

# HRG

**Herbert, Rowland & Grubic, Inc.**  
**Engineering & Related Services**

**AN EMPLOYEE-OWNED COMPANY**

[ BUILDING RELATIONSHIPS.  
DESIGNING SOLUTIONS. ]

**Ordinance  
Enforcement and  
Funding Resources:**

Tools for  
Successful  
Stormwater  
Management

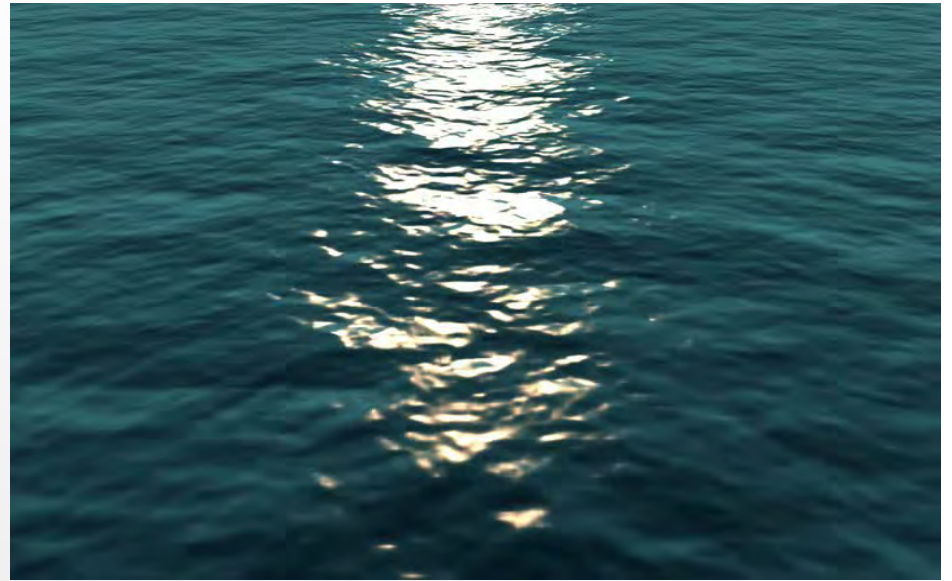
# AGENDA

1 Stormwater Regulations

2 Stormwater Ordinance

3 Funding

4 BMP Examples



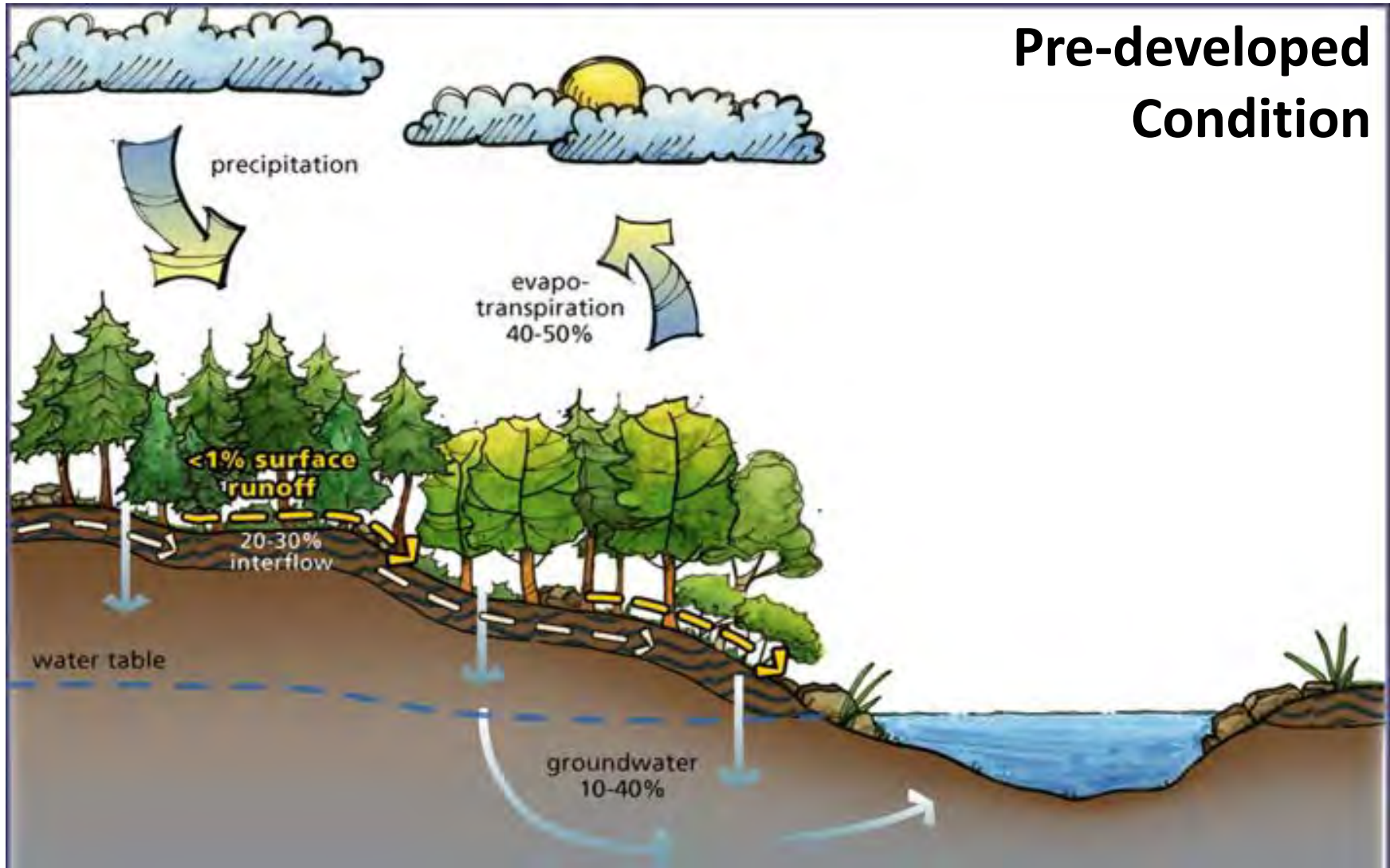
# Importance of Stormwater Management



[ BUILDING RELATIONSHIPS.  
DESIGNING SOLUTIONS. ]

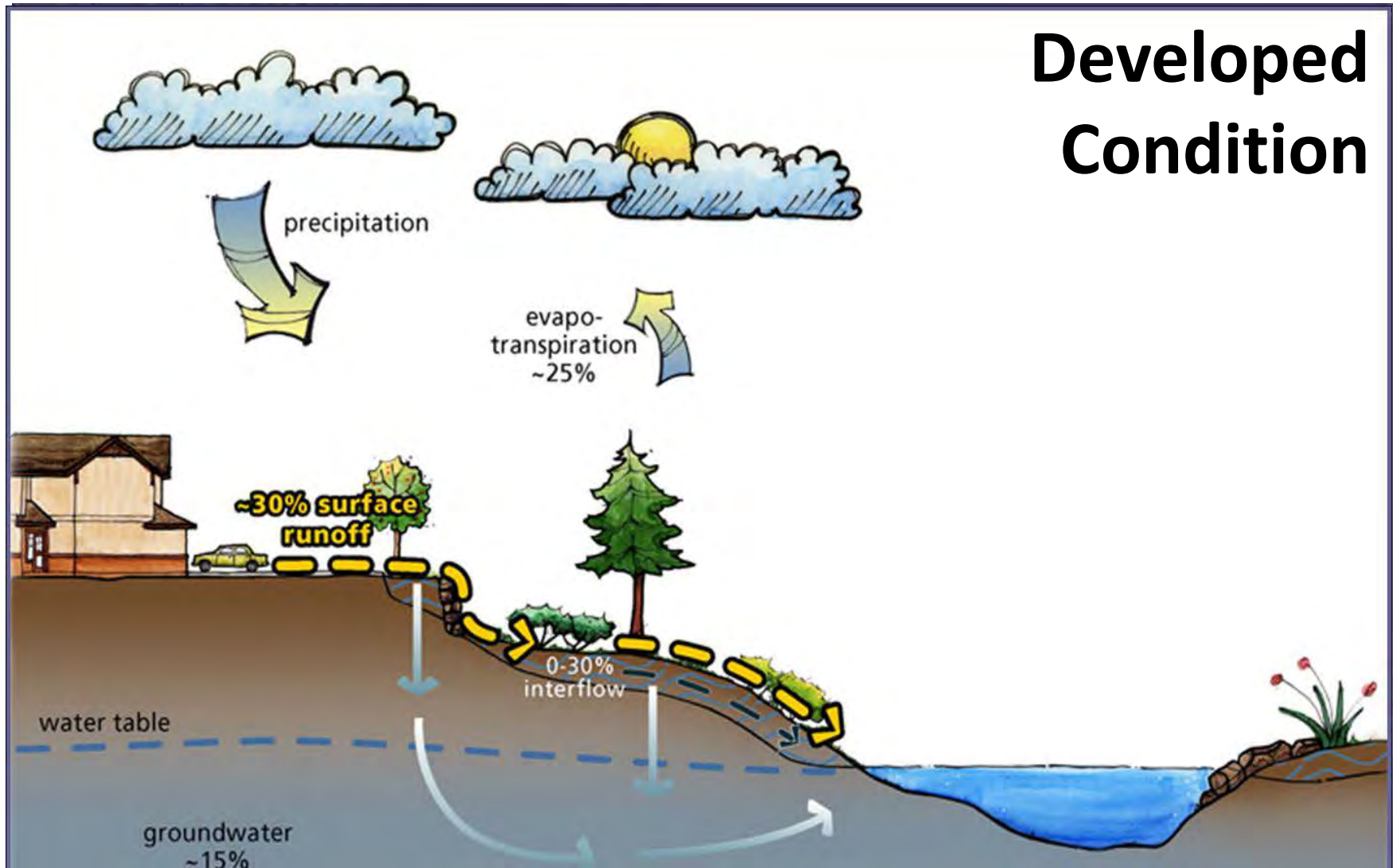
# Importance of Stormwater Management

**Pre-developed  
Condition**



# Importance of Stormwater Management

## Developed Condition



# Importance of Stormwater Management



# IMPACTS

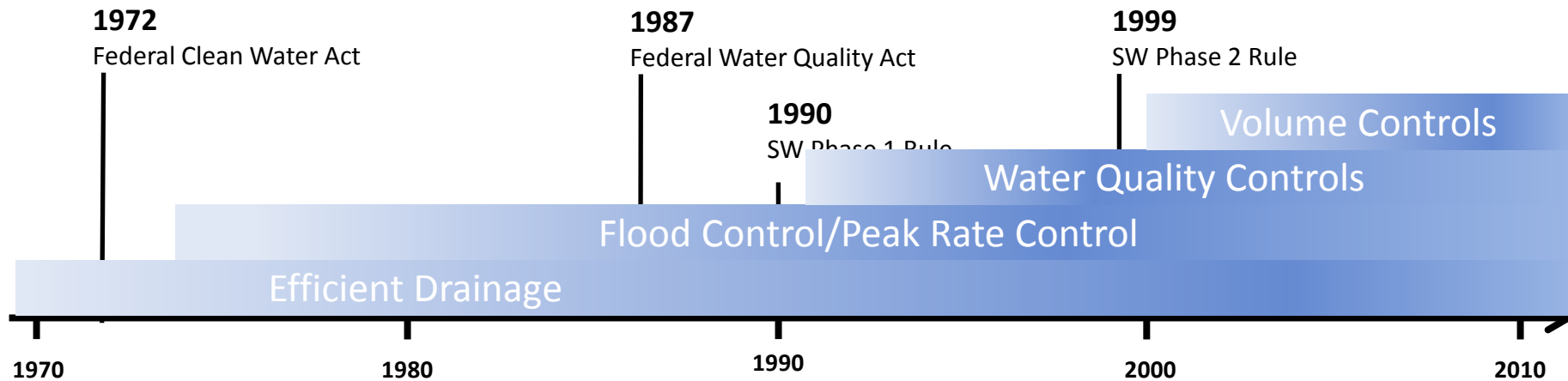
## from Land Development & Poorly Managed Stormwater



