Ordinance Enforcement and Funding Resources:

Tools for Successful Stormwater Management
AGENDA

1. Stormwater Regulations
2. Stormwater Ordinance
3. Funding
4. BMP Examples
Importance of Stormwater Management

What happens when it rains?
Importance of Stormwater Management

What happens when it rains?

Pre-developed Condition
Importance of Stormwater Management

What happens when it rains?

Pre-developed Condition

Developed Condition

precipitation

evapotranspiration ~25%

-30% surface runoff

0-30% interflow

water table

groundwater ~15%
Importance of Stormwater Management
IMPACTS from Land Development & Poorly Managed Stormwater

- Compacted Soils
- Less Evapotranspiration
- Less Groundwater Recharge
- Increased Runoff Volume
- Faster Conveyance of Water
- Increased Frequency of Runoff Events
- Erosion and Stream Channel Impacts
- Decreased Baseflow
- Pollution and Thermal Impacts
- Impacted Aquatic Life
Clean Water Act: NPDES Program is established; Focus is primarily on POTWs and industrial discharges

Water Quality Act: Amends CWA and calls for a phased approach; SW now explicitly regulated

Stormwater Phase 1 Rule: NPDES program covers (i) “medium & large” MS4s (ii) Earth Disturbances > 5 ac (iii) 10 categories of industrial activity

Stormwater Phase 2 Rule: NPDES program expands to cover “small” MS4s & Earth Disturbances > 1 ac

Energy Independence and Security Act: Requires federal agencies to use LID on projects > 5,000 sf
Stormwater regulations

1970-1980
- Federal Clean Water Act
  - NPDES Program established; Focus is primarily on POTWs and industrial discharges
- Water Quality Act
  - Amends CWA and calls for a phased approach; SW now explicitly regulated

1987
- Federal Water Quality Act

1990
- SW Phase 1 Rule
  - NPDES program covers (i) "medium & large" MS4s (ii) Earth Disturbances > 5 ac (iii) 10 categories of industrial activity

1999
- SW Phase 2 Rule
  - NPDES program expands to cover "small" MS4s & Earth Disturbances > 1 ac

2007
- EISA Sec. 438
  - Requires federal agencies to use LID on projects > 5,000 sf

Efficient Drainage
- Flood Control/Peak Rate Control
- Water Quality Controls
- Volume Controls
Conventional Stormwater Management

- Controls Peak **Rate** of Runoff to Existing Conditions for Large Storms (theoretically)
- No Runoff **Volume** Control
- No NPS **Pollutants** Control
Detention Basins may only slow the runoff
Still have...
• Flooding
• Polluted Runoff
• Eroded Streams

Perhaps Worse
• Concentration of flow
New Approach to SWM

Non-structural BMP’s

First – Protect & Preserve
- Avoid & Minimize Impacts
- Riparian Buffers/Woodlands

Maximize **Green Infrastructure**
- Conservation Corridors
- Green belts

[HRG Image: Building Relationships. Designing Solutions.]
New Approach to SWM

Non-structural BMP’s

Reduce Impervious Cover
- Cluster & Concentrate Development
New Approach to SWM

Non-structural BMP’s

Decentralize
Disconnect
Distribute

Slow down runoff

Lot = 0.1 acre (4050 sf)

Impervious: 2360 sf
- 1470 sf home
- 240 sf deck
- 500 sf driveway
- 150 sf walkway
AGENDA

1. Stormwater Regulations
2. Stormwater Ordinance
3. Funding
4. BMP Examples
DEP’s Model Ordinance (Document #363-0300-003 last updated November, 2008).
Article I - General Provisions

Section 101.  Short Title
Section 102.  Statement of Findings
Section 103.  Purpose
Section 104.  Statutory Authority
Section 105.  Applicability
Section 106.  Repealer
Section 107.  Severability
Section 108.  Compatibility with Other Requirements

REVIEW WITH SOLICITORS!
Model Ordinance

Article II - Definitions

**Agricultural Activity:** …construction of new buildings or impervious area is not considered an agricultural activity.

**Impervious Area:** A surface that prevents the infiltration of water into the ground.

**Regulated Activities:** Any earth disturbance activities or any activities that involve the alteration or development of land in a manner that may affect stormwater runoff.
Model Ordinance

Article III - Stormwater Management Standards

Section 301. General Requirements
Section 302. Exemptions
Section 303. Volume Controls
Section 304. Rate Controls

Triggers
Volume Control – a point between 250 sf to 1,000 sf
Rate Control – a point between 1,000 sf - 5,000 sf
<table>
<thead>
<tr>
<th>New Impervious Area (square footage)</th>
<th>Applicant Must Provide</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 – 2,500</td>
<td>No Submission</td>
</tr>
<tr>
<td>2,500 – 5,000</td>
<td>Documentation of Impervious Surface³</td>
</tr>
<tr>
<td>&gt; 5,000</td>
<td>Rate Controls, Volume Controls &amp; SWM Site Plan</td>
</tr>
</tbody>
</table>

NOTES:

1. New Impervious Area since the date of Adoption of this Ordinance.

2. Gravel in existing condition shall be considered pervious and gravel in proposed condition shall be considered impervious.

