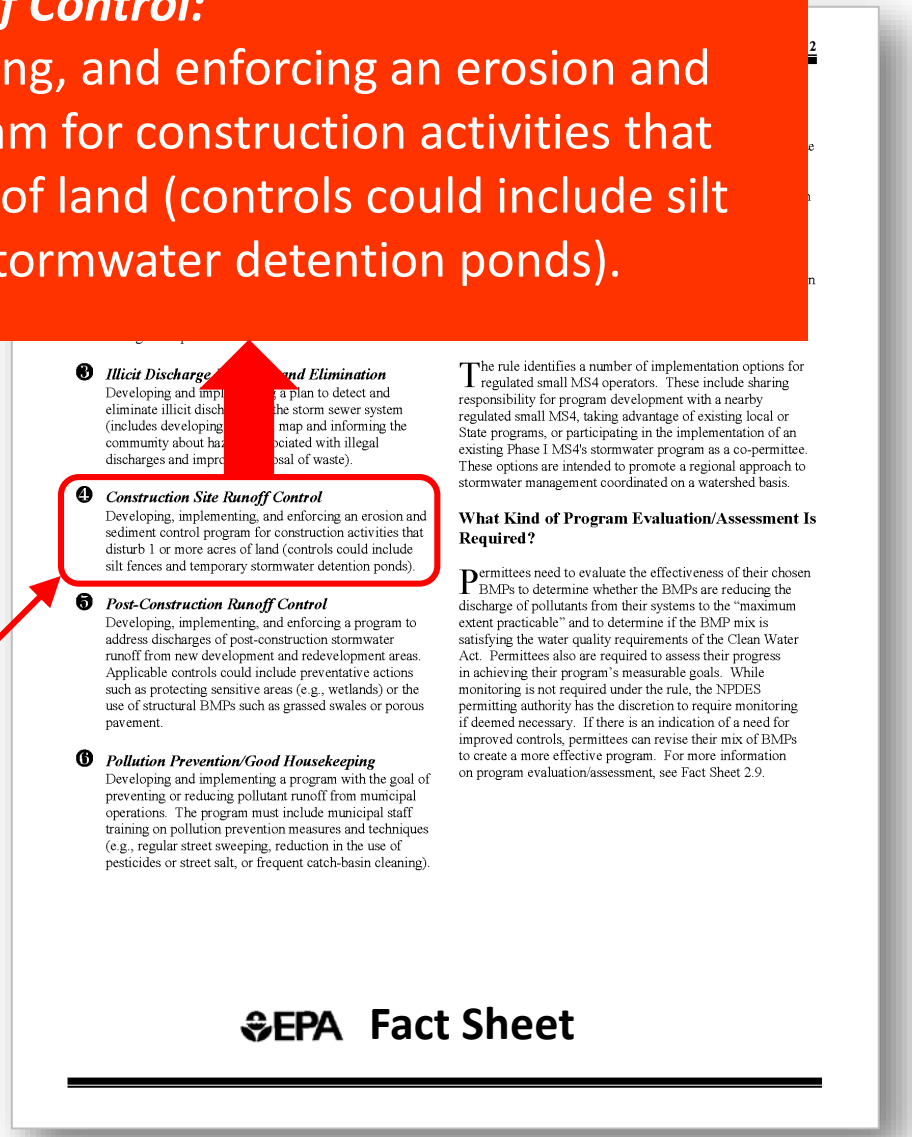
MCM 3: Illicit Discharge Detection and Elimination

MCM 4: Construction Site Runoff Control

MCM 5: Post-Construction Runoff Control

MCM 6: Pollution Prevention & Good Housekeeping

Construction Site Runoff Control:
Developing, implementing, and enforcing an erosion and sediment control program for construction activities that disturb 1 or more acres of land (controls could include silt fences and temporary stormwater detention ponds).



❸ ***Illicit Discharge … and Elimination***
Developing and imp… a plan to detect and eliminate illicit disch… the storm sewer system (includes developing … map and informing the community about ha… ociated with illegal discharges and impro… osal of waste).

❹ ***Construction Site Runoff Control***
Developing, implementing, and enforcing an erosion and sediment control program for construction activities that disturb 1 or more acres of land (controls could include silt fences and temporary stormwater detention ponds).

❺ ***Post-Construction Runoff Control***
Developing, implementing, and enforcing a program to address discharges of post-construction stormwater runoff from new development and redevelopment areas. Applicable controls could include preventative actions such as protecting sensitive areas (e.g., wetlands) or the use of structural BMPs such as grassed swales or porous pavement.

❻ ***Pollution Prevention/Good Housekeeping***
Developing and implementing a program with the goal of preventing or reducing pollutant runoff from municipal operations. The program must include municipal staff training on pollution prevention measures and techniques (e.g., regular street sweeping, reduction in the use of pesticides or street salt, or frequent catch-basin cleaning).

The rule identifies a number of implementation options for regulated small MS4 operators. These include sharing responsibility for program development with a nearby regulated small MS4, taking advantage of existing local or State programs, or participating in the implementation of an existing Phase I MS4's stormwater program as a co-permittee. These options are intended to promote a regional approach to stormwater management coordinated on a watershed basis.

What Kind of Program Evaluation/Assessment Is Required?

Permittees need to evaluate the effectiveness of their chosen BMPs to determine whether the BMPs are reducing the discharge of pollutants from their systems to the "maximum extent practicable" and to determine if the BMP mix is satisfying the water quality requirements of the Clean Water Act. Permittees also are required to assess their progress in achieving their program's measurable goals. While monitoring is not required under the rule, the NPDES permitting authority has the discretion to require monitoring if deemed necessary. If there is an indication of a need for improved controls, permittees can revise their mix of BMPs to create a more effective program. For more information on program evaluation/assessment, see Fact Sheet 2.9.

EPA Fact Sheet

Construction Site Stormwater Runoff Program Requirements

United State Environmental Protection Agency
Office of Water (4203)
EPA 833-F-00-008
January 2000 (revised December 2005)
Fact Sheet 2.6

EPA

Construction Site Runoff Control Minimum Control Measure

What Is Required?

The Phase II Final Rule requires an operator of a regulated small MS4 to develop, implement, and enforce a program to reduce pollutants in stormwater runoff to their MS4 from construction activities that result in a land disturbance of greater than or equal to 1 acre. The small MS4 operator is required to:

- ❑ Have an ordinance or other regulatory mechanism requiring the implementation of proper erosion and sediment controls, and controls for other wastes, on applicable construction sites;
- ❑ Have procedures for site plan review of construction plans that consider potential water quality impacts;
- ❑ Have procedures for site inspection and enforcement of control measures;
- ❑ Have sanctions to ensure compliance (established in the ordinance or other regulatory mechanism);
- ❑ Establish procedures for the receipt and consideration of information submitted by the public; and
- ❑ Determine the appropriate BMPs and measurable goals for this MCM.

Construction Site Stormwater Runoff Program Requirements

United State Environmental Protection Agency | Office of Water (4203) | EPA 833-F-00-008 (December 2005) | Fact Sheet 2.6

EPA

Construction Site Runoff Control Minimum Control Measure

AUDIT ITEMS

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Construction Site Stormwater Runoff Program Requirements

REGULATORY MECHANISM

SITE PLAN REVIEW

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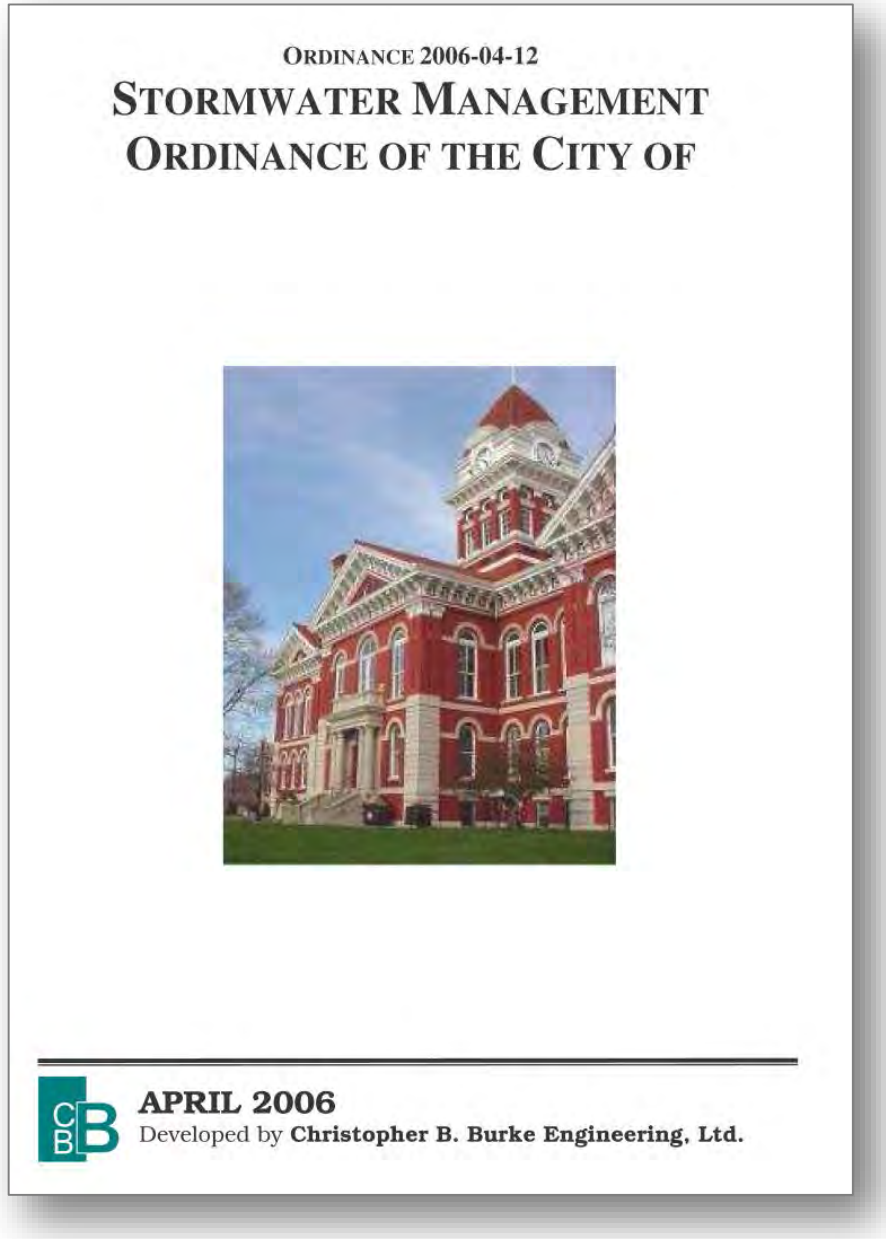
INFORMATION FROM THE PUBLIC

APPROPRIATE BMPs

MEASURABLE GOALS

- Have an ordinance or other regulatory mechanism requiring proper erosion and sediment controls on construction sites.
- Applicable to construction sites with a land disturbance of greater than or equal to one acre.
  - Local requirements may have smaller size restrictions.



Construction Site Stormwater Runoff Program Requirements

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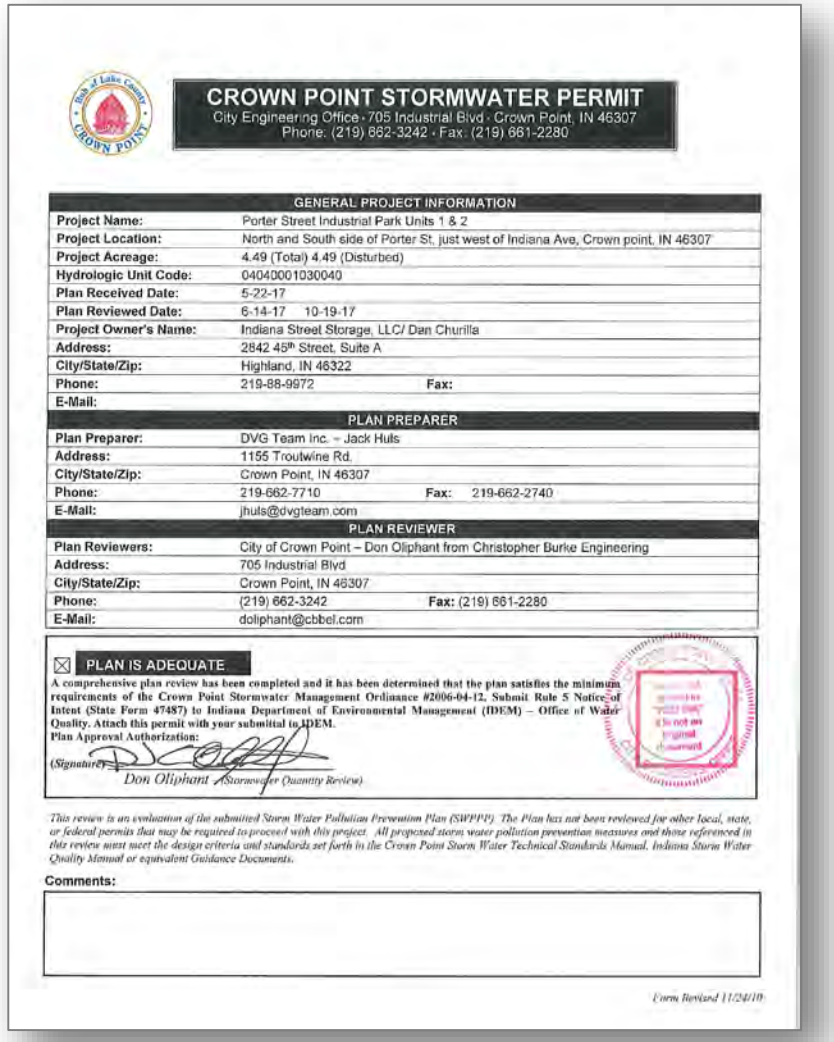
APPROPRIATE BMPs

MEASURABLE GOALS

- Plan review procedures that consider potential water quality impacts.
- Stormwater Pollution Prevention Plans (SWPPPs):
  - Stormwater Discharge Points.
  - Sources of Pollution.
  - Practices used to reduce pollutants in stormwater discharges.
  - Best Management Practices (BMPs) for stormwater quality and quantity
- Consistent Procedures:
  - Same procedures for MS4-Owned and Operated construction projects.
- Requirements may include a local Stormwater Permit



CROWN POINT STORMWATER PERMIT
City Engineering Office · 705 Industrial Blvd · Crown Point, IN 46307
Phone: (219) 662-3242 · Fax: (219) 661-2280

GENERAL PROJECT INFORMATION			
Project Name:	Porter Street Industrial Park Units 1 & 2		
Project Location:	North and South side of Porter St, just west of Indiana Ave, Crown point, IN 46307		
Project Acreage:	4.49 (Total) 4.49 (Disturbed)		
Hydrologic Unit Code:	04040001030040		
Plan Received Date:	5-22-17		
Plan Reviewed Date:	6-14-17 10-19-17		
Project Owner's Name:	Indiana Street Storage, LLC/ Dan Churilla		
Address:	2842 45th Street, Suite A		
City/State/Zip:	Highland, IN 46322		
Phone:	219-88-9972	Fax:	
E-Mail:			
PLAN PREPARER			
Plan Preparer:	DVG Team Inc. – Jack Huls		
Address:	1155 Troutwine Rd.		
City/State/Zip:	Crown Point, IN 46307		
Phone:	219-662-7710	Fax:	219-662-2740
E-Mail:	jhuls@dvgteam.com		
PLAN REVIEWER			
Plan Reviewers:	City of Crown Point – Don Oliphant from Christopher Burke Engineering		
Address:	705 Industrial Blvd		
City/State/Zip:	Crown Point, IN 46307		
Phone:	(219) 662-3242	Fax:	(219) 661-2280
E-Mail:	doliphant@cbbel.com		

☒ PLAN IS ADEQUATE

A comprehensive plan review has been completed and it has been determined that the plan satisfies the minimum requirements of the Crown Point Stormwater Management Ordinance #2006-04-12. Submit Rule 5 Notice of Intent (State Form 47487) to Indiana Department of Environmental Management (IDEM) – Office of Water Quality. Attach this permit with your submittal to IDEM.

Plan Approval Authorization:

(Signature) Don Oliphant (Stormwater Quantity Review)

This review is an evaluation of the submitted Storm Water Pollution Prevention Plan (SWPPP). The Plan has not been reviewed for other local, state, or federal permits that may be required to proceed with this project. All proposed storm water pollution prevention measures and those referenced in this review must meet the design criteria and standards set forth in the Crown Point Storm Water Technical Standards Manual, Indiana Storm Water Quality Manual or equivalent Guidance Documents.

Comments:

Form Revised 11/24/10

Construction Site Stormwater Runoff Program Requirements

REGULATORY MECHANISM

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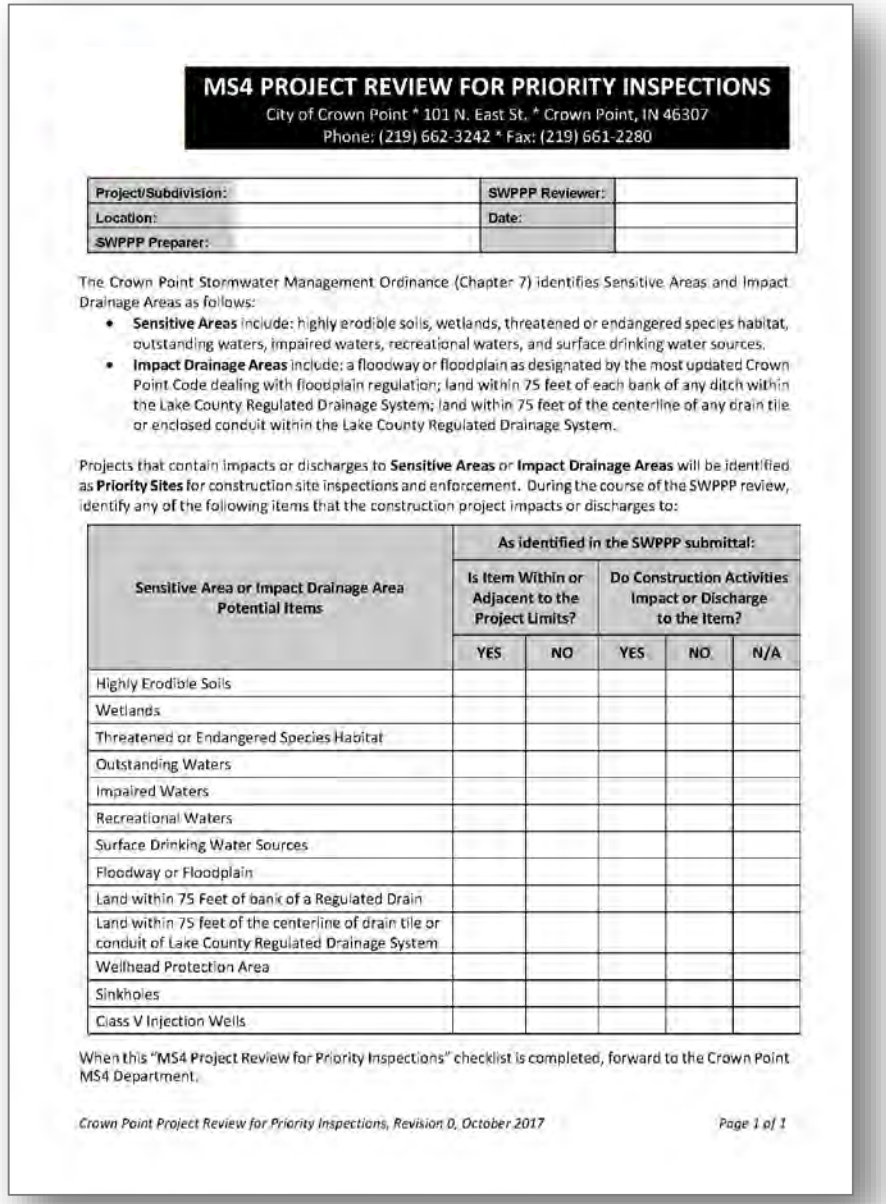
APPROPRIATE BMPs

MEASURABLE GOALS

- Establish written procedures or policies for implementing construction site runoff inspections.
- Procedures/Policies to identify priority sites for inspection:
  - Extent of construction activity
  - Topography
  - Soils
  - Receiving Waters
- **Convey plan review 'knowledge' to Inspectors**



MS4 PROJECT REVIEW FOR PRIORITY INSPECTIONS
City of Crown Point * 101 N. East St. * Crown Point, IN 46307
Phone: (219) 662-3242 * Fax: (219) 661-2280

Project/Subdivision:	SWPPP Reviewer:	
Location:	Date:	
SWPPP Preparer:		

The Crown Point Stormwater Management Ordinance (Chapter 7) identifies Sensitive Areas and Impact Drainage Areas as follows:

- **Sensitive Areas** include: highly erodible soils, wetlands, threatened or endangered species habitat, outstanding waters, impaired waters, recreational waters, and surface drinking water sources.
- **Impact Drainage Areas** include: a floodway or floodplain as designated by the most updated Crown Point Code dealing with floodplain regulation; land within 75 feet of each bank of any ditch within the Lake County Regulated Drainage System; land within 75 feet of the centerline of any drain tile or enclosed conduit within the Lake County Regulated Drainage System.

Projects that contain impacts or discharges to **Sensitive Areas** or **Impact Drainage Areas** will be identified as **Priority Sites** for construction site inspections and enforcement. During the course of the SWPPP review, identify any of the following items that the construction project impacts or discharges to:

Sensitive Area or Impact Drainage Area Potential Items	As identified in the SWPPP submittal:				
	Is Item Within or Adjacent to the Project Limits?		Do Construction Activities Impact or Discharge to the Item?		
	YES	NO	YES	NO	N/A
Highly Erodible Soils					
Wetlands					
Threatened or Endangered Species Habitat					
Outstanding Waters					
Impaired Waters					
Recreational Waters					
Surface Drinking Water Sources					
Floodway or Floodplain					
Land within 75 Feet of bank of a Regulated Drain					
Land within 75 feet of the centerline of drain tile or conduit of Lake County Regulated Drainage System					
Wellhead Protection Area					
Sinkholes					
Class V Injection Wells					

When this "MS4 Project Review for Priority Inspections" checklist is completed, forward to the Crown Point MS4 Department.

Crown Point Project Review for Priority Inspections, Revision 0, October 2017 *Page 1 of 1*

Construction Site Stormwater Runoff Program Requirements

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Outstanding Waters					
Impaired Waters					
Recreational Waters					
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Land within 75 feet of the centerline of drain tile or conduit of Lake County Regulated Drainage System					
Wellhead Protection Area					
Sinkholes					
Class V Injection Wells					

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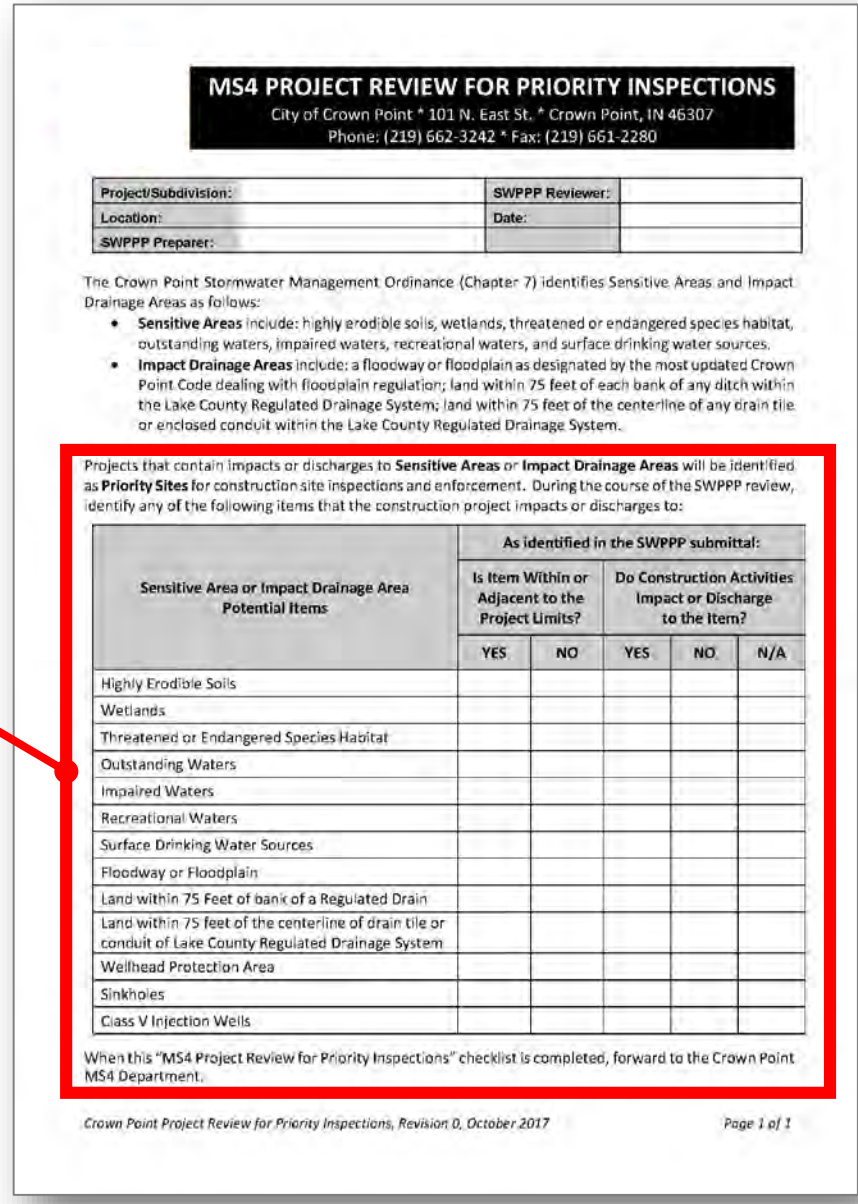

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Construction Site Stormwater Runoff Program Requirements

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APPROPRIATE BMPs

MEASURABLE GOALS

- Established within the Ordinance.
- Escalating in strength:
  - First time offense vs. repeat offender
  - Amount of pollutant discharged; severity
  - Accident vs. negligence

Sample #1

MATERIALS RELEASED (potential for harm)	EXTENT OF DAMAGE			
	Ranges are per/day violations *(does not include recoverable damages or expenses)*	**MINOR** Can be restored to original state	**MODERATE** Cannot be restored to original state No structural damage No impairment to MS4 drainage conveyance	**MAJOR** Significantly impairs drainage/structures Removal of contaminated soils or replacement of structures required Failure to obtain permit or comply with MS4 enforcement
	MINOR Non-toxic materials discharged	$100 - $500	$500 - $1000	$1000 - $2500
	MODERATE Potentially harmful materials discharged	$500 - $1000	$1000 - $2500	$2500 - $4000 (≤ $2500 for 1st offense)
	MAJOR Health-threatening materials discharged	$1000 - $2500	$2500 - $4000 (≤ $2500 for 1st offense)	$4000 - $7500 ($2500 for 1st offense)

Construction Site Stormwater Runoff Program Requirements

REGULATORY MECHANISM

SITE PLAN REVIEW

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INFORMATION FROM THE PUBLIC

APPROPRIATE BMPs

MEASURABLE GOALS

- Established within the Ordinance.
- Escalating in strength:
  - First time offense vs. repeat offender
  - Amount of pollutant discharged; severity
  - Accident vs. negligence

Sample #2

Any person found in violation of any provision of this Ordinance shall be responsible for a civil infraction and subject to a maximum fine of $2,500 for each offense, plus costs, damages, and expenses. The City of portage has established an Enforcement Response Schedule that standardizes the approach the City and its Public Utility Service Board may take in dealing with stormwater regulations offenses subject to this Ordinance and the associated Technical Standards document. The enforcement response schedule is as noted in the following table:

Offence #	Type of Response Anticipated
1st offense	Verbal Telephone Notice, Letter of Violation or Written Warning and Administrative Penalty
2nd offense	Letter of Violation, Administrative Penalty and/or Site Visit
3rd offense	Letter of Violation, Administrative Penalty and/or Site Visit
4th offense	Letter of Violation, Administrative Penalty and/or Site Visit
5th offense	Agreed Order, Administrative Penalty and/or Site Visit
6th offense	Administrative Order, Administrative Penalty and/or Site Visit
7th offense	Compliance Schedule, Administrative Penalty and/or Site Visit
8th offense	Litigation and Administrative Penalty

Offence #	Penalty
1st offense	$250.00
2nd offense	$500.00
3rd offense	$1,000.00
4th offense	$2,500.00

Construction Site Stormwater Runoff Program Requirements

REGULATORY MECHANISM

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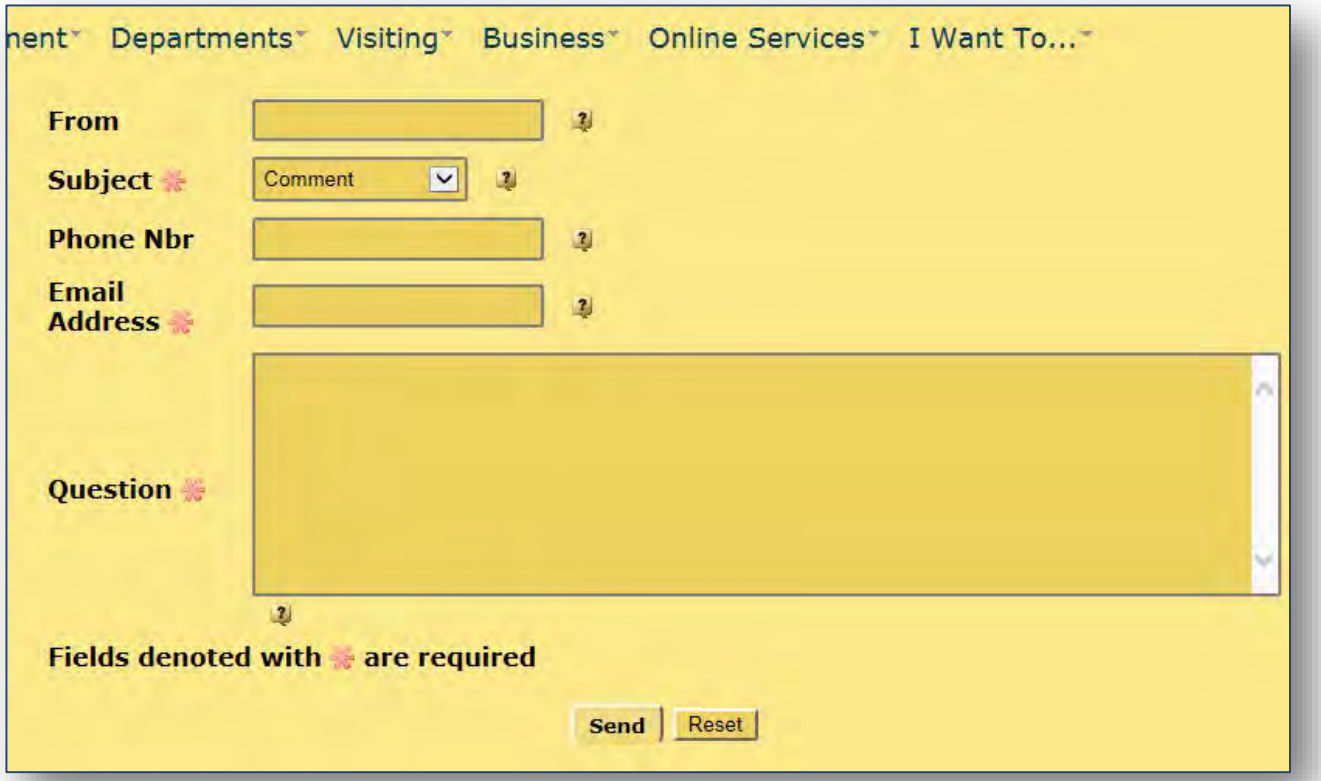
INFORMATION FROM THE PUBLIC

APPROPRIATE BMPs

MEASURABLE GOALS

- Required to demonstrate acknowledgement and consideration of information from the public.
- May use a simple tracking process: log book, spreadsheet, database, etc.
- Used as a tool to identify areas or instances of construction site non-compliance.

