Elements of Effective Erosion and Sediment Control Programs

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Baxter & Woodman, Inc.

May 25, 2010

Strategies for Compliance with NPDES Stormwater Regulations Workshop

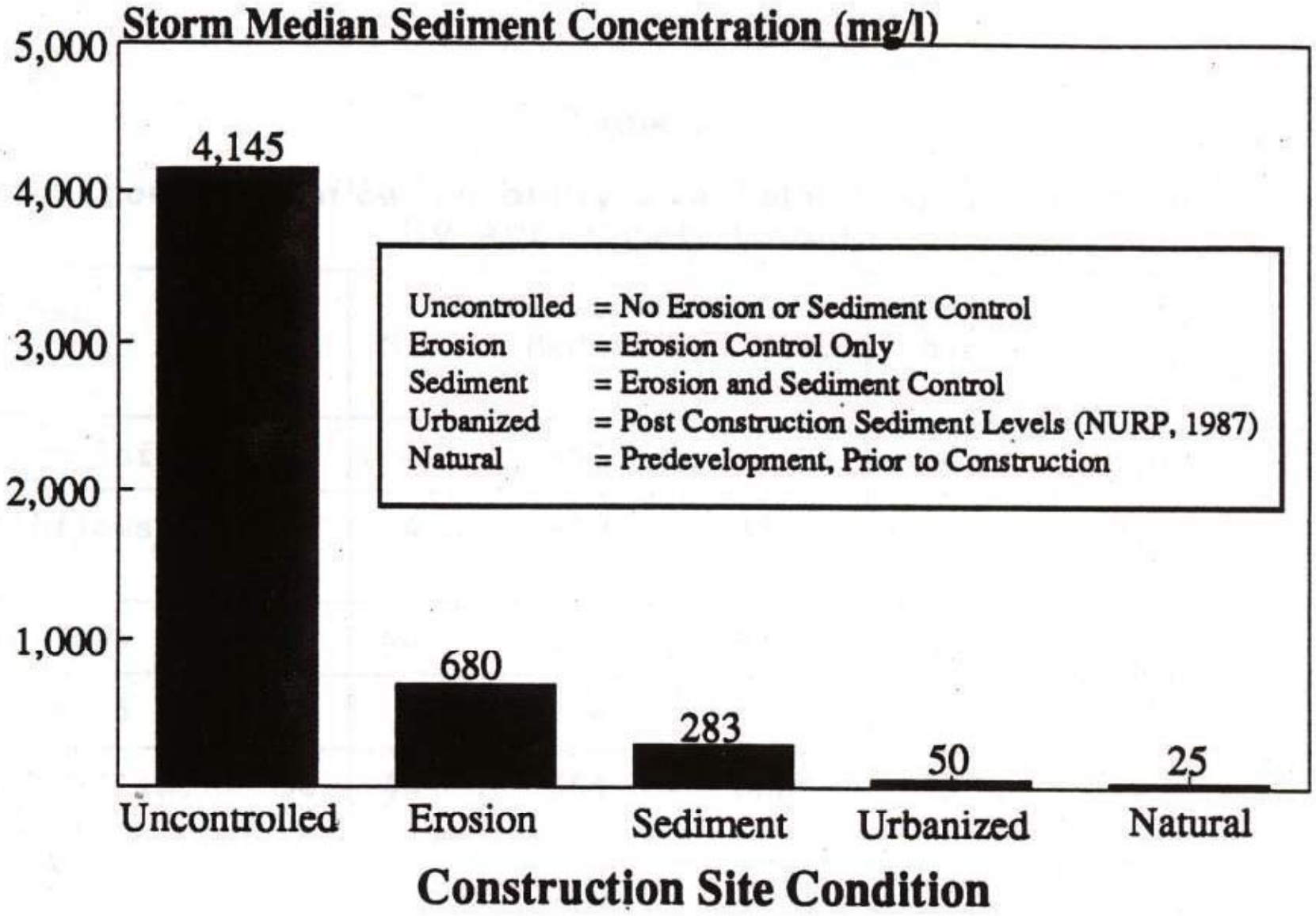
Moline, IL

IAFSM

Illinois Association for Floodplain and Stormwater Management

Why is Erosion and Sediment Control Important?

Effect of Erosion and Sediment Control Measures On Suspended Sediment Concentrations From Piedmont Construction Sites



Source: Schueler and Lugbill, 1990

Why is Erosion and Sediment Control Important?

1. ESC reduces runoff volumes, sediment loads and downstream flooding
2. ESC helps mitigate the impacts of land disturbing activities:
    1. Environmental impacts
    2. Economic impacts
3. ESC is required(!):
    1. Construction Stormwater Program
    2. Municipal Separate Storm Sewer System (MS4) Program

Top Excuses for NOT doing Erosion and Sediment Control…

8. “The city/county/my brother was supposed to do it”

7. “The water was ponding; it never worked right”

6. “I am working there tomorrow”

5. “It hasn’t rained”