3. The Small Project Stormwater Management Application included in Appendix E may be used for projects under 5,000 sf of new impervious surface and single family home construction. Small Project SWM Application documents new impervious surface, credits through disconnection of impervious surfaces and tree planting, and sizing of Volume Control BMP’s that may be required.
## Model Ordinance – VOLUME CONTROL

### Sizing Criteria

<table>
<thead>
<tr>
<th>Sizing Criteria</th>
<th>Description of Stormwater Sizing Criteria</th>
</tr>
</thead>
</table>
| **Design Method**     | **Storm Method (CG1)**: Regulation of the 2-year storm event:  
- No increase in total runoff volume for the 2-yr/24-yr event  
- Consider existing non-forest pervious area as meadow  
- 20% of existing impervious area considered as meadow |
| **Simplified Method** | **Storm Method (CG2)**: Regulation of stormwater runoff from new impervious (1 ac max):  
- Capture of first 2” of runoff  
- 1” of captured runoff shall be permanently removed  
- ½” of captured runoff shall be infiltrated |
| **Water Quality Calculations** | Where infiltration is not possible or desirable (document justification)  
- Specific BMP’s for Pollution Prevention to reduce  
  Total Suspended Solids (TSS) 85%  
  Total Phosphate (TP) 85%  
  Total Nitrate (NO₃⁻) 50% |
Model Ordinance - RATE CONTROL

Runoff volume and peak discharge alternatives

Peak rate control criteria:

- The post-development peak rate of discharge for the 1-year through 100-year events should not exceed the pre-development peak rates.
- Post-development release rates
Model Ordinance – RATE CONTROL

Runoff volume and peak discharge alternatives

Peak rate control criteria:
– The post-development peak rate of discharge for the 1-year through 100-year events should not exceed the pre-development peak rates.
– Post-development release rates
Article IV - SWM Site Plan Requirements

Section 401. Plan Contents
Section 402. Plan Submission
Section 403. Plan Review
Section 404. Modification of Plans
Section 405. Resubmission of Disapproved Stormwater Management Site Plans
Section 406. Authorization to Construct and Term of Validity
Section 407. As-Built Plans, Completion Certificate and Final Inspection
**Model Ordinance**

**Article V - Operation and Maintenance**

Section 501. Responsibilities of Developers and Landowners

Section 502. Operation and Maintenance Agreements

Who owns the facilities?  
Who maintains them?

**Article VI - Fees and Expenses**

Section 601. General

Set review fees?  
Reimbursement agreement?
Model Ordinance

Article VII - Prohibitions

Section 701. Prohibited Discharges and Connections

What you can’t connect to SWM

Section 702. Roof Drains

Discharge to vegetated surface

Section 703. Alteration of SWM BMPs

Can’t change BMP once approved
Model Ordinance

Article VIII - Enforcement and Penalties

Section 801. Right-of-Entry
Section 802. Inspection

1. Annually for the first 5 years following construction.
2. Once every 3 years thereafter.
3. During or immediately after a 10-yr storm.

Section 803. Enforcement
Section 804. Suspension and Revocation
Section 805. Penalties
Section 806. Appeals

Review with Solicitors
Appendices

Appendix A. Operation And Maintenance Agreement SWM BMPs

BMP Owners responsible to Operate & Maintain SW facilities

Appendix B. Disconnected Impervious Area

Exclusion of downspouts or sidewalks from runoff calculations where
- +75’ flow over pervious surface
- <5% slope
- Not hydrologic soil group “D”
- Max 1,000 sf discharge to any one point.
- Length of flow on the pervious must exceed the length of the paved surface flow.
Is there anything else that you can add to your Ordinance to make it more effective?
Section 109. Duty of Persons Engaged in the Development of Land

Notwithstanding any provision(s) of this Ordinance, including exemptions, any landowner or any person engaged in the alteration or development of land which may affect stormwater runoff characteristics shall implement such measures as are reasonably necessary to prevent injury to health, safety, or other property. Such measures also shall include actions as are required to manage the rate, volume, direction, and quality of resulting stormwater runoff in a manner which otherwise adequately protects health, property, and water quality.
Section 110. Municipal Liability Disclaimer

A. Neither the granting of any approval under this Ordinance, nor the compliance with the provisions of this Ordinance, or with any condition imposed by a municipal official hereunder, shall relieve any person from any responsibility for damage to persons or property resulting therefrom, or as otherwise imposed by law nor impose any liability upon the Municipality for damages to persons or property.