- 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



# Stormwater regulations



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

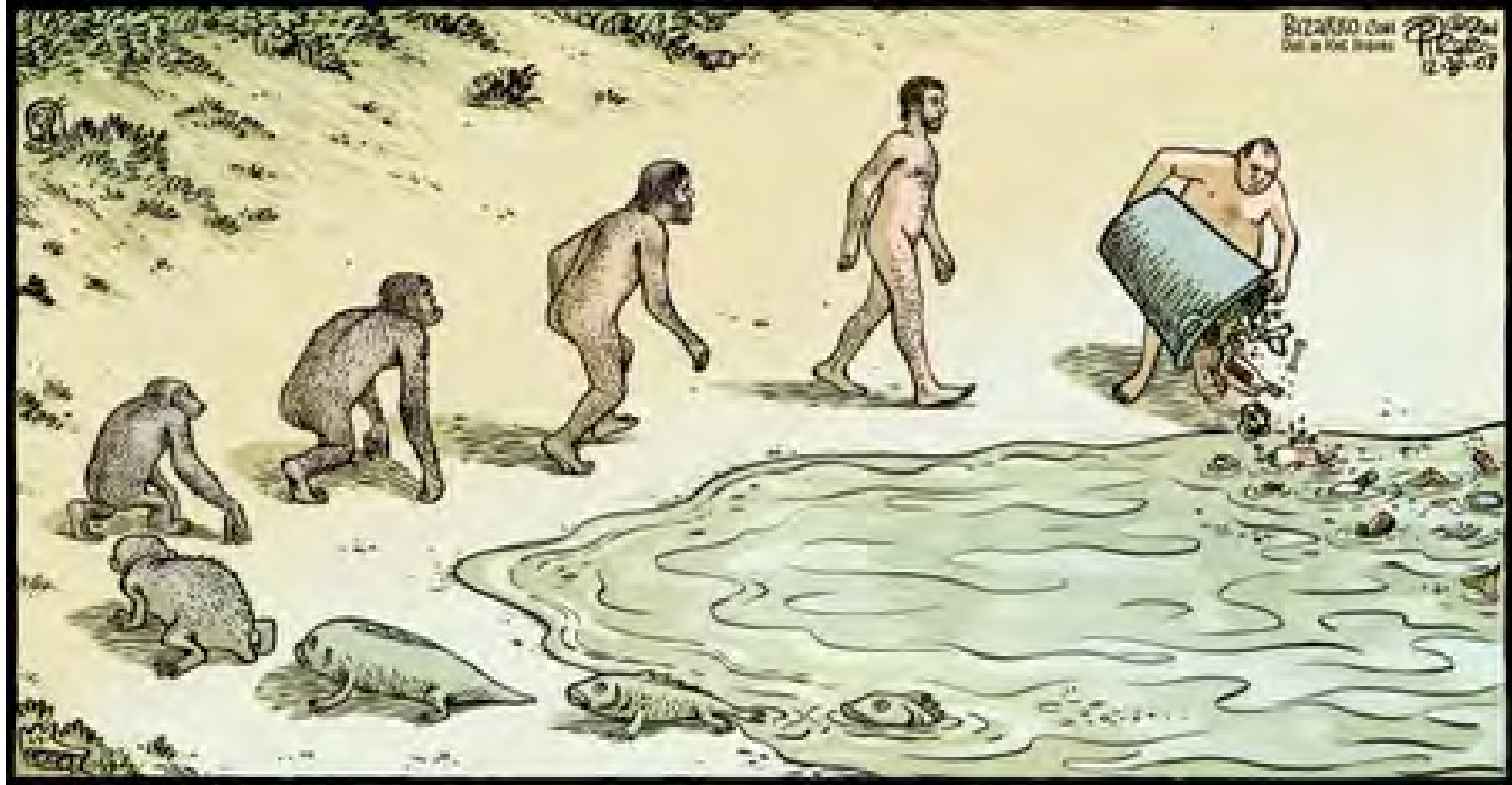
Stormwater Phase 1 Rule: NPDES program covers (i) “medium & large” MS4s (ii) Earth Disturbances > 5 ac (iii) 10 categories of industrial activity

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



# Conventional Stormwater Management



- Controls Peak **Rate** of Runoff to Existing Conditions for Large Storms (theoretically)
- No Runoff **Volume** Control
- No NPS **Pollutants** Control

# Conventional Stormwater Management



**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

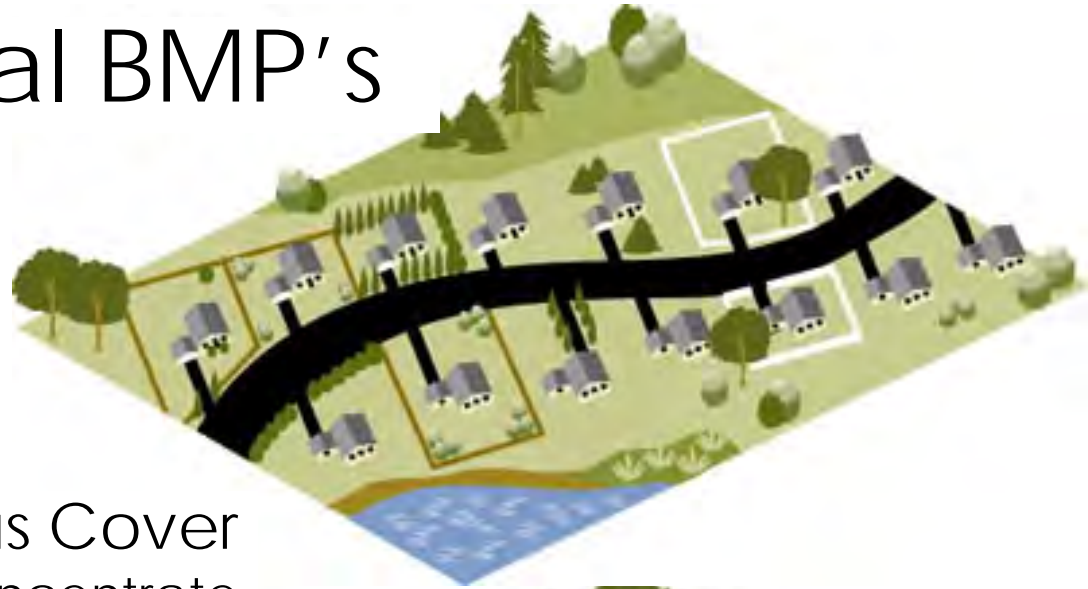
- Avoid & Minimize Impacts
- Riparian Buffers/Woodlands

### Maximize **Green Infrastructure**

- Conservation Corridors
- Green belts

# 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

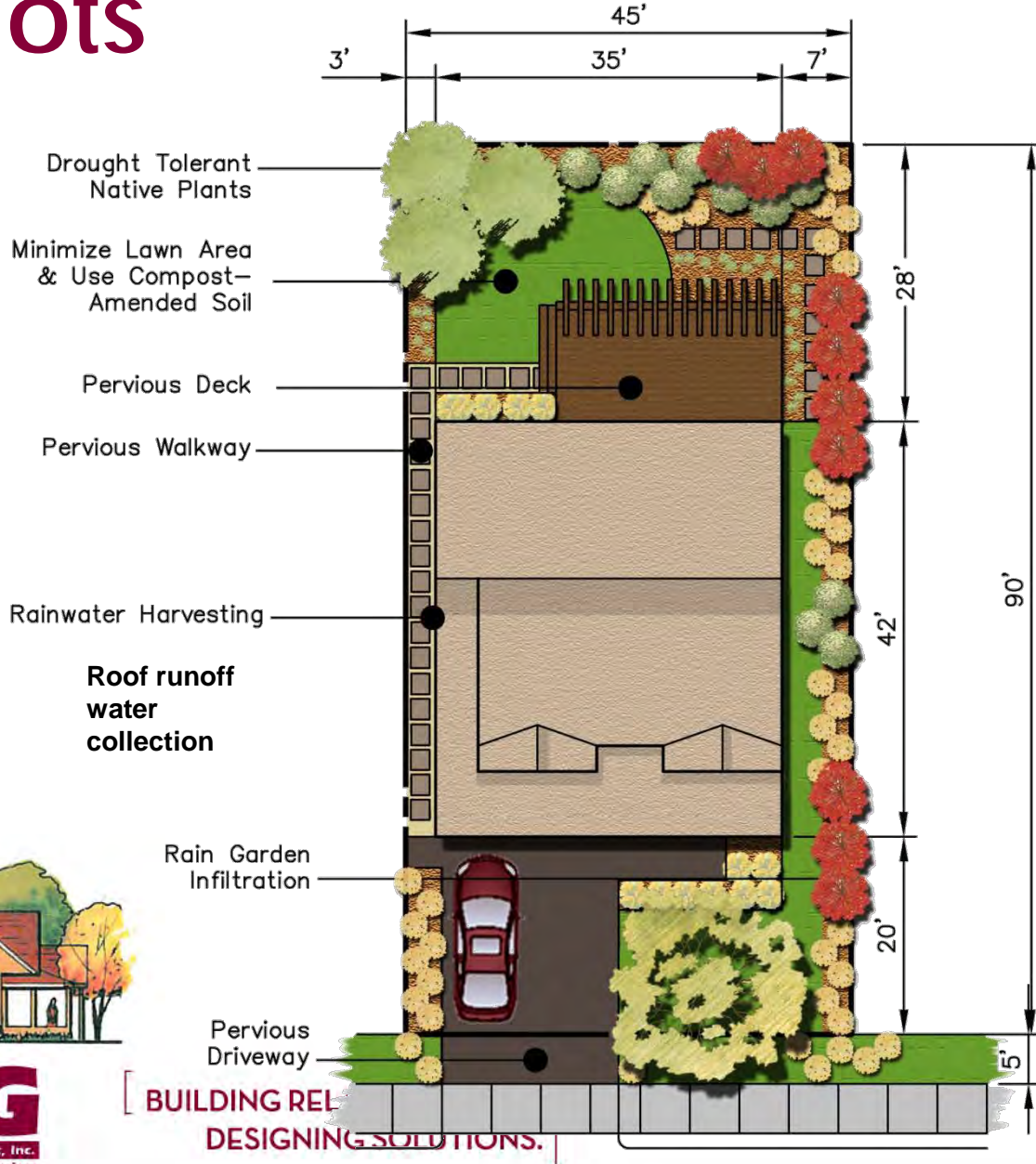
Slow down runoff

# SWM on small lots

Lot = 0.1 acre (4050 sf)

Impervious: 2360 sf

- 1470 sf home
- 240 sf deck
- 500 sf driveway
- 150 sf walkway



[ BUILDING REL [ DESIGNING SOLUTIONS. ]

# AGENDA

1 *Stormwater Regulations*

2 **Stormwater Ordinance**

3 Funding

4 BMP Examples





# Model Ordinance

DEP's Model Ordinance  
(Document #363-0300-003 last  
updated November, 2008).

STORMWATER MANAGEMENT ORDINANCE

ORDINANCE NO. \_\_\_\_\_

MUNICIPALITY OF

---

\_\_\_\_\_ COUNTY, PENNSYLVANIA

Adopted at a Public Meeting Held on

\_\_\_\_\_, 20\_\_\_\_

363-0300-003 / November 17, 2008 / Page 1

# Model Ordinance

## 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**

# Model Ordinance - EXEMPTIONS

New Impervious Area <sup>1, 2</sup> (square footage)	Applicant Must Provide
0 – 2,500	No Submission
2,500 – 5,000	Documentation of Impervious Surface <sup>3</sup>
> 5,000	Rate Controls, Volume Controls & SWM Site Plan

## 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

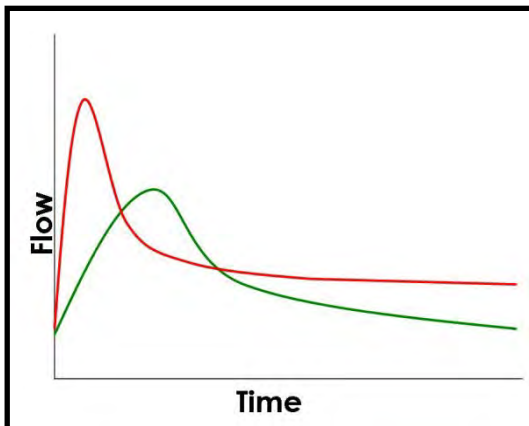
Sizing Criteria	Description of Stormwater Sizing Criteria
<b>Design Storm Method (CG1)</b>	Regulation of the 2-year storm event: -No increase in total runoff volume for the 2-yr/24-yr event -Consider existing non-forest pervious area as meadow -20% of existing impervious area considered as meadow
<b>Simplified Method (CG2)</b>	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
<b>Water Quality Calculations</b>	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 (NO <sub>3</sub> ) 50%