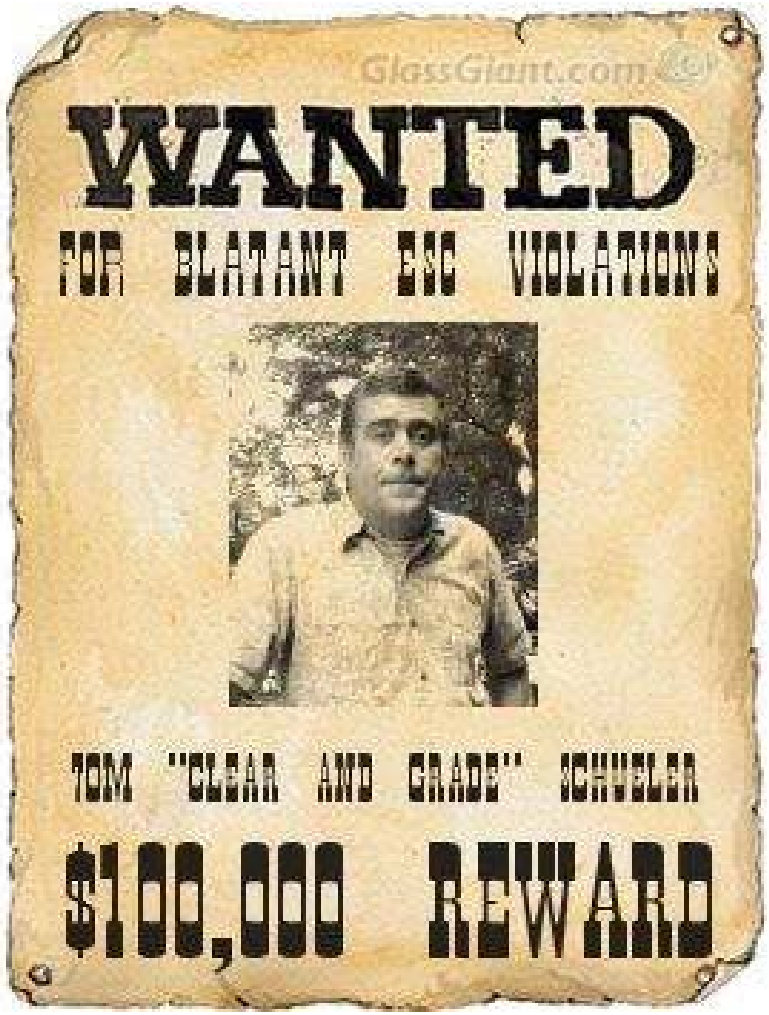
4. “It’s not me, it’s the farmer next door”

3. “The site is flat; there is no runoff”

2. “I just can’t afford it”

For a 1/4 acre lot:
-$600 seed & mulch
-$300 - 400/lot sed. basin
-$90/dewatering filter bag
-$27/100 ft. silt fence
-$100/catch basin
- If used all, several times, still < 1% of cost

1. “The developer is on the run from the FBI”



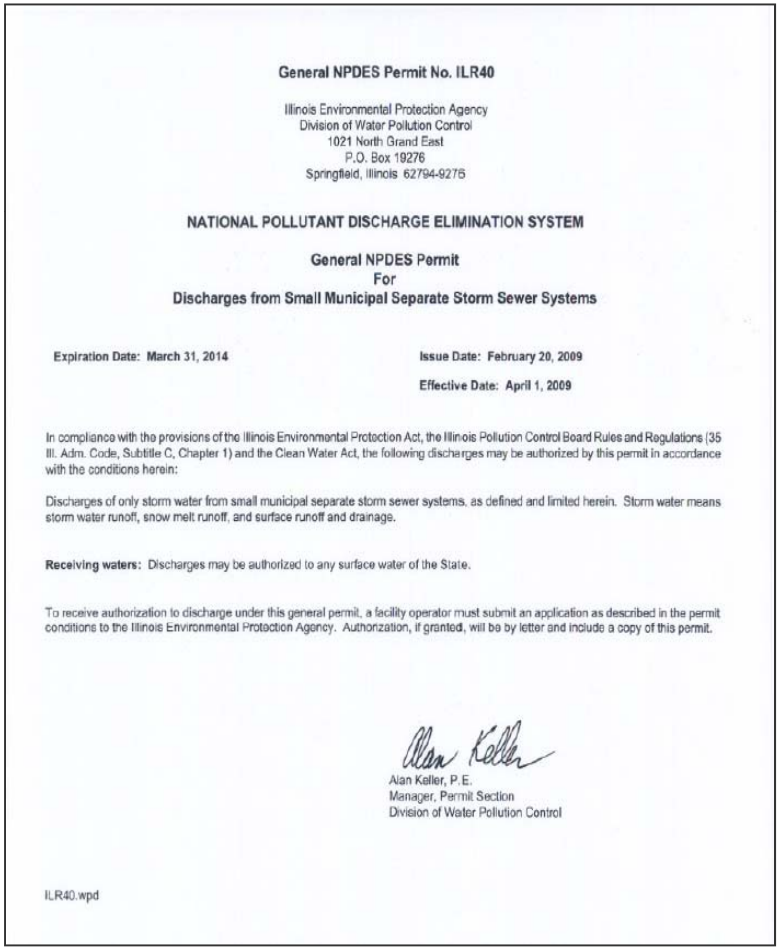
Summary of MS4 General Permit Erosion and Sediment Control Requirements

Illinois MS4 General Permit

- Re-issued: February 20, 2009
- Develop, implement and enforce a program to reduce pollutants in stormwater runoff discharged to your MS4 from construction activities that disturb ≥ 1 acre
  - Also from activities disturbing < 1 acre if part of a larger common plan of development (e.g., subdivision)

Illinois MS4 General Permit

- Local ordinance w/ penalties to ensure compliance
  - Requires appropriate erosion and sediment and non-sediment waste controls
  - Requires creation of stormwater pollution prevention plans
- Site plan review procedures
- Site inspection & enforcement procedures
- Receipt & consideration of information submitted by public



General NPDES Permit No. ILR40

Illinois Environmental Protection Agency
Division of Water Pollution Control
1021 North Grand East
P.O. Box 19276
Springfield, Illinois 62794-9276

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

General NPDES Permit
For
Discharges from Small Municipal Separate Storm Sewer Systems

Expiration Date: March 31, 2014

Issue Date: February 20, 2009

Effective Date: April 1, 2009

In compliance with the provisions of the Illinois Environmental Protection Act, the Illinois Pollution Control Board Rules and Regulations (35 Ill. Adm. Code, Subtitle C, Chapter 1) and the Clean Water Act, the following discharges may be authorized by this permit in accordance with the conditions herein:

Discharges of only storm water from small municipal separate storm sewer systems, as defined and limited herein. Storm water means storm water runoff, snow melt runoff, and surface runoff and drainage.