B. The granting of a permit which includes any storm water management facilities shall not constitute a representation, guarantee or warranty of any kind by the Municipality, or by an official or employee thereof, of the practicability or safety of any structure, use or other plan proposed, and shall create no liability upon or cause of action against such public body, official or employee for any damage that may result pursuant thereto.
Single Family Residential Exemption

Single Family Residential activities are exempt from these requirements provided the construction:

2. Buildings setback 75’ from downstream property lines
3. Driveways:
   • Discharge onto pervious surface w/gravel strip or other spreading device.
   • Max 1,000 sf of paved surface may discharge to any one point.
   • Length of flow on the pervious must exceed the length of the paved surface flow.
Section 306. Sensitive Areas and Stormwater Hotspots

1. Sensitive areas have the potential to endanger a water supply. These areas consist of the delineated 1-year zone of contribution and direct upslope areas tributary to the water supply wells.

2. Stormwater Hotspots are projects that have a high potential to endanger local water quality, and could potentially threaten ground water reservoirs. The PADEP wellhead protection contaminant source list shall be used as a guide in these determinations. Industrial manufacturing site and hazardous material storage areas must provide NPDES SIC codes.
Model Ordinance - Additional Provisions

Article IV - SWM Site Plan Requirements (Optional Additions)

SWM Site Plan & Report Contents

Add clarification of exactly what is needed to be submitted
Model Ordinance - Additional Provisions

PROTECTED WATERSHED STANDARDS (Optional Article)

Due Diligence Review in Protected Watershed Areas

Riparian Buffers
- Require natural areas adjacent to streams
- Use of areas adjacent to streams
- Refer to DEP’s new Chapter 102 Requirements
E&S STANDARDS (Optional Article)

E&S Standards are recommended to reinforce the importance of BMP’s during the construction process.

As E&S Standards regulated through PA DEP and Conservation Districts as well as required through other municipal ordinances, this Article may be redundant.
**Model Ordinance - Additional Provisions**

**DESIGN CRITERIA (Optional Article)**

Standards are recommended so that everyone is using the same:

- Calculation Methodologies
- Storm Drain Conveyance System Design
- Design Criteria for:
  - BMP’s
  - Grading/Slopes
  - Basins
- Construction Materials & Methods
Model Ordinance - Additional Provisions

EASEMENTS (Optional Article)

- Requirements for SWM Facilities
- If diffused flow is concentrated, downstream easement required.
Optional Appendices

Technical Design Data
Maps
Review Fee Reimbursement Agreement
Checklist
Small Project SWM Plan
**Small Project SWM Plan**

**Simpler Process using Application**

**2,500 sf threshold for Volume Control**

---

Per [municipality]'s Act 167 Stormwater Management Ordinance, a stormwater management plan is required whenever more than 2,500 square feet of impervious surface is proposed. Impervious surfaces are areas that prevent the infiltration of water into the ground and shall include, but not be limited to, roofs, patios, garages, storage sheds and similar structures, and any new streets or sidewalks.

### To Calculate Impervious Surfaces Please Complete This Table

<table>
<thead>
<tr>
<th>Surface Type</th>
<th>Length</th>
<th>Width</th>
<th>= Proposed Impervious Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(area per downspout)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Driveway</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parking Areas</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patios/Walks</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Total Impervious Surface Area to be managed (sum of all areas)**

If the Total Impervious Surface Area is LESS THAN 2,500 Square Feet, a Stormwater Management Plan IS NOT required for this regulated activity. Please read, acknowledge and sign below.

If the Total Impervious Surface Area is MORE THAN 2,500 Square Feet, complete the rest of the Application.

[municipality] may request additional information and/or SWM for any reason.

Property Owner Acknowledges that submission of inaccurate information may result in a stop work order or permit revocation. Acknowledgement of such is by signature below. I declare that I am the owner or owner’s legal representative. I further acknowledge that the information provided is accurate and employees of [municipality] are granted access to the above described property for review and inspection as may be required.