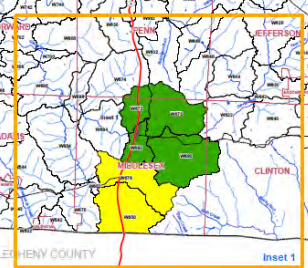
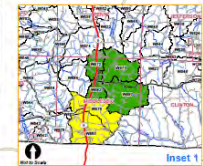
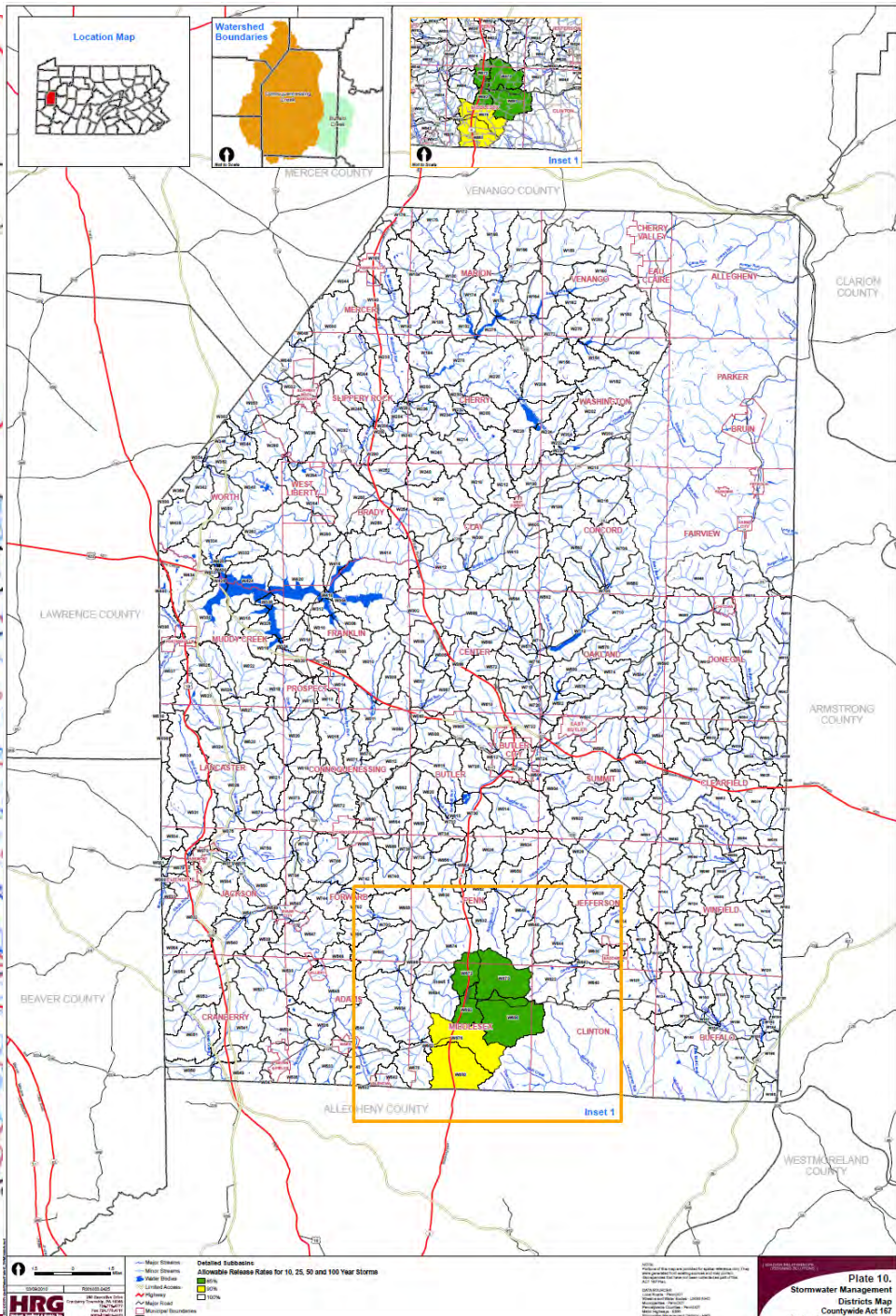
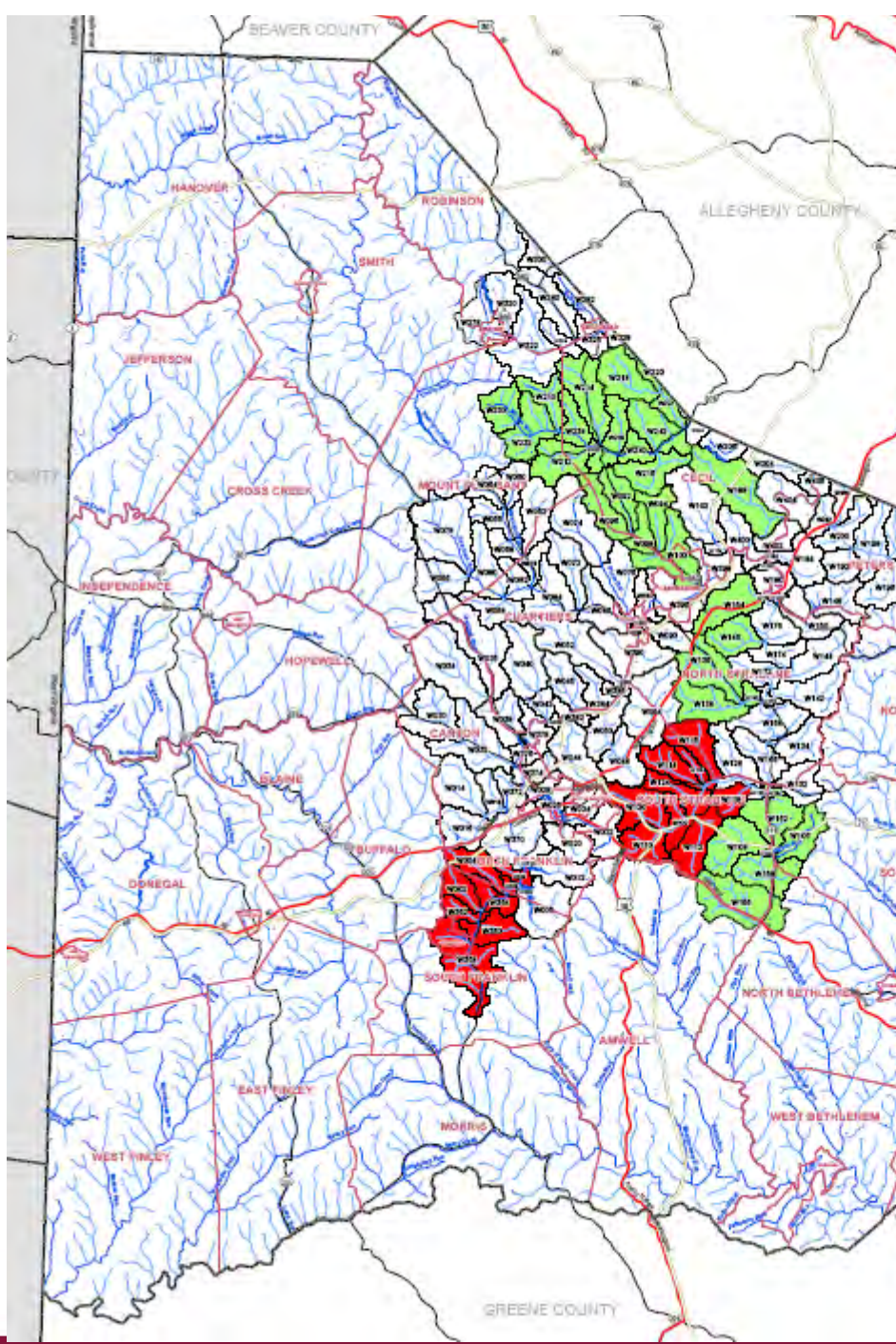
# Model Ordinance – RATE CONTROL

## *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

## 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**

# Model Ordinance

## 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.**

# Model Ordinance

Is there anything else that you can add to your Ordinance to make it more effective?

# Model Ordinance – Additional Provisions

## 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.

# Model Ordinance – Additional Provisions

## 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 there from, 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.



# Model Ordinance – Additional Provisions

## Single Family Residential Exemption

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

1. Comply with Sections 302.A, 302.B, and 302.C
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.



# Model Ordinance – Additional Provisions

## SECTION 306. Sensitive Areas and Stormwater Hotspots

### ADDED PERFORMANCE STANDARDS

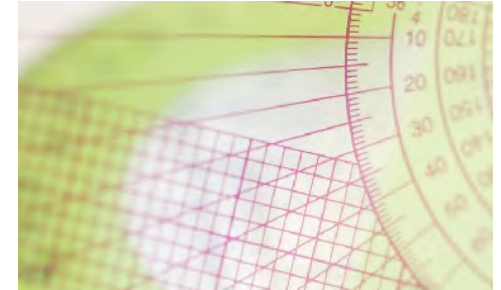
1. Sensitive areas have the potential to endanger a water supply. These areas consist of the delineated 1-year zone of contribution and direct upslope areas tributary to the water supply wells.
2. Stormwater Hotspots are projects that have a high potential to endanger local water quality, and could potentially 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



# Model Ordinance – Additional Provisions

## *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

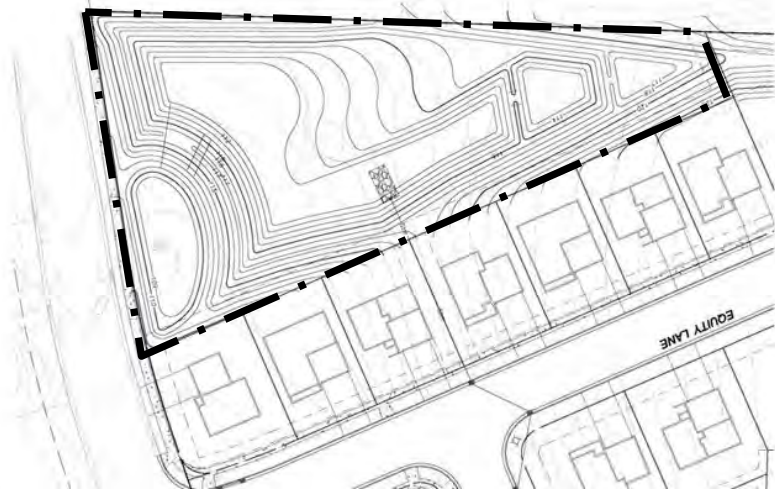
Construction Materials & Methods



# Model Ordinance – Additional Provisions

## *EASEMENTS (Optional Article)*

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



# Model Ordinance – Additional Provisions

## *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**

[Municipality]

## Small Project Stormwater Management Application

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					
Surface Type	Length	X	Width	=	Proposed Impervious Area
Building (area per downspout)		X		=	
		X		=	
		X		=	
		X		=	
Driveway		X		=	
		X		=	
		X		=	
Parking Areas		X		=	
		X		=	
		X		=	
Patios/Walks		X		=	
		X		=	
		X		=	
		X		=	
Other		X		=	
		X		=	
		X		=	
<b>Total Impervious Surface Area to be managed (sum of all areas)</b>					

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  $\leq 500$  sf
- paved area draining to a discharge is  $\leq 1,000$  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  $\leq 5\%$
- gravel strip or other spreading device is required at paved discharges.

Length of Pervious Flow Path from discharge point * (ft)	DIA Credit Factor
0 – 14	1.0
15 – 29	0.8
30 – 44	0.6
45 – 59	0.4
60 – 74	0.2
75 or more	0

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

Calculate DIA Credit & Required Capture Volume									
Surface Type	Proposed Impervious Area (from previous sheet)	X	DIA Credit Factor	=	Impervious Area to be managed	÷	6	=	Required Capture Volume (ft <sup>3</sup> )
Building (area per downspout)		X		=		÷	6	=	
		X		=		÷	6	=	
		X		=		÷	6	=	
		X		=		÷	6	=	
Driveway		X		=		÷	6	=	
		X		=		÷	6	=	
		X		=		÷	6	=	
Parking Areas		X		=		÷	6	=	
		X		=		÷	6	=	
		X		=		÷	6	=	
Patios/Walks		X		=		÷	6	=	
		X		=		÷	6	=	
		X		=		÷	6	=	
		X		=		÷	6	=	
Other		X		=		÷	6	=	
		X		=		÷	6	=	
		X		=		÷	6	=	
<b>Total Req'd Capture Volume</b>									

# Small Project SWM Plan

## Credit 2: TREE PLANTING

Perhaps the best BMP is a tree as they intercept rainfall, increase evapotranspiration and increase time of concentration. A portion of the required capture volume can be reduced provided the criteria are met.

### CREDITS

Deciduous Trees	Evergreen Trees
6 ft <sup>3</sup> per tree planted	10 ft <sup>3</sup> per tree planted

### Criteria

To receive credit for planting trees, the following must be met:

- Trees must be native species (see below), minimum 2" caliper and 6 feet tall (min).
- Trees shall be adequately protected during construction.
- Trees shall be maintained until redevelopment occurs.
- No more than 25% of the runoff volume can be mitigated through the use of trees.
- Dead trees shall be replaced within 6 months.
- Non-native species are not applicable.

<input type="text"/>	Req'd Capture Volume (ft <sup>3</sup> )
- <input type="text"/>	Tree Planting Credit (ft <sup>3</sup> )
<hr/> <hr/>	
<input type="text"/>	Capture Volume to be managed (ft <sup>3</sup> )

### Sizing of BMP

<input type="text"/>	How much of the Volume will you manage with a Rain Garden?
+ <input type="text"/>	How much of the Volume will you manage with a Sump or Trench?
<hr/> <hr/>	
<input type="text"/>	Capture Volume to be managed (ft <sup>3</sup> )

Enter the volumes into the **Small Project SWM Plan Worksheet** on the next sheet.

### Native Species Trees (Common Name)

- |  |  |
|--|--|
| - Blackgum                               | - Sycamore, American                                   |
| - Arrow-wood, southern                   | - Cotton-wood, eastern                                 |
| - Box-elder                              | - Aspen, big-tooth or quaking                          |
| - Maple, (red or silver)                 | - Cherry, black  |
| - Birch, (river or gray)                 | - Oak, (white, swamp white, scarlet, pin, willow, red) |
| - Ironwood                               | - Willow, black  |
| - Hickory, sweet pignut or shag-bark     | - Bald Cypress   |
| - Cedar, (Atlantic white or eastern red) | - Basswood, American                                   |
| - Beech, American                        | - Serviceberry, (downy or shadbush)                    |
| - Ash, (white, black or green)           | - Redbud, eastern                                      |
| - Holly, American                        | - Dogwood, flowering                                   |
| - Tuliptree                              | - Magnolia, sweetbay                                   |
|  | - Pine, (pitch or eastern white)                       |

Reduce size of BMP's  
with common, low  
cost BMP's

# Small Project SWM Plan

## 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:

Capture Volume to be managed (ft <sup>3</sup> )		Conversion	Surface Area of BMPs (ft <sup>2</sup> )
	<b>By Rain Garden</b> 6" ponding; 2' soil depth	x	1.20
	<b>Dry Well or Infiltration Trench</b> 2½' aggregate depth	x	1.25
Total		Total	

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: \_\_\_\_\_

# Documentation w/ O&M Agreement



# IMPLEMENTATION

Models to consider:

MODEL	DESCRIPTION
Individual Municipal	Each municipality passes, implements, and enforces the SWM ordinance individually.
Multi-Municipal	Several municipalities cooperate through a new, or existing, service-sharing agreement (COG, Sewage Association, etc.)
County Service Provider	County department, or office, (e.g. County Planning Entity or County Conservation District) provides SWM ordinance implementation and enforcement services to municipalities.