Receiving waters: Discharges may be authorized to any surface water of the State.

To receive authorization to discharge under this general permit, a facility operator must submit an application as described in the permit conditions to the Illinois Environmental Protection Agency. Authorization, if granted, will be by letter and include a copy of this permit.

Alan Keller, P.E.
Manager, Permit Section
Division of Water Pollution Control

ILR40.wpd

Developing an Effective Erosion and Sediment Control Program

DE Department of Natural Resources and Environmental Control

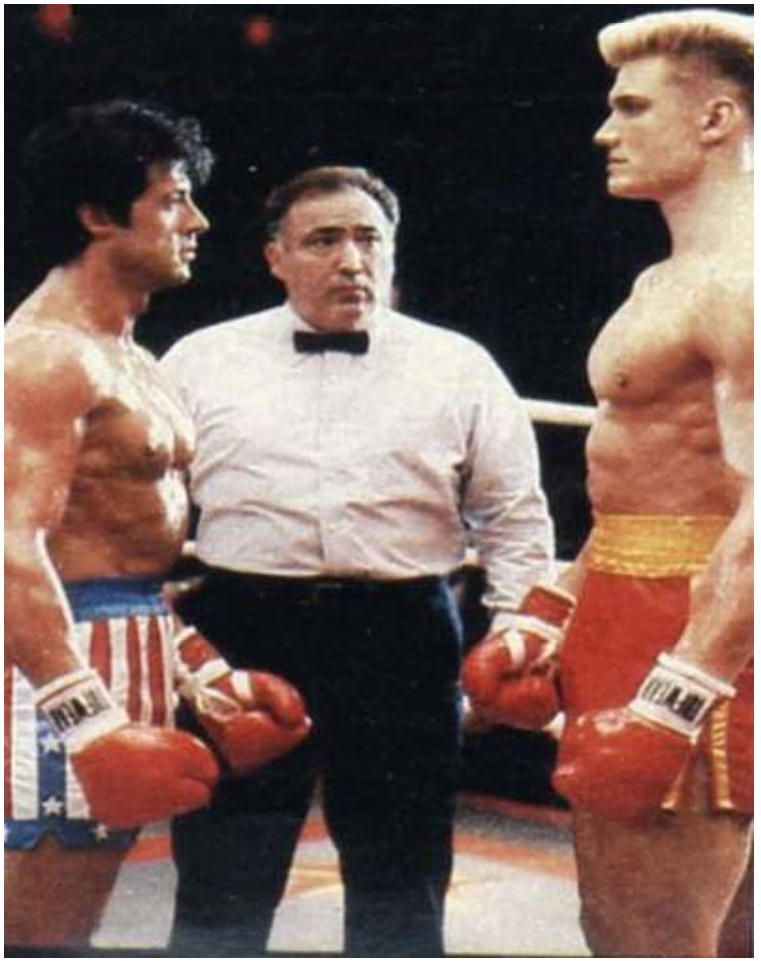
Audience Quiz

- Where is your community at with its erosion and sediment control program?

A) What program?
B) Just getting started
C) Have an ordinance in place, but need some help expanding the program
D) Doing well - have addressed all of the requirements outlined in the MS4 Permit

Challenges You've Faced

- Name some of the biggest challenges you have encountered with your local erosion and sediment control program…

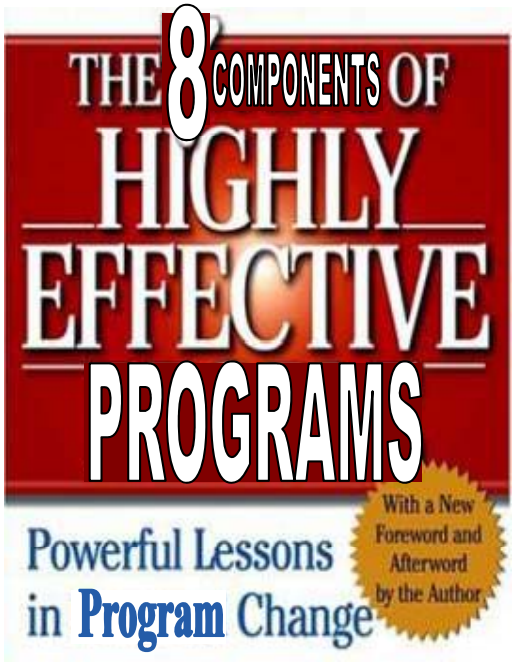


Erosion and Sediment Control: The Reality

- Implementation can be difficult

Overcoming the Challenges:
Developing a Local ESC Program

- The 8 Components of Highly Effective Programs:
  - Local Ordinance
  - Erosion and Sediment Control Plan Requirements
  - Plan and Approval Review Process
  - Preconstruction Meetings
  - Inspection Programs
  - Training and Certification Programs
  - Enforcement Tools
  - Demonstration Projects