Owner: __________  Date: __________
Small Project SWM Plan

Reduce size of Surfaces that need treatment with no cost BMP’s (Credits)

CREDITS

Credit 1: DISCONNECTION OF IMPERVIOUS AREA
When runoff from impervious areas is directed to a pervious area that allows for infiltration, filtration, and increased time of concentration, all or parts of the impervious areas may qualify as Disconnected Impervious Area (DIA). Using the criteria below, determine the portion of the impervious area that can be excluded from the calculation of total impervious area.

Criteria: An impervious area is considered to be completely or partially disconnected if it meets the requirements listed below:

- rooftop area draining to a downspout is ≤500 sf
- paved area draining to a discharge is ≤1,000 sf
- flow path of paved impervious area is not more than 75'
- soil at discharge is not designated as hydrologic soil group “D”
- flow path at discharge area has a positive slope of ≤5%
- gravel strip or other spreading device is required at paved discharges.

<table>
<thead>
<tr>
<th>Length of Pervious Flow Path from discharge point * (ft)</th>
<th>DIA Credit Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 14</td>
<td>1.0</td>
</tr>
<tr>
<td>15 - 29</td>
<td>0.8</td>
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<tr>
<td>30 - 44</td>
<td>0.6</td>
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<tr>
<td>45 - 59</td>
<td>0.4</td>
</tr>
<tr>
<td>60 - 74</td>
<td>0.2</td>
</tr>
<tr>
<td>75 or more</td>
<td>0</td>
</tr>
</tbody>
</table>

* Flow path cannot include impervious surfaces and must be at least 15 feet from any impervious surfaces.

Calculate DIA Credit & Required Capture Volume

<table>
<thead>
<tr>
<th>Surface Type</th>
<th>Proposed Impervious Area (from previous sheet)</th>
<th>X</th>
<th>DIA Credit Factor</th>
<th>Impervious Area to be managed</th>
<th>+</th>
<th>=</th>
<th>Required Capture Volume (ft²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(area per downspout)</td>
<td>x</td>
<td>=</td>
<td>+ 6 =</td>
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<tr>
<td>Driveway</td>
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<td>+ 6 =</td>
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<tr>
<td>Parking Areas</td>
<td>X =</td>
<td>+ 6 =</td>
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<tr>
<td>Patios/Walks</td>
<td>X =</td>
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<tr>
<td>Other</td>
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</tbody>
</table>

Total Req’d Capture Volume
Reduce size of BMP’s with common, low cost BMP’s
Small Project SWM Plan Worksheet

Based upon the information you have provided a Stormwater Plan is Required for this development activity. The Stormwater Management Ordinance developed through the Erie County Act 167 Stormwater Management Plan regulates compliance requirements for Stormwater Management in this jurisdiction. A complete copy of the Plan can be found on the Erie County Planning website.

Regulated activities shall be conducted only after [municipality] approves a stormwater management plan. The Erie County Act 167 Stormwater Management Plan will assist you in preparing the necessary information and plans for [municipality] to review and approve. This document will constitute an approved plan if all of the relevant details are to be installed in their entirety AND no part of the stormwater system adversely affects any other property, nor adversely affect any septic systems or drinking water wells on this, or any other, parcel. If an alternative system is to be used a plan will need to be submitted to [municipality] for approval. A design by a qualified professional may be required for more complex sites.

Please initial below to indicate the Stormwater Management Plan for this site

☐ Minimum Control #1 Erosion & Sediment Pollution Control (Elements 1-10)
☐ Minimum Control #2: Source Control of Pollution
☐ Minimum Control #3: Preservation of Natural Drainage Systems and Outfalls

The relevant details from Erie County Act 167 Stormwater Management Plan will be installed in their entirety AND the system will be located as not to adversely affect other property, nor any septic systems or drinking water wells on this, or any other, parcel.

To meet this requirement, the following will be installed and maintained:

<table>
<thead>
<tr>
<th>Capture Volume to be managed (ft³)</th>
<th>Conversion</th>
<th>Surface Area of BMPs (ft²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>By Rain Garden 6&quot; ponding; 2' soil depth</td>
<td>x 1.20</td>
<td></td>
</tr>
<tr>
<td>Dry Well or Infiltration Trench 2½&quot; aggregate depth</td>
<td>x 1.25</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>Total</td>
</tr>
</tbody>
</table>

In lieu of meeting the above, an alternative and/or professional design is attached for approval AND the system will be located as not to adversely affect other property, any septic systems or drinking water wells on this, or any other, parcel.