# IMPLEMENTATION - Administration

<b>Information tracked:</b>	<ul style="list-style-type: none"><li>• Project status</li><li>• Construction &amp; Post Construction Inspections</li><li>• Enforcement Actions</li><li>• Complaints</li><li>• Completion</li></ul>
<b>Plan Review</b>	<ul style="list-style-type: none"><li>• Size threshold for plan review?</li><li>• Submittal verified during review?</li><li>• Pre-project meetings conducted with developer?</li><li>• Engineering approval?</li><li>• Criteria checklist used?</li><li>• BMPs adequately incorporated into the plan to address erosion control, sediment control, housekeeping?</li><li>• Design specifications and details for all BMPs included on the plans?</li><li>• Standards conditions include erosion and sediment control or stormwater provisions?</li></ul>

# 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 Charge: \_\_\_\_\_  
 Property ID: \_\_\_\_\_ Date [Pick the date] \_\_\_\_\_ Time: \_\_\_\_\_

**Weather**  
 Clear  Snow  Warm  
 Overcast  Foggy  Hot  
 Rain  Cold  \_\_\_\_\_

**Site Conditions**  
 Clear  Dusty  
 Muddy  \_\_\_\_\_  
 Temperature Range \_\_\_\_\_

**Day**  
 Monday  Thursday  
 Tuesday  Friday  
 Wednesday  \_\_\_\_\_

Reason for site visit:  Routine Visit  Contractor/Developer Request  Municipality Request

Contractor Company: \_\_\_\_\_ Phone: \_\_\_\_\_  
 Contact Person: \_\_\_\_\_ E-Mail: \_\_\_\_\_

**Persons Contacted:**

Work Force:	Equipment at Site			
	[Contractor X]	[Contractor Y]	[Contractor Z]	
Classification				
Supervisor				

**Work Observed:**

**Items Discussed:**

**Nonconforming Work Reported this Date to Contractor:**

**Remarks:**

[ BUILDING RELATIONSHIPS.  
DESIGNING SOLUTIONS. ]



# IMPLEMENTATION – Construction Inspection

MCM #4 – CONSTRUCTION SITE SW RUNOFF CONTROL					Approval No.	Approval Date
<input type="checkbox"/>	E/S Approval Obtained		<input type="checkbox"/>	N/A		
<input type="checkbox"/>	NPDES Permit Obtained		<input type="checkbox"/>	N/A		
E/S BMPs Onsite:	Date Installed	Properly Functioning		Comments		
		Yes	No			
Inlet Protection	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>		
Silt Fence	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>		
Silt Sock	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>		
RCE	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>		
Sediment Basin	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>		
Sediment Trap	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>		
Truck Washout	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>		
	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>		
	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>		
	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>		
	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>		
	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>		
MCM #5 – POST CONSTRUCTION SW (PCSM) ACTIVITIES						
PCSM BMPs Onsite:	Date Installed	Properly Functioning		Comments		
		Yes	No			
Swales	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>		
Rain Garden	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>		
Bio Retention	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>		
Detention Basin	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>		
Underground Basin	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>		
	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>		
	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>		
	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>		
	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>		
	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>		
	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>		
	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>		
	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>		
	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>		
<b>Comments:</b>						

Attachments

Signed by: \_\_\_\_\_

Date: \_\_\_\_\_

Copies:  Municipality  Owner  Contractor  Consultants  \_\_\_\_\_  \_\_\_\_\_  File



# AGENDA

1 *Stormwater Regulations*

2 *Stormwater Ordinance*

3 **Funding**

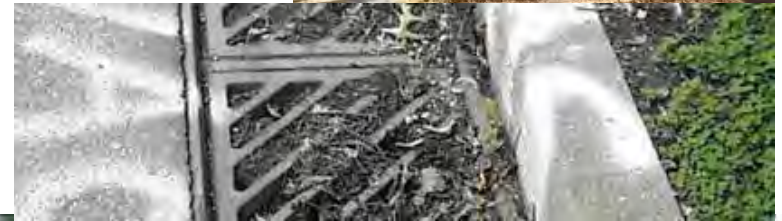
4 **BMP Examples**



# 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



# FUNDING OPTIONS

SOURCE	CAPITAL	O&M	FEATURES
Grants	Yes	No	Not guaranteed, highly competitive, not sustainable in the long-term
PENNVEST Loan Program	Yes	No	Not guaranteed, highly competitive, must repay often with interest
Bond Financing	Yes	No	Dependent on fiscal capacity, can utilize for large, long-term expenditures, must repay with interest
General Fund	Yes	Yes	Not equitable, competes with other community priorities, changes from year-to-year
Review/Inspection Fees	No	No	Not significant revenue, may deter development
Stormwater Utility Fee	Yes	Yes	Generates ample revenue, sustainable, dependable, equitable, requires significant public dialogue

# LEGISLATION

**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**

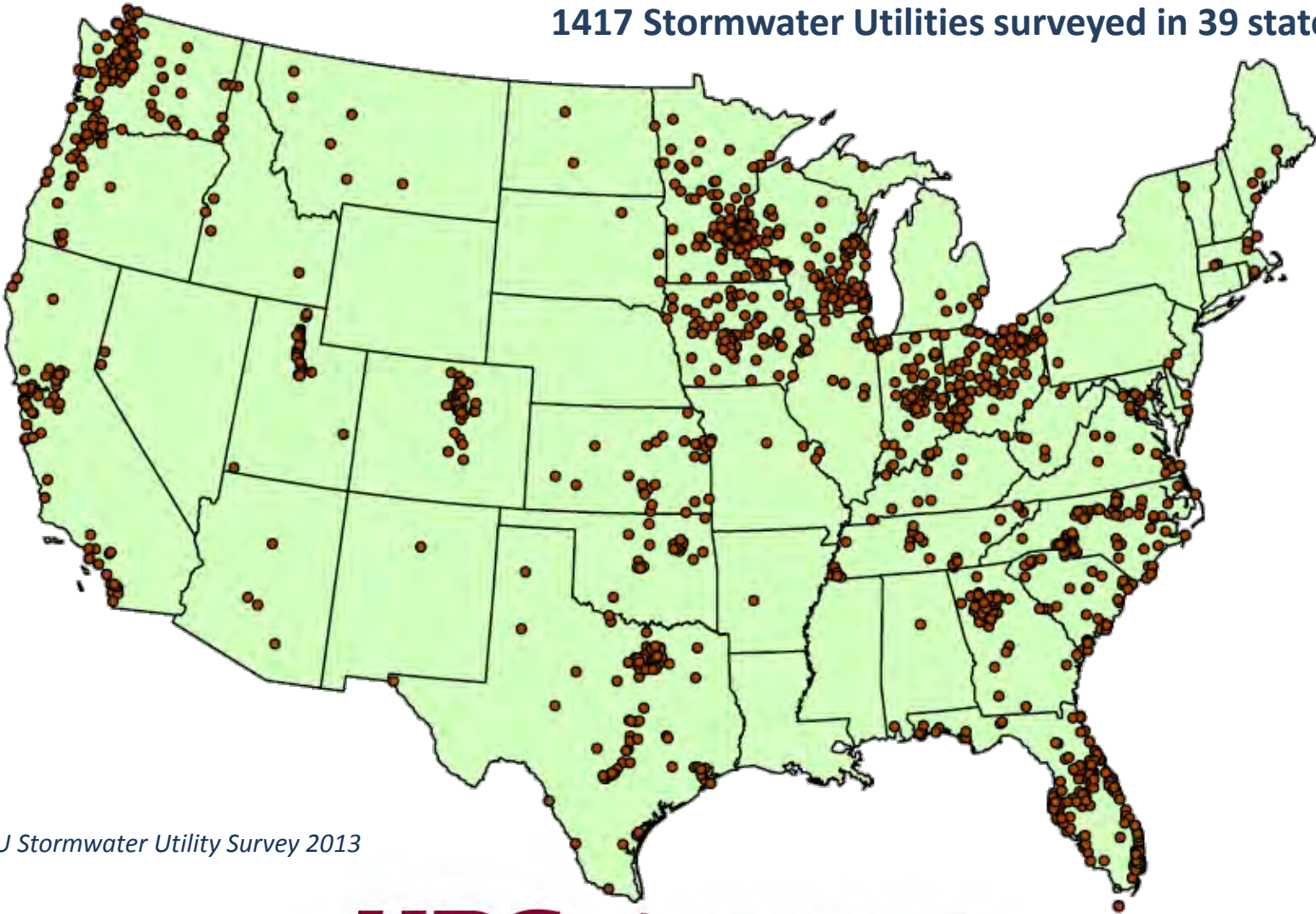
**Effective 9/9/2013**



**[ BUILDING RELATIONSHIPS.  
DESIGNING SOLUTIONS. ]**

# 2013 STORMWATER UTILITY LOCATIONS

1417 Stormwater Utilities surveyed in 39 states



Ref: WKU Stormwater Utility Survey 2013



[ BUILDING RELATIONSHIPS.  
DESIGNING SOLUTIONS. ]



# GRANTS



**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](http://www.portal.state.pa.us/portal/server.pt/community/available_funding/11211/drinking,_waste_and_storm_water_loans/560726)



[ BUILDING RELATIONSHIPS.  
DESIGNING SOLUTIONS. ]

# GRANTS



**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.

<http://www.newpa.com/find-and-apply-for-funding/funding-and-program-finder/watershed-restoration-and-protection-program-wrpp>



[ BUILDING RELATIONSHIPS.  
DESIGNING SOLUTIONS. ]

# GRANTS

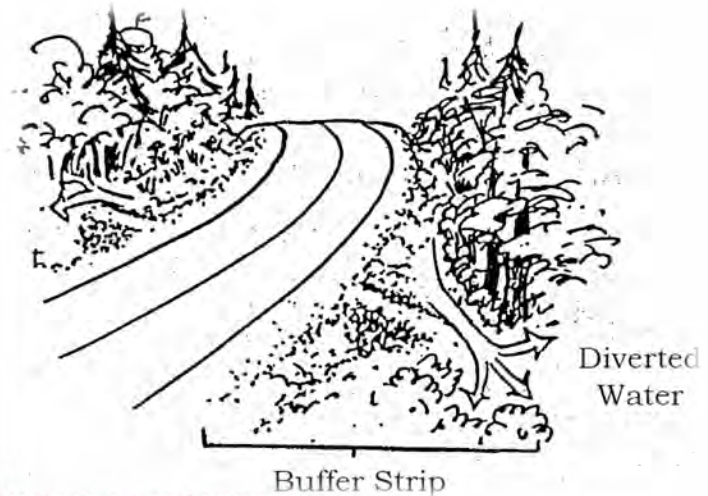
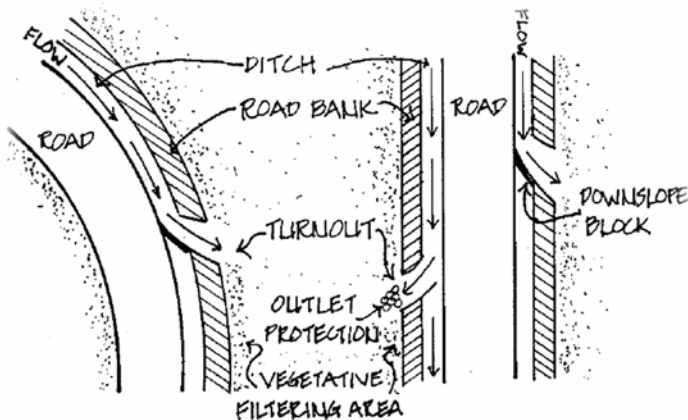


**Pennsylvania Department of Environmental Protection (PADEP)** - provides a variety of grant opportunities within the commonwealth.