1. Local Ordinance

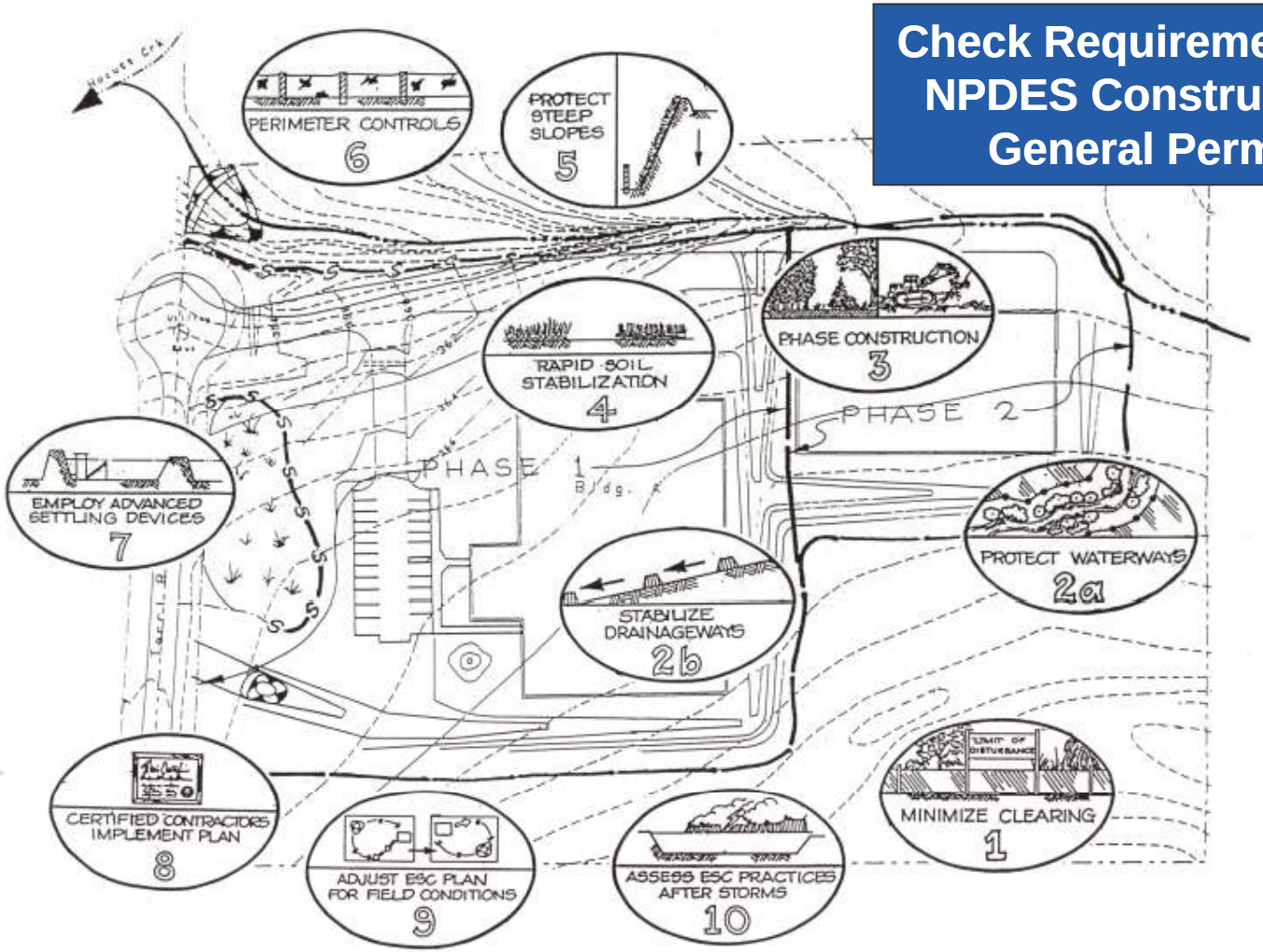
Include Language to Ensure Authority

- Applicability and exemptions
- Erosion and sediment control plan requirements
  - Design/performance criteria
  - Acceptable ESC and waste control practices, with reference to a technical manual
  - Measures to protect natural resources such as streams and wetlands
  - Flexibility to change the plan in response to field conditions
- Plan review and approval process
  - Submittal requirements
- Authority for inspectors to make regular inspections at construction sites
- Enforcement measures to ensure compliance

2. ESC Plan Requirements

Include Elements of Effective ESC Plans

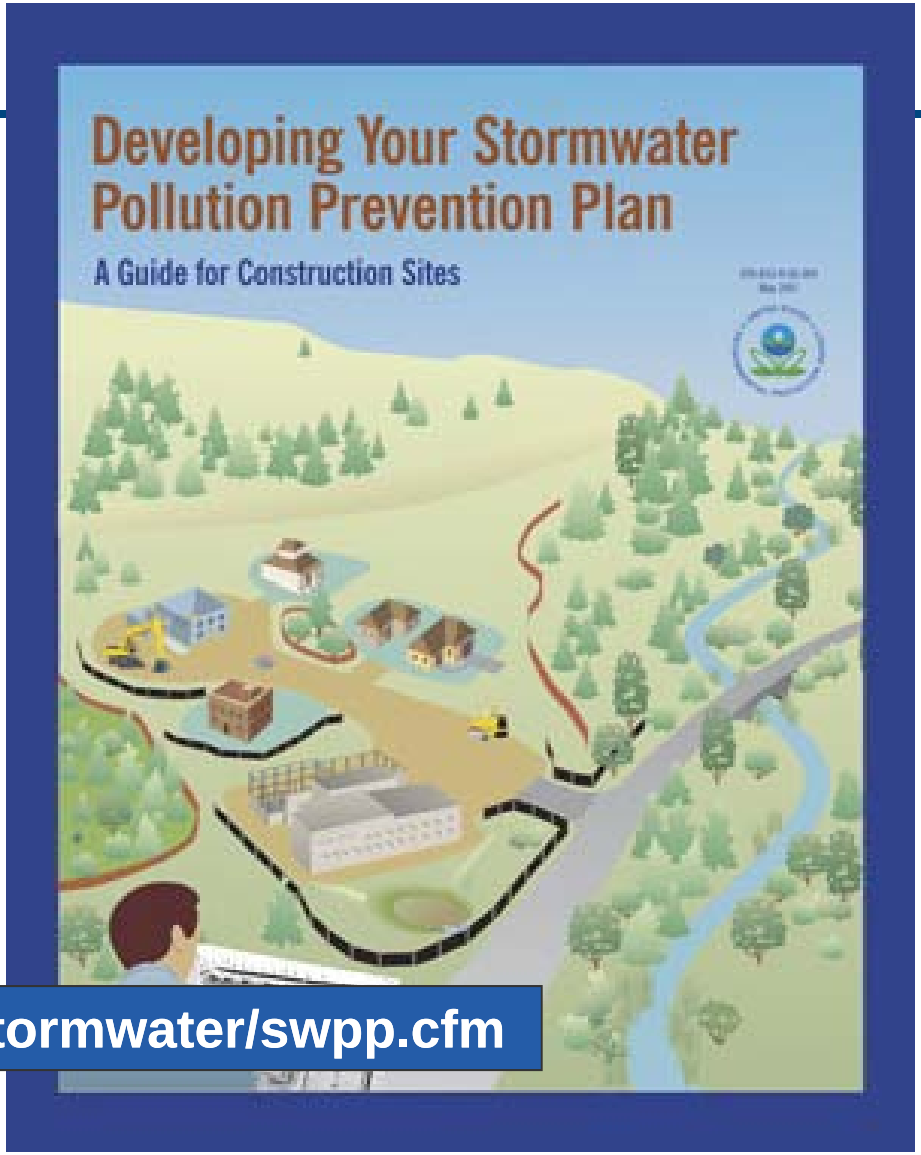
Check Requirements of NPDES Construction General Permit