Site Sketch Plan showing:
- Property lines with dimensions
- Proposed buildings with dimensions
- Proposed impervious surfaces with dimensions
- Proposed septic system, if applicable
- Proposed well site, if applicable
- Proposed stormwater management system(s)

Operation and Maintenance Agreement

Condition on approval - The stormwater management plan must be fully implemented prior to a request for final inspection of the building or zoning permit.

Acknowledgement - By executing below, the Owner acknowledges the following:
- I declare that I am the owner of the property.
- The Information provided is accurate.
- I further acknowledge that municipal representatives are granted access to the above described property for review and inspection as may be required.

Owner: __________________________ Date: __________________________
# Implementation

## Models to consider:

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual Municipal</td>
<td>Each municipality passes, implements, and enforces the SWM ordinance individually.</td>
</tr>
<tr>
<td>Multi-Municipal</td>
<td>Several municipalities cooperate through a new, or existing, service-sharing agreement (COG, Sewage Association, etc.)</td>
</tr>
<tr>
<td>County Service Provider</td>
<td>County department, or office, (e.g. County Planning Entity or County Conservation District) provides SWM ordinance implementation and enforcement services to municipalities.</td>
</tr>
</tbody>
</table>
# IMPLEMENTATION - Administration

**Information tracked:**
- Project status
- Construction & Post Construction Inspections
- Enforcement Actions
- Complaints
- Completion

<table>
<thead>
<tr>
<th>Plan Review</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Size threshold for plan review?</td>
</tr>
<tr>
<td>- Submittal verified during review?</td>
</tr>
<tr>
<td>- Pre-project meetings conducted with developer?</td>
</tr>
<tr>
<td>- Engineering approval?</td>
</tr>
<tr>
<td>- Criteria checklist used?</td>
</tr>
<tr>
<td>- BMPs adequately incorporated into the plan to address erosion control, sediment control, housekeeping?</td>
</tr>
<tr>
<td>- Design specifications and details for all BMPs included on the plans?</td>
</tr>
<tr>
<td>- Standards conditions include erosion and sediment control or stormwater provisions?</td>
</tr>
</tbody>
</table>
IMPLEMENTATION – Construction Inspection

Inspector Training/Knowledge
Is the inspector knowledgeable about:
• Erosion and sediment control BMPs,
• Stormwater/pollution prevention BMPs,
• Legal authority (ordinances)?
Is the inspector familiar with the requirements in the State stormwater construction general permit?
What type of stormwater training did the inspector receive? When, and how often?
**IMPLEMENTATION - Construction Inspection**

**Inspection Procedures**

Is a checklist used during the inspection?

Is the inspector aware of previous stormwater inspection results at this site?

Does the inspector review the approved plans required to be at the construction site?

Does the inspector walk the entire site and inspect all points of discharge?

Does the inspection address:

- E&S control
- Waste management practices
- Non-stormwater discharges?

Are inspection findings documented in writing and presented to the site contact?
IMPLEMENTATION - Construction Inspection

FIELD OBSERVATION REPORT

Municipality: ___________________________ Report Number: ___________________________
Project: ___________________________ HRG Project Number: ___________________________
Owner: ___________________________ Time Change: ___________________________
Property ID: ___________________________ Date: ___________________________ Time: ___________________________

Weather

- Clear
- Snow
- Warm
- Overcast
- Foggy
- Hot
- Rain
- Cold
- Muddy
- Temperature Range

Site Conditions

- Clear
- Dusty
- Temperature Range

Day

- Monday
- Tuesday
- Wednesday
- Thursday
- Friday

Reason for site visit:

- Routine Visit
- Contractor/Developer Request
- Municipality Request

Contractor Company: ___________________________ Phone: ___________________________
Contact Person: ___________________________ E-Mail: ___________________________

Persons Contacted:

Work Force:

<table>
<thead>
<tr>
<th>Classification</th>
<th>[Contractor X]</th>
<th>[Contractor Y]</th>
<th>[Contractor Z]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supervisor</td>
<td></td>
<td></td>
<td></td>
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<tr>
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</tr>
</tbody>
</table>

Equipment at Site

Work Observed:

Items Discussed:

Nonconforming Work Reported this Date to Contractor:

Remarks:

[ BUILDING RELATIONSHIPS. DESIGNING SOLUTIONS. ]
## IMPLEMENTATION - Construction Inspection

### MCM 24 - CONSTRUCTION SITE SW RUNOFF CONTROL

<table>
<thead>
<tr>
<th>E/S BMPs Onsite</th>
<th>Date Installed</th>
<th>Property Functioning</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inlet Protection</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Silt Fence</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Silt Sock</td>
<td></td>
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<tr>
<td>ROE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sediment Basin</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Sediment Trap</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Truck Washout</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