<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>



[ BUILDING RELATIONSHIPS.  
DESIGNING SOLUTIONS. ]

# GRANTS



**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>



[ BUILDING RELATIONSHIPS.  
DESIGNING SOLUTIONS. ]

# GRANTS



**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.

<http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-97824/0350-BK-DEP4266%20combined.pdf>



[ BUILDING RELATIONSHIPS.  
DESIGNING SOLUTIONS. ]

# GRANTS



**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](http://www.depweb.state.pa.us/portal/server.pt/community/growing_greener/13958)



[ BUILDING RELATIONSHIPS.  
DESIGNING SOLUTIONS. ]

# GRANTS



**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](http://www.portal.state.pa.us/portal/server.pt/community/nonpoint_source_management/10615)



[ BUILDING RELATIONSHIPS.  
DESIGNING SOLUTIONS. ]

# GRANTS



**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>



[ BUILDING RELATIONSHIPS.  
DESIGNING SOLUTIONS. ]



# GRANTS



**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.

<http://fishandboat.com/promo/grants/swg/summary2013swg.pdf>

# GRANTS



**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>



[ BUILDING RELATIONSHIPS.  
DESIGNING SOLUTIONS. ]

# GRANTS



**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>



[ BUILDING RELATIONSHIPS.  
DESIGNING SOLUTIONS. ]

# GRANTS



**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>



[ BUILDING RELATIONSHIPS.  
DESIGNING SOLUTIONS. ]

# GRANTS



**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>



[ BUILDING RELATIONSHIPS.  
DESIGNING SOLUTIONS. ]

# GRANTS



**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>

***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>



[ BUILDING RELATIONSHIPS.  
DESIGNING SOLUTIONS. ]

# 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



**HRG**  
Herbert, Rowland & Grubic, Inc.  
Engineering & Related Services

Project Name: DESIGN EXAMPLE 1

Project ID: MILL RUN RESIDENTIAL

Owner: \_\_\_\_\_

Calculated: \_\_\_\_\_ Date: \_\_\_\_\_

Checked: \_\_\_\_\_ Date: \_\_\_\_\_

**WORKSHEET 2. SENSITIVE NATURAL RESOURCES**

**INSTRUCTIONS:**

1. Provide Sensitive Resources Map according to non-structural BMP 5.4.1 in Chapter 5 of PA Stormwater BMP Manual. This map should identify waterbodies, floodplains, riparian areas, wetlands, woodlands, natural drainage ways, steep slopes, and other sensitive natural areas.

2. Summarize the existing extent of each sensitive resource in the Existing Sensitive Resources Table (below, using Acres). If none present, insert 0.

3. Summarize Total Protected Area as defined under BMPs in Chapter 5.

4. Do not count any area twice. For example, an area that is both a floodplain and a wetland may only be considered once.

EXISTING NATURAL SENSITIVE RESOURCE	MAPPED? yes/no/n/a	TOTAL AREA (Ac.)	PROTECTED AREA (Ac.)
Waterbodies	yes	0.00	
Floodplains	no	0.00	
Riparian Areas	no	0.00	
Wetlands	no	0.00	
Woodlands	yes	2.29	1.31
Natural Drainage Ways	N/A	0.00	
Steep Slopes, 15% - 25%	N/A	0.00	
Steep Slopes, over 25%	N/A	0.00	
Other:	N/A		
Other:	N/A		
<b>TOTAL EXISTING:</b>		<b>2.29</b>	<b>1.31</b>



# Integrating SWM w/design - Planning

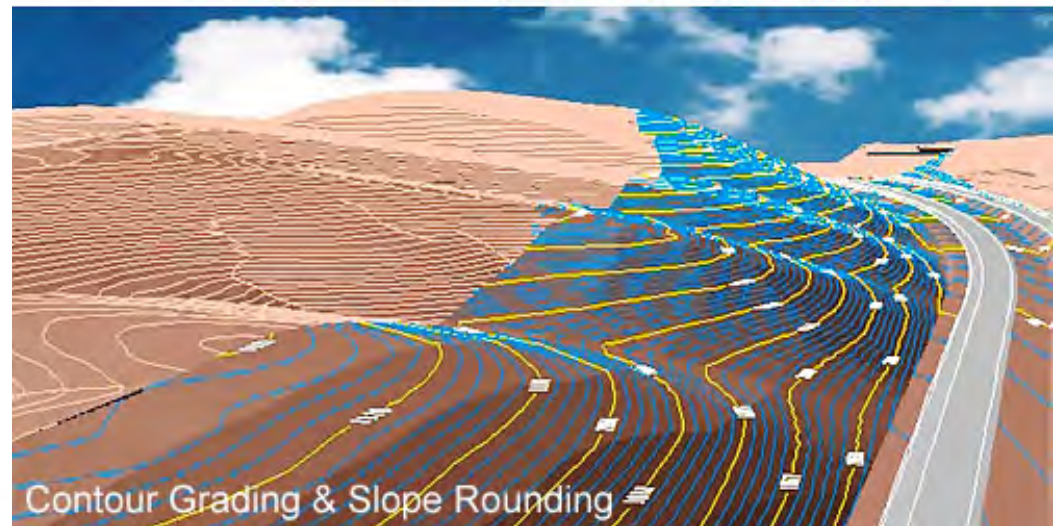
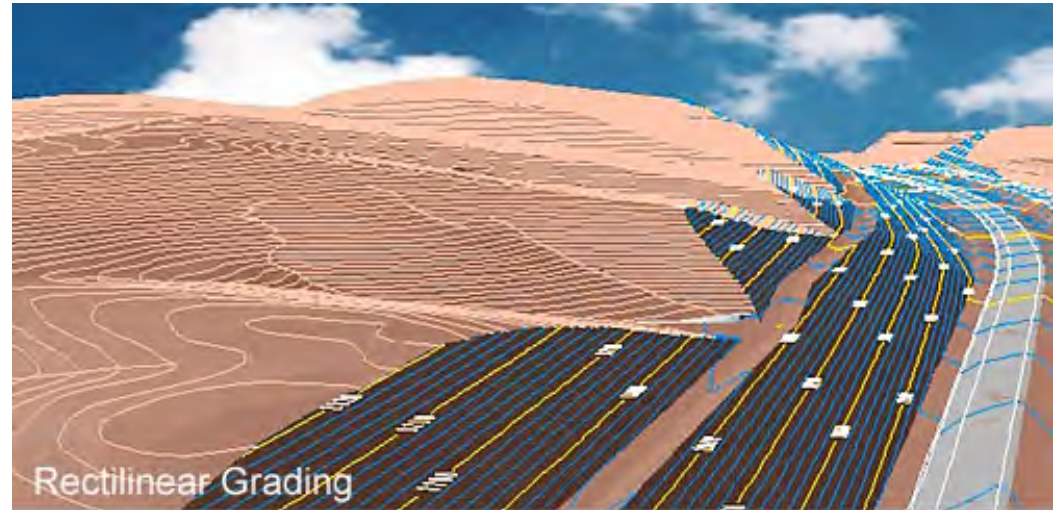


- Topography
- Drainage patterns
- Streams/water
- Soils
- Ground cover and vegetation
- Ex. development
- Ex. SWM facilities
- Adjacent areas
- Wetlands
- Critical habitat areas
- Floodplains
- Steep slopes
- Req'd buffers
- Ex. infrastructure
- Protection areas (e.g., well setbacks)