Erosion and Sediment Control Plans

- Can have different names:
  - Stormwater Pollution Prevention Plan (SWPPP)
  - Construction Site Best Management Practices Plan
  - Erosion, Sedimentation and Pollution Prevention Plan
  - Sediment and Stormwater Plan
  - Construction Best Management Practices Plan
  - Etc.

- Comprehensive guidance on developing Stormwater Pollution Prevention Plans
  - Use with NPDES construction general permit requirements
  - Provides site operators with useful guidance and template

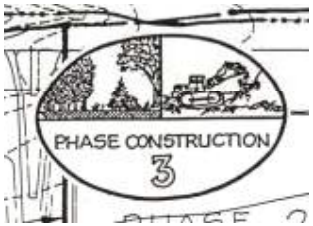


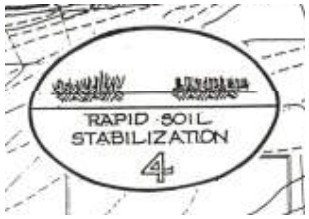
http://cfpub.epa.gov/npdes/stormwater/swpp.cfm

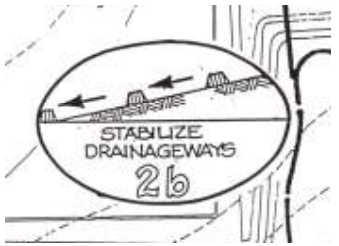
Erosion Control

- Erosion control prevents the suspension of soil in stormwater runoff
- Primary line of defense
  1. Minimize clearing and protect natural resources
  2. Phase construction activities to limit exposure
  3. Promptly stabilize soils (i.e., within 7 days)
  4. Protect drainageways and slopes

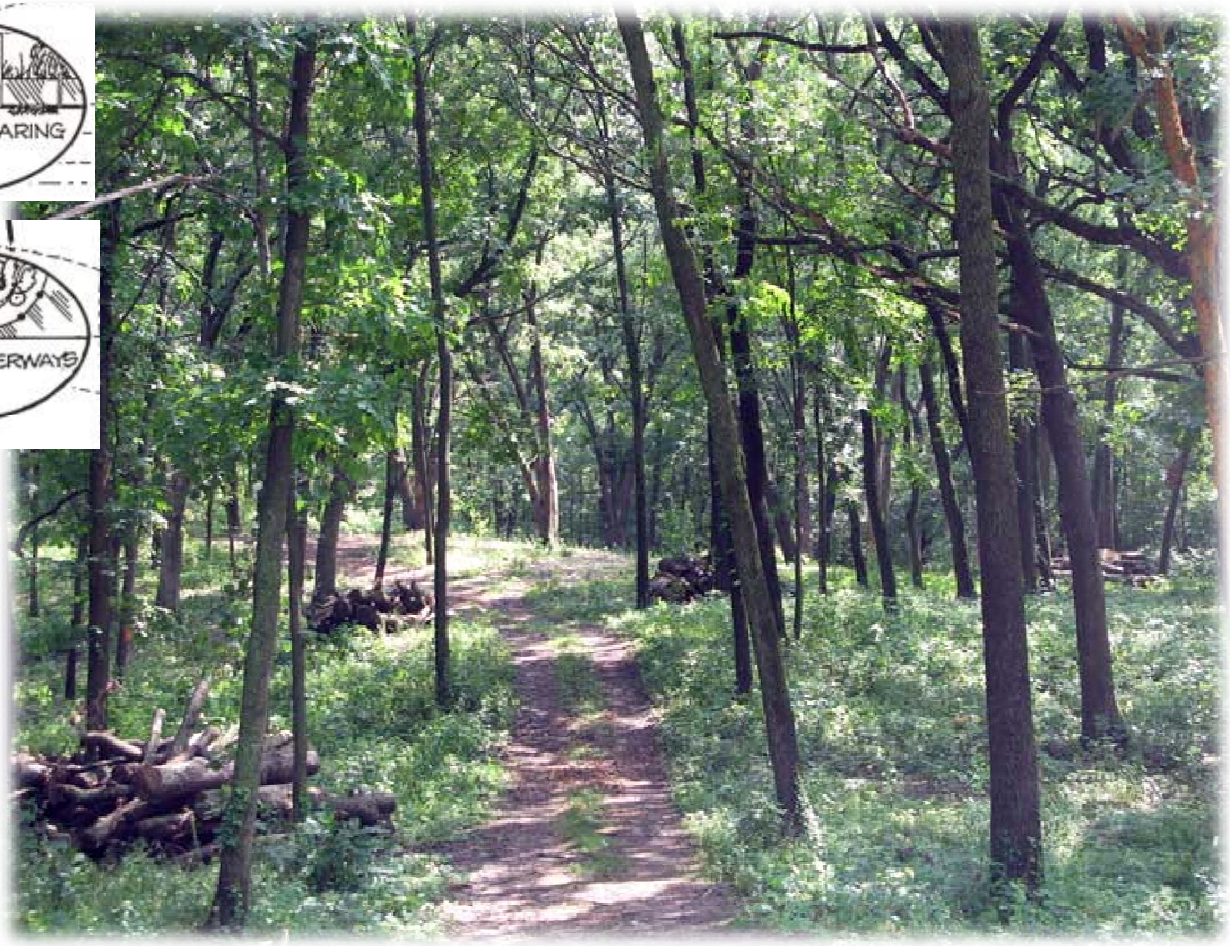
1. 