Sample Website Form



Construction Site Stormwater Runoff Program Requirements

- REGULATORY MECHANISM
- SITE PLAN REVIEW
- INSPECTIONS
- ENFORCEMENT
- INFORMATION FROM THE PUBLIC
- **APPROPRIATE BMPs**
- MEASURABLE GOALS

Sample Technical Standards

Table C-1
Approved Stormwater Pollution Control Practices for Construction Sites

Practice No.	BMP Description	Applicability / Limitations	Fact Sheet
Administrative			
1a	Permitting (Stormwater, Floodway, Wetland)	All Sites as required by local, state and federal regulations	N/A
1b	Stormwater Pollution Prevention Plan (SWP3)	All sites with 1 acre or more disturbance	N/A
1c	Posting Rule 5 NOI	All sites with 1 acre or more disturbance	N/A
1d	Self-monitoring	All permitted sites	N/A
1e	Apply for Rule 5 NOT	All sites with Rule 5 permit	N/A
Planning - Sequencing			
2a	Construction Sequencing	All permitted sites requiring a permit	CN - 101
Planning - Site Preservation / Protection			
3a	Tree Preservation and Protection	Strongly recommended for nearly all sites with desirable trees	CN 120
3b	Wetland Areas Protection	All delineated wetlands	CN 121
Site Access / Traffic Control Practices			
4a	Temporary Construction Entrances	All sites	CN 114
4b	Wheel Wash	All sites	CN 102
4c	Street Sweeping	All sites	CN 122
Filtration / Settling - Perimeter Sediment Control			
5a	Silt Fence (Short Term)	Projects lasting no longer than 3 months (see limitations)	CN 107
5b	Silt Fence (Long term)	Projects lasting >3 months (see limitations)	CN 107
5c	Coir Logs		
Filtration / Settling - Sediment Traps			
6a	Temporary Sediment Trap/Basin	5 acre maximum contributing drainage area	CN 123
Surface Stabilization - Temporary Cover			
7b	Temporary Seeding (including dormant seeding)	Areas of bare soil where additional work is not scheduled to be performed for a minimum of 14 days	CN 124
Surface Stabilization - Permanent Cover			
8a	Fertilization & Soil Amendments	Areas as needed based on soil testing	CN 126
8b	Permanent Seeding	All areas of bare soil at final grade	CN 125

APPENDIX C — October 8, 2013

Practice No.	BMP Description	Applicability / Limitations	Fact Sheet
8c	Erosion Control Blanket (Surface)	Final surface stabilization	CN 108
Material Management - Concrete Washout			
9a	Concrete Washout Pit (Above Ground)	All sites utilizing concrete	CN 127
9b	Concrete Washout Pit (Below Ground)	All sites utilizing concrete	CN 128
9c	Manufactured Concrete Washout Basins	All sites utilizing concrete	CN 116
Surface Stabilization -Temporary Diversion			
10a	Diversion Berm	Up-slope and down-slope sides of construction site, above disturbed slopes within construction site	CN 129
10b	Slope Drains		CN 130
Filtration / Settling -Check Dams			
11a	Rock Check Dam	2 acres maximum contributing drainage area	CN 123
11b	Manufactured Temporary Permeable Berms	For swales (max. 38% slopes)	CN 110
11c	Silt Tubes	Sheet flow, sheet flow perimeter barrier	CN 117
Filtration / Settling - Inlet Protections			
12a	Rigid Frame Yard inlet Protection	Maximum flow rate must be <= WQr	CN 131
12b	Yard Inlet Protection	Small areas only	
Surface Stabilization - Outlet Protection			
13a	Permanent Transition Mats for Outlets	Must cover entire outlet surface area	CN 113
Surface Stabilization – Wind Soil Suspension			
14a	Dust Control Treatments	Must be reapplied as needed	CN 115
14b	Drive Watering	Must be continually applied in dry weather	CN 132
Filtration / Settling – Dewatering Bag			
15a	Dewatering Bags	Must be sized for maximum pump rate	CN 117103
Filtration / Settling – Polymers			
16a	Floculating Polymers	Must be sized for maximum anticipated WQr	CN 118
Surface Stabilization – Soil Reinforcement			
17a	Long-Term Mats		CN 109

APPENDIX C — October 8, 2013

Construction Site Stormwater Runoff Program Requirements

REGULATORY MECHANISM

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APPROPRIATE BMPs

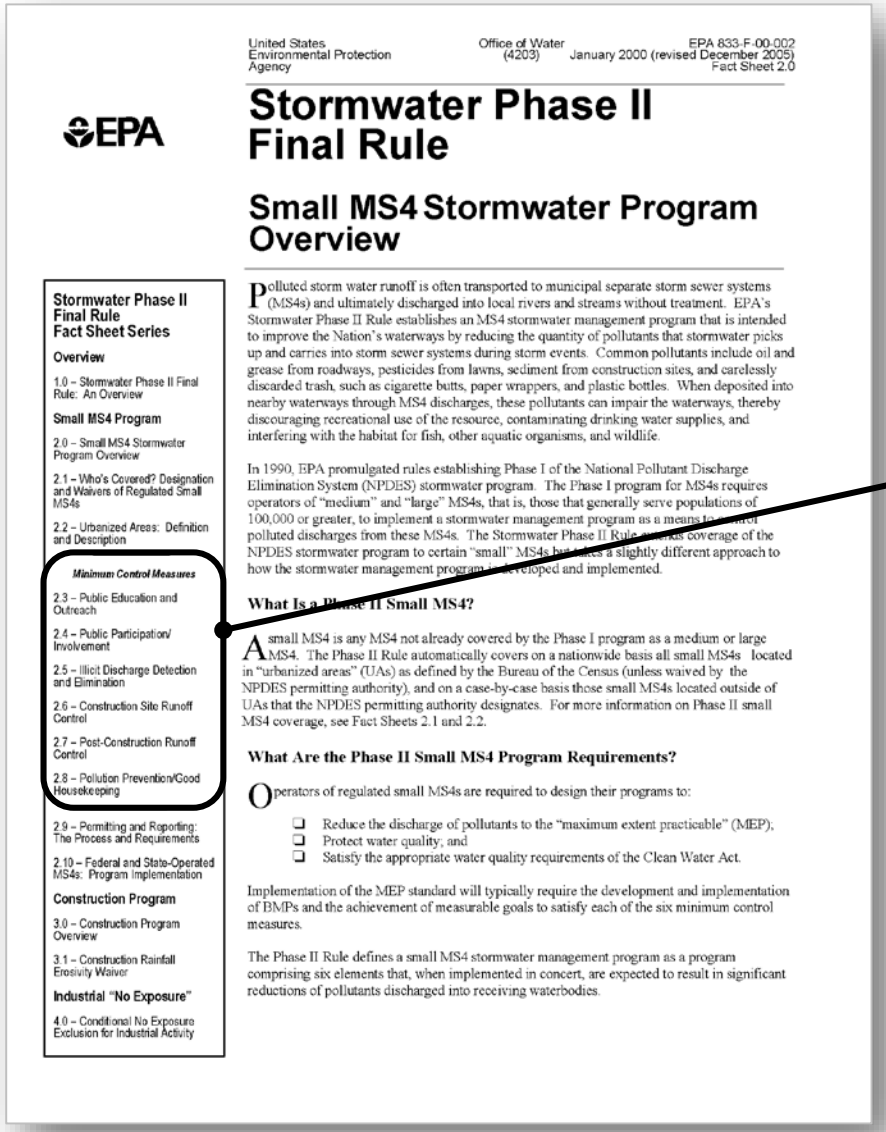
MEASURABLE GOALS

Sample Stormwater Quality Management Plan (SWQMP) Part C

Table 3-3 Construction and Post-Construction BMPs

Best Management Practice (BMP)	BMP Description	Measurable Goals, Tracking, and Programmatic Indicators	Timeline	Responsible Party
Stormwater Management Ordinance	• Review the active construction and post-construction site language contained in the Lake County Stormwater Management and Clean Water Regulations Ordinance once per permit term for updates and to ensure compliance with current Rule 5 language	• Continue to enforce the Stormwater Management and Clean Water Regulations Ordinance • Review the Stormwater Management and Clean Water Regulations Ordinance at least once per permit term; document the review	On-going	LCSO Staff; Consultant
Plan Review, Site Inspection, and Enforcement	• LCSO Staff will continue their review of project plans, conducting site inspections, and actively enforcing the Lake County Stormwater Management and Clean Water Regulations Ordinance for compliance with active construction site and post-construction site requirements	• Continue to review and approve proposed new and redevelopment projects • Continue to review 100% of construction plans and SWPPPs • Inspect priority construction sites at least four (4) times annually • Check As-Built drawings for newly installed post-construction BMPs • Track using Programmatic Indicators #13, #14, #15, #17, #18, #19, and #20	On-going	LCSO Staff; Consultant; SWCD for MS4-Owned Projects
Training for Construction Professionals	• Present an education program on erosion and sediment control standards and BMPs for members of the local construction and development community	• Conduct one (1) training/work-shop annually • Document date, time, and attendance at workshops • Track using Programmatic Indicators #1, #2, and #3	Annually	LCSO Staff; Consultant

Post-Construction Stormwater Runoff Program Requirements



United States Environmental Protection Agency | Office of Water (4203) | EPA 833-F-00-002 January 2000 (revised December 2005) Fact Sheet 2.0

EPA

Stormwater Phase II Final Rule

Small MS4 Stormwater Program Overview

Stormwater Phase II Final Rule Fact Sheet Series

Overview

1.0 – Stormwater Phase II Final Rule: An Overview

Small MS4 Program

2.0 – Small MS4 Stormwater Program Overview

2.1 – Who's Covered? Designation and Waivers of Regulated Small MS4s

2.2 – Urbanized Areas: Definition and Description

Minimum Control Measures

2.3 – Public Education and Outreach

2.4 – Public Participation/ Involvement

2.5 – Illicit Discharge Detection and Elimination

2.6 – Construction Site Runoff Control

2.7 – Post-Construction Runoff Control

2.8 – Pollution Prevention/Good Housekeeping

2.9 – Permitting and Reporting: The Process and Requirements

2.10 – Federal and State-Operated MS4s: Program Implementation

Construction Program

3.0 – Construction Program Overview

3.1 – Construction Rainfall Erosivity Waiver

Industrial "No Exposure"

4.0 – Conditional No Exposure Exclusion for Industrial Activity

Polluted storm water runoff is often transported to municipal separate storm sewer systems (MS4s) and ultimately discharged into local rivers and streams without treatment. EPA's Stormwater Phase II Rule establishes an MS4 stormwater management program that is intended to improve the Nation's waterways by reducing the quantity of pollutants that stormwater picks up and carries into storm sewer systems during storm events. Common pollutants include oil and grease from roadways, pesticides from lawns, sediment from construction sites, and carelessly discarded trash, such as cigarette butts, paper wrappers, and plastic bottles. When deposited into nearby waterways through MS4 discharges, these pollutants can impair the waterways, thereby discouraging recreational use of the resource, contaminating drinking water supplies, and interfering with the habitat for fish, other aquatic organisms, and wildlife.

In 1990, EPA promulgated rules establishing Phase I of the National Pollutant Discharge Elimination System (NPDES) stormwater program. The Phase I program for MS4s requires operators of "medium" and "large" MS4s, that is, those that generally serve populations of 100,000 or greater, to implement a stormwater management program as a means to control polluted discharges from these MS4s. The Stormwater Phase II Rule extends coverage of the NPDES stormwater program to certain "small" MS4s but takes a slightly different approach to how the stormwater management program is developed and implemented.

What Is a Phase II Small MS4?

A small MS4 is any MS4 not already covered by the Phase I program as a medium or large MS4. The Phase II Rule automatically covers on a nationwide basis all small MS4s located in "urbanized areas" (UAs) as defined by the Bureau of the Census (unless waived by the NPDES permitting authority), and on a case-by-case basis those small MS4s located outside of UAs that the NPDES permitting authority designates. For more information on Phase II small MS4 coverage, see Fact Sheets 2.1 and 2.2.

What Are the Phase II Small MS4 Program Requirements?

Operators of regulated small MS4s are required to design their programs to:

- Reduce the discharge of pollutants to the "maximum extent practicable" (MEP);
- Protect water quality; and
- Satisfy the appropriate water quality requirements of the Clean Water Act.

Implementation of the MEP standard will typically require the development and implementation of BMPs and the achievement of measurable goals to satisfy each of the six minimum control measures.

The Phase II Rule defines a small MS4 stormwater management program as a program comprising six elements that, when implemented in concert, are expected to result in significant reductions of pollutants discharged into receiving waterbodies.

6 MINIMUM CONTROL MEASURES (MCMs):

MCM 1: Public Education and Outreach

MCM 2: Public Participation and Involvement

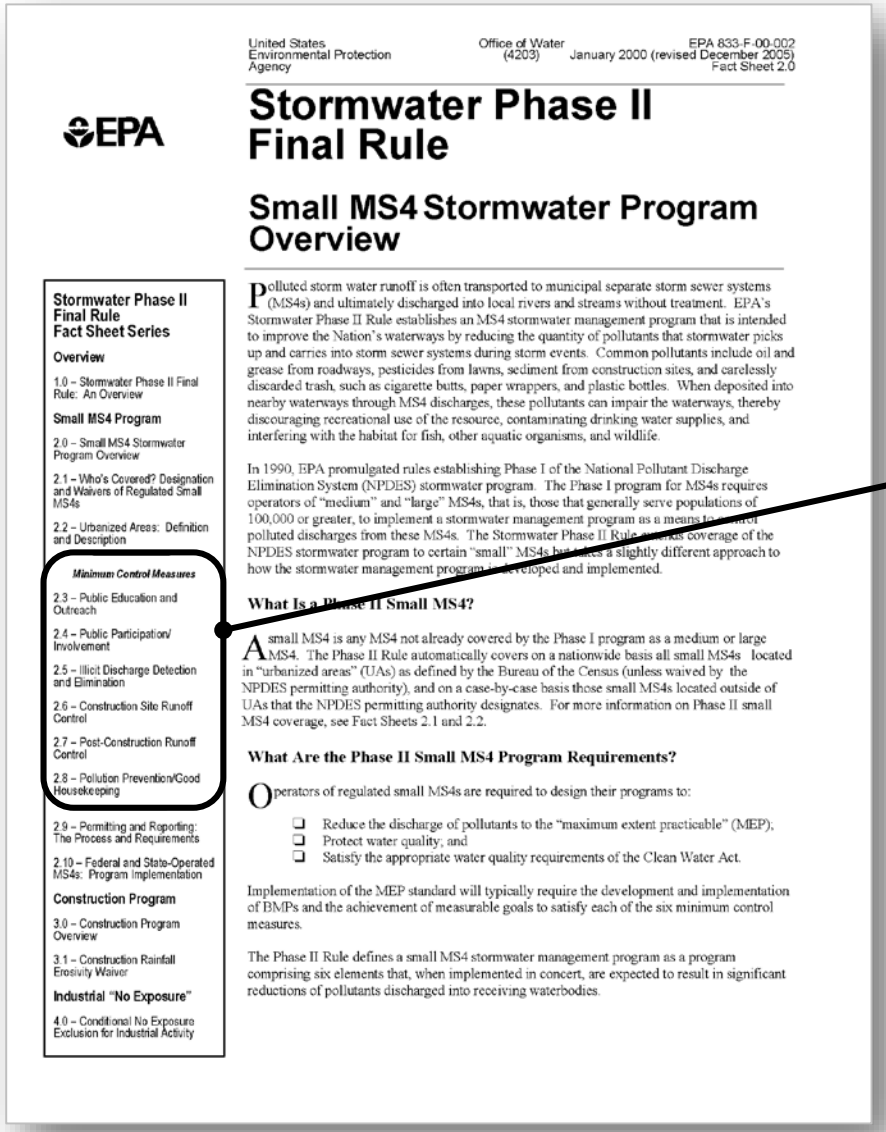
MCM 3: Illicit Discharge Detection and Elimination

MCM 4: Construction Site Runoff Control

MCM 5: Post-Construction Runoff Control

MCM 6: Pollution Prevention & Good Housekeeping

Post-Construction Stormwater Runoff Program Requirements



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MC
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and

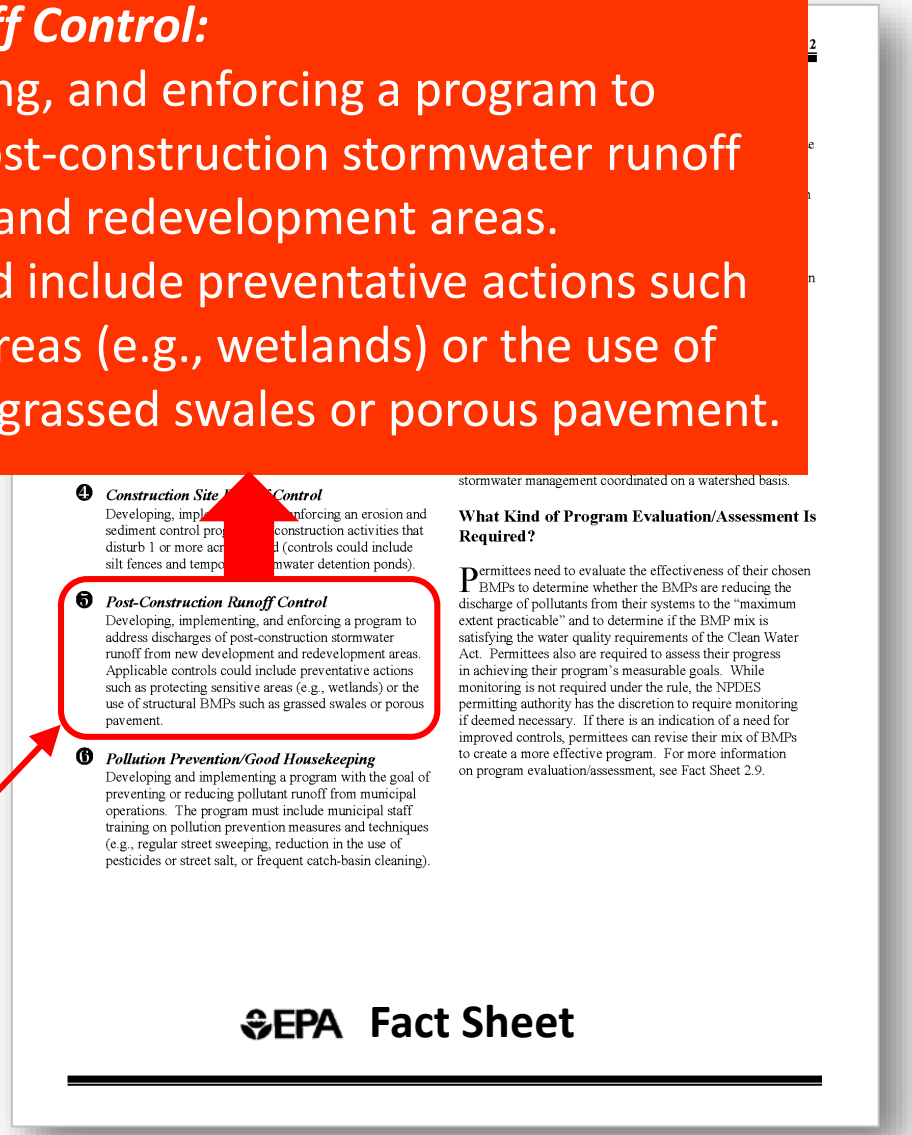
MCM 3: Illicit Discharge Detection and Elimination

MCM 4: Construction Site Runoff Control

MCM 5: Post-Construction Runoff Control

MCM 6: Pollution Prevention & Good Housekeeping

Post-Construction Runoff Control:
Developing, implementing, and enforcing a program to address discharges of post-construction stormwater runoff from new development and redevelopment areas. Applicable controls could include preventative actions such as protecting sensitive areas (e.g., wetlands) or the use of structural BMPs such as grassed swales or porous pavement.



❹ ***Construction Site … Control***
Developing, impl… enforcing an erosion and sediment control pro… construction activities that disturb 1 or more ac… d (controls could include silt fences and tempo… water detention ponds).

❺ ***Post-Construction Runoff Control***
Developing, implementing, and enforcing a program to address discharges of post-construction stormwater runoff from new development and redevelopment areas. Applicable controls could include preventative actions such as protecting sensitive areas (e.g., wetlands) or the use of structural BMPs such as grassed swales or porous pavement.

❻ ***Pollution Prevention/Good Housekeeping***
Developing and implementing a program with the goal of preventing or reducing pollutant runoff from municipal operations. The program must include municipal staff training on pollution prevention measures and techniques (e.g., regular street sweeping, reduction in the use of pesticides or street salt, or frequent catch-basin cleaning).

stormwater management coordinated on a watershed basis.

What Kind of Program Evaluation/Assessment Is Required?

Permittees need to evaluate the effectiveness of their chosen BMPs to determine whether the BMPs are reducing the discharge of pollutants from their systems to the "maximum extent practicable" and to determine if the BMP mix is satisfying the water quality requirements of the Clean Water Act. Permittees also are required to assess their progress in achieving their program's measurable goals. While monitoring is not required under the rule, the NPDES permitting authority has the discretion to require monitoring if deemed necessary. If there is an indication of a need for improved controls, permittees can revise their mix of BMPs to create a more effective program. For more information on program evaluation/assessment, see Fact Sheet 2.9.

EPA Fact Sheet

Post-Construction Stormwater Runoff Program Requirements

United States Environmental Protection Agency | Office of Water (4203) | EPA 833-F-00-009 January 2000 (revised December 2005) Fact Sheet 2.7

Post-Construction Runoff Control Minimum Control Measure

What Is Required?

The Phase II Final Rule requires an operator of a regulated small MS4 to develop, implement, and enforce a program to reduce pollutants in post-construction runoff to their MS4 from new development and redevelopment projects that result in the land disturbance of greater than or equal to 1 acre. The small MS4 operator is required to:

- ❑ Develop and implement strategies which include a combination of structural and/or non-structural best management practices (BMPs);
- ❑ Have an ordinance or other regulatory mechanism requiring the implementation of post-construction runoff controls to the extent allowable under State, Tribal or local law;
- ❑ Ensure adequate long-term operation and maintenance of controls;
- ❑ Determine the appropriate best management practices and measurable goals for this minimum control measure.

Post-Construction Stormwater Runoff Program Requirements

United States Environmental Protection Agency | Office of Water (4203) | January 2000 (| -F-00-009 mber 2005) ct Sheet 2.7

EPA

Post-Construction Ru f Control Minimum Control Me ure

AUDIT ITEMS

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- ❑ Ensure adequate long-term operation and maintenance of controls;
- ❑ Determine the appropriate best management practices and measurable goals for this minimum control measure.

United States Environmental Protection Agency | Office of Water (4203) | EPA 833-F-00-009 January 2000 (revised December 2005) Fact Sheet 2.7

Post-Construction Runoff Control Minimum Control Measure

❑ NON-STRUCTURAL BMPs

- **Planning Procedures**. Runoff problems can be addressed efficiently with sound planning procedures. Local master plans, comprehensive plans, and zoning ordinances can promote improved water quality in many ways, such as guiding the growth of a community away from sensitive areas to areas that can support it without compromising water quality.
- **Site-Based BMPs**. These BMPs can include buffer strip and riparian zone preservation, minimization of disturbance and imperviousness, and maximization of open space.

NON-STRUCTURAL BMPS

STRUCTURAL BMPS

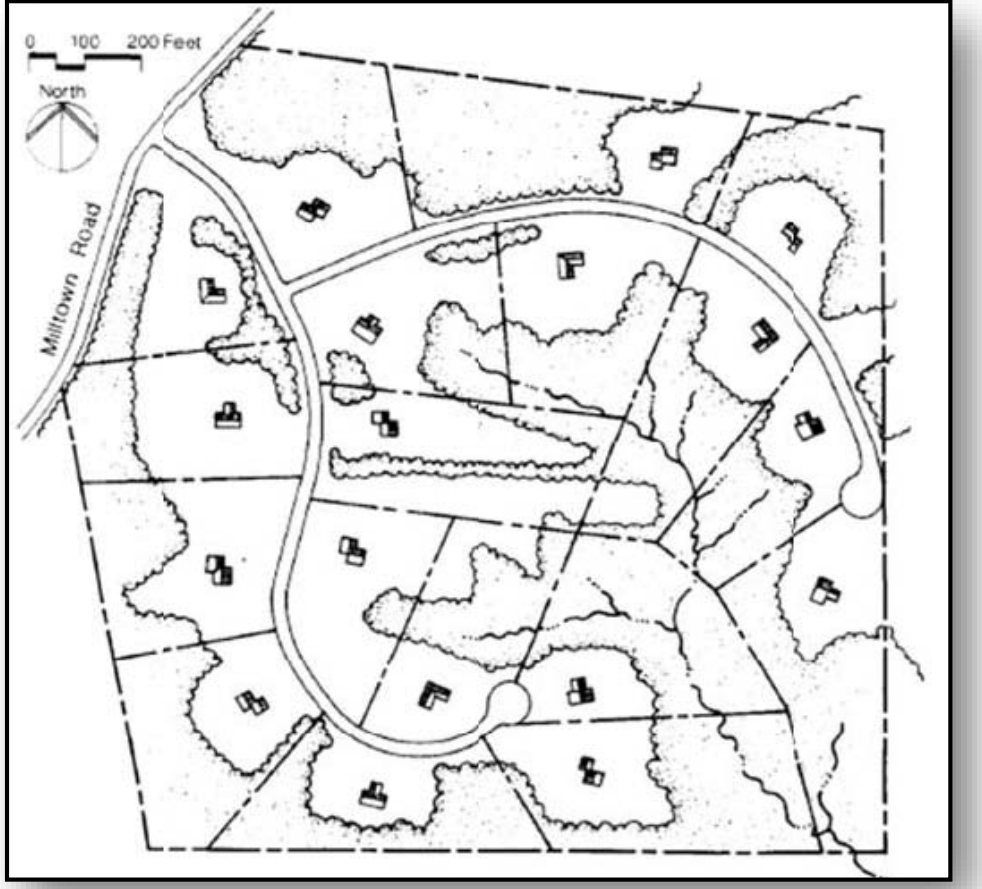
CLUSTER-TYPE DEVELOPMENT

PROTECT NATURAL FLOW PATHWAYS

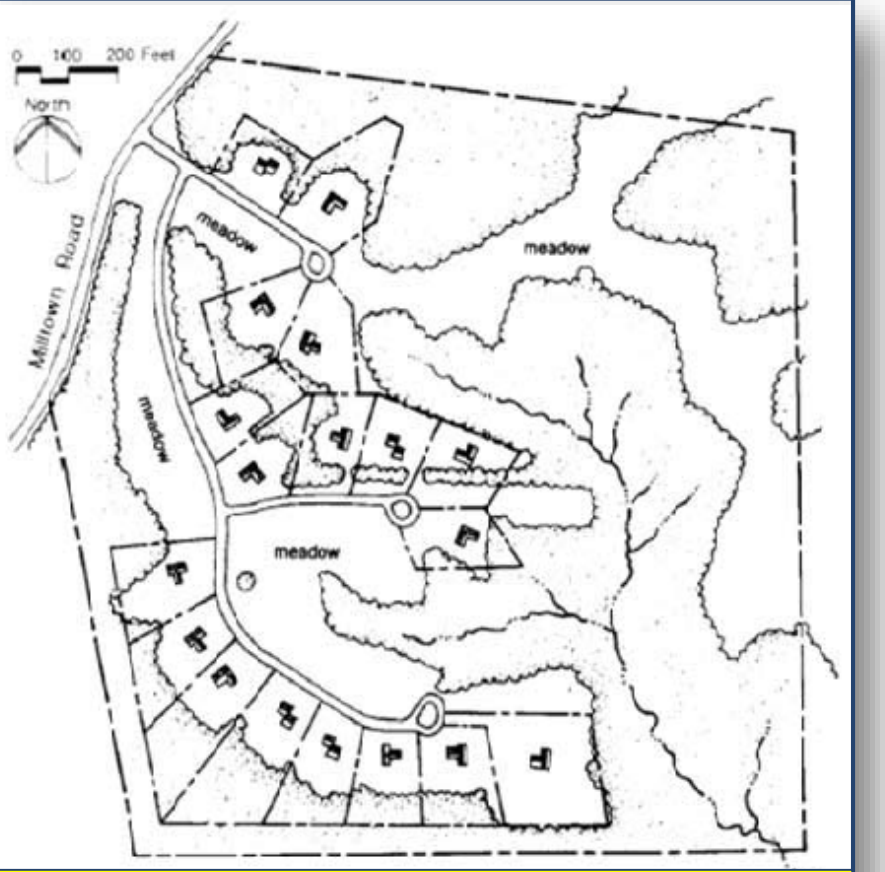
PROTECT RIPARIAN BUFFER AREAS

PROTECT SENSITIVE AREAS

CONVENTIONAL DEVELOPMENT (18 Homes)



CLUSTERED DEVELOPMENT (18 Homes)



Benefits:

- **Reduces Required Infrastructure**
- **Protects Environmentally Sensitive Areas**

Source: Growing Greener, Putting Conservation into Local Codes, Natural Land Trusts, Inc. 1997