### MCM 48 - POST CONSTRUCTION SW (PCSM) ACTIVITIES

<table>
<thead>
<tr>
<th>PCSM BMPs Onsite</th>
<th>Date Installed</th>
<th>Property Functioning</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Swales</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rain Garden</td>
<td></td>
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<tr>
<td>Bio Retention</td>
<td></td>
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<tr>
<td>Detention Basin</td>
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</tr>
<tr>
<td>Underground Basin</td>
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</tr>
</tbody>
</table>

Comments:

- Attachments

Signed by: ___________________________  Date: ____________

Copies: [ ] Municipality  [ ] Owner  [ ] Contractor  [ ] Consultants  [ ] File
AGENDA

1. Stormwater Regulations
2. Stormwater Ordinance
3. Funding
4. BMP Examples
WHAT IS A STORMWATER PROGRAM?

Possibilities typically include:

- Operations & Maintenance of drainage system
- Planning & Engineering
- Capital Improvements
- Finance & Billing
- Public Education
- Mapping
- Street Sweeping
- Water Quality (MS4)
- Regulation Enforcement
COMPREHENSIVE PROGRAM

Engineering & Planning

Finance

Administration

Water Quality [MS4]

Operation & Maintenance

Capital Projects

OTHERS?

Stormwater Program

BUILDING RELATIONSHIPS, DESIGNING SOLUTIONS.
<table>
<thead>
<tr>
<th>Source</th>
<th>Capital</th>
<th>O&amp;M</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grants</td>
<td>Yes</td>
<td>No</td>
<td>Not guaranteed, highly competitive, not sustainable in the long-term</td>
</tr>
<tr>
<td>PENNVEST Loan Program</td>
<td>Yes</td>
<td>No</td>
<td>Not guaranteed, highly competitive, must repay often with interest</td>
</tr>
<tr>
<td>Bond Financing</td>
<td>Yes</td>
<td>No</td>
<td>Dependent on fiscal capacity, can utilize for large, long-term expenditures, must repay with interest</td>
</tr>
<tr>
<td>General Fund</td>
<td>Yes</td>
<td>Yes</td>
<td>Not equitable, competes with other community priorities, changes from year-to-year</td>
</tr>
<tr>
<td>Review/Inspection Fees</td>
<td>No</td>
<td>No</td>
<td>Not significant revenue, may deter development</td>
</tr>
<tr>
<td>Stormwater Utility Fee</td>
<td>Yes</td>
<td>Yes</td>
<td>Generates ample revenue, sustainable, dependable, equitable, requires significant public dialogue</td>
</tr>
</tbody>
</table>
7/9/2013 Governor Corbett signed Senate Bill 351 into law allowing local governments to form stormwater authorities.

1. Senate Bill 351 amends the Municipality Authorities Act (Chapter 56 of Title 53) by adding storm water management planning and projects to the purposes and powers of municipal authorities. Allows – not mandates!

2. Section 5607 of Chapter 56 of Title 53 enumerates the specific purposes and powers of municipal authorities. For example, the list includes purposes such as sewer systems, water distribution systems, airports, parking spaces, industrial development projects, etc. Senate Bill 351 adds “storm water management planning and projects” as a purpose and power for which a municipal authority may be incorporated. Allows fees to be charged for services provided.

Effective 9/9/2013
2013 STORMWATER UTILITY LOCATIONS

1417 Stormwater Utilities surveyed in 39 states

Ref: WKU Stormwater Utility Survey 2013
Pennsylvania Infrastructure Investment Authority (PENNVEST) - provides a variety of loan & grant opportunities within the commonwealth for water resource infrastructure projects. http://www.portal.state.pa.us/portal/server.pt/community/available_funding/11211/drinking,_waste_and_storm_water_loans/560726
Pennsylvania Department of Community & Economic Development (PA DCED) - The Commonwealth Financing Authority (CFA) administers Pennsylvania's economic stimulus packages. The CFA holds fiduciary responsibility over the funding of programs and investments in Pennsylvania's economic growth. 
http://www.newpa.com/find-and-apply-for-funding/commonwealth-financing-authority

Watershed Restoration and Protection Program (WRPP) is to restore, and maintain restored stream reaches impaired by the uncontrolled discharge of nonpoint source polluted runoff.
Pennsylvania Department of Environmental Protection (PADEP) - provides a variety of grant opportunities within the commonwealth.

http://www.depreportingservices.state.pa.us/ReportServer/Pages/ReportViewer.aspx?/Grants/GrantLoans