**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



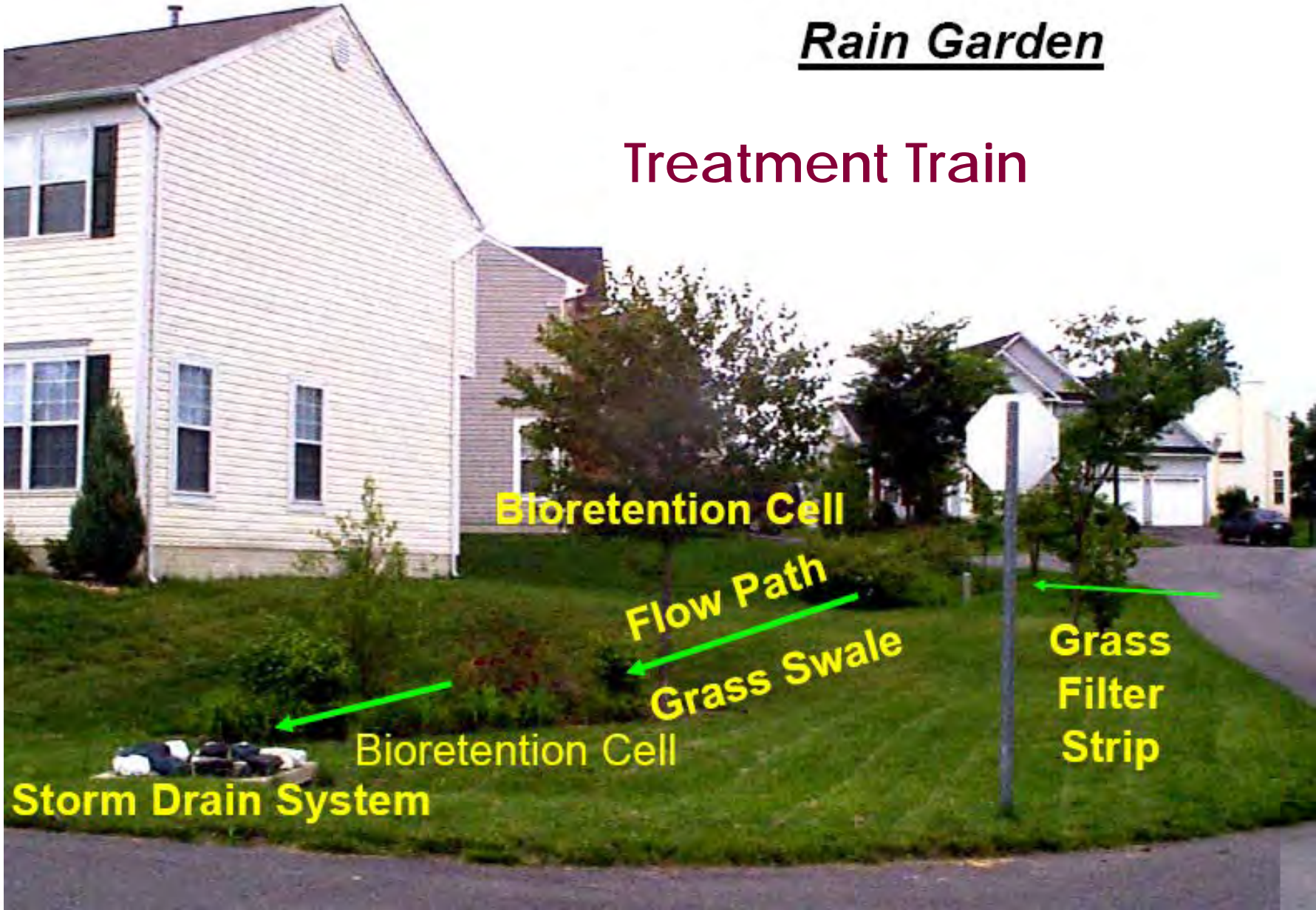
## Extended Detention w/Forebays





# Rain Garden

## Treatment Train



Bioretention Cell

Flow Path

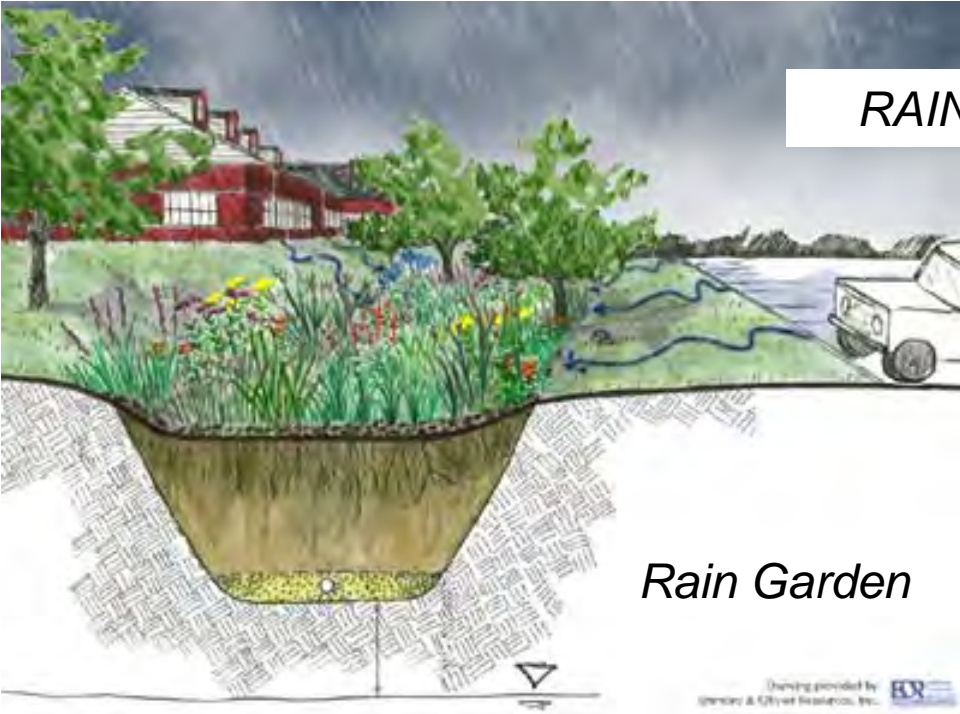
Grass Swale

Grass Filter Strip

Bioretention Cell

Storm Drain System

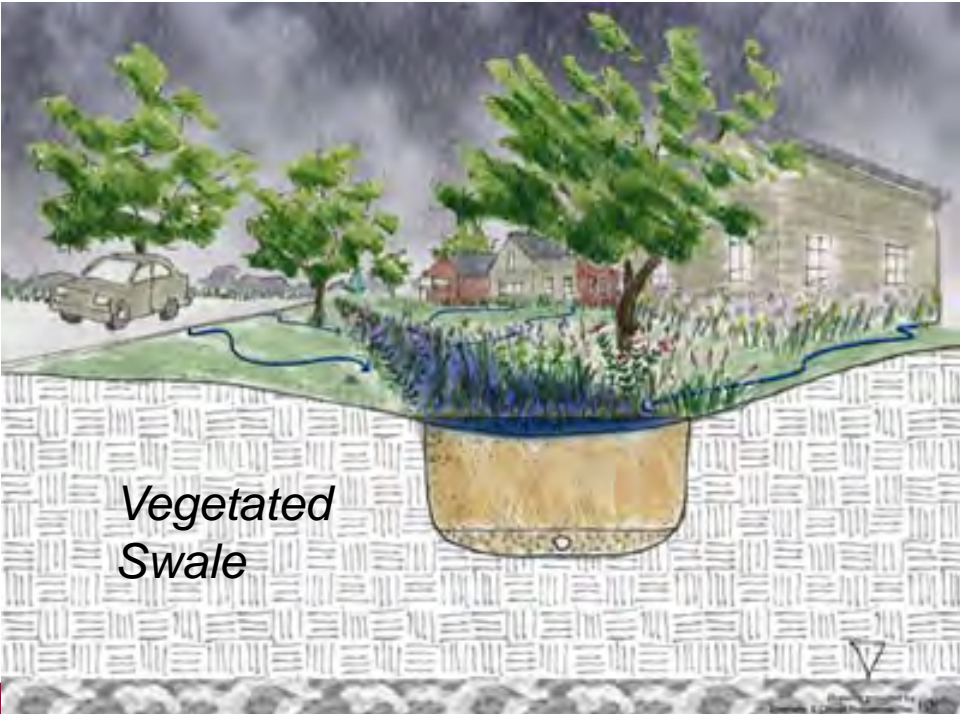
RAINFALL



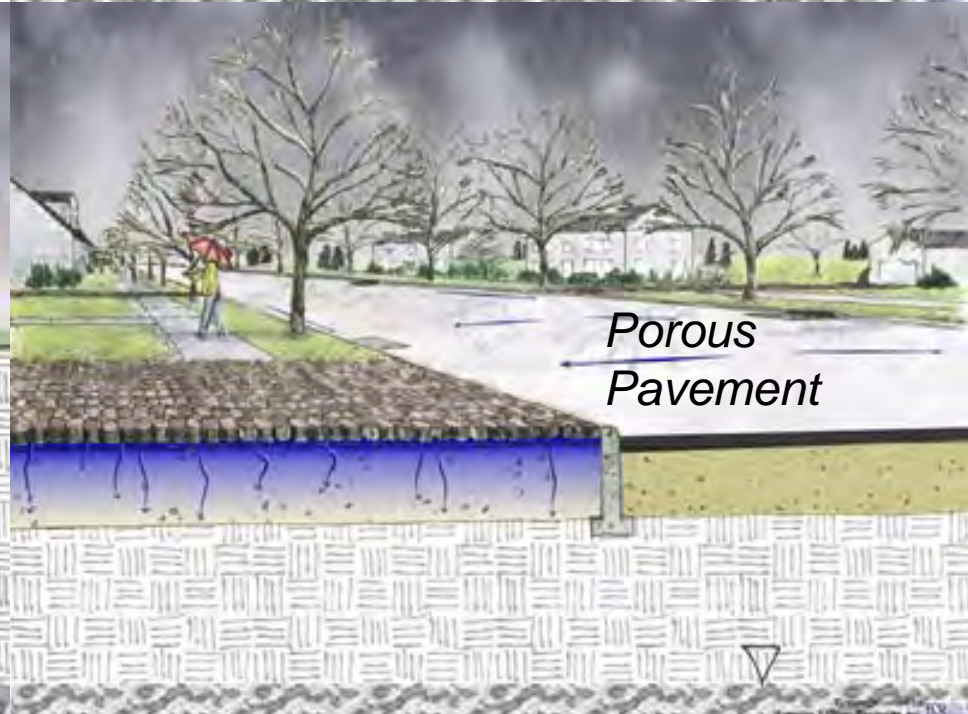
Rain Garden



Infiltration Trench

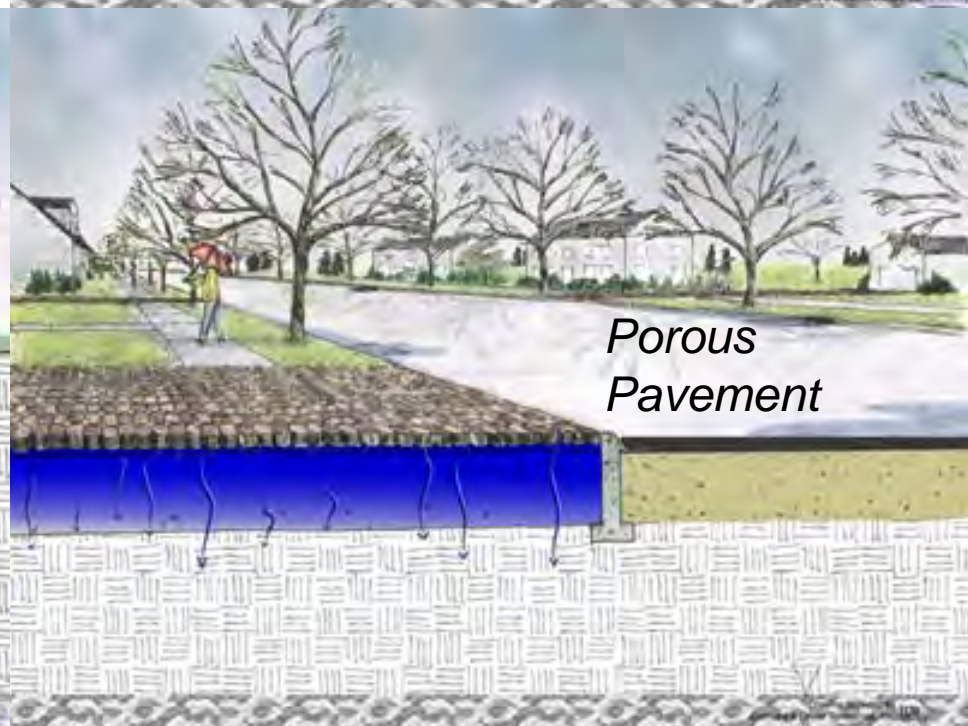
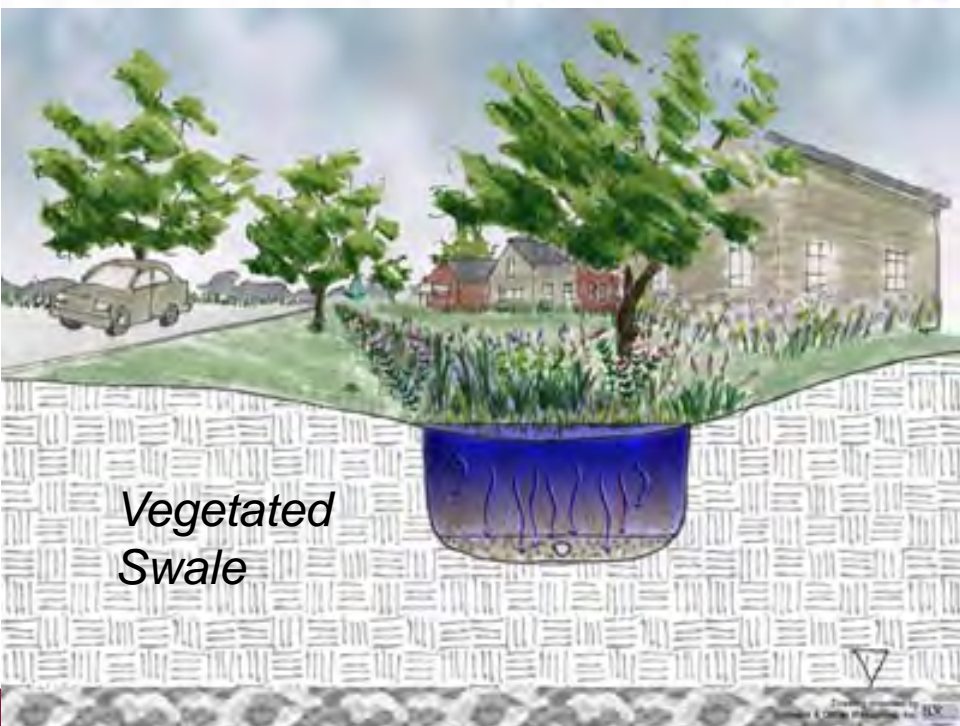
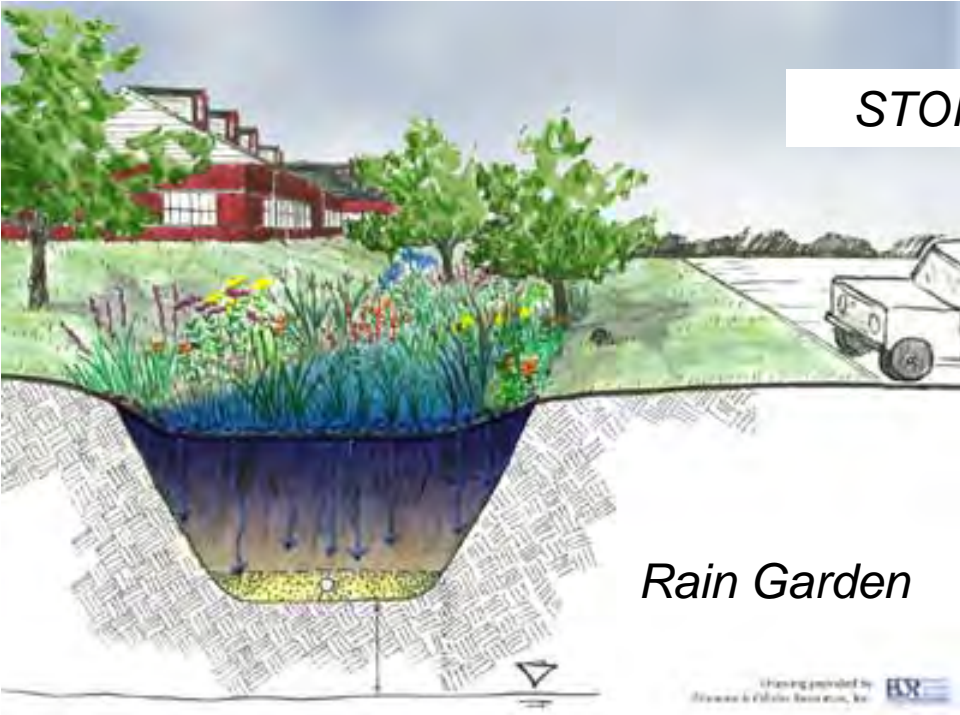