NON-STRUCTURAL BMPS

STRUCTURAL BMPS

- CLUSTER-TYPE DEVELOPMENT
- **PROTECT NATURAL FLOW PATHWAYS**
- PROTECT RIPARIAN BUFFER AREAS
- PROTECT SENSITIVE AREAS

NATURAL DRAINAGE FEATURES CAN GUIDE DESIGN

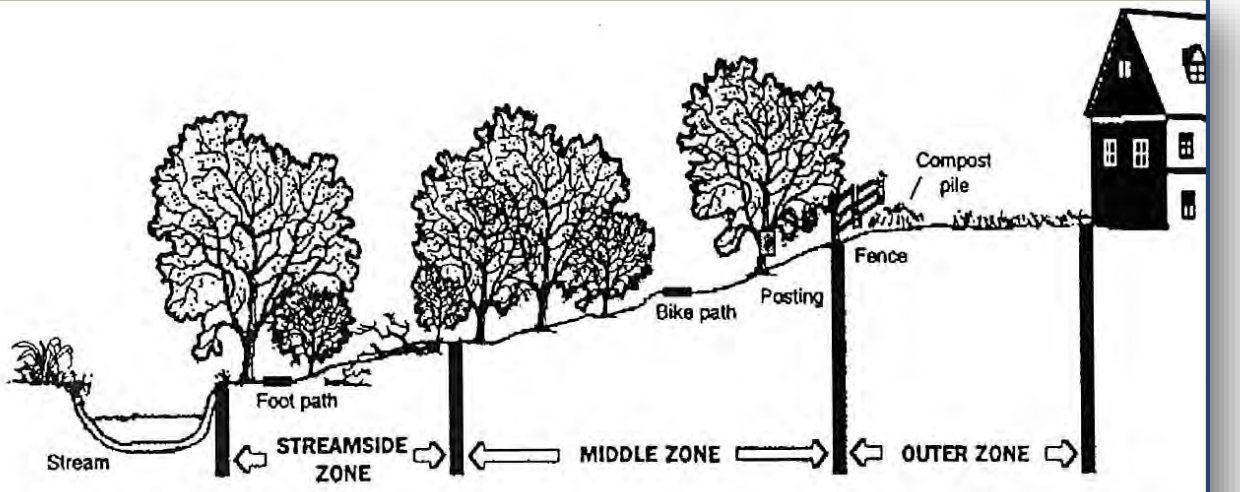
Benefits:

- **Maximizes Natural Hydrological Functions**
- **Reduces Amount of Structural Practices (Pipes)**
- **Reduces Management Costs**

Source: Delaware Department of Natural Resources and Environmental Control, Conservation Design for Stormwater Management

- CLUSTER-TYPE DEVELOPMENT
- PROTECT NATURAL FLOW PATHWAYS
- **PROTECT RIPARIAN BUFFER AREAS**
- PROTECT SENSITIVE AREAS

BUFFER WIDTH RECOMMENDATIONS



CHARACTERISTICS	STREAMSIDE ZONE	MIDDLE ZONE	OUTER ZONE
FUNCTION	Protect the physical integrity of the stream ecosystem	Provide distance between upland development and streamside zone	Prevent encroachment and filter backyard runoff
WIDTH	Min. 25 feet, plus wetlands and critical habitats	50 to 100 feet, depending on stream order, slope, and 100 year floodplain	25 foot minimum setback to structures
VEGETATIVE TARGET	Undisturbed mature forest. Reforest if grass	Managed forest, some clearing allowable	Forest encouraged, but usually turfgrass
ALLOWABLE USES	***Very Restricted*** e.g., flood control, utility right of ways, footpaths, etc.	***Restricted*** e.g., some recreational uses, some stormwater BMPs, bike paths, tree removal by permit	***Unrestricted*** e.g., residential uses including lawn, garden, compost, yard wastes, most stormwater BMPs

Source: Schueler, Watershed Protection Techniques, 1994

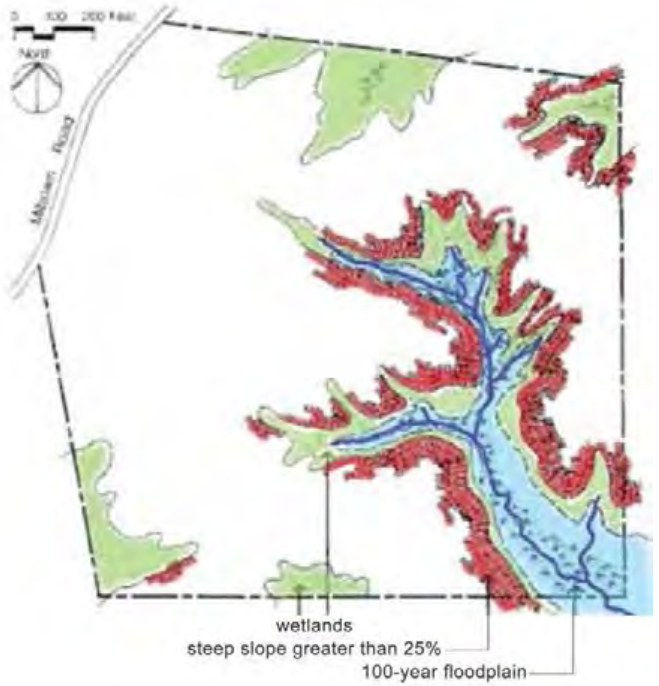
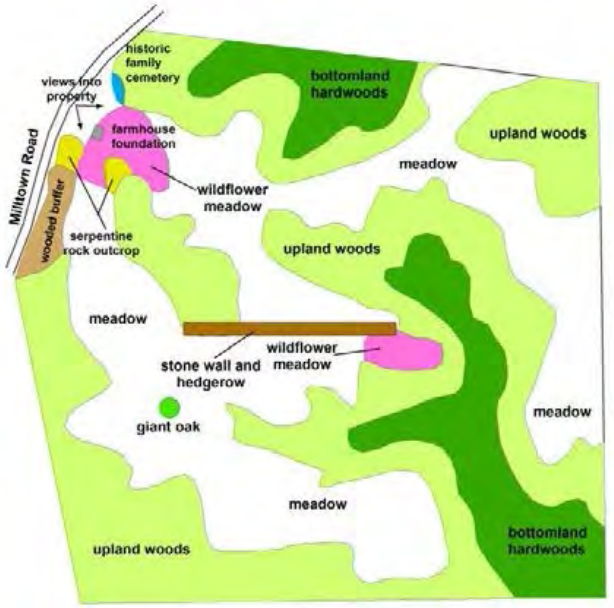
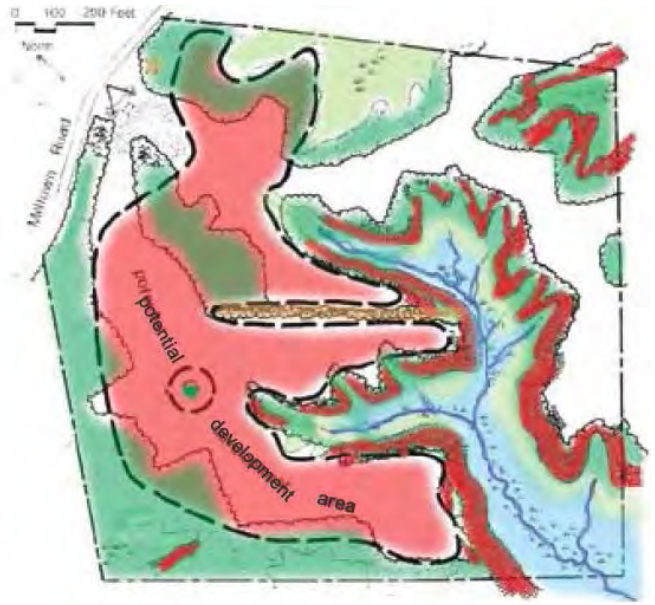
Benefits:

- **Improves Water Quality**
- **Reduces Runoff Velocities**
- **Reduces Flow**
- **Enhances Site Aesthetics, Habitat**

NON-STRUCTURAL BMPS

STRUCTURAL BMPS

- CLUSTER-TYPE DEVELOPMENT
- PROTECT NATURAL FLOW PATHWAYS
- PROTECT RIPARIAN BUFFER AREAS
- PROTECT SENSITIVE AREAS

MAP OF SENSITIVE AREAS	MAP OF SECONDARY RESOURCES	POTENTIAL DEVELOPMENT AREAS
		

Source: Arendt, Randall, 1997

Benefits:

- **Improves Water Quality**
- **Mitigation of Runoff Volume and Peak Rates**

United States Environmental Protection Agency
Office of Water (4203)
EPA 833-F-00-009
January 2000 (revised December 2005)
Fact Sheet 2.7

Post-Construction Runoff Control Minimum Control Measure

❑ STRUCTURAL BMPs

- **Stormwater Retention/Detention BMPs.** Retention or detention BMPs control stormwater by gathering runoff in wet ponds, dry basins, or multichamber catch basins and slowly releasing it to receiving waters or drainage systems. These practices can be designed to both control stormwater volume and settle out particulates for pollutant removal.
- **Infiltration BMPs**. Infiltration BMPs are designed to facilitate the percolation of runoff through the soil to ground water, and, thereby, result in reduced stormwater runoff quantity and reduced mobilization of pollutants. Examples include infiltration basins/trenches, dry wells, and porous pavement.
- **Vegetative BMPs**. Vegetative BMPs are landscaping features that, with optimal design and good soil conditions, remove pollutants, and facilitate percolation of runoff, thereby maintaining natural site hydrology, promoting healthier habitats, and increasing aesthetic appeal. Examples include grassy swales, filter strips, artificial wetlands, and rain gardens.

- **STORMWATER DETENTION BMPs**
  - Constructed Wetland
  - Dry Pond
  - Underground Detention
- **INFILTRATION BMPs**
  - Infiltration Basin
  - Infiltration Trench
  - Pervious Pavement
- **VEGETATIVE BMPs**
  - Rain Garden
  - Vegetated Swale
  - Vegetated Filter Strip

DETENTION BASINS - CONSTRUCTED WETLAND

A constructed wetland is a type of detention basin that is developed as shallow marsh system planted with emergent vegetation designed to treat stormwater runoff.

Figure 1 Photo Courtesy of USDA NRCS

Variations

- Shallow Wetlands
- Extended Detention Shallow Wetlands
- Pocket Wetlands
- Pond/Wetland

Key Design Features

- Storage capacity highly dependent on available site area
- Outlet structure configuration determines peak rate reduction effectiveness
- Regular maintenance of vegetation and sediment removal required
- Natural high groundwater table required
- Relatively impermeable soils or impermeable liner
- Forebay for sediment collection and removal
- Dewatering mechanism required
- Stabilized emergency overflow and energy dissipation at all outlets

Applications	
Residential	Yes
Commercial	Yes
Ultra Urban	No
Industrial	Yes
Retrofit	Yes
Highway/Road	Yes
Recreational	Yes

Stormwater Quantity Functions	
Volume	Low
Groundwater Recharge	None or Low
Peak Rate	High

Stormwater Quality Functions
Varies by type as follows:

Type	TSS	TP	TN	Temperature
Constructed Wetland	High	Medium	Medium	Low/Medium

- **STORMWATER DETENTION BMPs**
  - Constructed Wetland
  - Dry Pond
  - Underground Detention
- **INFILTRATION BMPs**
  - Infiltration Basin
  - Infiltration Trench
  - Pervious Pavement
- **VEGETATIVE BMPs**
  - Rain Garden
  - Vegetated Swale
  - Vegetated Filter Strip

DETENTION BASINS - DRY POND

Also called Dry-bottom Detention Ponds, Dry Ponds are earthen structures that provide temporary storage of runoff and release the stored volume of water over time to help reduce flooding.

Figure 1 Photograph Courtesy of US Environmental Protection Agency

Key Design Features

- Storage capacity highly dependent on available site area
- Outlet structure configuration determines peak rate reduction effectiveness
- Regular maintenance of vegetation and sediment removal required
- Relatively impermeable soils or impermeable liner
- Forebay for sediment collection and removal
- Stabilized emergency overflow and energy dissipation at all outlets

Applications	
Residential	Yes
Commercial	Yes
Ultra Urban	No
Industrial	Yes
Retrofit	Yes
Highway/Road	Yes
Recreational	Yes

Stormwater Quantity Functions	
Volume	Low
Groundwater Recharge	None or Low
Peak Rate	High

Stormwater Quality Functions

Type	TSS	TP	TN	Temperature
Dry Pond	Medium	Medium	Low	Low

- **STORMWATER DETENTION BMPs**
  - Constructed Wetland
  - Dry Pond
  - Underground Detention
- **INFILTRATION BMPs**
  - Infiltration Basin
  - Infiltration Trench
  - Pervious Pavement
- **VEGETATIVE BMPs**
  - Rain Garden
  - Vegetated Swale
  - Vegetated Filter Strip

DETENTION BASINS - UNDERGROUND DETENTION

An Underground Detention system is a type of detention basin that is completely underground.

Figure 1 Photograph courtesy of Vertex Design Group

Variations

- Underground Detention Beds
- Underground Vaults

Key Design Features

- Storage capacity highly dependent on available site area
- Outlet structure configuration determines peak rate reduction effectiveness
- Regular maintenance of vegetation and sediment removal required
- Relatively impermeable soils or impermeable liner
- Forebay for sediment collection and removal
- Stabilized emergency overflow and energy dissipation at all outlets

Applications	
Residential	Yes
Commercial	Yes
Ultra Urban	Yes
Industrial	Yes
Retrofit	Yes
Highway/Road	Yes
Recreational	Yes

Stormwater Quantity Functions	
Volume	Low
Groundwater Recharge	None or Low
Peak Rate	High

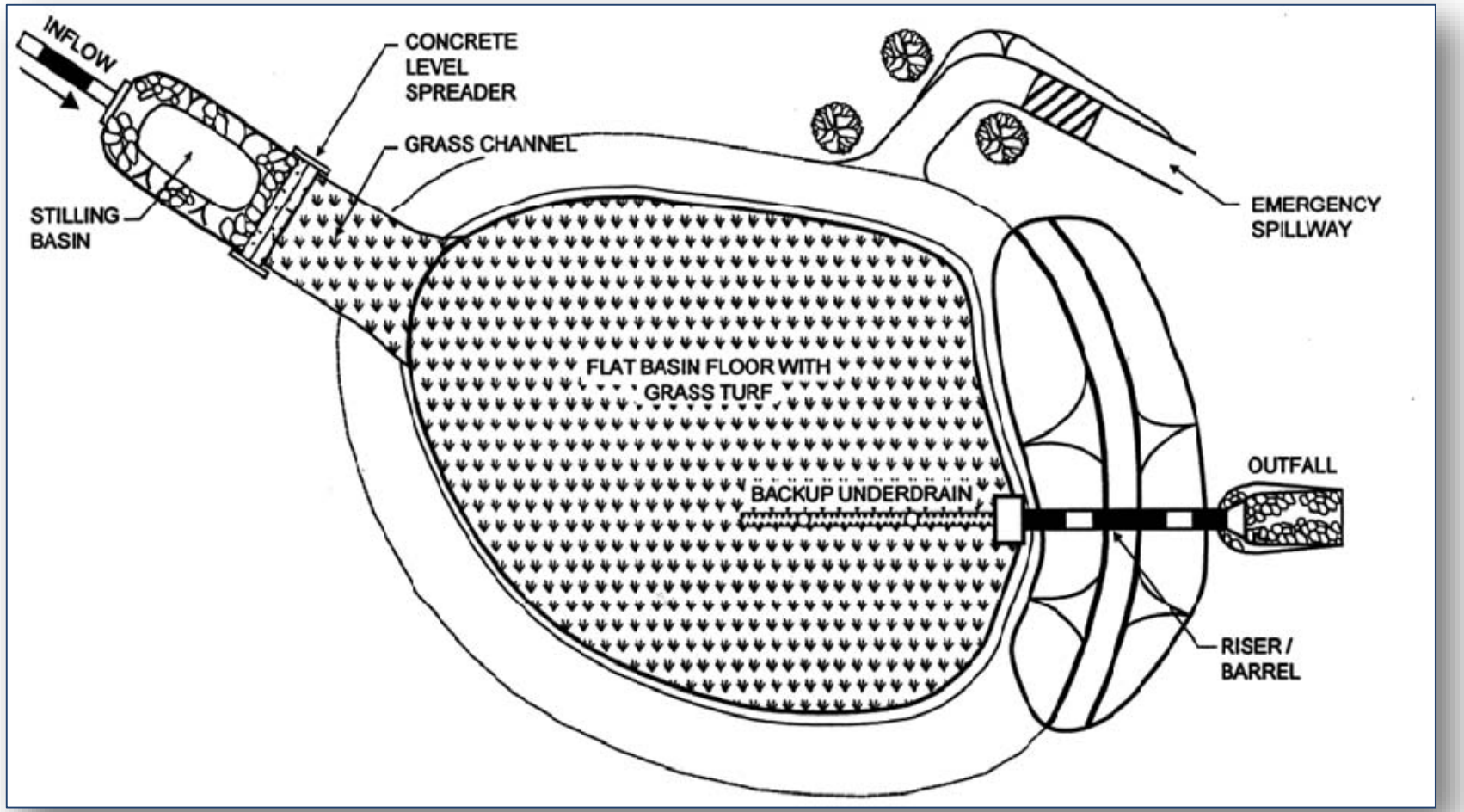
Stormwater Quality Functions

Type	TSS	TP	TN	Temperature
Underground Detention	N/A	N/A	N/A	N/A

NON-STRUCTURAL BMPS

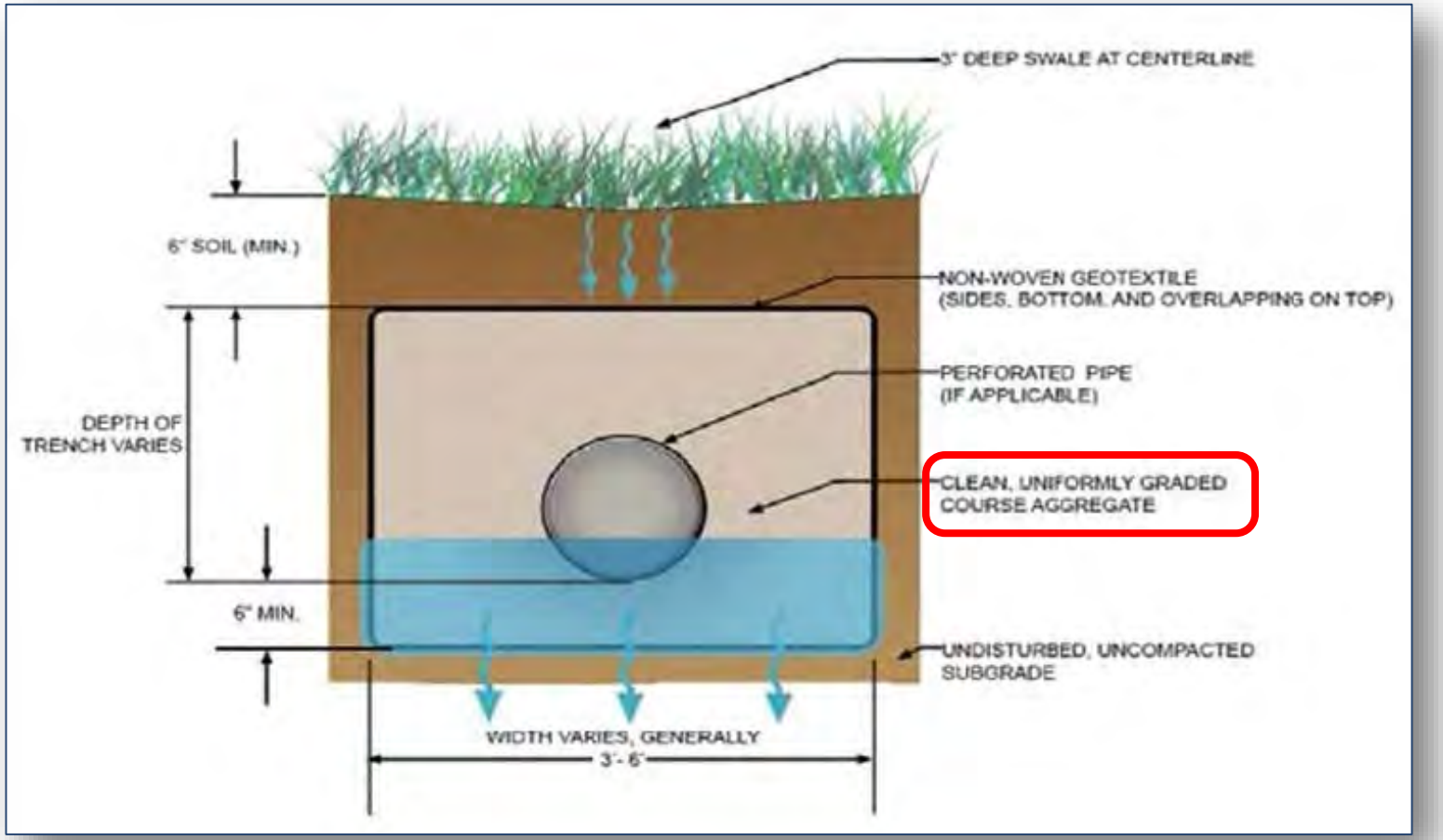
STRUCTURAL BMPS

- STORMWATER DETENTION BMPs
  - Constructed Wetland
  - Dry Pond
  - Underground Detention
- INFILTRATION BMPs
  - Infiltration Basin
  - Infiltration Trench
  - Pervious Pavement
- VEGETATIVE BMPs
  - Rain Garden
  - Vegetated Swale
  - Vegetated Filter Strip



- Infiltration Basins are typically used for drainage areas of **5 to 50 acres**
- The use of an underdrain should be considered to help drain the basin

- STORMWATER DETENTION BMPs
  - Constructed Wetland
  - Dry Pond
  - Underground Detention
- INFILTRATION BMPs
  - Infiltration Basin
  - Infiltration Trench
  - Pervious Pavement
- VEGETATIVE BMPs
  - Rain Garden
  - Vegetated Swale
  - Vegetated Filter Strip



- The infiltration trench is typically comprised of a section of **uniformly graded course aggregate**, such as AASHTO No. 3, which ranges one to two inches in gradation. The critical requirements are that the aggregate be uniformly-graded, clean-washed, and contain at least 40 percent void space.

NON-STRUCTURAL BMPS

STRUCTURAL BMPS

- STORMWATER DETENTION BMPs
  - Constructed Wetland
  - Dry Pond
  - Underground Detention
- INFILTRATION BMPs
  - Infiltration Basin
  - Infiltration Trench
  - Pervious Pavement
- VEGETATIVE BMPs
  - Rain Garden
  - Vegetated Swale
  - Vegetated Filter Strip

PERVIOUS PAVEMENT WITH INFILTRATION

Pervious pavement is an infiltration technique that combines stormwater infiltration, storage, and structural pavement consisting of a permeable surface underlain by a storage reservoir. Pervious pavement is well suited for parking lots, walking paths, sidewalks, playgrounds, plazas, tennis courts, and other similar uses.

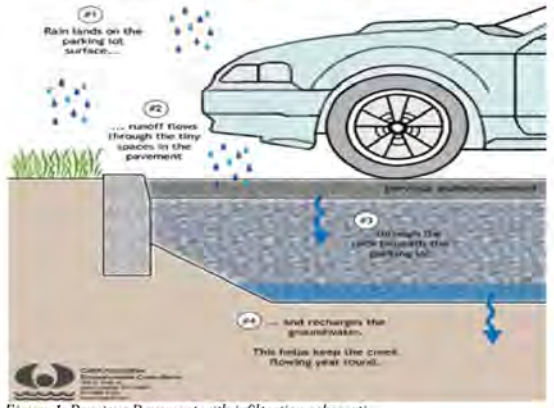


Figure 1 Pervious Pavement with infiltration schematic

Applications		Stormwater Quantity Functions	
Residential	Yes*	Volume	High
Commercial	Yes	Groundwater Recharge	High
Ultra Urban	Yes	Peak Rate	Med/High
Industrial	Yes*	Stormwater Quality Functions	
Retrofit	Yes*	TSS	High**
Highway/Road	Limited	TP	Med/High
Recreational	Yes	TN	Medium
		Temperature	High

Additional Considerations	
Cost	Medium
Maintenance	High
Winter Performance	Medium

*Applicable with special design considerations.
**Pretreatment for TSS is recommended.

Variations

- Porous asphalt
- Pervious concrete
- Permeable paver blocks
- Reinforced turf/gravel

Key Design Features

- Follow soil infiltration testing protocol (Appendix D4) and infiltration BMP guidelines
- Do not infiltrate on compacted soil
- Level storage bed bottoms
- Provide positive stormwater overflow from bed
- Surface permeability > 20"/hour

Site Factors

- Water table/Bedrock separation: two-foot minimum***
- Feasibility on steeper slopes: Low
- Potential hotspots: Not without design of pretreatment system

Benefits

- Volume control and groundwater recharge, moderate peak rate control
- Dual use for pavement structure and stormwater management

Limitations

- Pervious pavement not suitable for all uses
- High maintenance needs

*** Four feet recommended, if possible

- STORMWATER DETENTION BMPs
  - Constructed Wetland
  - Dry Pond
  - Underground Detention
- INFILTRATION BMPs
  - Infiltration Basin
  - Infiltration Trench
  - Pervious Pavement
- VEGETATIVE BMPs
  - Rain Garden
  - Vegetated Swale
  - Vegetated Filter Strip

BIORETENTION (RAIN GARDENS)

Bioretention areas (often called rain gardens) are shallow surface depressions planted with specially selected native vegetation to capture and treat stormwater runoff from rooftops, streets, and parking lots.

Figure 1 Residential rain garden, Lenexa KS (USEPA, picasaweb)

Stormwater Quantity Functions			
Residential	Yes	Volume	Med/High
Commercial	Yes	Groundwater Recharge	Med/High
Ultra Urban	Limited	Peak Rate	Medium
Industrial	Yes	Stormwater Quality Functions	
Retrofit	Yes	TSS	High
Highway/Road	Yes	TP	Medium
Recreational	Yes	TN	Medium
		Temperature	High

Additional Considerations	
Cost	Medium
Maintenance	Medium
Winter Performance	Medium

Variations

- Subsurface storage/infiltration bed
- Use of underdrain
- Use of impervious liner

Key Design Features

- Flexible in size and infiltration
- Ponding depths 6-18 inches for drawdown within 48 hours
- Native plants
- Amend soil as needed
- Provide positive overflow for extreme storm events

Site Factors

- Water table/bedrock separation: two-foot minimum, four foot recommended
- Soils: HSG A and B preferred; C & D may require an underdrain (see Infiltration BMP)
- Feasibility on steeper slopes
- Potential hotspots: Yes with pretreatment and/or impervious liner
- Maximum drainage area: 5:1, not more than 1 acre to one area

Benefits

- Volume control and groundwater recharge, moderate peak rate control, filtration
- Versatile with broad applicability
- Enhance site aesthetics, habitat
- Potential air quality and climate benefits

Limitations

- Higher maintenance until vegetation is established
- Limited impervious drainage area
- Requires careful selection and establishment of plants

VEGETATED SWALE

A vegetated swale (or bioswale) is a shallow stormwater channel that is densely planted with a variety of grasses, shrubs, and/or trees designed to slow, filter, and infiltrate stormwater runoff. Check dams can be used to improve performance and maximize infiltration, especially in steeper areas.

Figure 1 Vegetated Swale, Philadelphia, PA (USEPA, picasaweb)

Applications		Stormwater Quantity Functions	
Residential	Yes	Volume	Low/Med
Commercial	Yes	Groundwater Recharge	Low/Med
Ultra Urban	Limited	Peak Rate	Low/Med
Industrial	Yes	Stormwater Quality Functions	
Retrofit	Limited	TSS	Med/High
Highway/Road	Yes	TP	Low/High
Recreational	Yes	TN	Medium
		Temperature	Medium

Additional Considerations	
Cost	Low/Med
Maintenance	Low/Med
Winter Performance	Medium

Variations

- Vegetated swale with infiltration trench
- Linear wetland swale
- Grass swale

Key Design Features

- Handles the 10-year storm event with some freeboard
- Two-year storm flows do not cause erosion
- Maximum size is five acres
- Bottom width of two to eight feet
- Side slopes from 3:1 (H:V) to 5:1
- Longitudinal slope from one to six percent
- Check dams can provide additional storage and infiltration

Site Factors

- Water table to bedrock depth: 2 foot minimum.*
- Soils: A, B preferred; C & D may require an underdrain (see infiltration BMP)
- Slope: 1 to 6 percent. (less than one percent can be used w/ infiltration)
- Potential hotspots: No
- Maximum drainage area: 5 acres

Benefits

- Can replace curb and gutter for site drainage and provide significant cost savings
- Water quality
- Peak and volume control with

Limitations

- Limited application in areas where space is a concern
- Unless designed for infiltration, there is limited peak and volume control

* four feet recommended, if possible

VEGETATED FILTER STRIP

A vegetated filter strip is a permanent, maintained strip of vegetation designed to slow runoff velocities and filter out sediment and other pollutants from urban stormwater. Filter strips require the presence of sheet flow across the strip, which can be achieved through the use of level spreaders. Frequently, filter strips are designed where runoff is directed from a parking lot into a stone trench, a grass strip, and a longer naturally vegetative strip.