**Dirt and Gravel Road Maintenance** – The purpose of this program is to reduce non point source pollution from the maintenance of dirt and gravel roads.

http://www.dirtandgravel.psu.edu
Pennsylvania Department of Environmental Protection (PADEP) - provides a variety of grant opportunities within the commonwealth.

http://www.depreportingservices.state.pa.us/ReportServer/Pages/ReportViewer.aspx?/Grants/GrantLoans

**Enactment of Ordinances and Implementation of Stormwater Management Plans**

- Reimburse municipalities for costs incurred in the adoption or revision of ordinances or regulations and other actual administrative, enforcement, and implementation costs incurred in complying with the Pennsylvania Stormwater Management Act (1978 Act 167) and the companion regulation governing stormwater management grants and reimbursements (25 Pa. Code 111).

https://www.portal.state.pa.us/siteminderagent/forms/login
Pennsylvania Department of Environmental Protection (PADEP) - provides a variety of grant opportunities within the commonwealth.

http://www.depreportingservices.state.pa.us/ReportServer/Pages/ReportViewer.aspx?/Grants/GrantLoans

**Environmental Education Grants Program** - The Environmental Education Grant Program annually funds organizations, with a program focus on local and regional issues. Funding is provided by the Environmental Education Fund, established by the PA Environmental Education Act, with five percent of money collected from environmental fines and penalties.

Pennsylvania Department of Environmental Protection (PADEP) - provides a variety of grant opportunities within the commonwealth.
http://www.depreportingservices.state.pa.us/ReportServer/Pages/ReportViewer.aspx?/Grants/GrantLoans

Growing Greener Watershed Grants – These grants are available to restore watersheds and streams, reclaim mined lands, remediate abandoned mine drainage areas.
http://www.depweb.state.pa.us/portal/server.pt/community/growing_greener/13958
Pennsylvania Department of Environmental Protection (PADEP) - provides a variety of grant opportunities within the commonwealth.
http://www.depreportingservices.state.pa.us/ReportServer/Pages/ReportViewer.aspx?/Grants/GrantLoans

**Nonpoint Source Implementation Program (Section 319)** – assist in implementing PA's Nonpoint Source Management Program which includes funding for abandoned mine drainage, agricultural and urban run-off, and natural channel design/streambank stabilization projects.
http://www.portal.state.pa.us/portal/server.pt/community/nonpoint_source_management/10615
Pennsylvania Department of Environmental Protection (PADEP) - provides a variety of grant opportunities within the commonwealth.
http://www.depreportingservices.state.pa.us/ReportServer/Pages/ReportViewer.aspx?/Grants/GrantLoans

Watershed Education Grants (WREN) – These grants support community coalitions undertaking public education projects aimed at mitigating or preventing nonpoint source pollution in PA's watersheds.
http://wren.palwv.org/grants/local.html
Pennsylvania Fish and Boat Commission (PFBC) - PFBC provides a variety of grant opportunities within the commonwealth.  
http://fishandboat.com/grants.htm

State Wildlife Grant (SWG) Program - Funds for the State Wildlife Grants program (SWG) are provided by the U.S. Fish and Wildlife Service to keep species from becoming federally listed as threatened or endangered. Annually appropriated by the U.S. Congress, Pennsylvania’s funds are apportioned between the Fish and Boat Commission and Game Commission to address each agencies trust species and habitats.  
Department of Conservation and Natural Resources
DCNR provides a variety of grant opportunities within the commonwealth. Specific programs of interest area presented below.

http://www.dcnr.state.pa.us

**Community Recreation and Conservation Program** - This program funds projects that plan for, acquire, develop and/or rehabilitate public park, recreation, open space, greenway, trail and conservation areas and facilities.

https://www.grants.dcnr.state.pa.us/LearnMore.aspx?GrantProgramId=87
Department of Conservation and Natural Resources
DCNR provides a variety of grant opportunities within the commonwealth. Specific programs of interest area presented below.
http://www.dcnr.state.pa.us

Land Trust Program – This program funds projects that plan for and acquire critical habitat, as well as, open space and natural areas.
https://www.grants.dcnr.state.pa.us/LearnMore.aspx?GrantProgramId=90
Department of Conservation and Natural Resources
DCNR provides a variety of grant opportunities within the commonwealth. Specific programs of interest area presented below.

http://www.dcnr.state.pa.us

*Pennsylvania Recreational Trails Program* – This program funds projects that help develop and maintain recreational trails, as well as, trail related facilities for both motorized and non-motorized recreational trail use and provides for the purchase of trail related equipment.