2. 

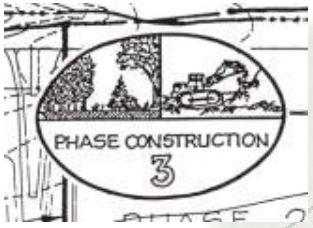
3. 

4. 

1. Minimize Clearing/Protect Natural Resources



2. Phase Construction



3. Stabilize Soils

Hydroseeding: Note the thickness!

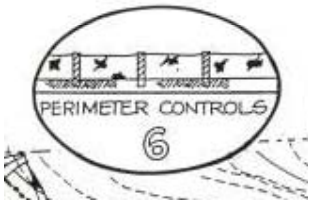
4. Stabilize Drainageways

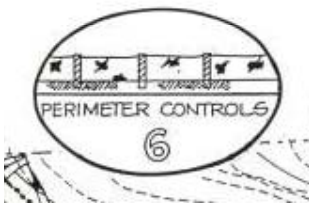
4. Protect Slopes

Erosion Control Blankets

Sediment Control

- Sediment Control removes soil once it becomes suspended in stormwater runoff
- Secondary line of defense
  5. Establish perimeter controls (e.g., silt fence)
  6. Protect storm drain inlets
  7. Use settling devices (e.g., sediment basins)
  8. Stabilize construction entrances

5. 

6. 

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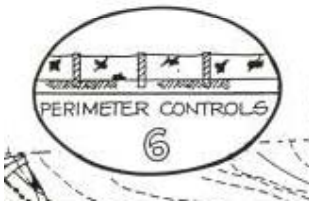
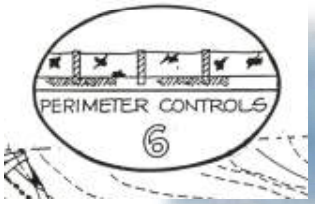
8. 

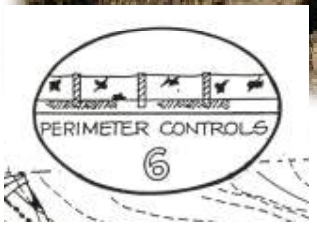
5. Perimeter Controls

Silt Fence: Drainage area is too large!



5. Perimeter Controls

Silt Fence: Poorly located!



5. Perimeter Controls

Silt Fence: Poorly installed!

6. Protect Storm Drain Inlets

Inlet Protection

- Inlets that do not drain to a sediment basin/pond
- **Cannot** be the only sediment control due to low efficiency

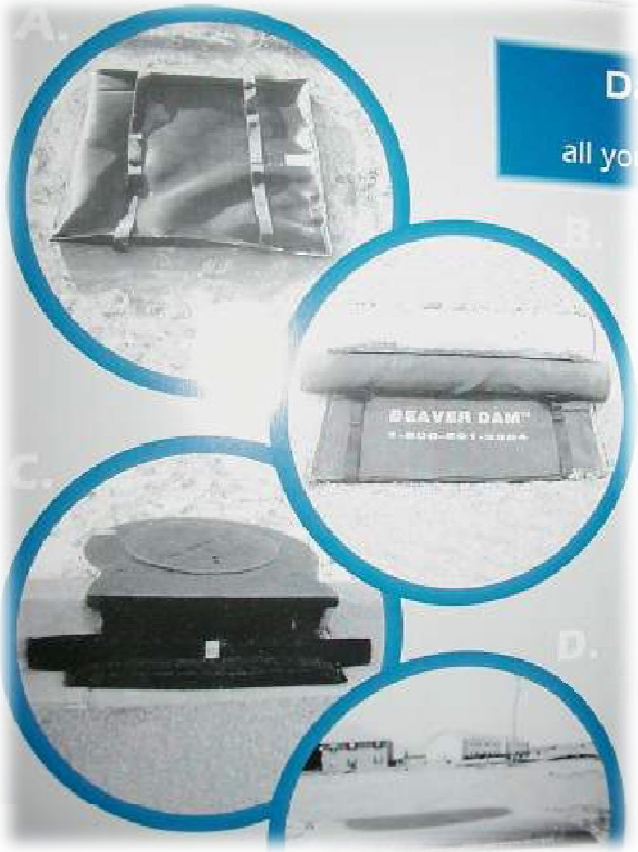
Field/Yard Inlet Protection

Curb Inlet Protection

6. Protect Storm Drain Inlets

Inlet Protection

Block & Gravel Inlet Protection



Proprietary Products

7. Settling Devices

Silt Fence vs. Sediment Basin/Pond

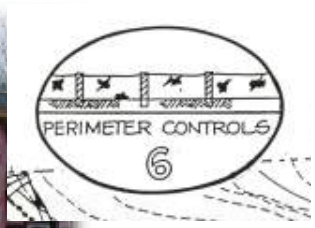
7. Settling Devices

Sediment Basins/Ponds

2 cells are often more effective than 1

8. Stabilize Construction Entrances

Control Off-Site Tracking



Non-Sediment Pollutant Control

- Stormwater Pollution Prevention Plan should also address non-sediment pollution
  - Wastewater discharges
    - Concrete truck or paint pan washout
    - Leachate and liquid waste spills
  - Waste disposal
    - Dispose in dumpsters
    - No open burning
  - Material storage
    - Fuel tanks within secondary containment
    - Locate stockpiles, drums, containers, etc. indoors/in trailers/away from drainageways and storm drain inlets