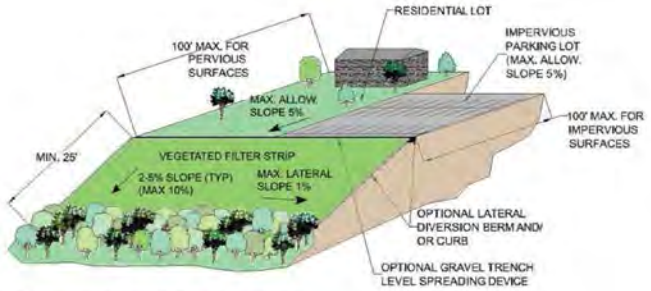


Figure 2 Diagram showing elements of a vegetated filter strip

Applications		Stormwater Quantity Functions	
Residential	Yes	Volume	Low
Commercial	Yes	Groundwater Recharge	Low
Ultra Urban	Limited*	Peak Rate	Low
Industrial	Limited*	Stormwater Quality Functions	
Retrofit	Yes	TSS	Med/High
Highway/Road	Yes	TP	Med/High
Recreational	Yes	NO_3	Med/High
		Temperature	Med/High

* According to site characteristics

Additional Considerations	
Cost	Low
Maintenance	Low/Medium Varies dependent on type of vegetation
Winter Performance	High

Variations

- Turf grasses
- Prairie grasses, shrubs, and groundcover vegetation, including trees
- Indigenous woods and dense vegetation

Key Design Features

- Use with level spreaders to promote sheet flow across strips
- Longitudinal slope from 1-6 percent
- Maintain dense vegetation

Site Factors

- Water table to bedrock depth: N/A
- Soils: N/A for permeability
- Slope: 2-5 percent preferred (1-10 percent if soils/vegetation allow)
- Potential hotspots: Yes with special design considerations
- Max. drainage area: 100 feet impervious or 150 feet pervious up gradient

Benefits

- Low cost
- Good water quality performance
- Aesthetic and habitat benefits

Limitations

- Generally should be coupled with other BMPs for comprehensive stormwater management

POST-CONSTRUCTION BMPs FOR STORMWATER "HOT SPOTS": PRE-TREATMENT OPTIONS

Stormwater Hot Spots	Minimum Pre-Treatment Options
Vehicle Maintenance and Repair Facilities	A, E, F, G
Vehicle Fueling Stations	A, D, G
Drive-through Restaurants, Pharmacies, Convenience Stores	B, C, D, I, K
Outdoor Chemical Mixing or Handling	G, H
Outdoor Storage of Liquids	G
Commercial Nursery Operations	I, J, L
Other Uses or Activities Designated by Appropriate Authority	As Required

Minimum Pre-Treatment Options	
A	Oil/Water Separators / Hydrodynamic Separators
B	Sediment Traps/Catch Basin Sumps
C	Trash/Debris Collectors in Catch Basins
D	Water Quality Inserts for Inlets
E	Use of Drip Pans and/or Dry Sweep Material under Vehicles/Equipment
F	Use of Absorbent Devices to Reduce Liquid Releases
G	Spill Prevention and Response Program
H	Diversion of Stormwater away from Potential Contamination Areas
I	Vegetated Swales/Filter Strips
J	Constructed Wetlands
K	Stormwater Filters (Sand, Peat, Compost, etc.)
L	Stormwater Collection and Reuse (especially for irrigation)
M	BMPs that are a part of a Stormwater Pollution Prevention Plan (SWPPP)

State Audit Form

Wetlands and Storm Water Section **Storm Water Program** **Office of Water Quality** **Indiana Department of Environmental Management** Municipal Separate Storm Sewer System (MS4) Minimum Control Measure Audit: • Construction Site Run-off • Post-Construction Run-off	**Authority:** *This inspection was conducted pursuant to Indiana Code (IC) 13-14-2-2 and is consistent with the requirements of IC 13-14-5.* **Date of Audit:** **Report Issued:** **Audit Conducted By:** **Report Prepared By:**

This audit report is a cumulative overview of the MS4 program for the construction site run-off and post-construction run-off minimum control measures. The report provides general background information, observations, recommendations, and requirements. The purpose of the audit is to identify program areas where an MS4 can improve program implementation, but to also identify deficiencies and/or violations that will require the MS4 to respond or address within specified timelines.

Section A: MS4 Program Information

MS4 Entity:	**County:**
MS4 Permit Number:	**Permit Start and Expiration:**
MS4 Operator:	
MS4 Coordinator/Representative:	
Audit Participants:	
Construction Certification Date: **Post-Construction Certification Date:**	

State Audit Form

Wetlands and Storm Water Section **Storm Water Program** **Office of Water Quality** **Indiana Department of Environmental Management** Municipal Separate Storm Sewer System (MS4) Minimum Control Measure Audit: • Construction Site Run-off • Post-Construction Run-off	**Authority:** *This inspection was conducted pursuant to Indiana Code (IC) 13-14-2-2 and is consistent with the requirements of IC 13-14-5.* **Date of Audit:** **Report Issued:** **Audit Conducted By:** **Report Prepared By:**

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Section A: MS4 Program Information	
MS4 Entity:	**County:**
MS4 Permit Number:	**Permit Start and Expiration:**
MS4 Operator:	
MS4 Coordinator/Representative:	
Audit Participants:	
Construction Certification Date: **Post-Construction Certification Date:**	

State Audit Form

Section B: Overall Program Assessment - Construction Site Run-off
(S = Satisfactory, M = Marginal, U = Unsatisfactory, NE = Not Evaluated, NA = Not Applicable)

S M U NE NA
(B1) ☐ ☐ ☐ ☐ ☐ The construction site ordinance meets the intent of 327 IAC 15-5.
Comment:
Recommendations:
Requirements:

S M U NE NA
(B2) ☐ ☐ ☐ ☐ ☐ Requirements and standards have been developed and/or adopted for the implementation of measures associated with erosion, sedimentation, and other waste on construction sites.
Comment:
Recommendations:
Requirements:

S M U NE NA
(B3) ☐ ☐ ☐ ☐ ☐ Construction plans submitted for regulated projects are reviewed in accordance with the local MS4 ordinance.
Comment:
Recommendations:
Requirements:

S M U NE NA
(B4) ☐ ☐ ☐ ☐ ☐ Construction projects are managed through a tracking system that includes name, address/location, duration, indication of compliance actions, and status (active NOI or equivalent and termination).
Comment:
Recommendations:
Requirements:

S M U NE NA
(B5) ☐ ☐ ☐ ☐ ☐ The construction site run-off inspection program has established procedures and written policy for program implementation; including sites that are a priority for inspection.
Comment:
Recommendations:
Requirements:

S M U NE NA
(B6) ☐ ☐ ☐ ☐ ☐ Policy and procedures are implemented to enforce the construction site run-off program.
The MS4 utilizes ☐ Fines ☐ Stop work orders ☐ Penalties ☐ Permit suspension
Comment:
Recommendations:
Requirements:

S M U NE NA
(B7) ☐ ☐ ☐ ☐ ☐ MS4 personnel responsible for plan review, inspection, and enforcement of construction activities attend annual training.
Comment:
Recommendations:
Requirements:

S M U NE NA
(B8) ☐ ☐ ☐ ☐ ☐ The construction site run-off program is reviewed at least once every five (5) years.
Comment:
Recommendations:
Requirements:

(B9) Overall performance in administering the construction site run-off minimum control measure.
Comment:
Recommendations:
Requirements:

Section C: Overall Program Assessment - Post-construction Site Run-off
(S = Satisfactory, M = Marginal, U = Unsatisfactory, NE = Not Evaluated, NA = Not Applicable)

S M U NE NA
(C1) ☐ ☐ ☐ ☐ ☐ The post-construction ordinance addresses local resource issues and meets the intent of 327 IAC15-5.
Comment:
Recommendations:
Requirements:

S M U NE NA
(C2) ☐ ☐ ☐ ☐ ☐ Requirements and standards have been developed and/or adopted for the implementation of measures associated with post-construction site run-off.
Comment:
Recommendations:
Requirements:

S M U NE NA
(C3) ☐ ☐ ☐ ☐ ☐ The MS4 directs physical growth away from sensitive areas and towards those that will not compromise water quality. The MS4 manages the selection of measures in wellhead protection areas, discharges to other sensitive resource areas, and where applicable sinkholes.
Comment:
Recommendations:
Requirements:

S M U NE NA
(C4) ☐ ☐ ☐ ☐ ☐ New retail gasoline outlets and refueling areas that replace their existing fuel tank systems are required by ordinance or other means to design and install appropriate measures to reduce lead, copper, zinc and polyaromatic hydrocarbons in storm water run-off from the facility.
Comment:
Recommendations:
Requirements:

S M U NE NA
(C5) ☐ ☐ ☐ ☐ ☐ Post-construction plans submitted for regulated projects are reviewed in accordance with the local MS4 ordinance.
Comment:
Recommendations:
Requirements:

S M U NE NA
(C6) ☐ ☐ ☐ ☐ ☐ The MS4 requires the development and implementation of written operational and maintenance plans for all planned structural post-construction storm water management measures to ensure long-term functionality.
Comment:
Recommendations:
Requirements:

S M U NE NA
(C7) ☐ ☐ ☐ ☐ ☐ The post-construction site run-off inspection program has established procedures for implementation, including a mechanism to enforce failure to maintain a post-construction measure.
Comment:
Recommendations:
Requirements:

S M U NE NA
(C8) ☐ ☐ ☐ ☐ ☐ MS4 personnel responsible for plan review, inspection, and enforcement of the post-construction program attend annual training.
Comment:
Recommendations:
Requirements:

S M U NE NA
(C9) ☐ ☐ ☐ ☐ ☐ The post-construction site run-off program is reviewed at least once every five (5) years.
Comment:
Recommendations:
Requirements:

State Audit Form

Section D: Audit Summary	
Action Items: • **Recommendations:** (1) • **Required Actions:** (1)	
Attachments:	
Action by IDEM: Failure to address and/or respond to deficiencies and/or violations may result in further action by IDEM including, but not limited to a compliance meeting and/or a non-compliance letter. As warranted, IDEM will perform follow-up inspections for projects owned and operated by the MS4 as they are permitted and will periodically revisit sites regulated by the MS4.	
Section E: Audit Information	
Report Provided to: • Insert primary recipient	
Report distributed: ☐ **Email** ☐ **Mail** ☐ **Via Certified Mail:**	
Questions and the submittal of documents in response to this report should be directed to: Storm Water Specialist Phone: Email:	Section Chief Storm Water and Wetlands Program 100 North Senate Avenue IGCN, Room 1255 Indianapolis, Indiana 46204 Phone: 317-234-3980

State Audit Form

Section D: Audit Summary
Action Items: • **Recommendations:** (1) • **Required Actions:** (1)
Attachments:
Action by IDEM: Failure to address and/or respond to deficiencies and/or violations may result in further action by IDEM including, but not limited to a compliance meeting and/or a non-compliance letter. As warranted, IDEM will perform follow-up inspections for projects owned and operated by the MS4 as they are permitted and will periodically revisit sites regulated by the MS4.
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Report distributed: ☐ **Email** ☐ **Mail** ☐ **Via Certified Mail:**

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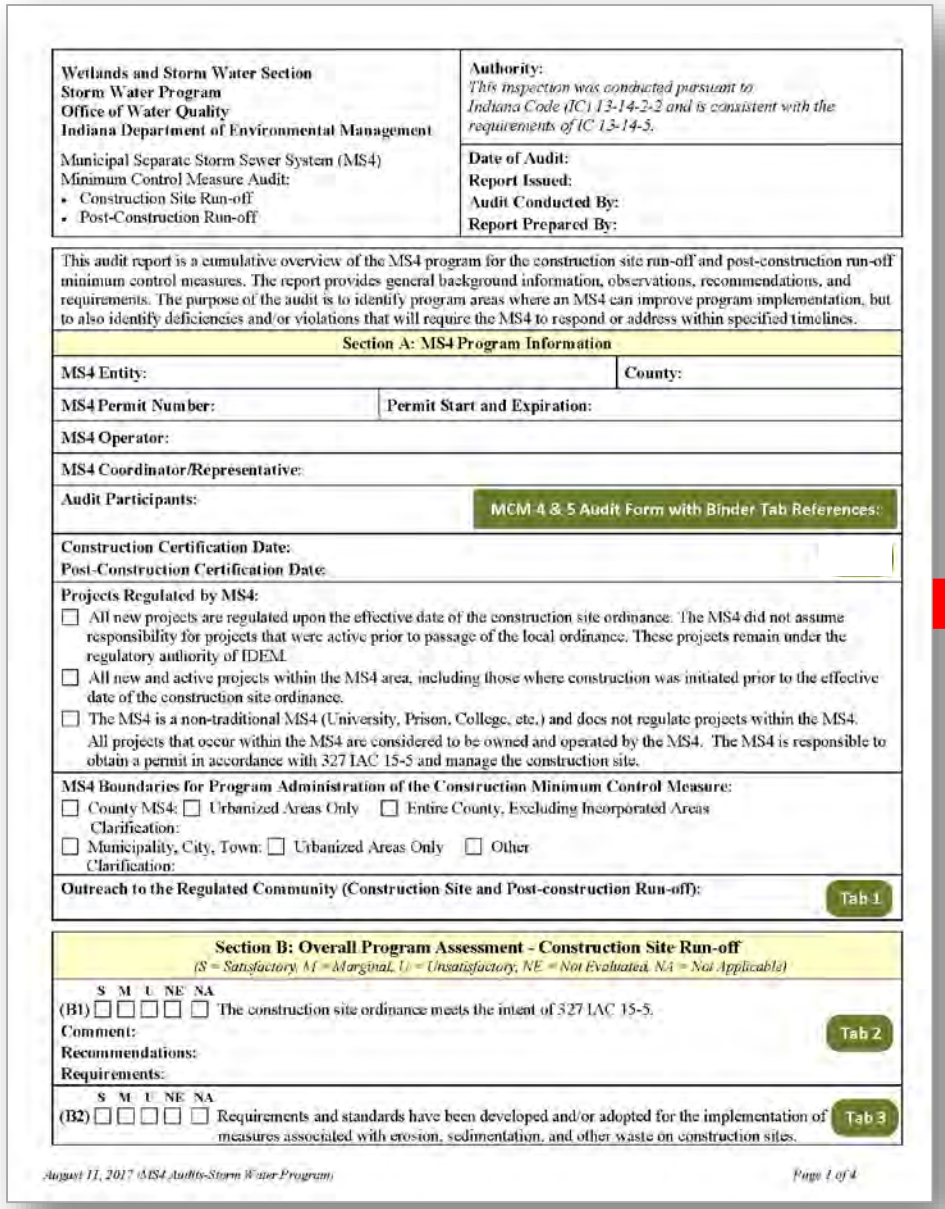


Wetlands and Storm Water Section
Storm Water Program
Office of Water Quality
Indiana Department of Environmental Management

Authority:
This inspection was conducted pursuant to Indiana Code (IC) 13-14-2-2 and is consistent with the requirements of IC 13-14-5.

Municipal Separate Storm Sewer System (MS4)
Minimum Control Measure Audit:
- Construction Site Run-off
- Post-Construction Run-off

Date of Audit:
Report Issued:
Audit Conducted By:
Report Prepared By:

This audit report is a cumulative overview of the MS4 program for the construction site run-off and post-construction run-off minimum control measures. The report provides general background information, observations, recommendations, and requirements. The purpose of the audit is to identify program areas where an MS4 can improve program implementation, but to also identify deficiencies and/or violations that will require the MS4 to respond or address within specified timelines.

Section A: MS4 Program Information

MS4 Entity: **County:**

MS4 Permit Number: **Permit Start and Expiration:**

MS4 Operator:

MS4 Coordinator/Representative:

Audit Participants: MCM 4 & 5 Audit Form with Binder Tab References:

Construction Certification Date:
Post-Construction Certification Date:

Projects Regulated by MS4:
- ☐ All new projects are regulated upon the effective date of the construction site ordinance. The MS4 did not assume responsibility for projects that were active prior to passage of the local ordinance. These projects remain under the regulatory authority of IDEM.
- ☐ All new and active projects within the MS4 area, including those where construction was initiated prior to the effective date of the construction site ordinance.
- ☐ The MS4 is a non-traditional MS4 (University, Prison, College, etc.) and does not regulate projects within the MS4. All projects that occur within the MS4 are considered to be owned and operated by the MS4. The MS4 is responsible to obtain a permit in accordance with 327 IAC 15-5 and manage the construction site.

MS4 Boundaries for Program Administration of the Construction Minimum Control Measure:
- ☐ County MS4: ☐ Urbanized Areas Only ☐ Entire County, Excluding Incorporated Areas
  Clarification:
- ☐ Municipality, City, Town: ☐ Urbanized Areas Only ☐ Other
  Clarification:

Outreach to the Regulated Community (Construction Site and Post-construction Run-off): Tab 1

Section B: Overall Program Assessment - Construction Site Run-off
(S = Satisfactory, M = Marginal, U = Unsatisfactory, NE = Not Evaluated, NA = Not Applicable)

S M U NE NA
(B1) ☐ ☐ ☐ ☐ ☐ The construction site ordinance meets the intent of 327 IAC 15-5. Tab 2

Comment:
Recommendations:
Requirements:

S M U NE NA
(B2) ☐ ☐ ☐ ☐ ☐ Requirements and standards have been developed and/or adopted for the implementation of measures associated with erosion, sedimentation, and other waste on construction sites. Tab 3

August 11, 2017 (MS4 Audits-Storm Water Program) *Page 1 of 4*

Create Binder with

Required Documents

INDIANA ADMINISTRATIVE CODE SECTIONS 327 IAC 15-13-15 & -16 **MCM 4 & MCM 5 Document Binder Index**	TAB NO.
MCM 4 & MCM 5 Certification documents; Outreach to Regulated Community.	Tab 1 Certification Outreach Materials
MCM 4 & MCM 5: Local Ordinance that governs Construction Site Run-off (MCM 4) and Post-Construction Site Run-off (MCM 5) and meets the intent of 327 IAC 15-5. Trigger for local drainage review is land disturbance area of _____. Trigger for local SWPPP is land disturbance area of _____.	Tab 2 Local Ordinance Governing Construction & Post-Construction Site Run-off
MCM 4 & MCM 5: Requirements & Technical Standards for implementation of measures associated with MCM 4 & MCM 5.	Tab 3 Local Technical Standards for MCM 4 & 5
MCM 4 Implementation Measures: (A) Construction plan review process; checklists. (B) Construction project tracking system that includes the name, address/location, duration, compliance actions, status (NOI and NOT). (C) Implementation procedures: written procedures for inspections; inspection checklist; procedures for priority site inspections. (D) Enforcement procedures.	Tab 4 MCM 4 Implementation Measures
MCM 4 & MCM 5: MS4 personnel responsible for plan review, inspection, and enforcement of construction activities and post-construction program activities shall attend annual training.	Tab 5 Training
MCM 4 & MCM 5: Ordinance and program review/update cycle.	Tab 6 Program Review Cycle
MCM 5 Implementation Measures: (A) Growth is directed away from sensitive areas. (B) MS4 manages the selection of measures in wellhead protection areas, discharges to other sensitive resource areas, and where applicable sinkholes. (C) New/Replaced Fuel Tanks: MS4 requires new and replacement fuel tanks to have appropriate stormwater BMPs. (D) Requirement for Post-Construction O&M plans. (E) Inspection procedures. (F) Mechanism to enforce failure to maintain a post-construction measure.	Tab 7 MCM 5 Implementation Measures

WHAT IS A STORMWATER POLLUTION PREVENTION PLAN?

A **Stormwater Pollution Prevention Plan**, or **SWPPP**, is more than simply the construction site's sediment and erosion control plan. The SWPPP is a requirement of the **Clean Water Act** and **State and local stormwater regulations**. The SWPPP has many key components that:

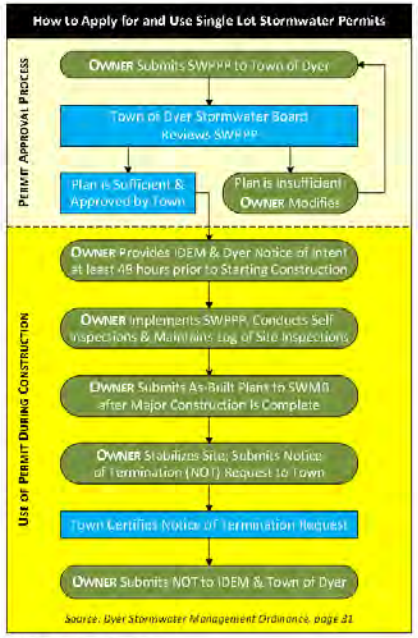
- Outline construction activities to occur on site;
- Serve as a communication tool between the site owner, other contractors and workers on the site, and site inspectors;
- Outline the water quality protection measures installed or completed at the site.

What information you will find in a SWPPP?

- ☐ A listing of key project personnel, expected roles during the construction process, and contact information for routine contacts & emergency situations.
- ☐ A Site Map showing activity staging and location of activities or practices.
- ☐ An identification of potential pollutant sources, as well as any activities or practices designed to reduce pollution.
- ☐ A record of any maintenance activities, site inspections, practice inspections, and any amendments or other changes to the approved SWPPP.
- ☐ A SWPPP certification signed by a qualified, responsible individual.

STEPS TOWARDS STORMWATER COMPLIANCE FOR HOME BUILDERS

1. When applicable, obtain the larger development's Stormwater Pollution Prevention Plan (SWPPP). Use this information to create a SWPPP for the individual lot.
2. Submit individual lot information to the Town of Dyer for review.
3. After review and if acceptable, an Individual Lot Plot Plan Permit will be issued.
4. Implement the SWPPP throughout the project. Changes may need to be made to ensure the Construction Plan or the SWPPP accurately reflect what is being done on site.
5. The individual lot operator is responsible for installation and maintenance of all erosion and sediment control measures until the site is stabilized.



For more information, contact:
Bryan Lane, Director of Storm Water Management, (219) 865-6100

STORMWATER OBLIGATIONS WHEN BUILDING A HOUSE IN THE TOWN OF DYER, INDIANA

Key stormwater management questions for home builders when disturbing more than 2,500 square feet of land, or when part of a larger common plan of development in the Town of Dyer:

If disturbing more than 2,500 sq. ft. or if part of a larger development, does your project require a **local** Stormwater Permit?	☑ Yes ☐ No
Do local Stormwater Permits typically require an approved **Stormwater Pollution Prevention Plan (SWPPP)**?	☑ Yes ☐ No
Does your SWPPP require a self monitoring inspection after **every** rain event greater than 0.5"?	☑ Yes ☐ No
Even without a rain event, should there be a documented site self-inspection **every week**?	☑ Yes ☐ No
Does your SWPPP require **documented** maintenance and repair procedures?	☑ Yes ☐ No
Must you produce your permanent record log of site inspections to inspectors within **48 hours upon request**?	☑ Yes ☐ No

This information brought to you by:

TOWN OF DYER, INDIANA
DEPT. OF STORMWATER MANAGEMENT

CONSTRUCTION SITE REQUIREMENTS FOR THE TOWN OF DYER, INDIANA

Per EPA, IDEM & local regulations, the soil stockpiling shown above is not acceptable. Town of Dyer Master Stormwater Management Ordinance No. 2011 13 provides local requirements for construction sites and the Ordinance includes the following:

DYER STORMWATER ORDINANCE:

"Any project, located within the Town of Dyer corporate limits that includes clearing, grading, excavation, and/or other land disturbing activities may require an approved Stormwater Pollution Prevention Plan (SWPPP) prior to commencement. The following land disturbing activities are subject to the requirements of this Ordinance or may be exempt:

a. Land disturbance of 1 acre or more shall require an approved SWPPP for Issuance of a Town of Dyer Stormwater Permit.

b. Land disturbance of less than 1 acre that is part of a larger common plan of development that will disturb 1 or more acres must implement the typical lot detail for erosion and sediment control as specified in the SWPPP."

Source: Dyer Stormwater Management Ordinance, page 14

How does the Stormwater Ordinance apply to home construction in the Town of Dyer?

- Owners of individual lot(s) located within a larger permitted project site must comply with the terms and conditions of the SWPPP approved for the larger project site.
- Plans containing multiple lots must include detailed erosion & sediment control measures for a typical individual lot. In addition, individual lots are required to submit Individual Lot Plot Plan Permit applications prior to receiving a building permit.

WHAT DOES AN INSPECTOR LOOK FOR DURING A SITE INSPECTION?

All construction site stormwater pollution prevention Best Management Practices (BMPs) shall be inspected and maintained as needed to ensure the BMPs perform as intended during construction. BMP inspection and maintenance shall continue until the entire site has been stabilized and a Notice of Termination has been issued by the Owner to IDEM and the Town of Dyer. An inspection of the project site must be completed by the end of the next business day following each measurable storm event. If there are no measurable storm events within a given week, the site should be monitored at least once in that week. A record shall be kept of all inspections and repairs for the site.

SAMPLE CONSTRUCTION SITE INSPECTION FORM

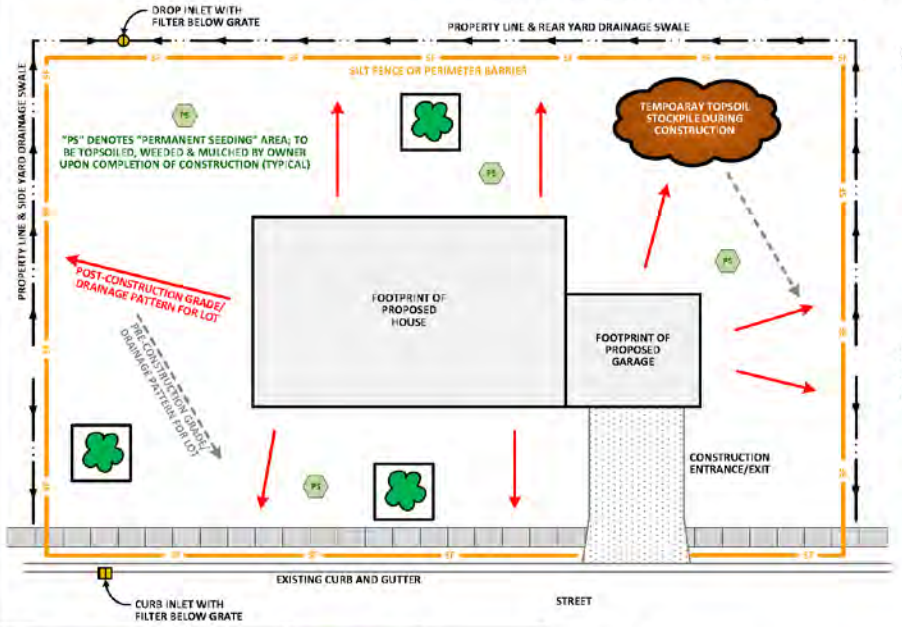
Sample form available at the Town of Dyer website: http://www.townofdyer.net/edc/Portals/2/Departments/Stormwater/TDDSelfMonitoring.pdf

	Yes	No	N/A
Are all sediment control barriers, inlet protection and silt fences in place and functioning properly?	○	○	○
Are all erodible slopes protected from erosion with the use of acceptable soil stabilization practices?	○	○	○
Are all dewatering structures functioning properly?	○	○	○
Are all discharge points free of any noticeable pollutant discharges?	○	○	○
Are all discharge points free of any noticeable erosion or sediment transport?	○	○	○
Are designated equipment washout areas properly sited, clearly marked, and being utilized?	○	○	○
Are construction staging and parking areas restricted to areas as designated on the plans?	○	○	○
Are temporary soil stockpiles in approved areas and properly protected?	○	○	○
Are construction entrances properly installed and being used and maintained?	○	○	○
Are "Do Not Disturb" areas designated on plan sheets clearly marked on-site and avoided?	○	○	○
Are public roads at intersections with site access roads being kept clear of sediment, debris & mud?	○	○	○
Is spill response equipment on-site, logically located, and easily accessed in an emergency?	○	○	○
Are emergency response procedures and contact information clearly posted?	○	○	○
Is solid waste properly contained?	○	○	○
Is a stable access provided to the solid waste storage and pick-up area?	○	○	○
Are hazardous materials, waste or otherwise, being properly handled and stored?	○	○	○
Have previously recommended corrective actions been implemented?	○	○	○

If you answered "no" to any of the above questions, describe any corrective action which must be taken to remedy the problem and when the corrective actions are to be completed: _____

SAMPLE INDIVIDUAL LOT SITE PLAN FOR A STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

SAMPLE INDIVIDUAL LOT EROSION AND SEDIMENT CONTROL PLAN:



SAMPLE LEGEND FOR INDIVIDUAL LOT EROSION CONTROL PLAN:

- PROPERTY LINE/ DRAINAGE SWALE
- EXISTING GRADE/ DRAINAGE PATTERN
- FINISHED GRADE
- SILT FENCE OR PERIMETER BARRIER
- SOIL SALVAGE AND UTILIZATION
- DROP INLET PROTECTION
- CURB INLET PROTECTION
- TREE CONSERVATION WITH PROTECTION DURING CONSTRUCTION
- PERMANENT SEEDING AREA
- CONSTRUCTION ENTRANCE/EXIT

GENERAL NOTES FOR EROSION AND SEDIMENT CONTROL ON INDIVIDUAL BUILDING LOTS MUST ADDRESS THE FOLLOWING MEASURES (Dyer Stormwater Management Ordinance Chapter 7, Section 3.B):

1. Installation and maintenance of a stable construction site access.
2. Installation and maintenance of appropriate perimeter erosion and sediment control measures prior to land disturbance.
3. Minimization of sediment discharge and tracking from the lot.
4. Clean up of sediment that is either tracked or washed onto roads. Bulk clearing of sediment shall not include flushing the area with water. Cleared sediment must be redistributed or disposed of in a manner that is in compliance with all applicable statutes and rules.
5. Adjacent lots disturbed by an individual lot operator must be repaired and stabilized with temporary or permanent surface stabilization.

CHRISTOPHER B. BURKE ENGINEERING, LLC
PNC Center, 115 W. Washington Street
Suite 1368 South Tower
Indianapolis, Indiana 46204
317-256-6000

TOWN OF DYER, INDIANA
DEPT. OF STORMWATER MANAGEMENT

Indiana 811 Know what's below. Call before you dig.