https://www.grants.dcnr.state.pa.us/LearnMore.aspx?GrantProgramId=91
Department of Conservation and Natural Resources
DCNR provides a variety of grant opportunities within the commonwealth. Specific programs of interest area presented below.

http://www.dcnr.state.pa.us

Rails-to-Trails Program – This program funds projects that plan for, acquire and/or develop rail-trail corridors, to include trails and support facilities, such as comfort stations, trail heads, interpretive facilities, landscaping, and signage.

https://www.grants.dcnr.state.pa.us/LearnMore.aspx?GrantProgramId=92
Department of Conservation and Natural Resources

DCNR provides a variety of grant opportunities within the commonwealth. Specific programs of interest are presented below.

http://www.dcnr.state.pa.us

**Peer-to-Peer Program** - This program funds projects that help municipalities improve their park, recreation and conservation services through a collaborative process. Projects are accomplished through contracts with experienced park, recreation and conservation professionals from nearby communities who will work closely with local leaders.

https://www.grants.dcnr.state.pa.us/LearnMore.aspx?GrantProgramId=95
AGENDA

1. Stormwater Regulations
2. Stormwater Ordinance
3. Funding
4. BMP Examples
Integrating SWM w/ design - Planning

Conceptual site layout

- Incorporate non-structural BMPs
  - Undisturbed = good
  - Limit impervious where possible
  - Use vegetated systems when possible
  - Avoid steep slopes
- Identify good locations for SW facilities
  - Natural drainage paths
  - Good infiltration areas
- Choose appropriate structural BMPs
- Consider BMP connectivity for “treatment train” effect
- Calculate approximate area needed for SW management & make sure everything fits
Integrating SWM w/design - Planning

- Topography
- Drainage patterns
- Streams/water
- Soils
- Ground cover and vegetation
- Ex. development
- Ex. SWM facilities
- Adjacent areas
- Wetlands
- Critical habitat areas
- Floodplains
- Steep slopes
- Req’d buffers
- Ex. infrastructure
- Protection areas (e.g., well setbacks)

Site Inventory & Analysis
New Approach to SWM

Structural BMP’s

Grading
New Approach to SWM

Structural BMP’s

Infiltration Basin

Infiltration basin under normal conditions (above), and during heavy rain (left).
New Approach to SWM

Structural BMP’s

Infiltration Trench
New Approach to SWM

Structural BMP’s Bio Retention
New Approach to SWM

Structural BMP’s

Bio Retention
New Approach to SWM

Structural BMP’s

Vegetated Swale
New Approach to SWM

Structural BMP’s

Extended Detention w/Forebays
Rain Garden

Treatment Train

Bioresetention Cell
Flow Path
Grass Swale
Grass Filter Strip
Storm Drain System
Rain Garden

Infiltration Trench

Vegetated Swale

Porous Pavement

STORAGE
Evapotranspiration:

- The “missing link”
- Dual processes at work.
- Not well understood
  - Number crunching
  - Water Balance Model
- Occurs between storms – making storage essential.
  - Not event-based
New Approach to SWM
Parking Lots

This set-up allows for pretreatment.

Design Guidelines for Subsurface Infiltration

runoff

Perforated Pipe

STANDARD

ASPHALT PAVEMENT

FOR STORMWATER STORAGE AND RECHARGE

AN EMPLOYEE-OWNED COMPANY
New Approach to SWM

Even better......

Bioretention - Treat (clean) runoff before recharge.

Design Guidelines for Subsurface Infiltration

Perforated Pipe

STANDARD

ASPHALT PAVEMENT

FOR STORMWATER STORAGE AND RECHARGE
New Approach to SWM

Bioretention in bad soils

- Gravel w/geotex
- Underdrain
- Overflow Structure
- Outflow (6” above underdrain)
New Approach to SWM
Level spreaders

Profile View

Turf Reinforcement Mat (3' Typ.)

Geotextile Lining (non-woven)

Bedding Material
No. 3 Stone (clean)

Lip

Inflow

Outflow

N.T.S.

Profile View

Suitable rigid measures and protective geofabric (TRM)-min. 3 ft. or as needed.

Inflow

Outflow

X

Y

h

Level Spreader

Plunge Pool

Undisturbed Ground

Optional Drain.
2" ductile iron Driven horizontally

[ BUILDING RELATIONSHIPS. DESIGNING SOLUTIONS. ]
GRAHAM PARK
GRAHAM PARK
GRAHAM PARK
PITTSBURGH INTERNATIONAL BUSINESS PARK
Questions