Non-Sediment Pollutant Control

Wastewater Discharges

Non-Sediment Pollutant Control

Waste Disposal

- No open burning of waste
- Do not bury wastes on site
- Provide a covered dumpster for disposal of construction debris

Non-Sediment Pollutant Control

Material Storage

Leaking lift and fuel tank near pond

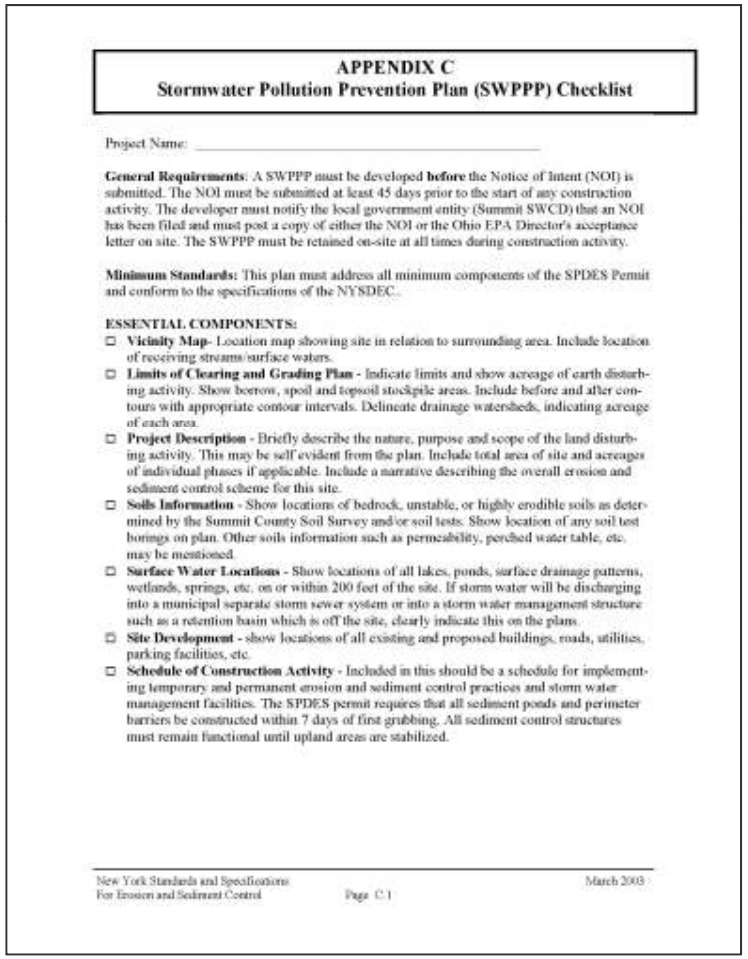
Secondary containment

Spills should be cleaned up when they occur

3. Plan Review and Approval Process

Make it an Effective Process

- Discuss ESC in pre-design meeting
- Provide a plan review checklist
  - Promotes consistency during the review process
  - Helps designers focus on the plan requirements
  - Helps reviewers identify what is missing
- Ensure plan includes all important elements (short and long term)



APPENDIX C
Stormwater Pollution Prevention Plan (SWPPP) Checklist

Project Name: _____

General Requirements: A SWPPP must be developed **before** the Notice of Intent (NOI) is submitted. The NOI must be submitted at least 45 days prior to the start of any construction activity. The developer must notify the local government entity (Summit SWCD) that an NOI has been filed and must post a copy of either the NOI or the Ohio EPA Director's acceptance letter on site. The SWPPP must be retained on-site at all times during construction activity.

Minimum Standards: This plan must address all minimum components of the SPDES Permit and conform to the specifications of the NYSDEC..

ESSENTIAL COMPONENTS:

- ☐ **Vicinity Map**- Location map showing site in relation to surrounding area. Include location of receiving streams/surface waters.
- ☐ **Limits of Clearing and Grading Plan** - Indicate limits and show acreage of earth disturbing activity. Show borrow, spoil and topsoil stockpile areas. Include before and after contours with appropriate contour intervals. Delineate drainage watersheds, indicating acreage of each area.
- ☐ **Project Description** - Briefly describe the nature, purpose and scope of the land disturbing activity. This may be self evident from the plan. Include total area of site and acreages of individual phases if applicable. Include a narrative describing the overall erosion and sediment control scheme for this site.
- ☐ **Soils Information** - Show locations of bedrock, unstable, or highly erodible soils as determined by the Summit County Soil Survey and/or soil tests. Show location of any soil test borings on plan. Other soils information such as permeability, perched water table, etc. may be mentioned.
- ☐ **Surface Water Locations** - Show locations of all lakes, ponds, surface drainage patterns, wetlands, springs, etc. on or within 200 feet of the site. If storm water will be discharging into a municipal separate storm sewer system or into a storm water management structure such as a retention basin which is off the site, clearly indicate this on the plans.
- ☐ **Site Development** - show locations of all existing and proposed buildings, roads, utilities, parking facilities, etc.
- ☐ **Schedule of Construction Activity** - Included in this should be a schedule for implementing temporary and permanent erosion and sediment control practices and storm water management facilities. The SPDES permit requires that all sediment ponds and perimeter barriers be constructed within 7 days of first grubbing. All sediment control structures must remain functional until upland areas are stabilized.