July 2014

SAMPLE CURB INLET PROTECTION

SAMPLE CONSTRUCTION ENTRANCE/EXIT

SAMPLE PERIMETER PROTECTION

ORDINANCE 2006-04-12

STORMWATER MANAGEMENT ORDINANCE OF THE CITY OF

Developed by **Christopher B. Burke Engineering, Ltd.**

STORMWATER TECHNICAL STANDARDS MANUAL

Developed By: Christopher B. Burke Engineering, Ltd. (CBBEL)

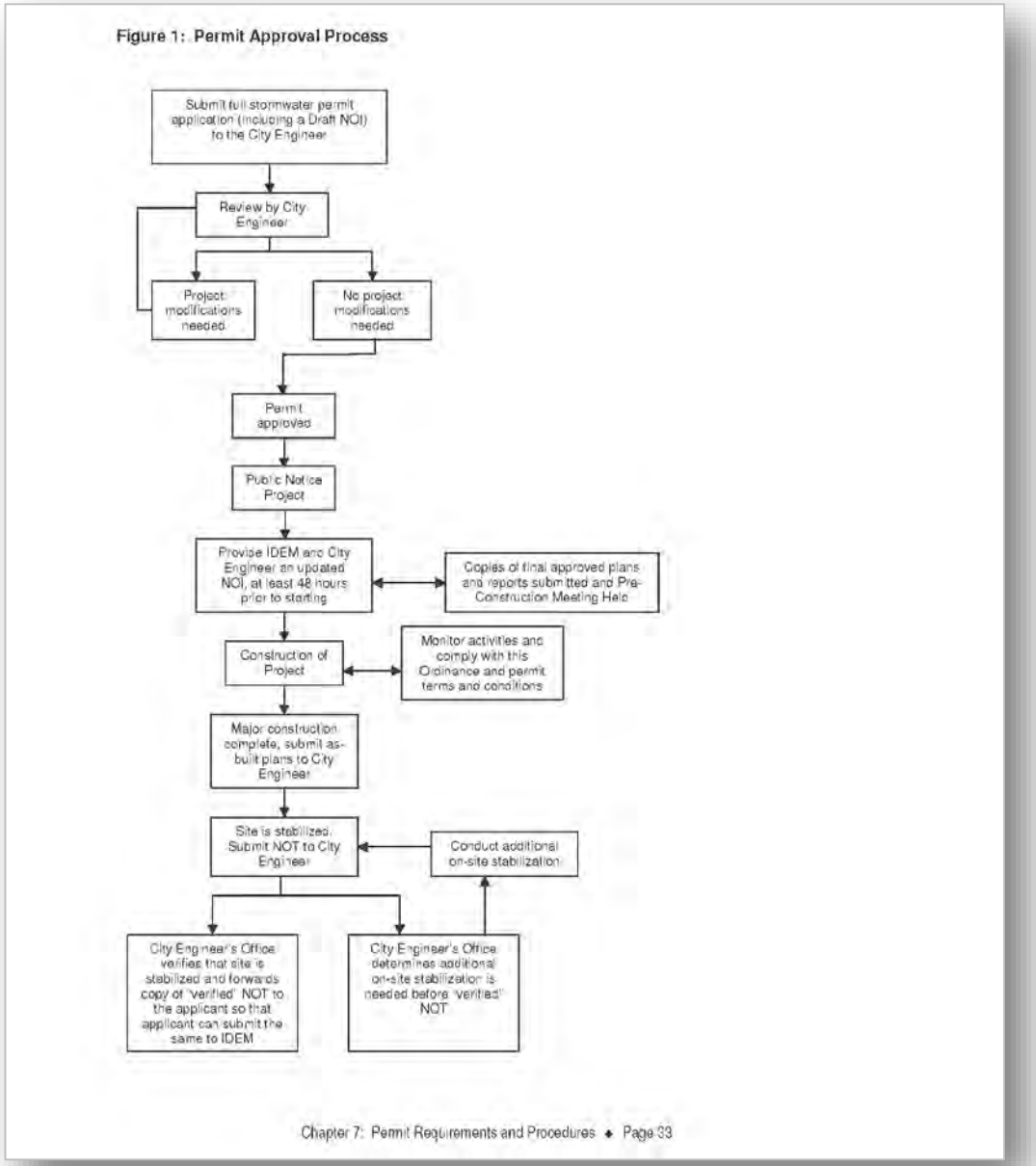
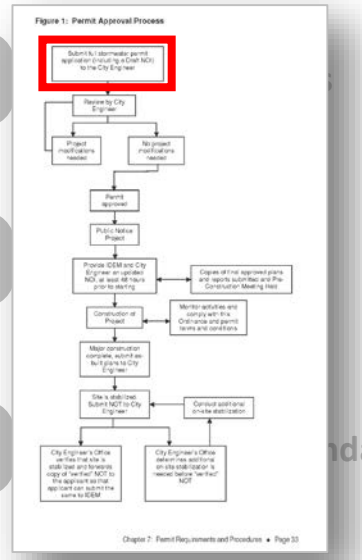


Figure 1: Permit Approval Process

Chapter 7: Permit Requirements and Procedures ♦ Page 33

AUDIT PREPARATION | OFFICE AUDIT | CONSTRUCTION SITE | POST-AUDIT ACTIONS

- Tab 1
- Tab 2
- Tab 3 ...ndards
- **Tab 4 MCM 4: Implementation Measures/Procedures**
- Tab 5 Training Documentation
- Tab 6 Program Review Cycle
- Tab 7 MCM 5: Implementation Measures/Procedures



C8	Material handling and storage associ... shall meet the spill prevention and sp... 327 IAC 2-6.1.
C9	Name, address, telephone number, a... trained individual in charge of the ma... prevention self-monitoring program f...
6. Post-Construction Storm Water Pollut...	
D1	A description of potential pollutant so... use, which may reasonably be expec... of pollutants to storm water discharge...
D2	Location, dimensions, detailed specif... details of all post-construction storm ...
D3	A description of measures that will be... in storm water discharges that will oc... have been completed. Such practices... flow reduction by use of open vegeta... depressions, buffer strip and riparian... creation, minimization of land disturb... imperviousness, maximization of ope... retention and detention ponds.
D4	A sequence describing when each p... quality measure will be installed.
D5	Storm water quality measures that wi... pollutants from storm water run-off.
D6	Stormwater quality measures that wil... minimize adverse impacts to stream ...
D7	A narrative description of the mainter... construction storm water quality mea... long term function. This narrative des... available to future parties who will as... operation and maintenance of the po... quality measures.

4. Storm Water Drainage Technical Repo...	
A summary report, including the followin...	
B1	The significant drainage problems as...
B2	The analysis procedure used to evalu... propose solutions;
B3	Any assumptions or special condition... these procedures, especially the hydr...
B4	The proposed design of the drainage ...
B5	The results of the analysis of the prop... showing that it does solve the project ... hydrologic or hydraulic calculations o... adequately cited and described in the ... hydrologic or hydraulic models are us... for all necessary runs must be include... showing any drainage area subdivisio... accompany the report
A Hydrologic/Hydraulic Analysis, consist... [technical standards], and including the f...	
B6	A hydraulic report detailing existing a... on the subject site. The report should ... present land use and proposed land ... entering the site should be addressed... be comprehensive and detail all of the... during the design process.
B7	All hydrologic and hydraulic computat... submittal. These calculations should ... runoff curve numbers and runoff coef... stage-discharge relationships, times-... volumes.
B8	Copies of all computer runs. These c... both the input and the outputs. Electr... runs with input files will expedite the r... to be submitted.
B9	A set of exhibits should be included s... and a schematic detailing of how the ...
B10	A conclusion which summarizes the t... how this design satisfies this Ordinan...
5. Storm Water Pollution Prevention Plan	
C1	Location, dimensions, detailed specif... details of all temporary and permaner... measures
C2	Temporary stabilization plans and se...
C3	Permanent stabilization plans and se...
Temporary and permanent stabilization p...	
C4	Construction sequence describing the... implementation of storm water quality ... construction activities.
C5	A typical erosion and sediment contro... development.
C6	Self-monitoring program including pla...
C7	A description of potential pollutant so... construction activities, which may rea... significant amount of pollutants to sto...

A16	Identification and delineation of veg... trees on the project site
A17	Location of storm, sanitary, combin...
A18	Land use of all adjacent properties.
A19	Identification and delineation of sen...
A20	Existing topography at a contour int...
A21	The location of regulated drains. Fa...
A22	Location of all existing cornerstones... protect and preserve them.
Final project site layout, including the f...	
A23	Location of all proposed site improv... and identification, proposed structu...
A24	One hundred (100) year floodplains ... none exists.
A25	Proposed final topography, at a con... patterns.
A grading plan, including the following ...	
A26	Delineation of all proposed land dis... will provide services to the project s...
A27	Location of all soil stockpiles and b...
A28	Information regarding any off-site b... associated with a project site, and u...
A29	Existing and proposed topographic ...
A drainage plan, including the following ...	
A30	An estimate of the peak discharge, ... project site for post-construction co...
A31	The proposed 100-year release rate ... methodology used to calculate them... downstream restrictions (if any) tha...
A32	Calculation showing peak runoff rat... 24-hour storms do not exceed the r...
A33	Location, size, and dimensions of a... drainage systems such as culverts, ... 100-year overflow paths/ponding ar... associated easements.
A34	Locations where storm water may b... abandoned wells or sinkholes. Plea...
A35	Locations of specific points where s...
A36	Name of all receiving waters. If the ... identify the name of the municipal c...
A37	Location, size, and dimensions of f... facilities, including existing or plann... water management. Include existin... maintained, enlarged, or otherwise ... the basis of their design.
A38	The estimated depth and amount o... basins.
A39	One or more typical cross sections ... open drainage facilities carried to a ... the elevation of the existing land an... water elevations expected from the ... called for by this ordinance, and the ... facilities.

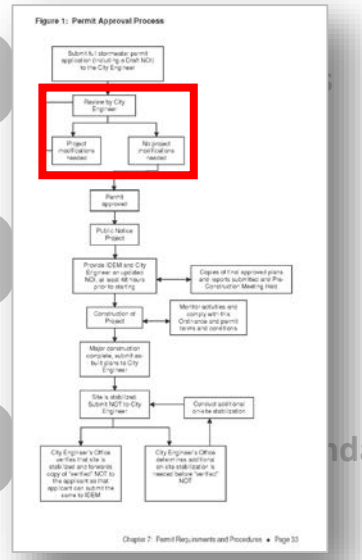
STORMWATER PERMIT APPLICATION

City of Crown Point * 11035 Broadway – Suite F * Crown Point, Indiana 46307
Phone: (219) 662-3242 * Fax: (219) 661-2280
(to be completed by Applicant)

Project Name:
General Location:
File Number: | Date Completed:

1. Application Fee		
None at this time		Amt: $ 0.00
2. Notice of Intent		
Completed Notice of Intent – State Form #47487		Attached
3. Construction Plans		**Page/Sheet#**
Project narrative and supporting documents, including the following information:		
A1	An index indicating the location, in the construction plans, of all information required by this subsection (can use this application form as index)	
A2	Description of the nature and purpose of the project.	
A3	A copy of a legal boundary survey for the site, performed in accordance with Rule 12 of Title 865 of the Indiana Administrative Code or any applicable and subsequently adopted rule or regulation for the subdivision limits, including all drainage easements and wetlands.	
A4	Soil properties, characteristics, limitations, and hazards associated with the project site and the measures that will be integrated into the project to overcome or minimize adverse soil conditions.	
A5	General construction sequence of how the project site will be built, including phases of construction.	
A6	14-Digit Watershed Hydrologic Unit Code	
A7	A reduced plat or project site map showing the lot numbers, lot boundaries, easements, and road layout and names. The reduced map must be legible and submitted on a sheet or sheets no larger than eleven (11) inches by seventeen (17) inches for all phases or sections of the project site.	
A8	A general site plan exhibit with the proposed construction area superimposed on the city GIS map at a scale of 1"=100'. The exhibit should provide 2-foot contour information and include all roads and buildings within a minimum 500' radius beyond the project boundaries. All on-site elevations shall be given in North American Vertical Datum of 1988 (NAVD). The horizontal datum of topographic map shall be based on Indiana State Plane Coordinates, NAD83. The map will contain a notation indicating the noted datum information.	
A9	Identification of any other state or federal water quality permits that are required for construction activities associated with the owner's project site.	
A10	Proof of Errors and Omissions Insurance for the registered professional engineer or licensed Engineer showing a minimum amount of $1,000,000 in coverage.	
A11	Vicinity map depicting the project site location in relationship to recognizable local landmarks, towns, and major roads, such as a USGS topographic quadrangle map, or county or municipal road map.	
An existing project site layout that must include the following information:		
A12	Location, name, and normal water level of all wetlands, lakes, ponds, and water courses on, or adjacent to, the project site.	
A13	Location of all existing structures on the project site.	
A14	One hundred (100) year floodplains, floodway fringes, and floodways. Please note if none exists.	
A15	Soil map of the predominant soil types, as determined by the United States Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) Soil Survey, or as determined by a soil scientist. Hydrologic classification for soils should be shown when hydrologic methods requiring soils information are used. A soil legend must be included with the soil map.	

Revised 3/6/08



CONSTRUCTION PLAN REVIEWS

Reviews are based on the Stormwater Ordinance and Technical Standards.

Reviews include checking for each ordinance requirement, including but not limited to, these general ordinance categories:

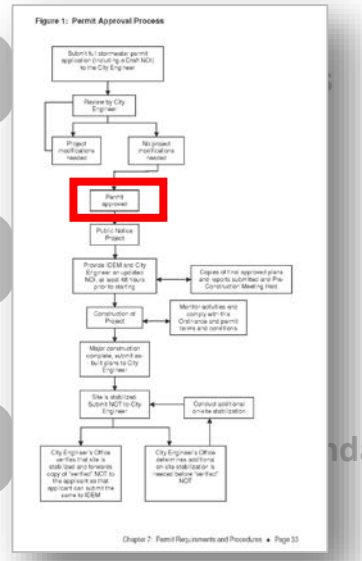
- Construction plan sheets and an accompanying narrative report
- Vicinity map
- Existing project site layout
- Final project site layout
- Grading plan
- Drainage plan
- Stormwater Drainage Technical Report
- Stormwater Pollution Prevention Plan for Construction
- Post-Construction Storm Water Pollution Prevention Plan
- Operation and Maintenance Manual

Once plans are reviewed a memo describing any needed revisions to the submittal and comments are submitted to the design firm.

Tab 1

Tab 2

Tab 3

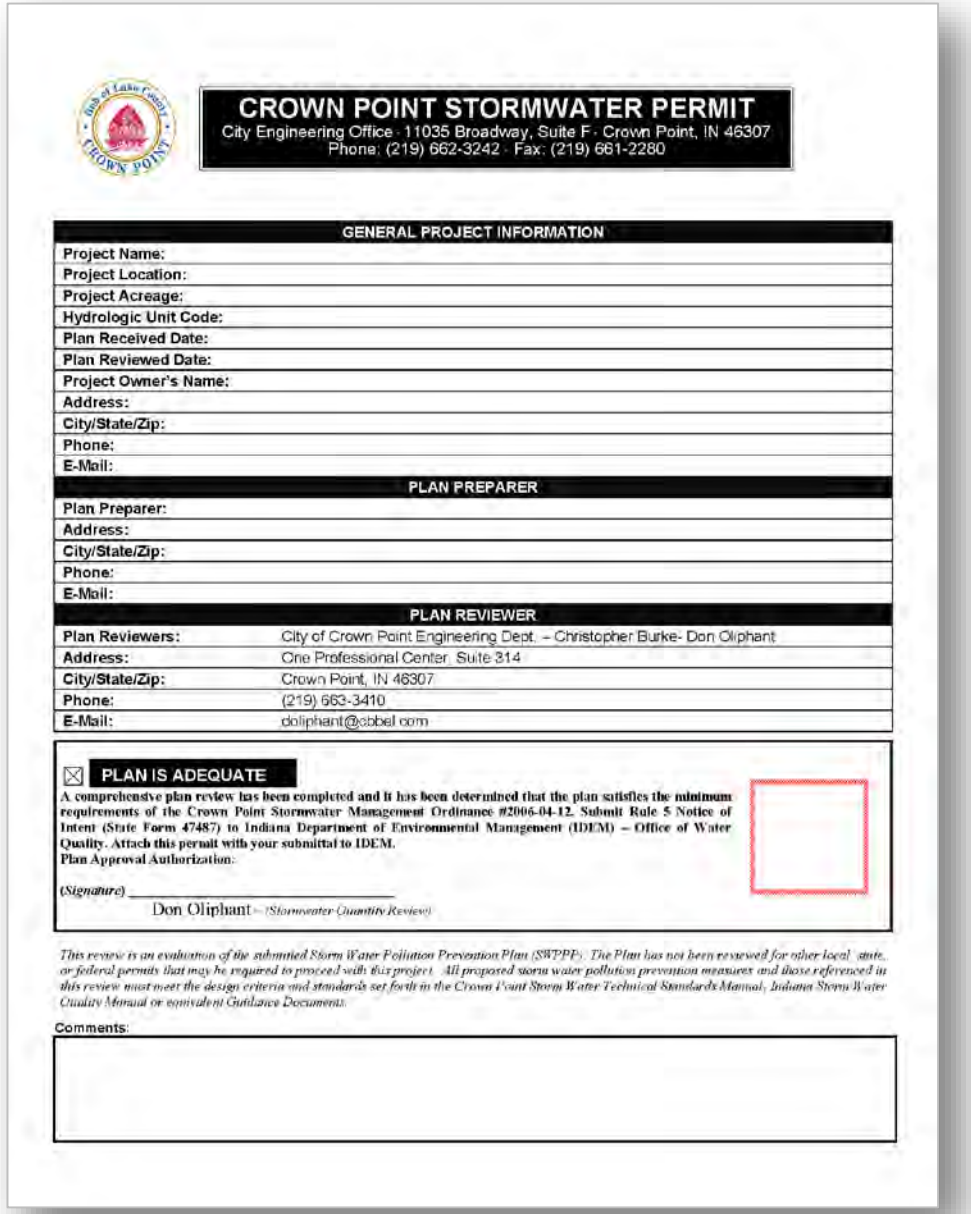


Tab 4 **MCM 4: Implementation Measures/Procedures**

Tab 5 Training Documentation

Tab 6 Program Review Cycle

Tab 7 MCM 5: Implementation Measures/Procedures



CROWN POINT STORMWATER PERMIT
City Engineering Office · 11035 Broadway, Suite F · Crown Point, IN 46307
Phone: (219) 662-3242 · Fax: (219) 661-2280

GENERAL PROJECT INFORMATION	
Project Name:	
Project Location:	
Project Acreage:	
Hydrologic Unit Code:	
Plan Received Date:	
Plan Reviewed Date:	
Project Owner's Name:	
Address:	
City/State/Zip:	
Phone:	
E-Mail:	

PLAN PREPARER	
Plan Preparer:	
Address:	
City/State/Zip:	
Phone:	
E-Mail:	

PLAN REVIEWER	
Plan Reviewers:	City of Crown Point Engineering Dept. – Christopher Burke- Don Oliphant
Address:	One Professional Center, Suite 314
City/State/Zip:	Crown Point, IN 46307
Phone:	(219) 663-3410
E-Mail:	doliphant@cbbel.com

☒ **PLAN IS ADEQUATE**

A comprehensive plan review has been completed and it has been determined that the plan satisfies the minimum requirements of the Crown Point Stormwater Management Ordinance #2006-04-12. Submit Rule 5 Notice of Intent (State Form 47487) to Indiana Department of Environmental Management (IDEM) – Office of Water Quality. Attach this permit with your submittal to IDEM.

Plan Approval Authorization:

(*Signature*) _____

Don Oliphant – *(Stormwater Quantity Review)*

This review is an evaluation of the submitted Storm Water Pollution Prevention Plan (SWPPP). The Plan has not been reviewed for other local, state, or federal permits that may be required to proceed with this project. All proposed storm water pollution prevention measures and those referenced in this review must meet the design criteria and standards set forth in the Crown Point Storm Water Technical Standards Manual, Indiana Storm Water Quality Manual or equivalent Guidance Documents.

Comments:

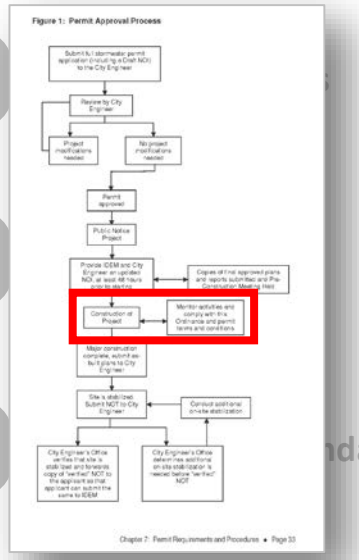


Figure 1: Permit Approval Process

Submit NJ stormwater permit application (including a Draft NOI) to the City Engineer

Review by City Engineer

Project modifications needed

No project modifications needed

Permit approved

Public Notice Project

Provide IDEM and City Engineer an updated NOI, at least 48 hours prior to starting

Copies of final approved plans and reports submitted and Pre-Construction Meeting Held

Construction of Project

Monitor activities and comply with the Ordinance and permit terms and conditions

Major construction complete, submit as-built plans to City Engineer

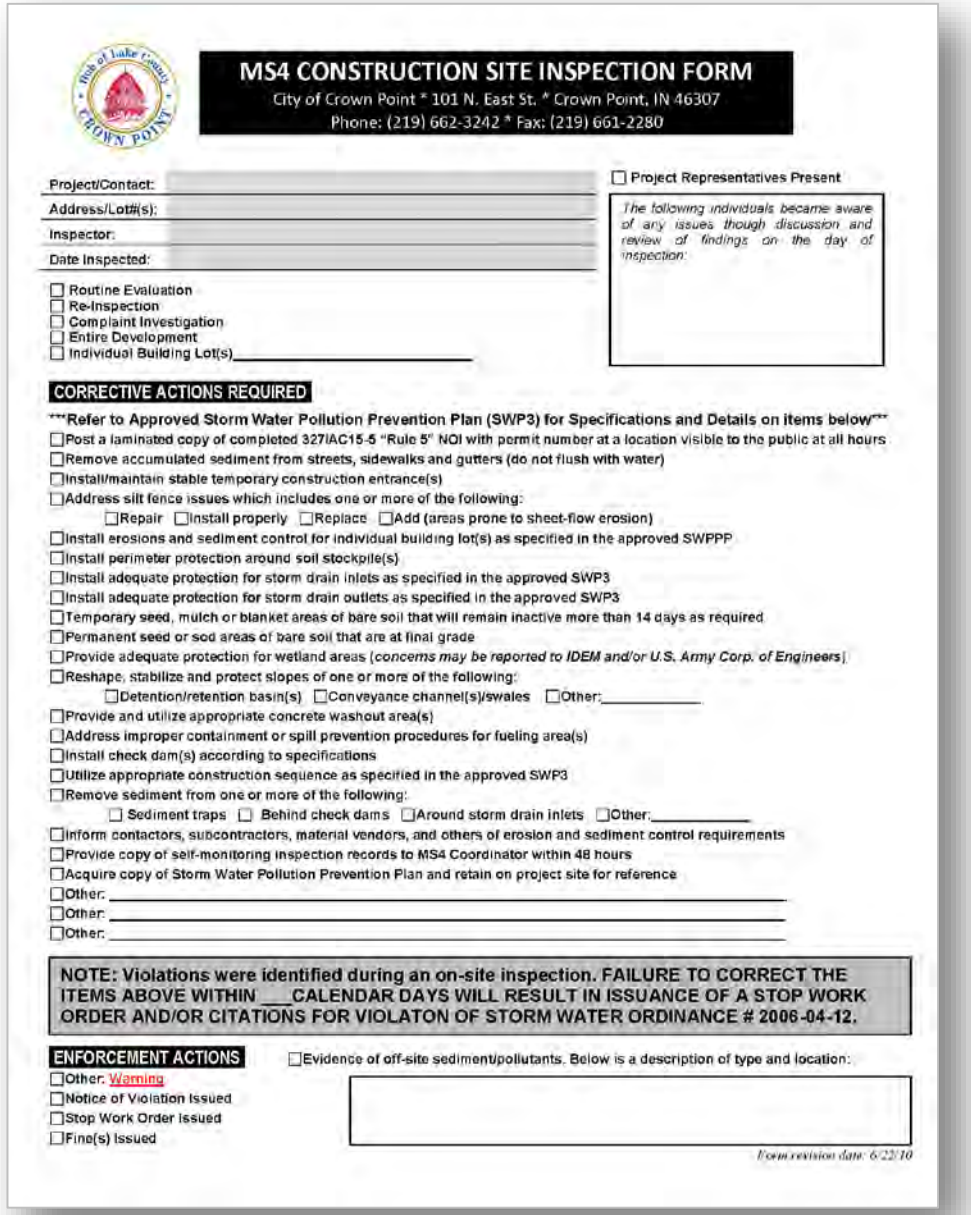
Site is stabilized. Submit NOT to City Engineer

Conduct additional on-site stabilization

City Engineer's Office verifies that site is stabilized and forwards copy of "verified" NOT to the applicant so that applicant can submit the same to IDEM

City Engineer's Office determines additional on-site stabilization is needed before "verified" NOT

Chapter 2 Permit Requirements and Procedures • Page 10



MS4 CONSTRUCTION SITE INSPECTION FORM

City of Crown Point * 101 N. East St. * Crown Point, IN 46307
Phone: (219) 662-3242 * Fax: (219) 661-2280

Project/Contact:
Address/Lot#(s):
Inspector:
Date Inspected:

☐ Project Representatives Present

The following individuals became aware of any issues though discussion and review of findings on the day of inspection:

☐ Routine Evaluation
☐ Re-Inspection
☐ Complaint Investigation
☐ Entire Development
☐ Individual Building Lot(s)_____

CORRECTIVE ACTIONS REQUIRED

Refer to Approved Storm Water Pollution Prevention Plan (SWP3) for Specifications and Details on items below

☐ Post a laminated copy of completed 327IAC15-5 "Rule 5" NOI with permit number at a location visible to the public at all hours
☐ Remove accumulated sediment from streets, sidewalks and gutters (do not flush with water)
☐ Install/maintain stable temporary construction entrance(s)
☐ Address silt fence issues which includes one or more of the following:
☐ Repair ☐ Install properly ☐ Replace ☐ Add (areas prone to sheet-flow erosion)
☐ Install erosions and sediment control for individual building lot(s) as specified in the approved SWPPP
☐ Install perimeter protection around soil stockpile(s)
☐ Install adequate protection for storm drain inlets as specified in the approved SWP3
☐ Install adequate protection for storm drain outlets as specified in the approved SWP3
☐ Temporary seed, mulch or blanket areas of bare soil that will remain inactive more than 14 days as required
☐ Permanent seed or sod areas of bare soil that are at final grade
☐ Provide adequate protection for wetland areas (*concerns may be reported to IDEM and/or U.S. Army Corp. of Engineers*)
☐ Reshape, stabilize and protect slopes of one or more of the following:
☐ Detention/retention basin(s) ☐ Conveyance channel(s)/swales ☐ Other:_____
☐ Provide and utilize appropriate concrete washout area(s)
☐ Address improper containment or spill prevention procedures for fueling area(s)
☐ Install check dam(s) according to specifications
☐ Utilize appropriate construction sequence as specified in the approved SWP3
☐ Remove sediment from one or more of the following:
☐ Sediment traps ☐ Behind check dams ☐ Around storm drain inlets ☐ Other:_____
☐ Inform contactors, subcontractors, material vendors, and others of erosion and sediment control requirements
☐ Provide copy of self-monitoring inspection records to MS4 Coordinator within 48 hours
☐ Acquire copy of Storm Water Pollution Prevention Plan and retain on project site for reference
☐ Other: _____
☐ Other: _____
☐ Other: _____

NOTE: Violations were identified during an on-site inspection. FAILURE TO CORRECT THE ITEMS ABOVE WITHIN ___CALENDAR DAYS WILL RESULT IN ISSUANCE OF A STOP WORK ORDER AND/OR CITATIONS FOR VIOLATON OF STORM WATER ORDINANCE # 2006-04-12.

ENFORCEMENT ACTIONS

☐ Other: Warning
☐ Notice of Violation Issued
☐ Stop Work Order Issued
☐ Fine(s) Issued

☐ Evidence of off-site sediment/pollutants. Below is a description of type and location:

Form revision date: 6/22/10

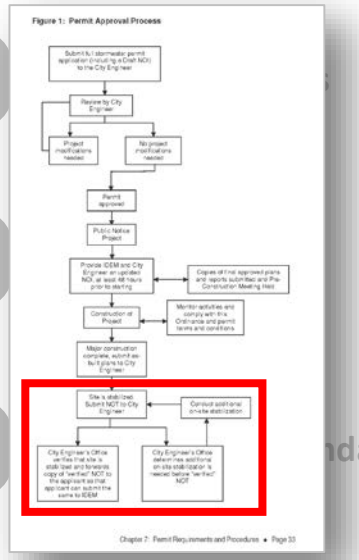


Figure 1: Permit Approval Process

Date: _____
Project: _____
Inspected by: _____

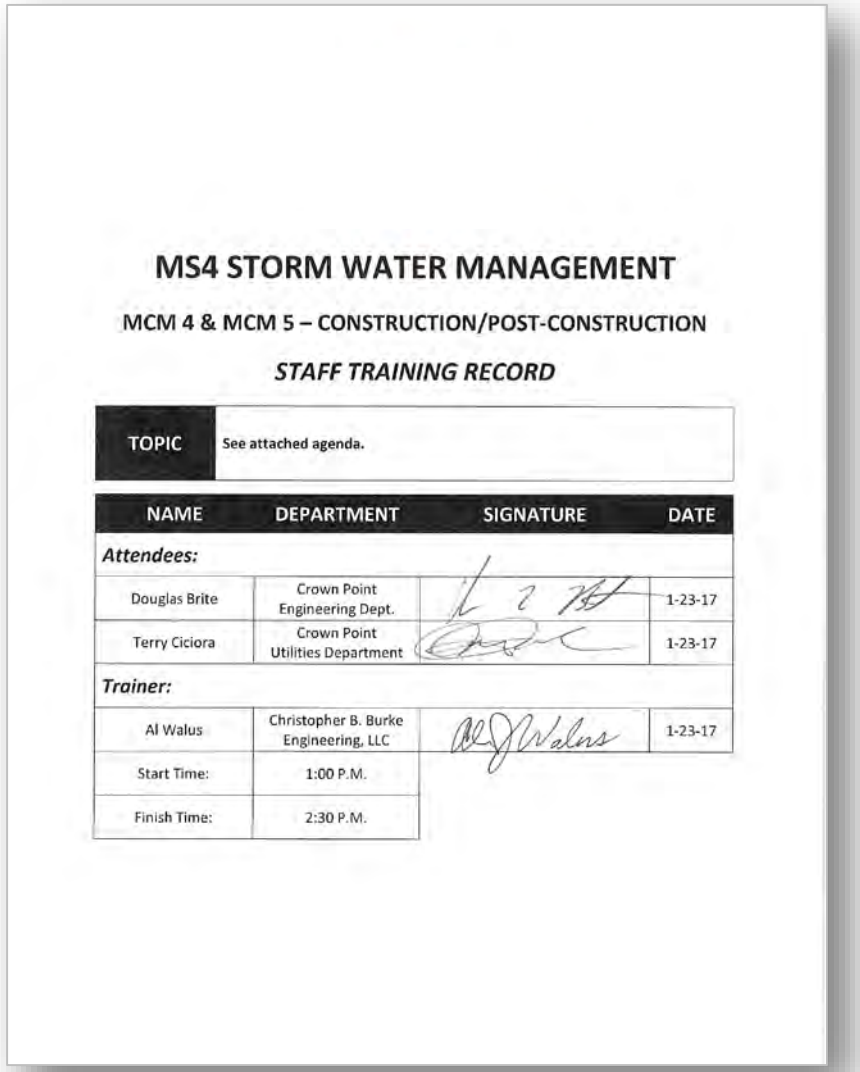
Insert Local Logo Here

NOTICE OF TERMINATION INSPECTION
(To be Completed by the City of Crown Point City Engineer or Agent)

All construction sites shall undergo a final inspection by the City of Crown Point City Engineer following submittal of a Notice of Termination (NOT) by the project owner to ensure the site is stabilized and that post construction BMPs have been properly installed.

Yes	No	N/A	
			1. Have all earth disturbing activities been completed?
			2. Are all soils stabilized with either vegetation or mulch?
			3. Are all drainageways stabilized with either vegetation, rip rap, or other armament?
			4. Have all temporary erosion and sediment control measures been removed?
			5. Has all construction waste, trash, and debris been removed from the site?
			6. Have all permanent stormwater quality BMPs been installed in accordance with the plans, specifications, and details?
			7. Are all permanent BMPs free of sediment accumulation resulting from construction activities?