Vegetated Swale

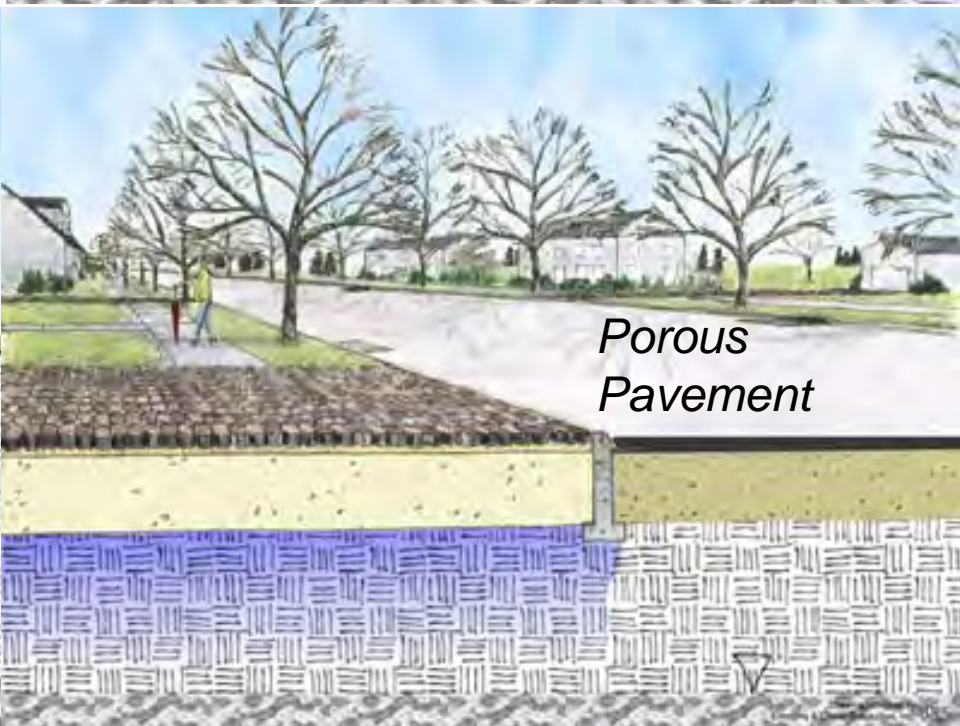
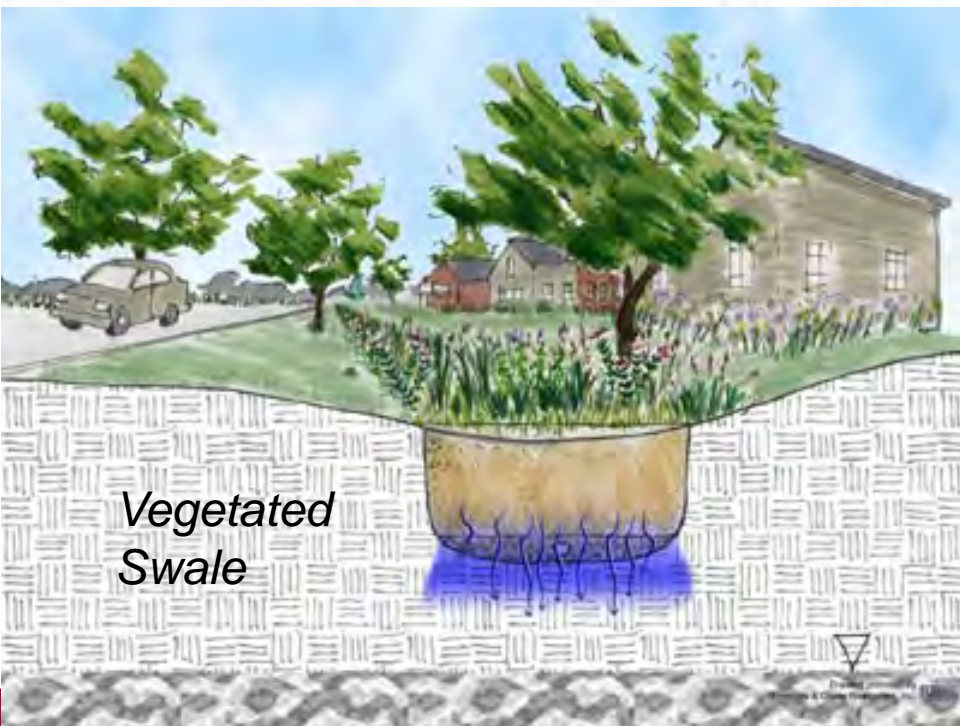
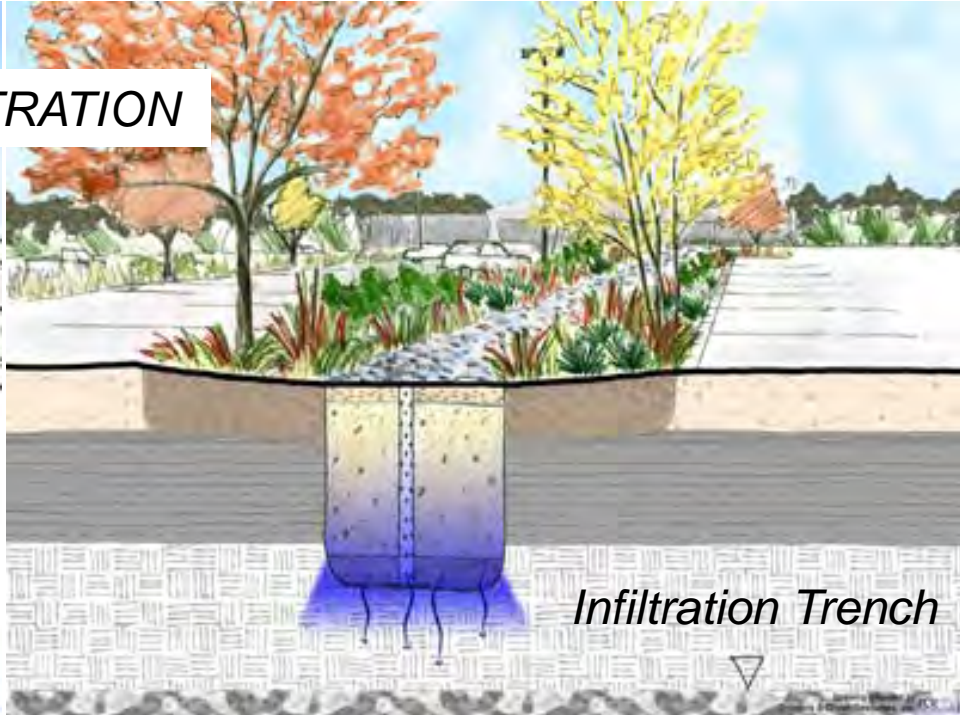
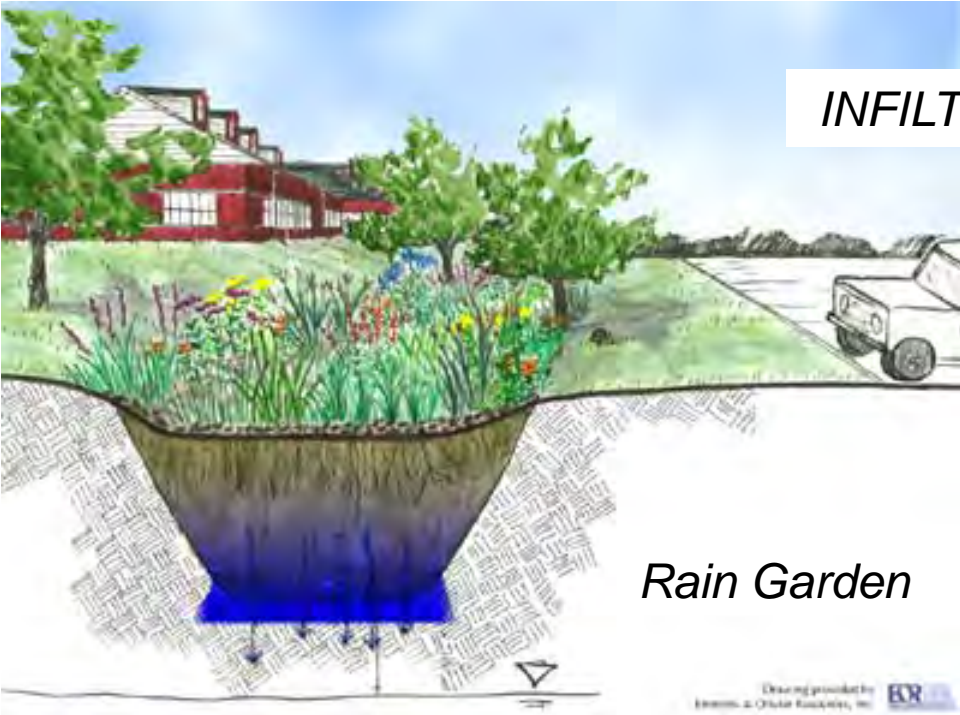


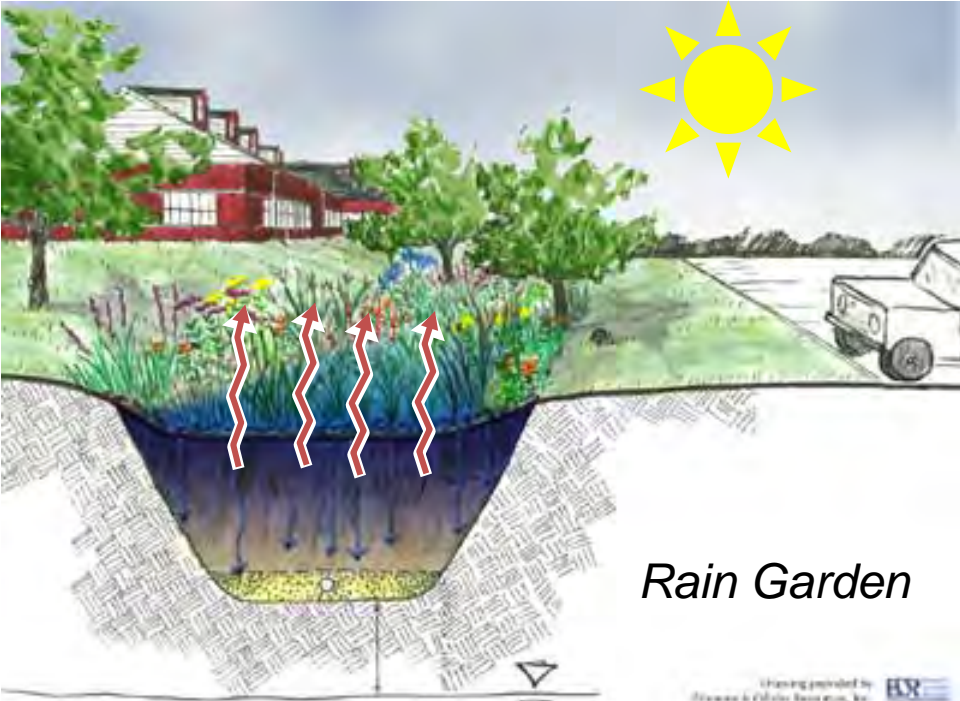
Porous Pavement

STORAGE

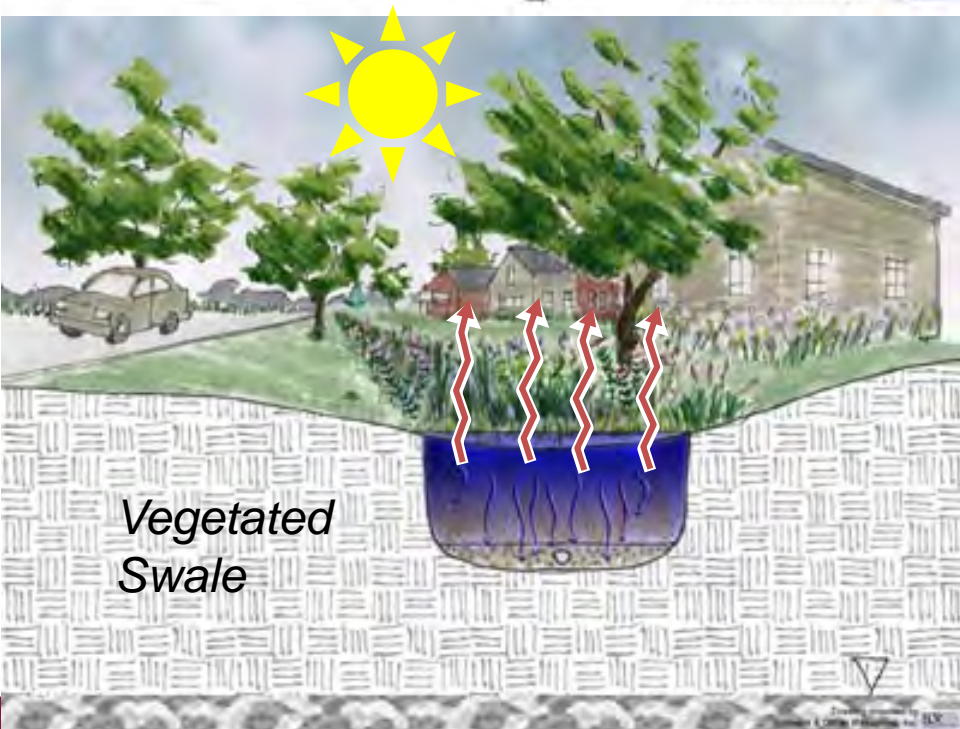


# INFILTRATION





*Rain Garden*



*Vegetated Swale*

## 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

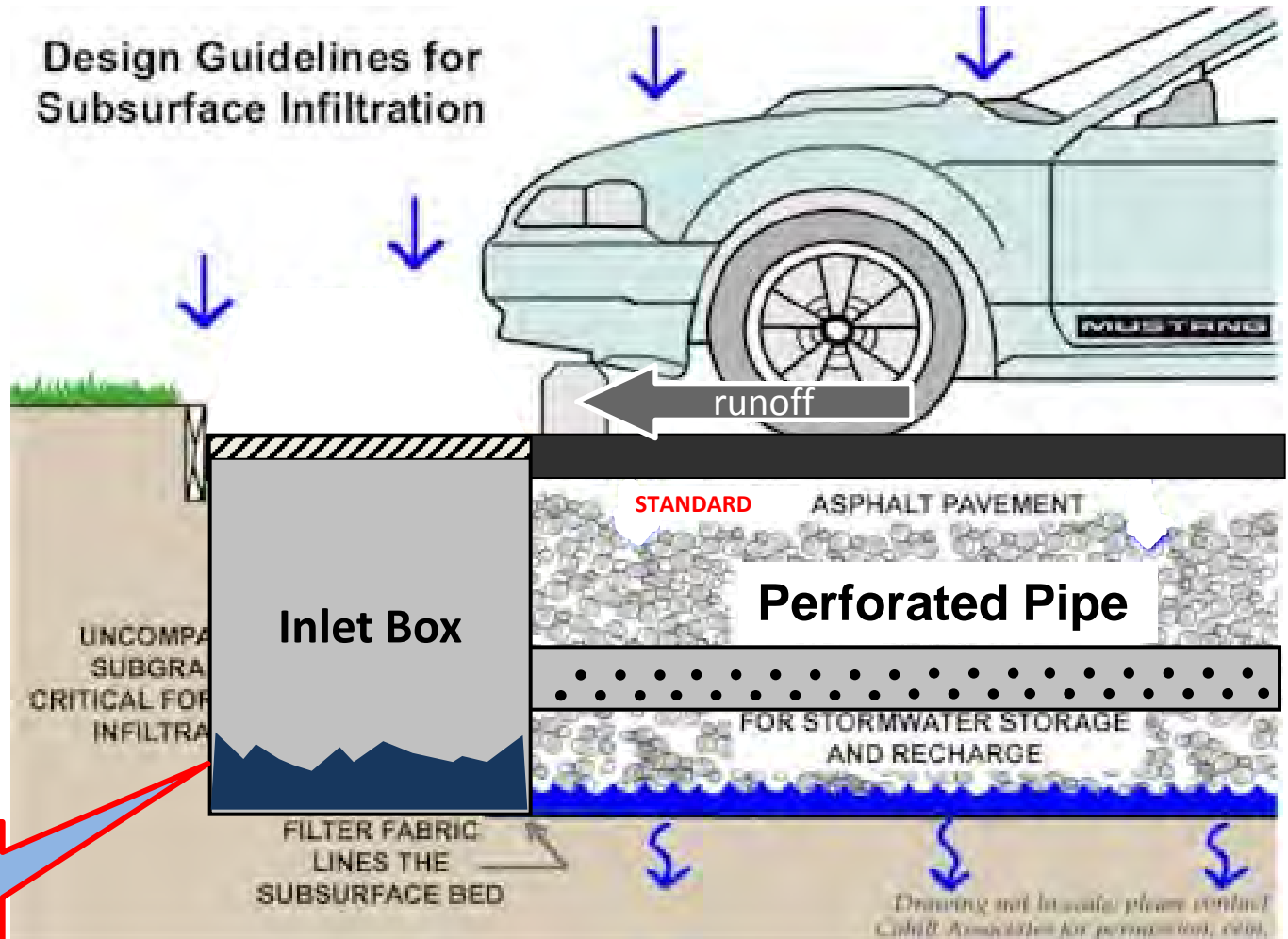
BUILDING RELATIONSHIPS.  
DESIGNING SOLUTIONS.]