General Submittal Requirements

- Information that should be included in a plan submittal:
  - Vicinity map
  - Project description
  - Clearing & grading plan
  - Limits of disturbance
  - Surface water locations
  - Sensitive areas
  - Soils information
  - Erosion control measures
  - Location of sediment control practices
  - Detail drawings
  - Maintenance and inspection information
  - Location of post-construction stormwater BMPs
  - Pollution source control practices (non-sediment)

What Should Reviewers Look For?

- Stormwater Pollution Prevention Plan
  - Did they show limits of disturbance?
  - Are drainage areas delineated & acreage given?
  - Is a narrative provided?
  - Are drawings and specifications provided for all BMPs?
  - Are BMPs site specific?
  - Do BMPs address all phases of construction, not just final grade?
  - Does it include non-sediment pollution control BMPs?
  - Who will inspect and maintain each control?

4. Preconstruction Meetings

Check Relationship Between Plan and Site

- Before any clearing & grading can begin
- Contractor, project engineer, inspector & plan reviewer walk the site
- Walk through may consider:
  - Identifying sensitive areas
  - Delineating limits of disturbance
  - Ensuring all sediment control measures are installed
  - Field changes to plan

5. Inspection Program
Ensure Controls are Working

- Assess development sites routinely and after storms
  - Prior to construction
  - Routinely (every 7 days)
  - Within 24 hours after a storm event 1/2” or greater
  - Final site inspection
- Maintain a record of all inspections on site
- Inspection reports should be both descriptive & prescriptive

Inspection Requirements

- When to inspect
  - Once every 7 days
  - Within 24 hours of a ≥ 0.5-inch rainfall
- Areas to inspect
  - Walk the site perimeter and note areas where sediment is leaving the site
  - All BMPs to assure that they have been installed as the SWP3 specified, built correctly, and are functional and appropriate
  - Areas where construction vehicles access the site
  - Water resources on the site or which flow through the site
- Document results!

Descriptive vs. Prescriptive

- Descriptive Writing
  - Describes a situation
  - Provides details and tells a story
- Prescriptive Writing
  - Describes a situation
  - Prescribes a solution to the problem

Descriptive vs. Prescriptive

- Descriptive
  - Slope is not properly stabilized and is eroding.
- Prescriptive
  - Slope needs to be re-graded, topsoiled and stabilized in accordance with the approved plan. Use straw/coconut erosion control matting as specified on the plan. Complete this work by 10/15/05.

Increasing Inspection Capacity

- Prioritize sites for inspection
  - Watershed
  - Size
  - Track Record
  - Season
- Use standard inspection checklists/reports
- Require self-inspections
- Coordinate erosion and sediment control inspections with building inspections
- Consider using private inspectors
- Establish “watchdog” hotline

6. Training and Certification Programs

Need Better Training for Designers and Contractors?

6. Training and Certification Programs
Increase Local Technical Capacity

- Objectives
  - Train designers, contractors and inspectors to ensure better plan design and implementation
- Techniques
  - Formal certification/licensing programs (state, private)
    - Attend training, take exam & receive official certification
    - Regular re-certification required
  - Pre-construction meeting and site inspections
  - Local design/installation workshops

Tie certification to particular program elements

Training and Certification Programs

Example: Delaware Sediment & Stormwater Program

- State requires a Certified Construction Reviewer (CCR) to provide inspection duties; State provides certification
- CCR must become familiar with site plan
- Reports prepared by CCR on weekly basis
- ESC controls must be in accordance with approved plan and design guidelines
- Non-compliance must be reported to State
- State pursues enforcement actions and has ability to revoke certification

7. Enforcement Tools

Ensure Controls Continue to Work

- Tied into local ordinance
- Examples:
  - Written warning with voluntary compliance
  - Written notice of violation ordering compliance
  - Civil penalties
  - Performance bonds
  - Criminal prosecution
  - Compensatory action
  - Cost of abatement of the violation/property liens
  - Stop work order
  - Withhold building permits/certificates

% of fees and fines should go back into program…

Civil Penalties

- Specified in code
- Civil fines for specified violations (like a traffic ticket)
- Requires trained inspection staff to determine when fines should be levied

PROS

- Effective compliance
- Easier to apply than criminal penalties

CONS

- Political will needed
- Need control of “renegade” inspectors
- Need enough inspectors to document conditions at sites
- Judges not always sympathetic

Performance Bonds

- Financial surety posted prior to plan approval and/or grading permit
- Motivator for compliance
- Usually required in code
- Allows program authority to cash bond & conduct work if applicant is not in compliance

PROS

- Economic incentive for compliance
- Good complement to other enforcement tools

CONS

- Administrative burden (compute bonds, inspections, database)
- Politically & administratively difficult to cash bonds & perform work
- Bonds need a life span

8. Demonstration Projects
Set a Good Example

- Use municipal projects to demonstrate good/innovative practices
- Illustrate the use, design, installation and maintenance of erosion and sediment control practices
- Incorporate into local training program

PROS

- Non-threatening, but convincing
- Allows local government to set good example and high bar
- Good outreach potential
- Grants/funding available

CONS

- Temporary technique
- Risk factor – some projects fail (or don't turn out quite right)
- Only one piece of the puzzle

Helpful Tips

1. Have committed local leadership
2. Re-deploy existing plan review staff from office to field (or training room)
3. Cross train local development review and inspection staff
4. Require early (pre-design) discussion of erosion and sediment control
5. Prioritize inspections

Helpful Tips

6. Require designer to sign off on initial installation of ESC practices
7. Invest in designer, contractor and inspector training and certification programs
8. Enlist the talents of developers and engineering consultants
9. Reinvent the ESC manual
10. Borrow from existing programs

Any others?

Contact Information

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