If you answered "no" to any of the above questions, describe any corrective action which must be taken to remedy the problem and when the corrective actions are to be completed.



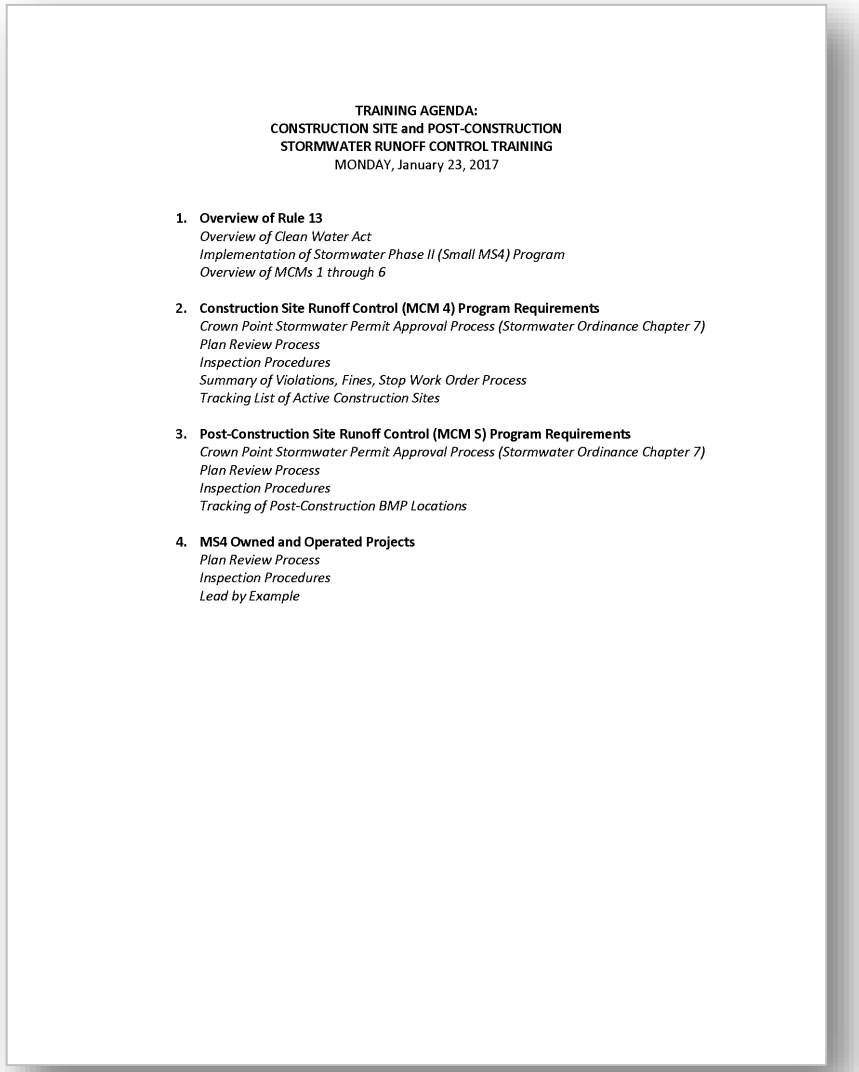
MS4 STORM WATER MANAGEMENT

MCM 4 & MCM 5 – CONSTRUCTION/POST-CONSTRUCTION

STAFF TRAINING RECORD

TOPIC	See attached agenda.

NAME	DEPARTMENT	SIGNATURE	DATE
Attendees:			
Douglas Brite	Crown Point Engineering Dept.		1-23-17
Terry Ciciora	Crown Point Utilities Department		1-23-17
Trainer:			
Al Walus	Christopher B. Burke Engineering, LLC		1-23-17
Start Time:	1:00 P.M.		
Finish Time:	2:30 P.M.		



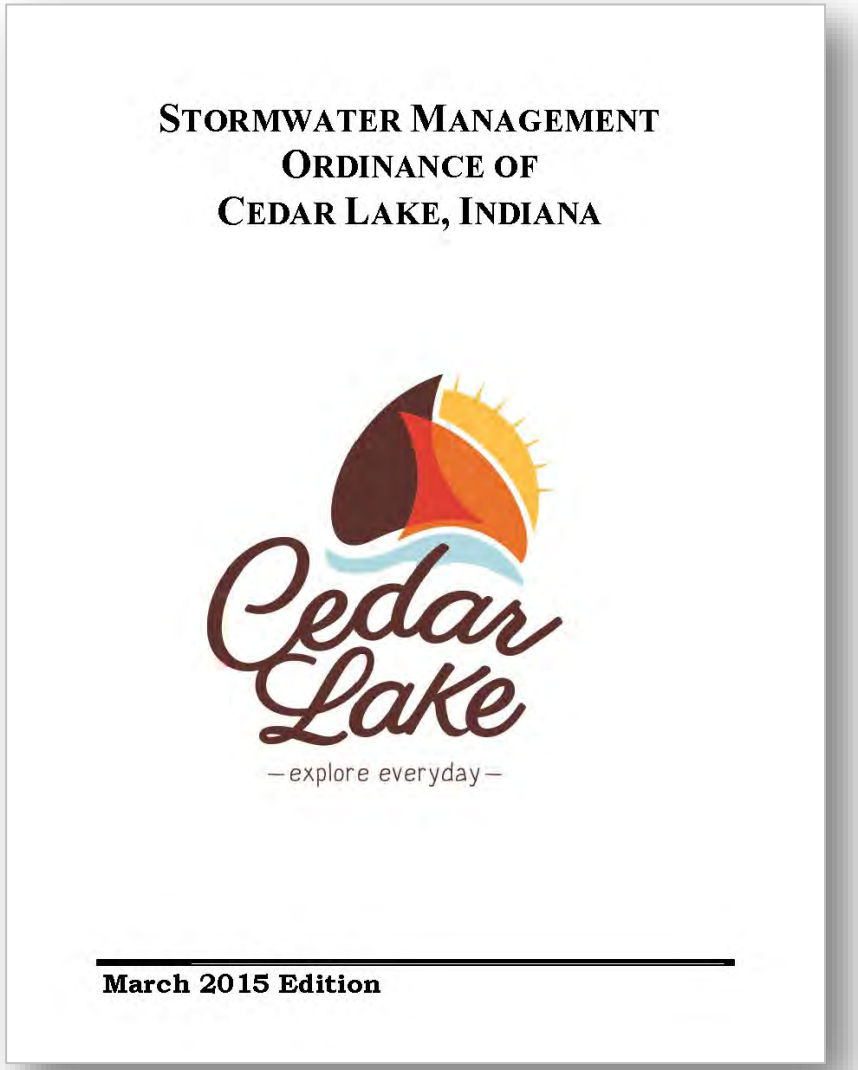
TRAINING AGENDA:
CONSTRUCTION SITE and POST-CONSTRUCTION
STORMWATER RUNOFF CONTROL TRAINING
MONDAY, January 23, 2017

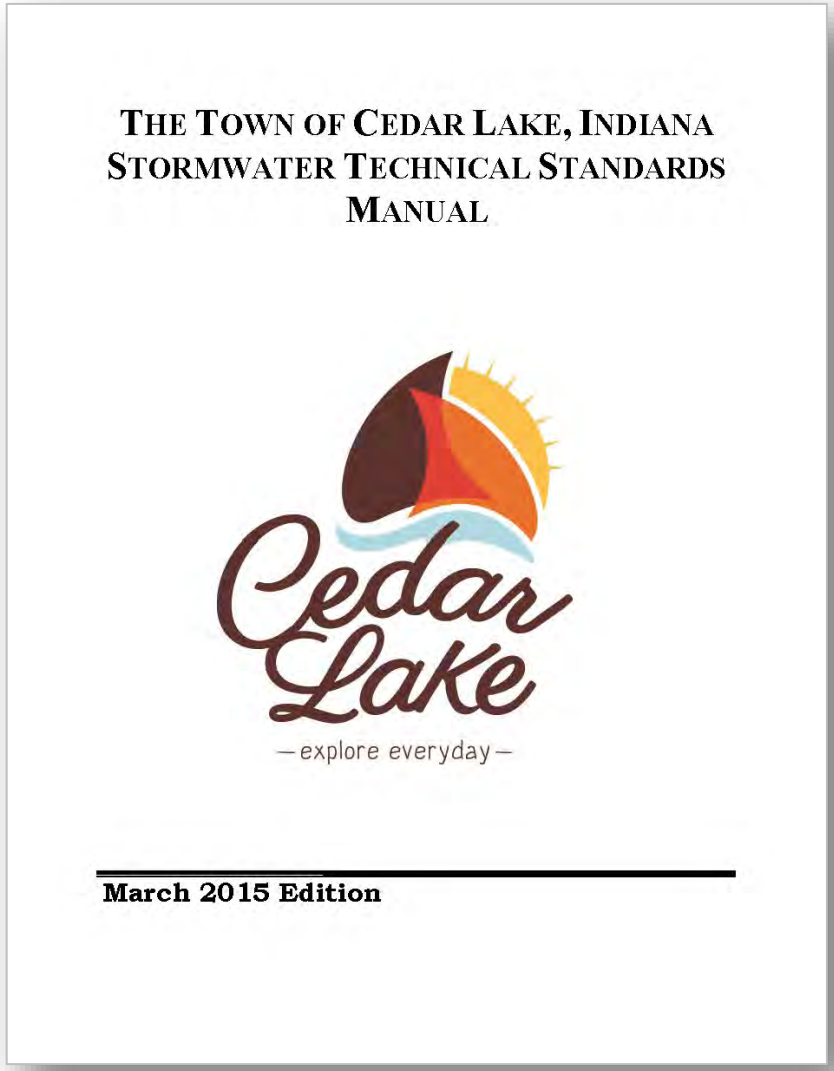
1. **Overview of Rule 13**
   Overview of Clean Water Act
   Implementation of Stormwater Phase II (Small MS4) Program
   Overview of MCMs 1 through 6

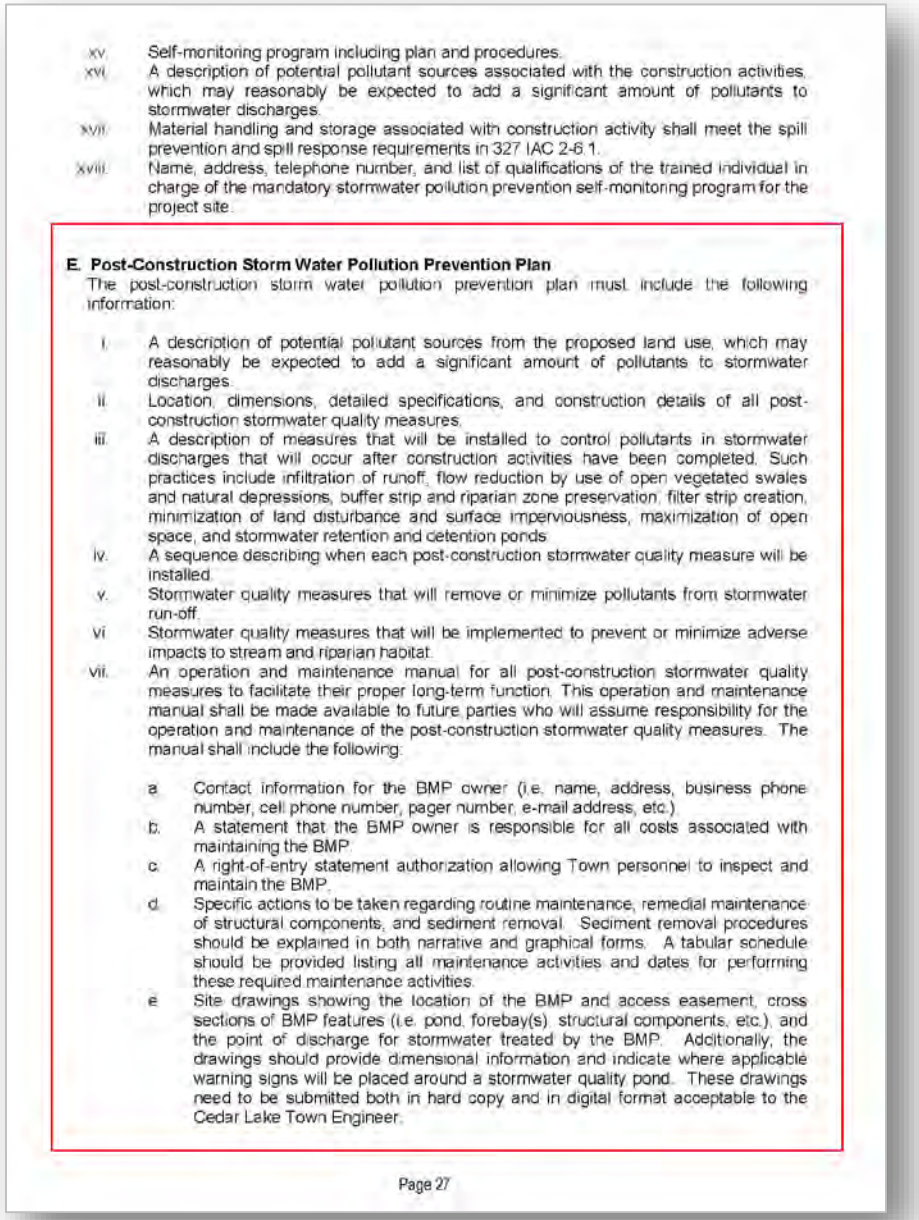
2. **Construction Site Runoff Control (MCM 4) Program Requirements**
   Crown Point Stormwater Permit Approval Process (Stormwater Ordinance Chapter 7)
   Plan Review Process
   Inspection Procedures
   Summary of Violations, Fines, Stop Work Order Process
   Tracking List of Active Construction Sites

3. **Post-Construction Site Runoff Control (MCM S) Program Requirements**
   Crown Point Stormwater Permit Approval Process (Stormwater Ordinance Chapter 7)
   Plan Review Process
   Inspection Procedures
   Tracking of Post-Construction BMP Locations

4. **MS4 Owned and Operated Projects**
   Plan Review Process
   Inspection Procedures
   Lead by Example







xv. Self-monitoring program including plan and procedures.
xvi. A description of potential pollutant sources associated with the construction activities which may reasonably be expected to add a significant amount of pollutants to stormwater discharges.
xvii. Material handling and storage associated with construction activity shall meet the spill prevention and spill response requirements in 327 IAC 2-6.1.
xviii. Name, address, telephone number, and list of qualifications of the trained individual in charge of the mandatory stormwater pollution prevention self-monitoring program for the project site.

E. Post-Construction Storm Water Pollution Prevention Plan

The post-construction storm water pollution prevention plan must include the following information:

i. A description of potential pollutant sources from the proposed land use, which may reasonably be expected to add a significant amount of pollutants to stormwater discharges.
ii. Location, dimensions, detailed specifications, and construction details of all post-construction stormwater quality measures.
iii. A description of measures that will be installed to control pollutants in stormwater discharges that will occur after construction activities have been completed. Such practices include infiltration of runoff, flow reduction by use of open vegetated swales and natural depressions, buffer strip and riparian zone preservation, filter strip creation, minimization of land disturbance and surface imperviousness, maximization of open space, and stormwater retention and detention ponds.
iv. A sequence describing when each post-construction stormwater quality measure will be installed.
v. Stormwater quality measures that will remove or minimize pollutants from stormwater run-off.
vi Stormwater quality measures that will be implemented to prevent or minimize adverse impacts to stream and riparian habitat.
vii. An operation and maintenance manual for all post-construction stormwater quality measures to facilitate their proper long-term function. This operation and maintenance manual shall be made available to future parties who will assume responsibility for the operation and maintenance of the post-construction stormwater quality measures. The manual shall include the following:

a. Contact information for the BMP owner (i.e. name, address, business phone number, cell phone number, pager number, e-mail address, etc.).
b. A statement that the BMP owner is responsible for all costs associated with maintaining the BMP.
c. A right-of-entry statement authorization allowing Town personnel to inspect and maintain the BMP.
d. Specific actions to be taken regarding routine maintenance, remedial maintenance of structural components, and sediment removal. Sediment removal procedures should be explained in both narrative and graphical forms. A tabular schedule should be provided listing all maintenance activities and dates for performing these required maintenance activities.
e. Site drawings showing the location of the BMP and access easement, cross sections of BMP features (i.e. pond, forebay(s), structural components, etc.), and the point of discharge for stormwater treated by the BMP. Additionally, the drawings should provide dimensional information and indicate where applicable warning signs will be placed around a stormwater quality pond. These drawings need to be submitted both in hard copy and in digital format acceptable to the Cedar Lake Town Engineer.

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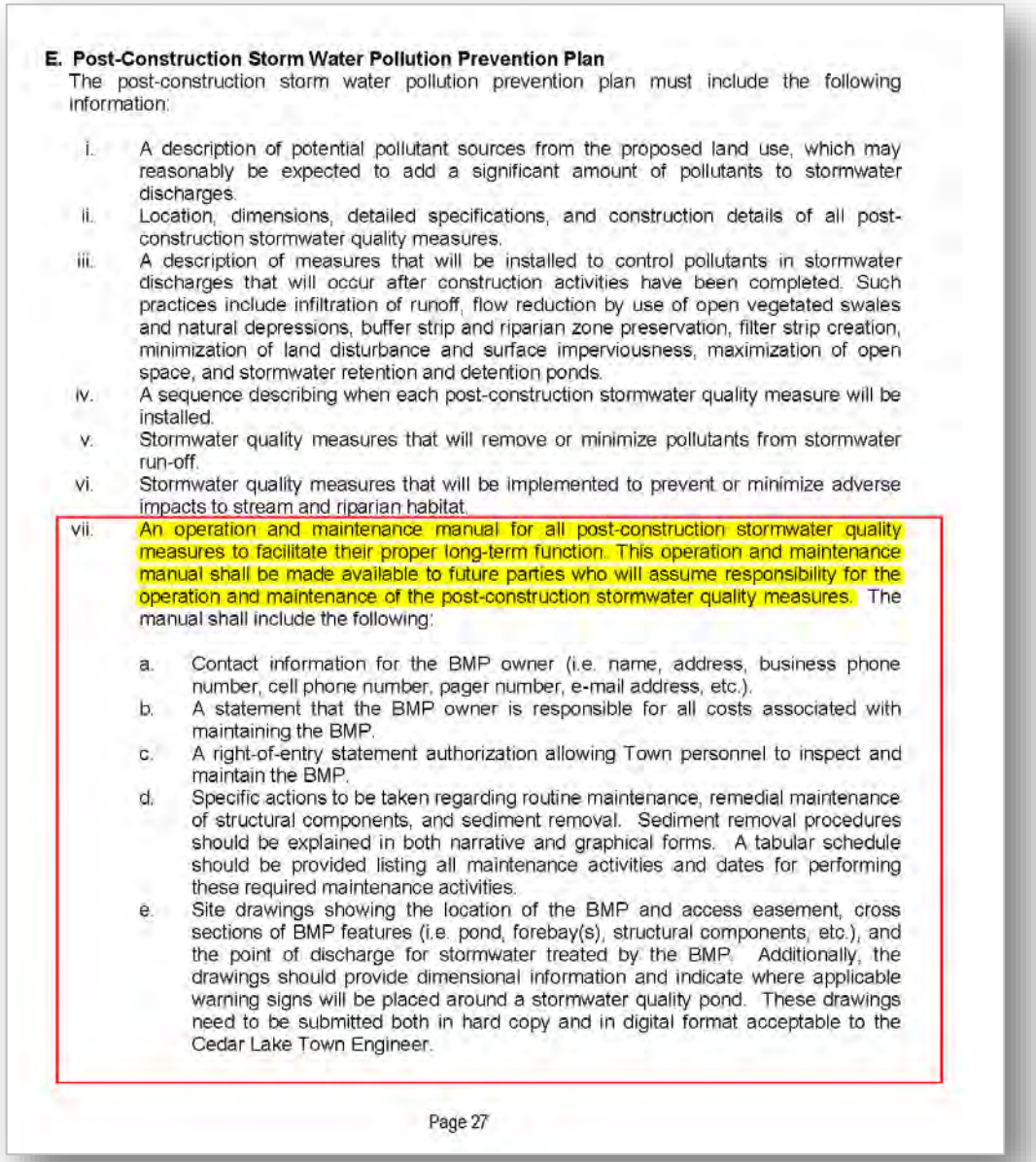

E. Post-Construction Storm Water Pollution Prevention Plan

The post-construction storm water pollution prevention plan must include the following information:

i. A description of potential pollutant sources from the proposed land use, which may reasonably be expected to add a significant amount of pollutants to stormwater discharges.

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iii. A description of measures that will be installed to control pollutants in stormwater discharges that will occur after construction activities have been completed. Such practices include infiltration of runoff, flow reduction by use of open vegetated swales and natural depressions, buffer strip and riparian zone preservation, filter strip creation, minimization of land disturbance and surface imperviousness, maximization of open space, and stormwater retention and detention ponds.

iv. A sequence describing when each post-construction stormwater quality measure will be installed.

v. Stormwater quality measures that will remove or minimize pollutants from stormwater run-off.

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vii. An operation and maintenance manual for all post-construction stormwater quality measures to facilitate their proper long-term function. This operation and maintenance manual shall be made available to future parties who will assume responsibility for the operation and maintenance of the post-construction stormwater quality measures. The manual shall include the following:

a. Contact information for the BMP owner (i.e. name, address, business phone number, cell phone number, pager number, e-mail address, etc.).

b. A statement that the BMP owner is responsible for all costs associated with maintaining the BMP.

c. A right-of-entry statement authorization allowing Town personnel to inspect and maintain the BMP.

d. Specific actions to be taken regarding routine maintenance, remedial maintenance of structural components, and sediment removal. Sediment removal procedures should be explained in both narrative and graphical forms. A tabular schedule should be provided listing all maintenance activities and dates for performing these required maintenance activities.

e. Site drawings showing the location of the BMP and access easement, cross sections of BMP features (i.e. pond, forebay(s), structural components, etc.), and the point of discharge for stormwater treated by the BMP. Additionally, the drawings should provide dimensional information and indicate where applicable warning signs will be placed around a stormwater quality pond. These drawings need to be submitted both in hard copy and in digital format acceptable to the Cedar Lake Town Engineer.

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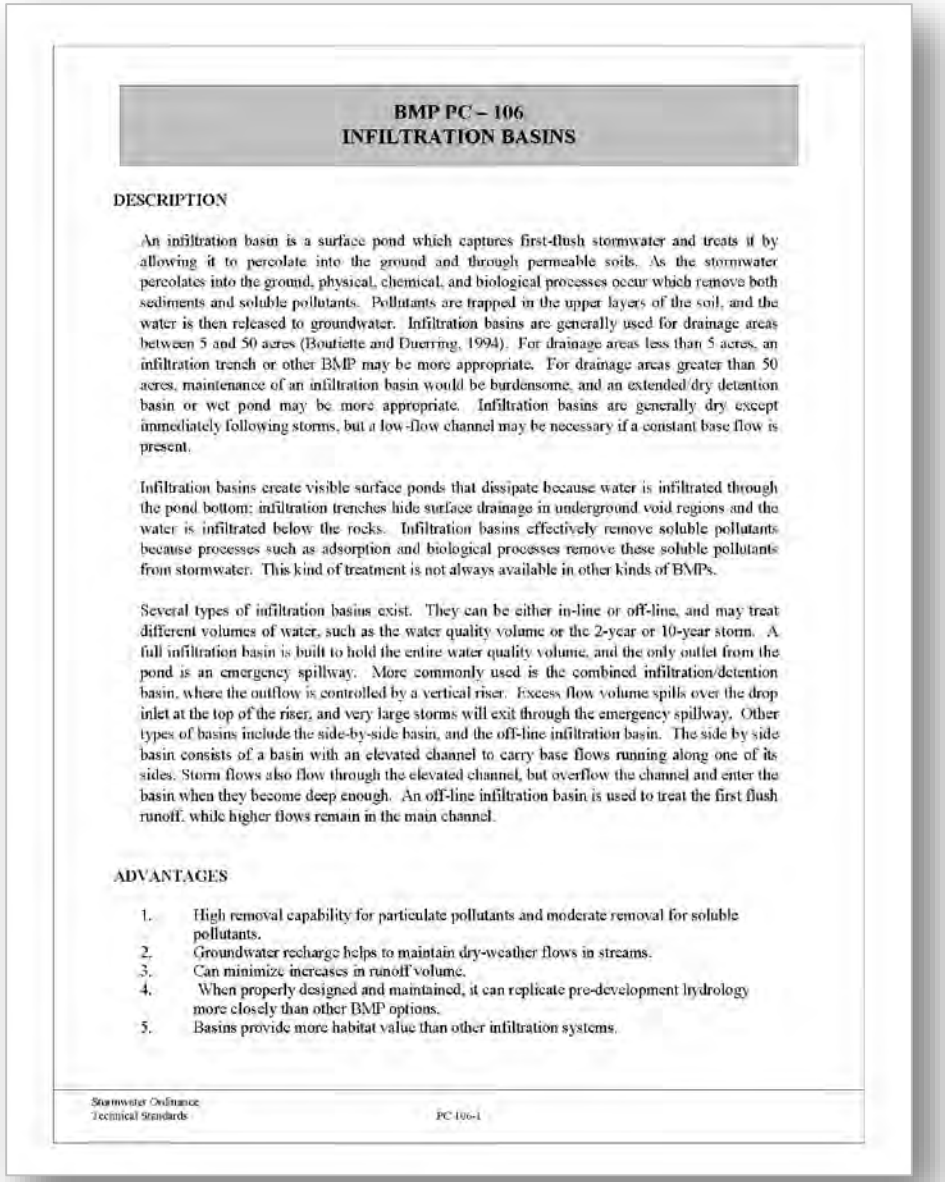


BMP PC – 106
INFILTRATION BASINS

DESCRIPTION

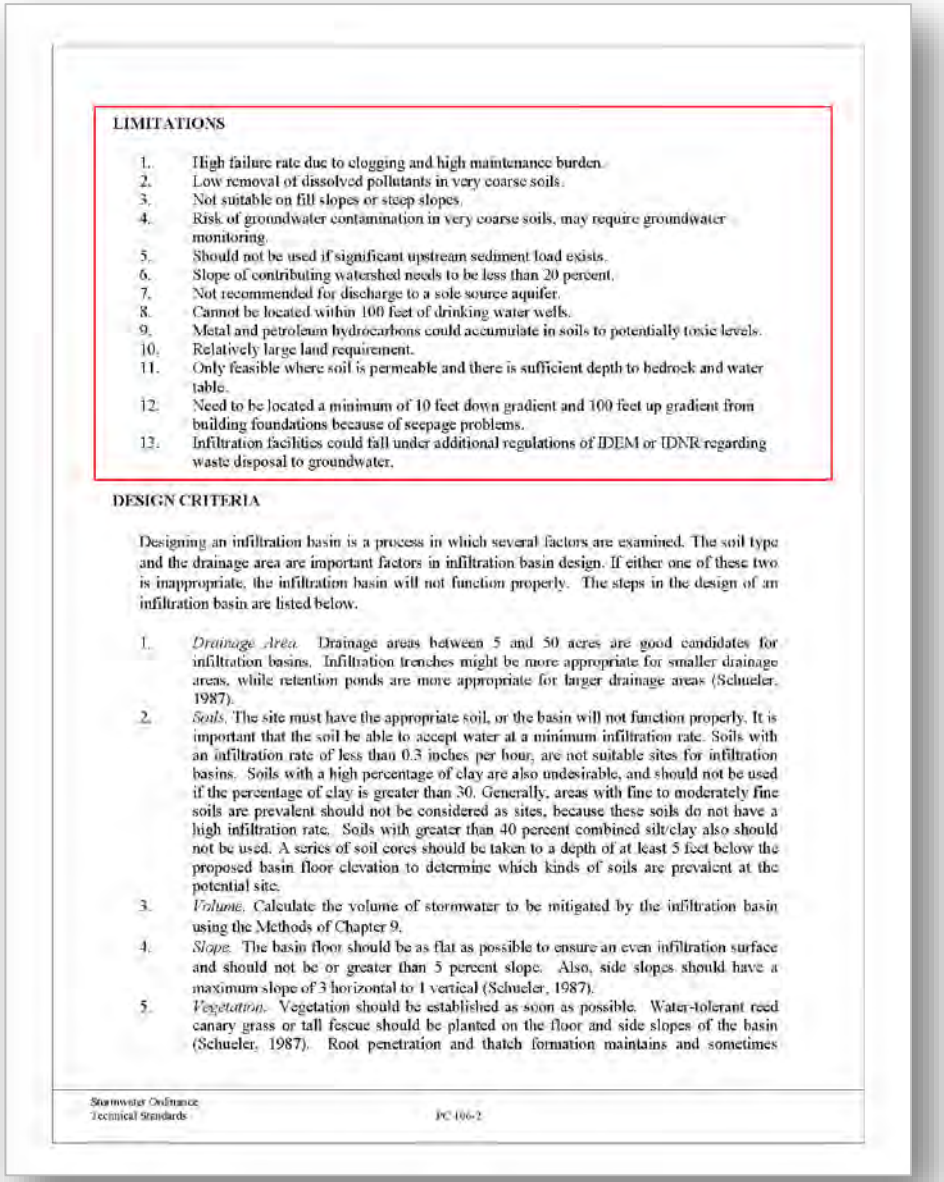
An infiltration basin is a surface pond which captures first-flush stormwater and treats it by allowing it to percolate into the ground and through permeable soils. As the stormwater percolates into the ground, physical, chemical, and biological processes occur which remove both sediments and soluble pollutants. Pollutants are trapped in the upper layers of the soil, and the water is then released to groundwater. Infiltration basins are generally used for drainage areas between 5 and 50 acres (Boutiette and Duerring, 1994). For drainage areas less than 5 acres, an infiltration trench or other BMP may be more appropriate. For drainage areas greater than 50 acres, maintenance of an infiltration basin would be burdensome, and an extended/dry detention basin or wet pond may be more appropriate. Infiltration basins are generally dry except immediately following storms, but a low-flow channel may be necessary if a constant base flow is present.

Infiltration basins create visible surface ponds that dissipate because water is infiltrated through the pond bottom; infiltration trenches hide surface drainage in underground void regions and the water is infiltrated below the rocks. Infiltration basins effectively remove soluble pollutants because processes such as adsorption and biological processes remove these soluble pollutants from stormwater. This kind of treatment is not always available in other kinds of BMPs.

Several types of infiltration basins exist. They can be either in-line or off-line, and may treat different volumes of water, such as the water quality volume or the 2-year or 10-year storm. A full infiltration basin is built to hold the entire water quality volume, and the only outlet from the pond is an emergency spillway. More commonly used is the combined infiltration/detention basin, where the outflow is controlled by a vertical riser. Excess flow volume spills over the drop inlet at the top of the riser, and very large storms will exit through the emergency spillway. Other types of basins include the side-by-side basin, and the off-line infiltration basin. The side by side basin consists of a basin with an elevated channel to carry base flows running along one of its sides. Storm flows also flow through the elevated channel, but overflow the channel and enter the basin when they become deep enough. An off-line infiltration basin is used to treat the first flush runoff, while higher flows remain in the main channel.

ADVANTAGES

1. High removal capability for particulate pollutants and moderate removal for soluble pollutants.
2. Groundwater recharge helps to maintain dry-weather flows in streams.
3. Can minimize increases in runoff volume.
4. When properly designed and maintained, it can replicate pre-development hydrology more closely than other BMP options.
5. Basins provide more habitat value than other infiltration systems.



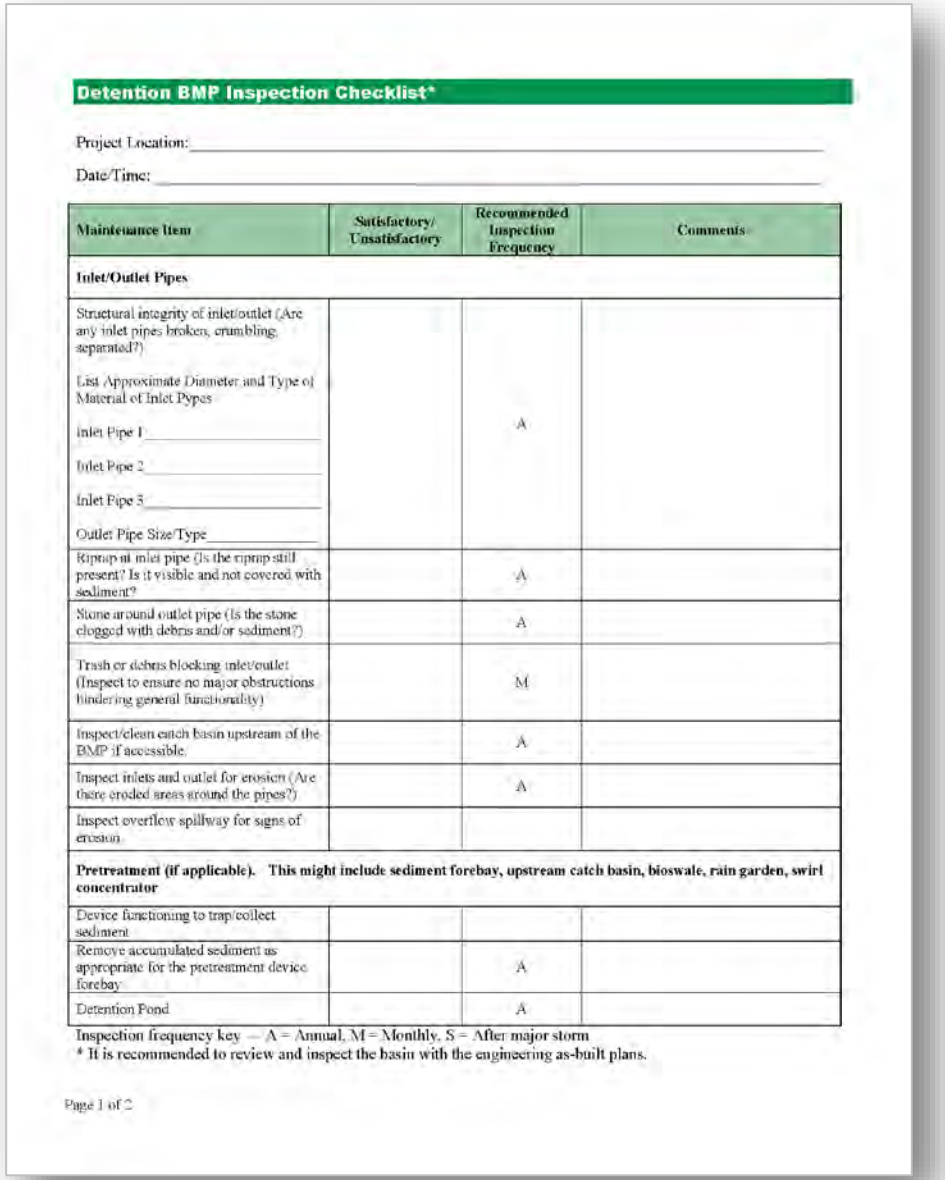
LIMITATIONS

1. High failure rate due to clogging and high maintenance burden.
2. Low removal of dissolved pollutants in very coarse soils.
3. Not suitable on fill slopes or steep slopes.
4. Risk of groundwater contamination in very coarse soils, may require groundwater monitoring.
5. Should not be used if significant upstream sediment load exists.
6. Slope of contributing watershed needs to be less than 20 percent.
7. Not recommended for discharge to a sole source aquifer.
8. Cannot be located within 100 feet of drinking water wells.
9. Metal and petroleum hydrocarbons could accumulate in soils to potentially toxic levels.
10. Relatively large land requirement.
11. Only feasible where soil is permeable and there is sufficient depth to bedrock and water table.
12. Need to be located a minimum of 10 feet down gradient and 100 feet up gradient from building foundations because of seepage problems.
13. Infiltration facilities could fall under additional regulations of IDEM or IDNR regarding waste disposal to groundwater.

DESIGN CRITERIA

Designing an infiltration basin is a process in which several factors are examined. The soil type and the drainage area are important factors in infiltration basin design. If either one of these two is inappropriate, the infiltration basin will not function properly. The steps in the design of an infiltration basin are listed below.

1. *Drainage Area.* Drainage areas between 5 and 50 acres are good candidates for infiltration basins. Infiltration trenches might be more appropriate for smaller drainage areas, while retention ponds are more appropriate for larger drainage areas (Schueler, 1987).
2. *Soils.* The site must have the appropriate soil, or the basin will not function properly. It is important that the soil be able to accept water at a minimum infiltration rate. Soils with an infiltration rate of less than 0.3 inches per hour, are not suitable sites for infiltration basins. Soils with a high percentage of clay are also undesirable, and should not be used if the percentage of clay is greater than 30. Generally, areas with fine to moderately fine soils are prevalent should not be considered as sites, because these soils do not have a high infiltration rate. Soils with greater than 40 percent combined silt/clay also should not be used. A series of soil cores should be taken to a depth of at least 5 feet below the proposed basin floor elevation to determine which kinds of soils are prevalent at the potential site.
3. *Volume.* Calculate the volume of stormwater to be mitigated by the infiltration basin using the Methods of Chapter 9.
4. *Slope.* The basin floor should be as flat as possible to ensure an even infiltration surface and should not be or greater than 5 percent slope. Also, side slopes should have a maximum slope of 3 horizontal to 1 vertical (Schueler, 1987).
5. *Vegetation.* Vegetation should be established as soon as possible. Water-tolerant reed canary grass or tall fescue should be planted on the floor and side slopes of the basin (Schueler, 1987). Root penetration and thatch formation maintains and sometimes



Detention BMP Inspection Checklist*

Project Location: _____

Date/Time: _____

Maintenance Item	Satisfactory/ Unsatisfactory	Recommended Inspection Frequency	Comments
Inlet/Outlet Pipes			
Structural integrity of inlet/outlet (Are any inlet pipes broken, crumbling, separated?) List Approximate Diameter and Type of Material of Inlet Pipes Inlet Pipe 1: _____ Inlet Pipe 2: _____ Inlet Pipe 3: _____ Outlet Pipe Size/Type: _____		A	
Riprap at inlet pipe (Is the riprap still present? Is it visible and not covered with sediment?		A	
Stone around outlet pipe (Is the stone clogged with debris and/or sediment?)		A	
Trash or debris blocking inlet/outlet (Inspect to ensure no major obstructions hindering general functionality)		M	
Inspect/clean catch basin upstream of the BMP if accessible.		A	
Inspect inlets and outlet for erosion (Are there eroded areas around the pipes?)		A	
Inspect overflow spillway for signs of erosion			
Pretreatment (if applicable). This might include sediment forebay, upstream catch basin, bioswale, rain garden, swirl concentrator			
Device functioning to trap/collect sediment			
Remove accumulated sediment as appropriate for the pretreatment device forebay		A	
Detention Pond		A	

Inspection frequency key — A = Annual, M = Monthly, S = After major storm

* It is recommended to review and inspect the basin with the engineering as-built plans.

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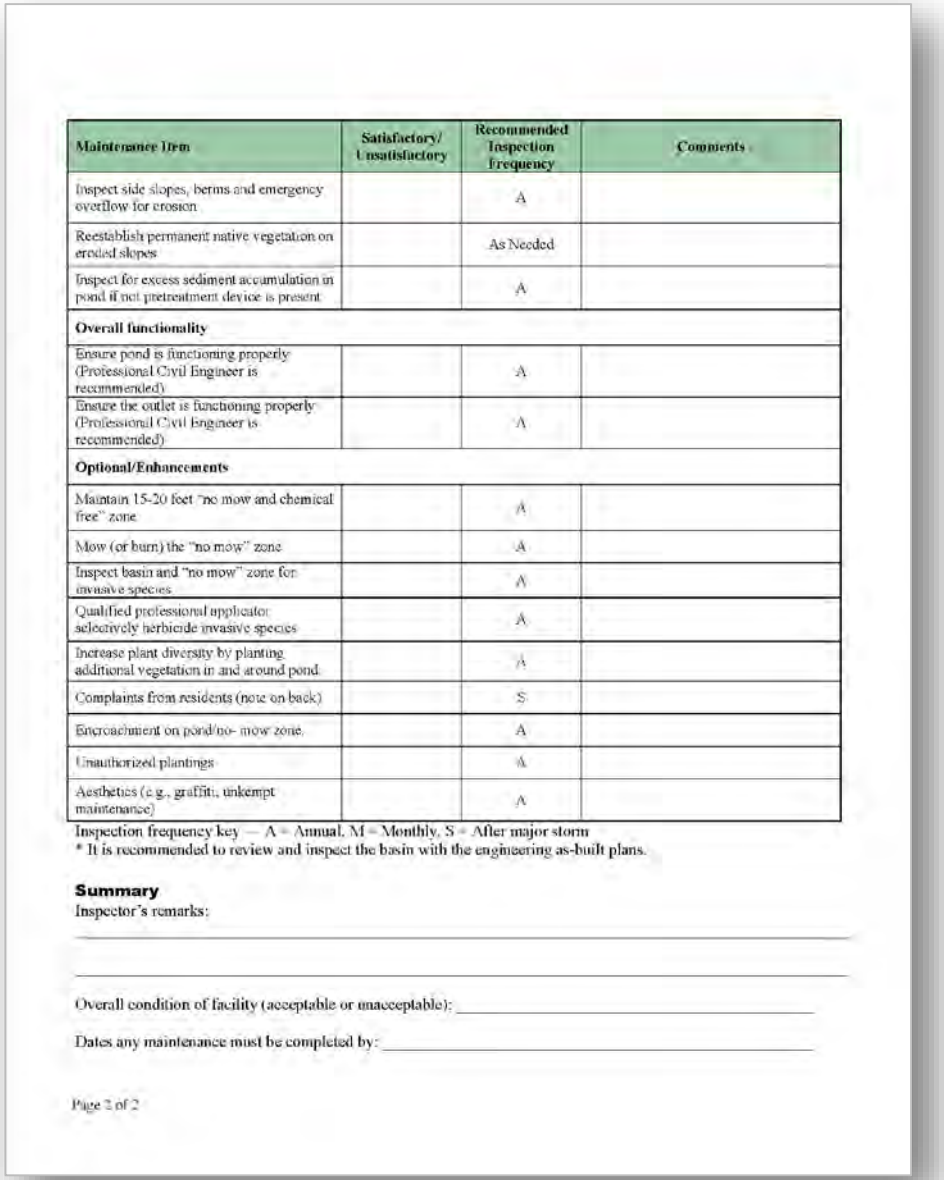

Maintenance Item	Satisfactory/ Unsatisfactory	Recommended Inspection Frequency	Comments
Inspect side slopes, berms and emergency overflow for erosion		A	
Reestablish permanent native vegetation on eroded slopes		As Needed	
Inspect for excess sediment accumulation in pond if not pretreatment device is present		A	
Overall functionality			
Ensure pond is functioning properly (Professional Civil Engineer is recommended)		A	
Ensure the outlet is functioning properly (Professional Civil Engineer is recommended)		A	
Optional/Enhancements			
Maintain 15-20 feet "no mow and chemical free" zone		A	
Mow (or burn) the "no mow" zone		A	
Inspect basin and "no mow" zone for invasive species		A	
Qualified professional applicator selectively herbicide invasive species		A	
Increase plant diversity by planting additional vegetation in and around pond.		A	
Complaints from residents (note on back)		S	
Encroachment on pond/no- mow zone.		A	
Unauthorized plantings		A	
Aesthetics (e.g., graffiti, unkempt maintenance)		A	

Inspection frequency key — A = Annual, M = Monthly, S = After major storm

* It is recommended to review and inspect the basin with the engineering as-built plans.

Summary

Inspector's remarks:

_____

_____

Overall condition of facility (acceptable or unacceptable): _____

Dates any maintenance must be completed by: _____

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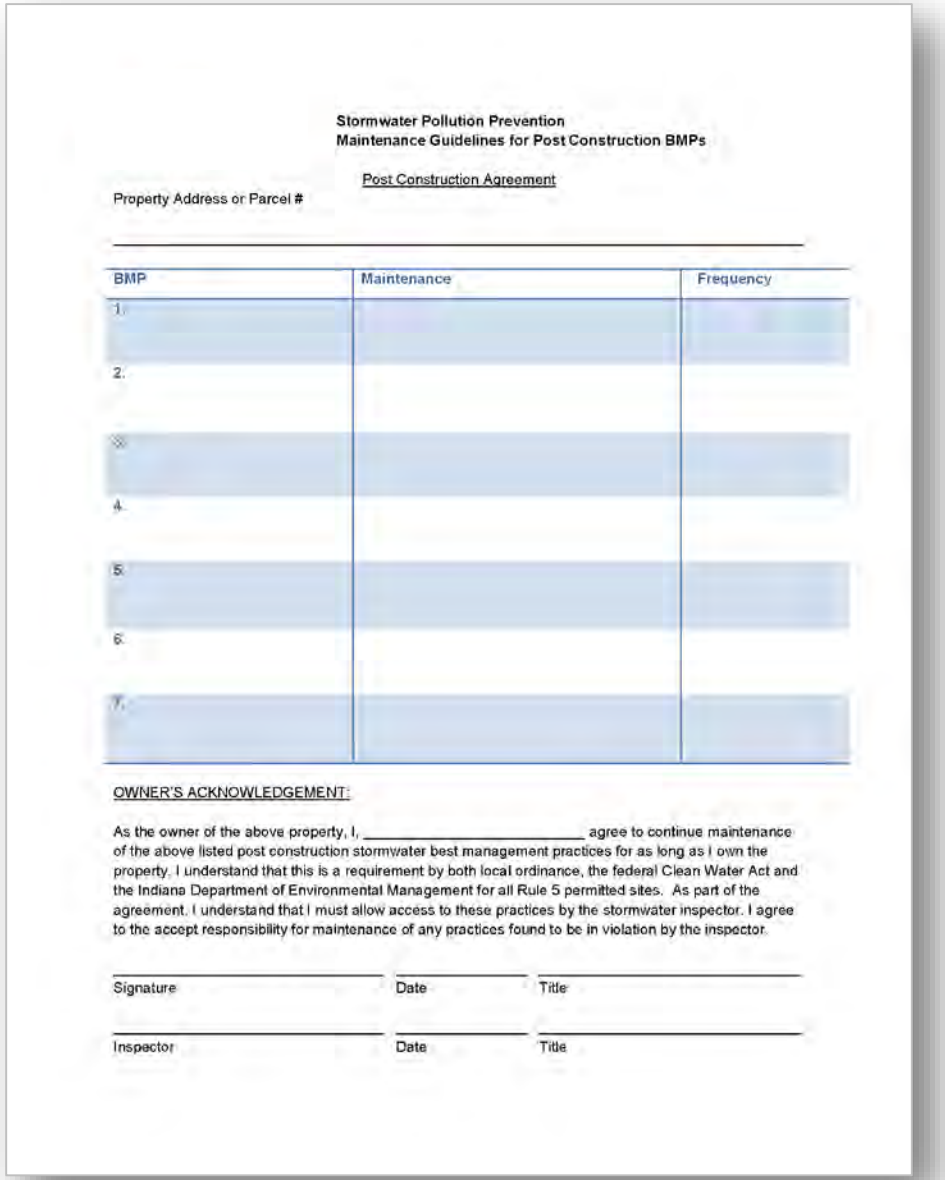


Stormwater Pollution Prevention
Maintenance Guidelines for Post Construction BMPs

Post Construction Agreement

Property Address or Parcel #

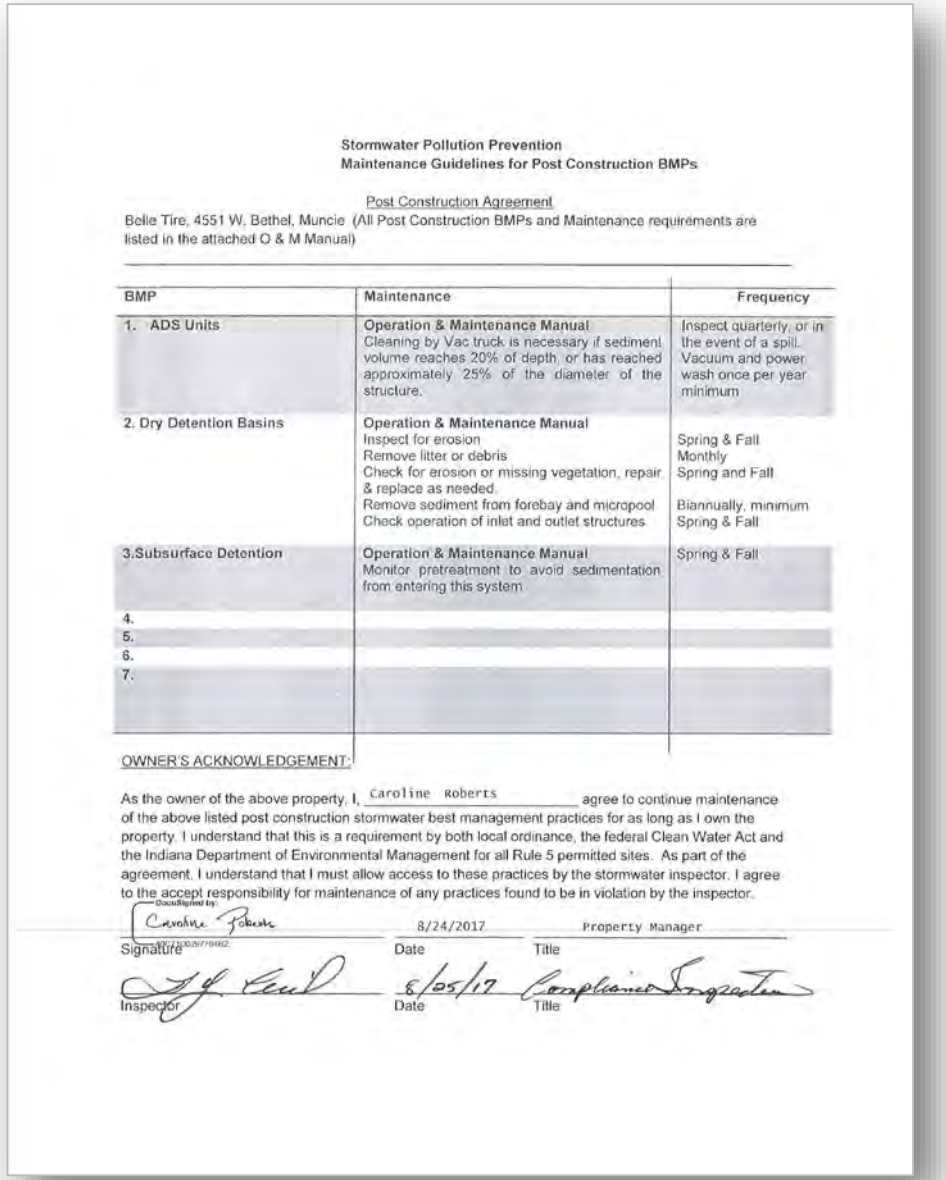
BMP	Maintenance	Frequency
1.		
2.		
3.		
4.		
5.		
6.		
7.		

OWNER'S ACKNOWLEDGEMENT:

As the owner of the above property, I, _____ agree to continue maintenance of the above listed post construction stormwater best management practices for as long as I own the property. I understand that this is a requirement by both local ordinance, the federal Clean Water Act and the Indiana Department of Environmental Management for all Rule 5 permitted sites. As part of the agreement, I understand that I must allow access to these practices by the stormwater inspector. I agree to the accept responsibility for maintenance of any practices found to be in violation by the inspector.

Signature Date Title

Inspector Date Title



Stormwater Pollution Prevention
Maintenance Guidelines for Post Construction BMPs

Post Construction Agreement

Belle Tire, 4551 W. Bethel, Muncie (All Post Construction BMPs and Maintenance requirements are listed in the attached O & M Manual)

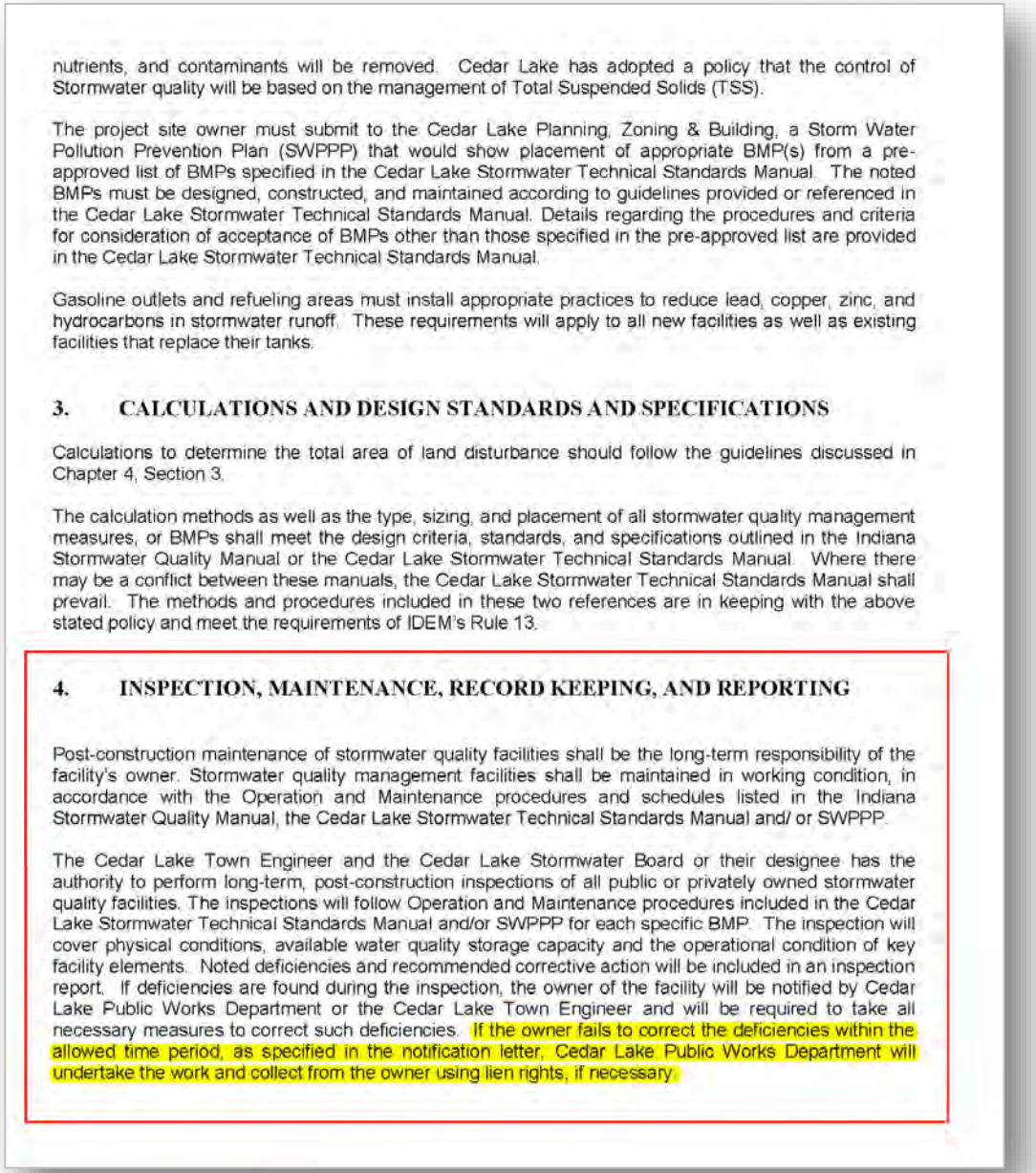
BMP	Maintenance	Frequency
1. ADS Units	**Operation & Maintenance Manual** Cleaning by Vac truck is necessary if sediment volume reaches 20% of depth, or has reached approximately 25% of the diameter of the structure.	Inspect quarterly, or in the event of a spill. Vacuum and power wash once per year minimum
2. Dry Detention Basins	**Operation & Maintenance Manual** Inspect for erosion Remove litter or debris Check for erosion or missing vegetation, repair & replace as needed. Remove sediment from forebay and micropool Check operation of inlet and outlet structures	 Spring & Fall Monthly Spring and Fall Biannually, minimum Spring & Fall
3.Subsurface Detention	**Operation & Maintenance Manual** Monitor pretreatment to avoid sedimentation from entering this system	Spring & Fall
4.		
5.		
6.		
7.		

OWNER'S ACKNOWLEDGEMENT:

As the owner of the above property, I, Caroline Roberts agree to continue maintenance of the above listed post construction stormwater best management practices for as long as I own the property. I understand that this is a requirement by both local ordinance, the federal Clean Water Act and the Indiana Department of Environmental Management for all Rule 5 permitted sites. As part of the agreement, I understand that I must allow access to these practices by the stormwater inspector. I agree to the accept responsibility for maintenance of any practices found to be in violation by the inspector.

Caroline Roberts — 8/24/2017 — Property Manager
Signature Date Title

Inspector 8/25/17 Compliance Inspector
Date Title



nutrients, and contaminants will be removed. Cedar Lake has adopted a policy that the control of Stormwater quality will be based on the management of Total Suspended Solids (TSS).

The project site owner must submit to the Cedar Lake Planning, Zoning & Building, a Storm Water Pollution Prevention Plan (SWPPP) that would show placement of appropriate BMP(s) from a pre-approved list of BMPs specified in the Cedar Lake Stormwater Technical Standards Manual. The noted BMPs must be designed, constructed, and maintained according to guidelines provided or referenced in the Cedar Lake Stormwater Technical Standards Manual. Details regarding the procedures and criteria for consideration of acceptance of BMPs other than those specified in the pre-approved list are provided in the Cedar Lake Stormwater Technical Standards Manual.

Gasoline outlets and refueling areas must install appropriate practices to reduce lead, copper, zinc, and hydrocarbons in stormwater runoff. These requirements will apply to all new facilities as well as existing facilities that replace their tanks.

3. CALCULATIONS AND DESIGN STANDARDS AND SPECIFICATIONS

Calculations to determine the total area of land disturbance should follow the guidelines discussed in Chapter 4, Section 3.

The calculation methods as well as the type, sizing, and placement of all stormwater quality management measures, or BMPs shall meet the design criteria, standards, and specifications outlined in the Indiana Stormwater Quality Manual or the Cedar Lake Stormwater Technical Standards Manual. Where there may be a conflict between these manuals, the Cedar Lake Stormwater Technical Standards Manual shall prevail. The methods and procedures included in these two references are in keeping with the above stated policy and meet the requirements of IDEM's Rule 13.

4. INSPECTION, MAINTENANCE, RECORD KEEPING, AND REPORTING

Post-construction maintenance of stormwater quality facilities shall be the long-term responsibility of the facility's owner. Stormwater quality management facilities shall be maintained in working condition, in accordance with the Operation and Maintenance procedures and schedules listed in the Indiana Stormwater Quality Manual, the Cedar Lake Stormwater Technical Standards Manual and/ or SWPPP.

The Cedar Lake Town Engineer and the Cedar Lake Stormwater Board or their designee has the authority to perform long-term, post-construction inspections of all public or privately owned stormwater quality facilities. The inspections will follow Operation and Maintenance procedures included in the Cedar Lake Stormwater Technical Standards Manual and/or SWPPP for each specific BMP. The inspection will cover physical conditions, available water quality storage capacity and the operational condition of key facility elements. Noted deficiencies and recommended corrective action will be included in an inspection report. If deficiencies are found during the inspection, the owner of the facility will be notified by Cedar Lake Public Works Department or the Cedar Lake Town Engineer and will be required to take all necessary measures to correct such deficiencies. If the owner fails to correct the deficiencies within the allowed time period, as specified in the notification letter, Cedar Lake Public Works Department will undertake the work and collect from the owner using lien rights, if necessary.

MS4 Program Information

- **Local MS4 Staff/Organization**
  - MS4 Operator (Highest Elected Official)
  - MS4 Coordinator
  - Plan Reviewers, Site Inspectors
- **Program Certification dates (2005-2006 timeframe in Indiana)**

Overall Program Assessment of Construction Site Run-off

- **MS4 Boundaries**
  - City/Town Limits
  - County Urbanized Area
  - Entire County

Overall Program Assessment of Post-Construction Site Run-off

- **Outreach to Regulated Community**
  - Local Contractors, Developers, Engineering Firms, Designers
  - “Construction Site Personnel” is a defined target constituency for having “an awareness of storm water quality issues”

MS4 Program Information

“Do you have a local Ordinance regulating Construction Site Run-Off?”

Overall Program Assessment of Construction Site Run-off

Overall Program Assessment of Post-Construction Site Run-off

MS4 Program Information

"Do you have a local Ordinance regulating Construction Site Run-Off?"

"Is you Ordinance on-line?" (Auditor may already know the answer!)

Overall Program Assessment of Construction Site Run-off

Overall Program Assessment of Post-Construction Site Run-off

MS4 Program Information

"Do you have a local Ordinance regulating Construction Site Run-Off?"

"Is you Ordinance on-line?" (Auditor may already know the answer!)

"Do you have a local Technical Standards Manual?"

Overall Program Assessment of Construction Site Run-off

Overall Program Assessment of Post-Construction Site Run-off

MS4 Program Information	"Do you have a local Ordinance regulating Construction Site Run-Off?" "Is you Ordinance on-line?" (Auditor may already know the answer!) "Do you have a local Technical Standards Manual?"
Overall Program Assessment of Construction Site Run-off	**"Who reviews local construction plans and SWPPPs?"**
Overall Program Assessment of Post-Construction Site Run-off	

MS4 Program Information	"Do you have a local Ordinance regulating Construction Site Run-Off?"
	"Is you Ordinance on-line?" (Auditor may already know the answer!)
	"Do you have a local Technical Standards Manual?"
Overall Program Assessment of Construction Site Run-off	"Who reviews local construction plans and SWPPPs?"
	"What are the qualifications of the plan reviewer?"
Overall Program Assessment of Post-Construction Site Run-off	

MS4 Program Information	"Do you have a local Ordinance regulating Construction Site Run-Off?"
	"Is you Ordinance on-line?" (Auditor may already know the answer!)
	"Do you have a local Technical Standards Manual?"
Overall Program Assessment of Construction Site Run-off	"Who reviews local construction plans and SWPPPs?"
	"What are the qualifications of the plan reviewer?"
	"Does the reviewer use a checklist?"
Overall Program Assessment of Post-Construction Site Run-off	

MS4 Program Information	"Do you have a local Ordinance regulating Construction Site Run-Off?"
	"Is you Ordinance on-line?" (Auditor may already know the answer!)
	"Do you have a local Technical Standards Manual?"
Overall Program Assessment of Construction Site Run-off	"Who reviews local construction plans and SWPPPs?"
	"What are the qualifications of the plan reviewer?"
	"Does the reviewer use a checklist?"
	"Who reviews plans/SWPPPs for MS4 Owned & Operated projects?"
Overall Program Assessment of Post-Construction Site Run-off	

MS4 Program Information	"Do you have a local Ordinance regulating Construction Site Run-Off?"
	"Is you Ordinance on-line?" (Auditor may already know the answer!)
	"Do you have a local Technical Standards Manual?"
Overall Program Assessment of Construction Site Run-off	"Who reviews local construction plans and SWPPPs?"
	"What are the qualifications of the plan reviewer?"
	"Does the reviewer use a checklist?"
	"Who reviews plans/SWPPPs for MS4 Owned & Operated projects?"
Overall Program Assessment of Post-Construction Site Run-off	**"Are MS4 Owned & Operated projects reviewed to the same standards?"**

MS4 Program Information	"Do you have a local Ordinance regulating Construction Site Run-Off?"
	"Is you Ordinance on-line?" (Auditor may already know the answer!)
	"Do you have a local Technical Standards Manual?"
Overall Program Assessment of Construction Site Run-off	"Who reviews local construction plans and SWPPPs?"
	"What are the qualifications of the plan reviewer?"
	"Does the reviewer use a checklist?"
	"Who reviews plans/SWPPPs for MS4 Owned & Operated projects?"
Overall Program Assessment of Post-Construction Site Run-off	"Are MS4 Owned & Operated projects reviewed to the same standards?"
	"When the plan review is completed, do you issue a Stormwater Permit?"

MS4 Program Information

“Do you have a construction project Tracking System?”

Overall Program Assessment of Construction Site Run-off

Overall Program Assessment of Post-Construction Site Run-off

MS4 Program Information

"Do you have a construction project Tracking System?"

"Do you have written procedures for your inspection program?"

Overall Program Assessment of Construction Site Run-off

Overall Program Assessment of Post-Construction Site Run-off

MS4 Program Information

"Do you have a construction project Tracking System?"

"Do you have written procedures for your inspection program?"

"Provide your procedure for determining priority sites for inspection?"

Overall Program Assessment of Construction Site Run-off

Overall Program Assessment of Post-Construction Site Run-off

MS4 Program Information	"Do you have a construction project Tracking System?"
	"Do you have written procedures for your inspection program?"
	"Provide your procedure for determining priority sites for inspection?"
Overall Program Assessment of Construction Site Run-off	**"How often do you inspect a site?"**
Overall Program Assessment of Post-Construction Site Run-off	

MS4 Program Information

"Do you have a construction project Tracking System?"

"Do you have written procedures for your inspection program?"

"Provide your procedure for determining priority sites for inspection?"

Overall Program Assessment of Construction Site Run-off

"How often do you inspect a site?"

"How do you enforce inspection violations?"

Overall Program Assessment of Post-Construction Site Run-off

MS4 Program Information	"Do you have a construction project Tracking System?"
	"Do you have written procedures for your inspection program?"
	"Provide your procedure for determining priority sites for inspection?"
Overall Program Assessment of Construction Site Run-off	"How often do you inspect a site?"
	"How do you enforce inspection violations?"
	"How many inspections have been performed in the past year?"
Overall Program Assessment of Post-Construction Site Run-off	

MS4 Program Information	"Do you have a construction project Tracking System?"
	"Do you have written procedures for your inspection program?"
	"Provide your procedure for determining priority sites for inspection?"
Overall Program Assessment of Construction Site Run-off	"How often do you inspect a site?"
	"How do you enforce inspection violations?"
	"How many inspections have been performed in the past year?"
	"How many warnings, fines and Stop Work Orders have been issued?"
Overall Program Assessment of Post-Construction Site Run-off	

MS4 Program Information	"Do you have a construction project Tracking System?"
	"Do you have written procedures for your inspection program?"
	"Provide your procedure for determining priority sites for inspection?"
Overall Program Assessment of Construction Site Run-off	"How often do you inspect a site?"
	"How do you enforce inspection violations?"
	"How many inspections have been performed in the past year?"
	"How many warnings, fines and Stop Work Orders have been issued?"
Overall Program Assessment of Post-Construction Site Run-off	**"What training have staff completed in the past year?"**

MS4 Program Information	"Do you have a construction project Tracking System?"
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Overall Program Assessment of Construction Site Run-off	"How often do you inspect a site?"
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	"How many inspections have been performed in the past year?"
	"How many warnings, fines and Stop Work Orders have been issued?"
Overall Program Assessment of Post-Construction Site Run-off	"What training have staff completed in the past year?"
	"How often do you review your construction site run-off program?"

MS4 Program Information

“Do you direct growth away from sensitive areas?”

Overall Program Assessment of Construction Site Run-off

Overall Program Assessment of Post-Construction Site Run-off

MS4 Program Information

"Do you direct growth away from sensitive areas?"

"Do you manage selection of measures in wellhead protection areas?"

Overall Program Assessment of Construction Site Run-off

Overall Program Assessment of Post-Construction Site Run-off

MS4 Program Information

"Do you direct growth away from sensitive areas?"

"Do you manage selection of measures in wellhead protection areas?"

"Do you regulate projects that install new or replace existing fuel tanks?"

Overall Program Assessment of Construction Site Run-off

Overall Program Assessment of Post-Construction Site Run-off

MS4 Program Information

"Do you direct growth away from sensitive areas?"

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Overall Program Assessment of Construction Site Run-off

"How do you review Post-Construction plans?"

Overall Program Assessment of Post-Construction Site Run-off

MS4 Program Information

"Do you direct growth away from sensitive areas?"

"Do you manage selection of measures in wellhead protection areas?"

"Do you regulate projects that install new or replace existing fuel tanks?"

Overall Program Assessment of Construction Site Run-off

"How do you review Post-Construction plans?"

"Do you require written Operational & Maintenance Plans?"

Overall Program Assessment of Post-Construction Site Run-off

MS4 Program Information

"Do you direct growth away from sensitive areas?"

"Do you manage selection of measures in wellhead protection areas?"

"Do you regulate projects that install new or replace existing fuel tanks?"

Overall Program Assessment of Construction Site Run-off

"How do you review Post-Construction plans?"

"Do you require written Operational & Maintenance Plans?"

"What are your procedures for inspecting post-construction BMPs?"

Overall Program Assessment of Post-Construction Site Run-off

MS4 Program Information

"Do you direct growth away from sensitive areas?"

"Do you manage selection of measures in wellhead protection areas?"

"Do you regulate projects that install new or replace existing fuel tanks?"

Overall Program Assessment of Construction Site Run-off

"How do you review Post-Construction plans?"

"Do you require written Operational & Maintenance Plans?"

"What are your procedures for inspecting post-construction BMPs?"

"How many post-construction BMPs inspections have been performed?"

Overall Program Assessment of Post-Construction Site Run-off

MS4 Program Information	"Do you direct growth away from sensitive areas?"
	"Do you manage selection of measures in wellhead protection areas?"
	"Do you regulate projects that install new or replace existing fuel tanks?"
Overall Program Assessment of Construction Site Run-off	"How do you review Post-Construction plans?"
	"Do you require written Operational & Maintenance Plans?"
	"What are your procedures for inspecting post-construction BMPs?"
	"How many post-construction BMPs inspections have been performed?"
Overall Program Assessment of Post-Construction Site Run-off	**"How many post-construction warnings/violations have been issued?"**

MS4 Program Information	"Do you direct growth away from sensitive areas?"
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Overall Program Assessment of Construction Site Run-off	"How do you review Post-Construction plans?"
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	"How many post-construction BMPs inspections have been performed?"
	"How many post-construction warnings/violations have been issued?"
Overall Program Assessment of Post-Construction Site Run-off	**"What training have staff completed in the past year?"**

MS4 Program Information	"Do you direct growth away from sensitive areas?"
	"Do you manage selection of measures in wellhead protection areas?"
	"Do you regulate projects that install new or replace existing fuel tanks?"
Overall Program Assessment of Construction Site Run-off	"How do you review Post-Construction plans?"
	"Do you require written Operational & Maintenance Plans?"
	"What are your procedures for inspecting post-construction BMPs?"
	"How many post-construction BMPs inspections have been performed?"
	"How many post-construction warnings/violations have been issued?"
	"What training have staff completed in the past year?"
Overall Program Assessment of Post-Construction Site Run-off	**"How often do you review your construction site run-off program?"**

MS4 Coordinator: “Let’s go to the South Ridge Subdivision for our construction site audit.”

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Auditor: “Before we go there, as I was checking directions on how to get to the Engineering Department Office and I saw this huge land disturbance right next door. Let’s go there first.”

MS4 C… …our constr…

Audito… …now to get … …nd distur…

“What are the limits of land disturbing activities?”

"What are the limits of land disturbing activities?"

"Is upgradient run-off diverted from the land disturbing activities?"

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"What are the perimeter erosion and sediment control measures?"

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"Where are the outfalls?"

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"Is upgradient run-off diverted from the land disturbing activities?"

"What are the perimeter erosion and sediment control measures?"

"Where are the outfalls?"

"Are the outfalls stabilized?"

“Any sign of off-site pollution or sedimentation?”

"Any sign of off-site pollution or sedimentation?"

"Are there any on-site or downstream sensitive areas?"

"Any sign of off-site pollution or sedimentation?"

"Are there any on-site or downstream sensitive areas?"

"What is the construction sequence for the project?"

"Any sign of off-site pollution or sedimentation?"

"Are there any on-site or downstream sensitive areas?"

"What is the construction sequence for the project?"

"Where is the concrete washout location?"

"Any sign of off-site pollution or sedimentation?"

"Are there any on-site or downstream sensitive areas?"

"What is the construction sequence for the project?"

"Where is the concrete washout location?"

"Where is the NOI posting?"

Section D: Audit Summary
Action Items: • **Recommendations:** **B(7):** MS4 personnel responsible for field inspections should pursue additional training related to construction site run-off. This training is available through courses that focus entirely on construction site run-off (i.e. local county Contractor workshop and online webinars) **C(7):** No enforcement mechanism is in place should an owner refuse to correct a post-construction non-compliance issue, should one arise. While the MS4 has yet to have a compliance issue with an owner or facility, it is recommended that language should be inserted into county Code to address lack of enforcement mechanisms in place. • **Required Actions:** C(7): Identify policy and procedures for the routine inspection of post-construction measures in addition to those currently implemented based on complaints. This item must be completed and the policy and procedures submitted to IDEM **no later than December 29, 2017**.
Attachments:
Action by IDEM: Failure to address and/or respond to deficiencies and/or violations may result in further action by IDEM including, but not limited to a compliance meeting and/or a non-compliance letter. As warranted, IDEM will perform follow-up inspections for projects owned and operated by the MS4 as they are permitted and will periodically revisit sites regulated by the MS4.

NPDES PHASE II -- STORMWATER QUALITY MANAGEMENT PROGRAM
CONSTRUCTION SITE STORMWATER RUNOFF CONTROL

MS4 STANDARD OPERATING PROCEDURE (SOP) FOR:

CONSTRUCTION/POST-CONSTRUCTION STORMWATER RUNOFF CONTROL

SOP Number: MCM-4/5
October 2017

BACKGROUND

State and Federal regulations require that MS4 operators shall develop and implement a Stormwater Quality Management Plan that: includes a commitment to develop, implement, manage, and enforce an erosion and sediment control program for **construction activities** that disturb one or more acres of land within the MS4 area (Minimum Control Measure 4); and includes developing, implementing, managing, and enforcing a program to address discharges of **postconstruction storm water run-off** from new development and redevelopment areas that disturb one or more acres of land (Minimum Control Measure 5). Specifically, State regulations for Construction Site Stormwater Runoff (MCM 4) and Post-Construction Stormwater Runoff (MCM 5) for the City of Crown Point National Pollutant Discharge Elimination System (NPDES) MS4 stormwater permit require the following:

327 IAC 15-13-15(f): "The MS4 operator, or a designated MS4 entity, shall meet the following:
(1) Develop requirements for the implementation of appropriate BMPs on construction sites to control sediment, erosion, and other waste.
(2) Review and approve the construction plans submitted by the construction site operator before construction activities commence.
(3) Develop procedures for site inspection and enforcement to ensure that BMPs are properly installed.
(4) Establish written procedures to identify priority sites for inspection and enforcement based on, at a minimum, the nature and extent of the construction activity, topography, and the characteristics of soils and receiving water quality.
(5) Develop procedures for the receipt and consideration of public inquiries, concerns, and information submitted regarding local construction activities.
(6) Implement, at a minimum, a tracking process in which submitted public information, both written and verbal, is documented and then given to appropriate staff for follow-up."

327 IAC 15-13-16(c): "The MS4 operator, or a designated MS4 entity, shall meet the following:
(1) Infiltration practices will not be allowed in wellhead protection areas.
(2) Discharges from an MS4 area will not be allowed directly into sinkholes or fractured bedrock without treatment that results in the discharge meeting Indiana ground water quality standards as referenced in 327 IAC 2-11.
(3) Any storm water practice that is a Class V injection well must ensure that the discharge from such practices meets Indiana ground water quality standards as referenced in 327 IAC 2-11.
(4) As site conditions allow, the rate at which water flows through the MS4 conveyances shall be regulated to reduce outfall scouring and stream bank erosion.
(5) As site conditions allow, a vegetated filter strip of appropriate width shall be maintained along unvegetated swales and ditches.
(6) New retail gasoline outlets, new municipal, state, federal, or institutional refueling areas, or outlets and refueling areas that replace their existing tank systems shall be required by MS4 ordinance or other regulatory means to design and install appropriate practices to reduce lead, copper, zinc, and polyaromatic hydrocarbons in storm water run-off."

Failure to implement the state regulations cited above in 327 IAC 15-13-15(f) and 327 IAC 15-13-16(c) will result in non-compliance with Crown Point's NPDES MS4 stormwater permit. An accepted practice for establishing written documentation of program implementation activities is through the use of Standard Operating Procedures, or SOPs. This SOP has been prepared and issued for Crown Point's Construction Site and Post-Construction Site Runoff control programs (Item 327 IAC 15-13-15(f) and 327 IAC 15-13-16(c) noted above) and has been named Crown Point SOP No. MS4-MCM-4/5.

2.2.2.1 Installation and maintenance of a stable construction site access.
2.2.2.2 Installation and maintenance of appropriate perimeter erosion and sediment control measures prior to land disturbance.
2.2.2.3 Minimization of sediment discharge and tracking from the lot.
2.2.2.4 Clean-up of sediment that is either tracked or washed onto roads. Bulk clearing of sediment shall not include flushing the area with water. Cleared sediment must be redistributed or disposed of in a manner that is in compliance with all applicable statutes and rules.
2.2.2.5 Implementation of concrete washout practices that securely contain and allow for the proper disposal of washout waste.
2.2.2.6 Adjacent lots disturbed by an individual lot operator must be repaired and stabilized with temporary or permanent surface stabilization.
2.2.2.7 Self-monitoring program including plan and procedures.

2.2.3 **Certification of Compliance** stating that the individual lot plan is consistent with the Stormwater Management Permit, as approved by the City, for the larger project (if the individual lot is part of a larger permitted project).

2.2.4 **Trained Individual:** name, address, telephone number, and list of qualifications of the trained individual in charge of the mandatory stormwater pollution prevention self-monitoring program for the project site.

2.2.5 **Implementation:** The individual lot operator is responsible for installation and maintenance of all erosion and sediment control measures until the site is stabilized.

2.2.6 **Individual Lot Plot Plan Permit Approval:** Crown Point MS4 staff will provide approval of Individual Lot Plot Plan Permit.

2.2.7 *TRACKING:* The number of Individual Lot Plot Plan Permits approved shall be tracked using Programmatic Indicator #13 and this information will be included with the Crown Point MS4 Annual Report.

3 CONSTRUCTION SITE INSPECTION & ENFORCEMENT

Indiana Administrative Code: "Develop procedures for site inspection and enforcement to ensure that BMPs are properly installed" (327 IAC 15-13-15(f)(3))."

Note: this Section applies to "Non-MS4 Owned and Operated" and "MS4 Owned and Operated" projects.

3.1 **Pre-Construction Meeting:** The Project Owner must schedule a Pre-Construction Meeting with the Crown Point MS4 staff to discuss and review the following items: construction site posting requirements, construction schedule, construction work sequence, self-monitoring requirements and the prioritization of MS4 staff site inspections correlated to critical construction periods/activities. A Pre-Construction Meeting Agenda template is attached in Appendix B of this SOP.

3.2 **Notice of Intent (NOI) & Proof of Public Notice:** The signed NOI, accompanied by proof of publication in a newspaper of general circulation in the affected area that notified the public that a construction activity is to commence, will need to be resubmitted later after the Stormwater Management Permit is granted and at least 48 hours prior to commencement of construction.

3.3 **Notice of Intent Posting:** The project site owner shall post the following near the main entrance of the project site: completed NOI; name, company name, telephone number, e-mail address (if available), and address of the project site owner or local contact person; and location of the construction plan if the project site does not have an on-site location to store the plan.

3.4 **Initial Inspection:** At the start of construction, Crown Point MS4 staff will conduct an initial inspection of the construction site to verify that perimeter controls have been installed properly and that the SWPPP is being implemented. A sample Inspection Form is included in Appendix B of this SOP.

3.5 **Self-Monitoring:** A self-monitoring program must be implemented by the project site owner to ensure the stormwater pollution prevention plan is working effectively. A trained individual, acceptable to the City, shall perform a written evaluation of the project site by the end of the next business day following each measurable storm event. A measurable storm event is defined as a precipitation event that results in a total measured precipitation accumulation equal to, or greater than, one-half (0.5) inch of rainfall. If there are no measurable storm events within a given week, the site should be monitored at least once in that week. Weekly inspections by the trained individual shall continue until the entire site has been stabilized and a Notice of Termination has been issued. The trained individual should look at the maintenance of existing stormwater pollution prevention measures, including erosion and sediment control measures, drainage structures, and construction materials storage/containment facilities, to ensure they are functioning properly. The trained individual should also identify additional measures, beyond those originally identified in the stormwater pollution prevention plan, necessary to remain in compliance with all applicable statutes and regulations. The resulting evaluation reports must include the name of the individual performing the evaluation, the date of the evaluation, problems identified at the project site, and details of maintenance, additional measures, and corrective actions recommended and completed.

3.6 **Inspections by Crown Point MS4 Staff:** After the initial construction site inspection to verify perimeter controls and required posting are in place, Crown Point MS4 staff will schedule future site inspections quarterly, with additional inspections for shorter duration projects and additional inspections associated with priority sites having defined critical inspection periods.

3.6.1 After a construction site inspection is completed by Crown Point MS4 staff, if any Corrective Action items are deemed necessary, the required Corrective Action items and timelines will be communicated to the construction project's person responsible for onsite erosion control.
3.6.2 After the issuance of a Corrective Action notification, Crown Point MS4 staff will conduct a follow-up inspection to verify that the Corrective Actions have been satisfactorily addressed.
3.6.3 If a follow-up inspection by Crown Point MS4 staff determines that the identified Corrective Actions were not addressed satisfactorily, the City of Crown Point has enforcement and violation provisions as defined in the Stormwater Ordinance (Chapter 8). The Escalating enforcement actions identified in the Stormwater Ordinance include provisions for: fines, Stop Work Orders and the suspension of access to the City's storm drain system.
3.6.4 *TRACKING:* The number of construction sites inspected shall be tracked using Programmatic Indicator #14 and this information will be included with the Crown Point MS4 Annual Report.
3.6.5 *TRACKING:* The number and type of enforcement actions taken against construction site operators shall be tracked using Programmatic Indicator #15 and this information will be included with the Crown Point MS4 Annual Report.

3.7 **Notice of Termination (NOT):**

3.7.1 Upon completion of construction activities, as-built plans must be submitted to the City of Crown Point.
3.7.2 Upon achieving site stabilization and all temporary construction site erosion and sediment control measures have been removed, an NOT shall be submitted to the Crown Point MS4 staff.
3.7.3 Upon receipt of an NOT from a Project Owner, the Crown Point MS4 staff will conduct an inspection of the site to ensure full compliance with the provisions of the Stormwater Ordinance and the terms and conditions of the site's approved SWPPP. After the NOT site inspection is completed by Crown Point MS4 staff, if any corrective action items are deemed necessary, the required corrective action items and timelines will be communicated to the person responsible for onsite erosion control. Upon verification by Crown Point MS4 staff that the requirements for an NOT have been met,

13.3 To provide additional guidance for appropriate practices to reduce lead, copper, zinc, and polyaromatic hydrocarbons in stormwater runoff, Appendix C of this SOP contains pre-treatment options for "hot spot" land uses (Fact Sheet PC-113). The Fact Sheet identifies land uses associated with the potential to be high pollutant producers ("hot spots") and provides a list of pre-treatment BMP options for each of the different "hot spot" land uses. SWPPP preparers can use this Fact Sheet to determine the appropriate pre-treatment options based on individual site conditions.

13.4 *TRACKING:* The number and location of new retail gasoline outlets or municipal, state, federal, or institutional refueling areas, or outlets or refueling areas that replaced existing tank systems that have installed storm water BMPs will be tracked using Programmatic Indicator #23 and this information will be included with the Crown Point MS4 Annual Report.

14 REPORTING & RECORD KEEPING

Indiana Administrative Code: "An MS4 operator regulated under this rule shall submit an annual report to the department (IDEM) with the following information: Progress towards development, implementation, and enforcement of all MCMs, including updated programmatic indicator data (327 IAC 15-13-18(a)(1))."

Programmatic Indicators relevant to this SOP include:

- The number of Stormwater Permits issued shall be tracked using Programmatic Indicator #13
- The number of construction sites inspected shall be tracked using Programmatic Indicator #14
- The number and type of enforcement actions taken against construction site operators shall be tracked using Programmatic Indicator #15
- The number of, and associated construction site name and location for, public informational requests received shall be tracked using Programmatic Indicator #16
- The number, type, and location of Post-Construction structural BMPs installed will be tracked using Programmatic Indicator #17
- The number, type, and location of Post-Construction structural BMPs inspected will be tracked using Programmatic Indicator #18
- The number, type, and location of Post-Construction structural BMPs maintained or improved to function properly will be tracked using Programmatic Indicator #19
- The type and location of Post-Construction non-structural BMPs utilized will be tracked using Programmatic Indicator #20
- The number and location of new retail gasoline outlets or municipal, state, federal, or institutional refueling areas, or outlets or refueling areas that replaced existing tank systems that have installed storm water BMPs will be tracked using Programmatic Indicator #23

Information and data tracked for the above Programmatic Indicators will be included with the Crown Point MS4 Annual Report.

MS4 PROJECT PRE-CONSTRUCTION MTG. AGENDA

City of Crown Point * 101 N. East St. * Crown Point, IN 46307
Phone: (219) 662-3242 * Fax: (219) 661-2280

Project Name:		**Local Contact:**	
Location:		**Meeting Date:**	
Responsible Party:		**Meeting Location:**	

The Crown Point Construction/Post-Construction Stormwter Runoff Control Standard Operation Procedure (SOP MCM-4/5) requires that a Pre-Construction Meeting will be held prior to the initiation of construction. This agenda/checklist provides the items to be reviewed during the meeting:

Pre-Construction Meeting Agenda Item	Agenda Item Covered?		Notes
	YES	NO	
48-hr. Notice Requirement			
Posting Requirement			
Record Copy of SWPPP			
Documenting SWPPP Changes			
Construction Schedule			
Construction Sequence			
Construction Entrance			
Perimeter Controls			
Sensitive Areas			
Impact Drainage Areas			
Priority Inspection Areas			
Concrete Washout			
Stockpiles			
Disposal of Paint & Dyes			
Spill Prevention			
Self-Inspections			
Failed BMPs			
Sub-Contractors			

Attendee Documentation:

Name	Company/Entity	Phone Number	Signature

Crown Point MS4 Project Pre-Construction Meeting Agenda Form, Revision 0, October 2017 *Page 1 of 1*

MS4 NOTICE OF TERMINATION INSPECTION FORM

City of Crown Point * 101 N. East St. * Crown Point, IN 46307
Phone: (219) 662-3242 * Fax: (219) 661-2280

Project Name:	
Location:	
Date:	

All construction sites shall undergo a final inspection by Crown Point MS4 Staff following submittal of a Notice of Termination (NOT) by the project owner to ensure the site is stabilized and that Post-Construction BMPs have been properly installed.

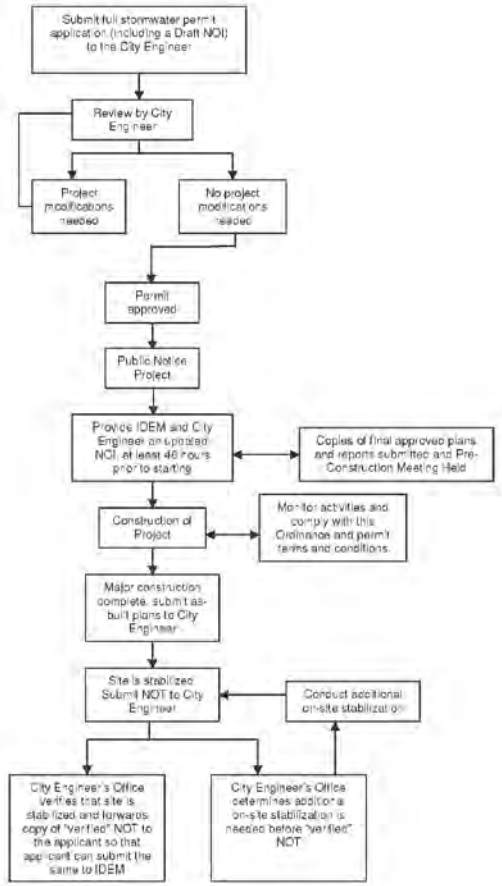
Notice of Termination (NOT) Verification Inspection Items	YES	NO	N/A
1. Have all earth disturbing activities been completed?			
2. Has the site been stabilized (70% uniform density of permanent vegetation)?			
3. Are all drainageways stabilized with either vegetation, rip rap, or other armament?			
4. Have all temporary erosion and sediment control measures been removed?			
5. Has all construction waste, trash, and debris been removed from the site?			
6. Has all construction equipment and material been removed from the site?			
7. Have all the permanent stormwater quality BMPs been installed in accordance with the plans, specifications, and details?			
8. Are all the permanent BMPs free of sediment accumulation resulting from construction activities?			

If you answered "no" to any of the above questions, describe any corrective action which must be taken to remedy the problem and when the corrective actions are to be completed.

Inspector's Name _____ Inspector's Signature _____ Date _____

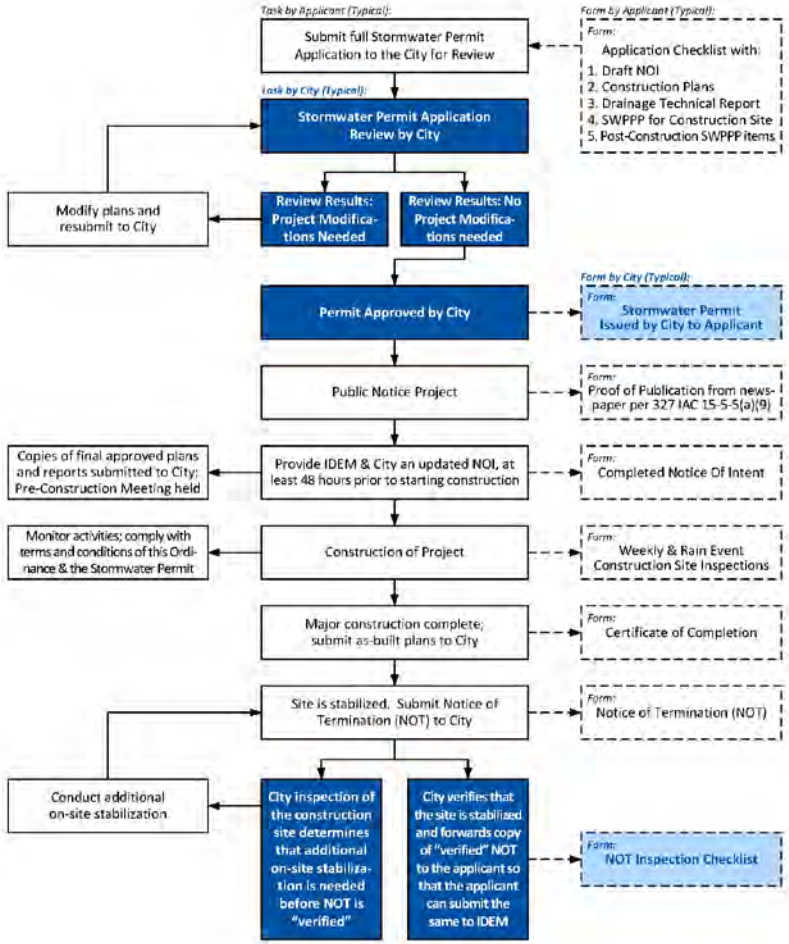
Crown Point MS4 Notice of Termination Inspection Form, Revision 1, October 2017 *Page 1 of 1*

Figure 1: Permit Approval Process



Chapter 7: Permit Requirements and Procedures ♦ Page 33

(Ordinance Chapter 7, Figure 1)



What will you be audited on? 327 IAC 15-13(f) & (g)!

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Surviving Detailed MS4 Managed Construction & Post-Construction Program Audits

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