# New Approach to SWM

## Parking Lots



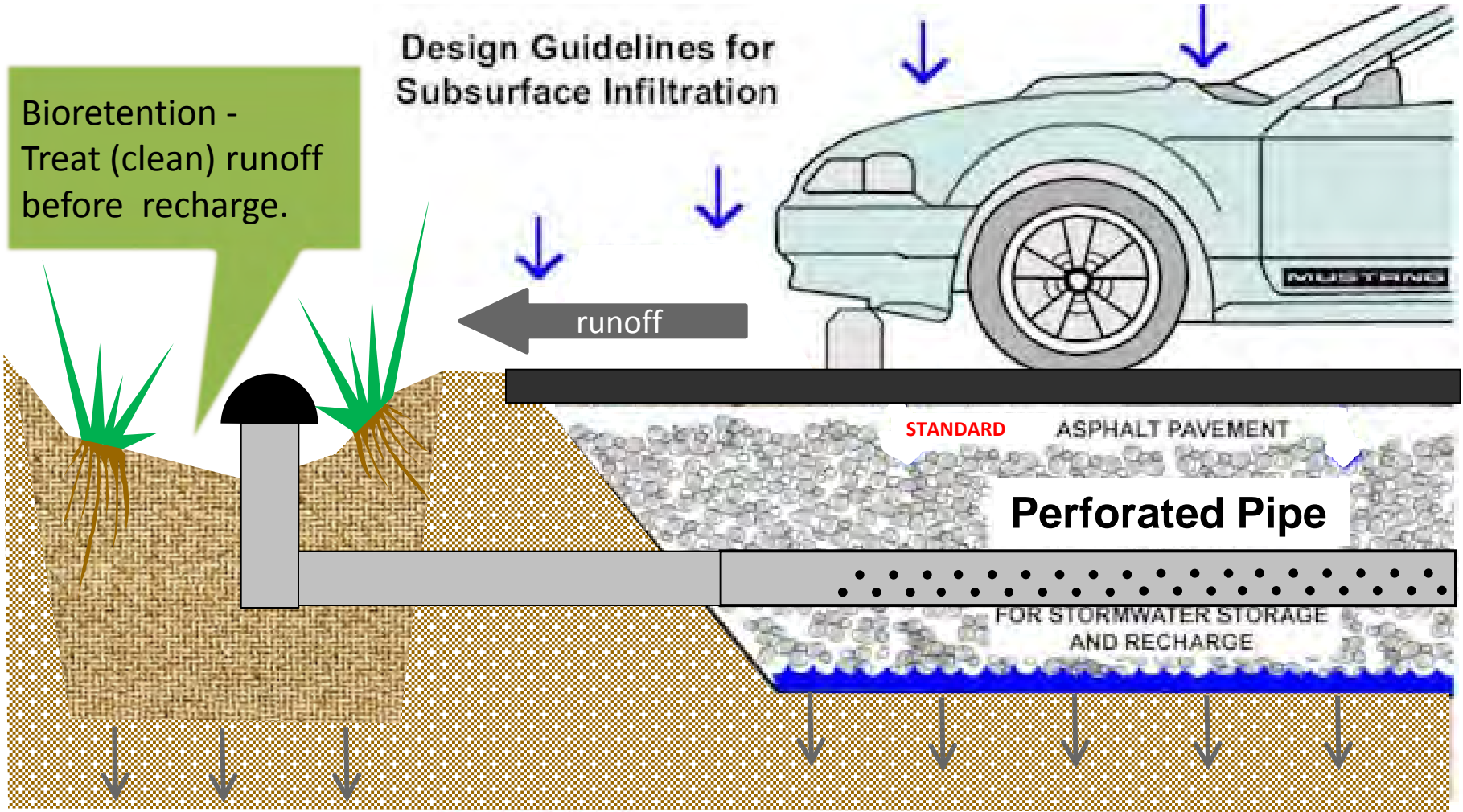
Design Guidelines for  
Subsurface Infiltration



This set-up allows  
for pretreatment

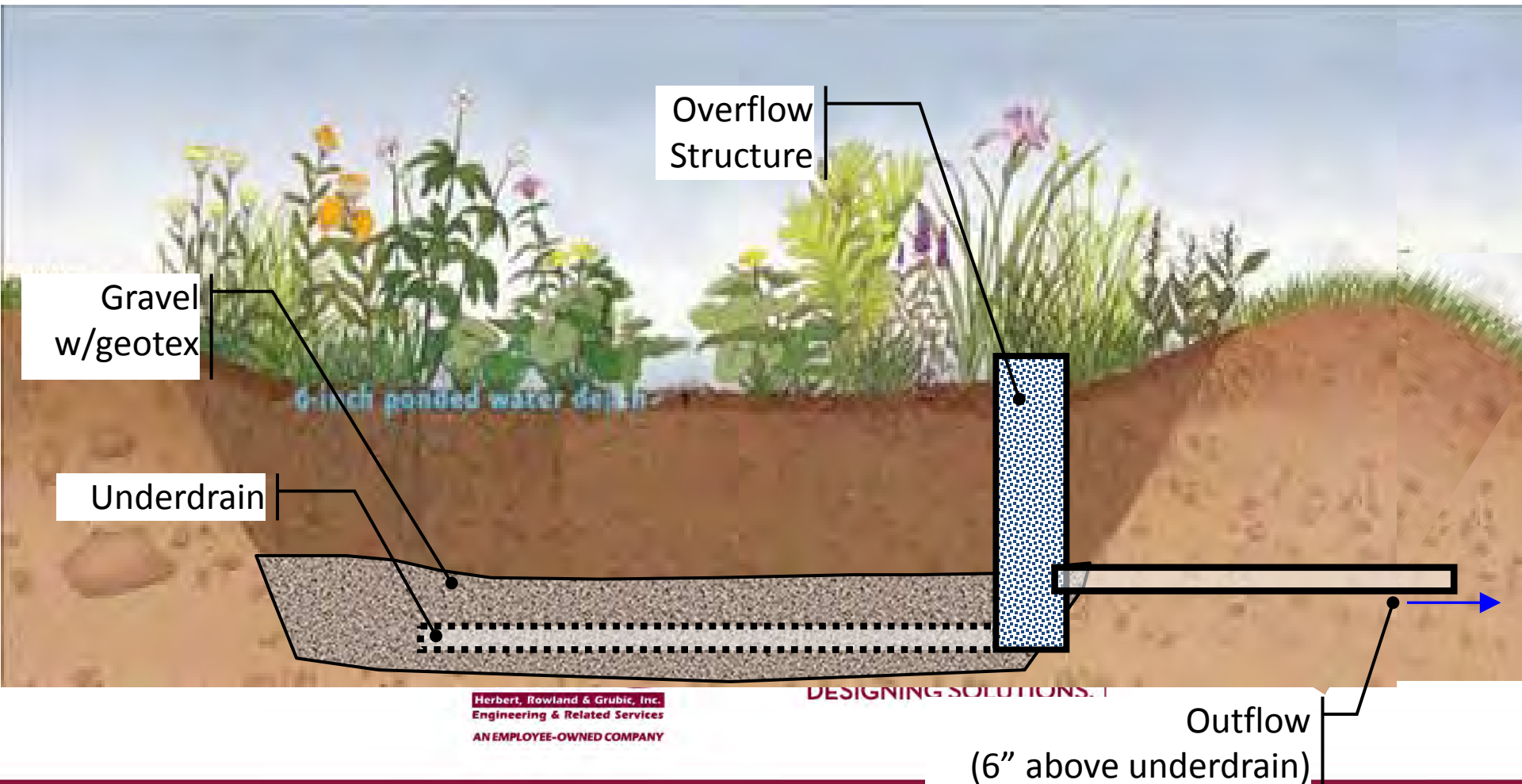
# New Approach to SWM

Even better.....



# New Approach to SWM

## Bioretention in bad soils





# New Approach to SWM

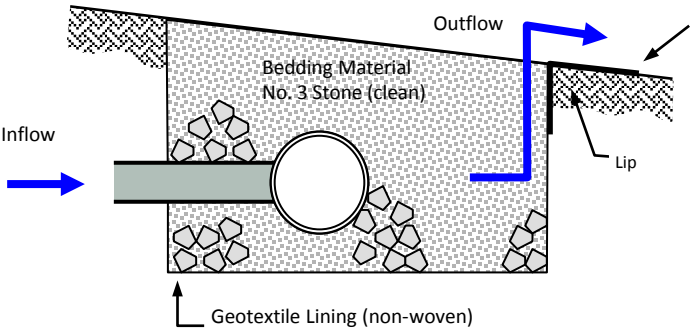


# Level spreaders

Profile View

N.T.S.

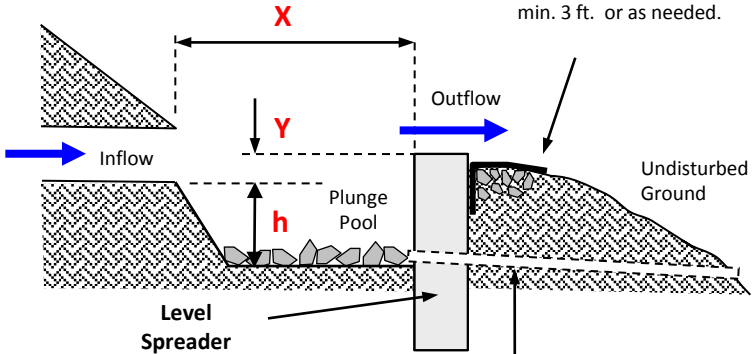
Turf Reinforcement Mat (3' Typ.)



Profile View

N.T.S.

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



Optional Drain.  
2" ductile iron Driven horizontally



[ BUILDING RELATIONSHIPS.  
DESIGNING SOLUTIONS. ]

# GRAHAM PARK



# GRAHAM PARK



**HRG**  
Herbert, Rowland & Grubic, Inc.  
Engineering & Related Services  
AN EMPLOYEE-OWNED COMPANY

[ BUILDING RELATIONSHIPS.  
DESIGNING SOLUTIONS. ]

# GRAHAM PARK



**HRG**  
Herbert, Rowland & Grubic, Inc.  
Engineering & Related Services  
AN EMPLOYEE-OWNED COMPANY

[ BUILDING RELATIONSHIPS.  
DESIGNING SOLUTIONS. ]

# GRAHAM PARK



**HRG**  
Herbert, Rowland & Grubic, Inc.  
Engineering & Related Services  
AN EMPLOYEE-OWNED COMPANY

[ BUILDING RELATIONSHIPS.  
DESIGNING SOLUTIONS. ]

# GRAHAM PARK



[ BUILDING RELATIONSHIPS.  
DESIGNING SOLUTIONS. ]

# GRAHAM PARK



[ BUILDING RELATIONSHIPS.  
DESIGNING SOLUTIONS. ]



# GRAHAM PARK



**HRG**  
Herbert, Rowland & Grubic, Inc.  
Engineering & Related Services  
AN EMPLOYEE-OWNED COMPANY

[ BUILDING RELATIONSHIPS.  
DESIGNING SOLUTIONS. ]

# GRAHAM PARK



**HRG**  
Herbert, Rowland & Grubic, Inc.  
Engineering & Related Services  
AN EMPLOYEE-OWNED COMPANY

[ BUILDING RELATIONSHIPS.  
DESIGNING SOLUTIONS. ]

# GRAHAM PARK



**HRG**  
Herbert, Rowland & Grubic, Inc.  
Engineering & Related Services  
AN EMPLOYEE-OWNED COMPANY

[ BUILDING RELATIONSHIPS.  
DESIGNING SOLUTIONS. ]

# GRAHAM PARK



[ BUILDING RELATIONSHIPS.  
DESIGNING SOLUTIONS. ]

# PENN HILLS ELEMENTARY SCHOOL



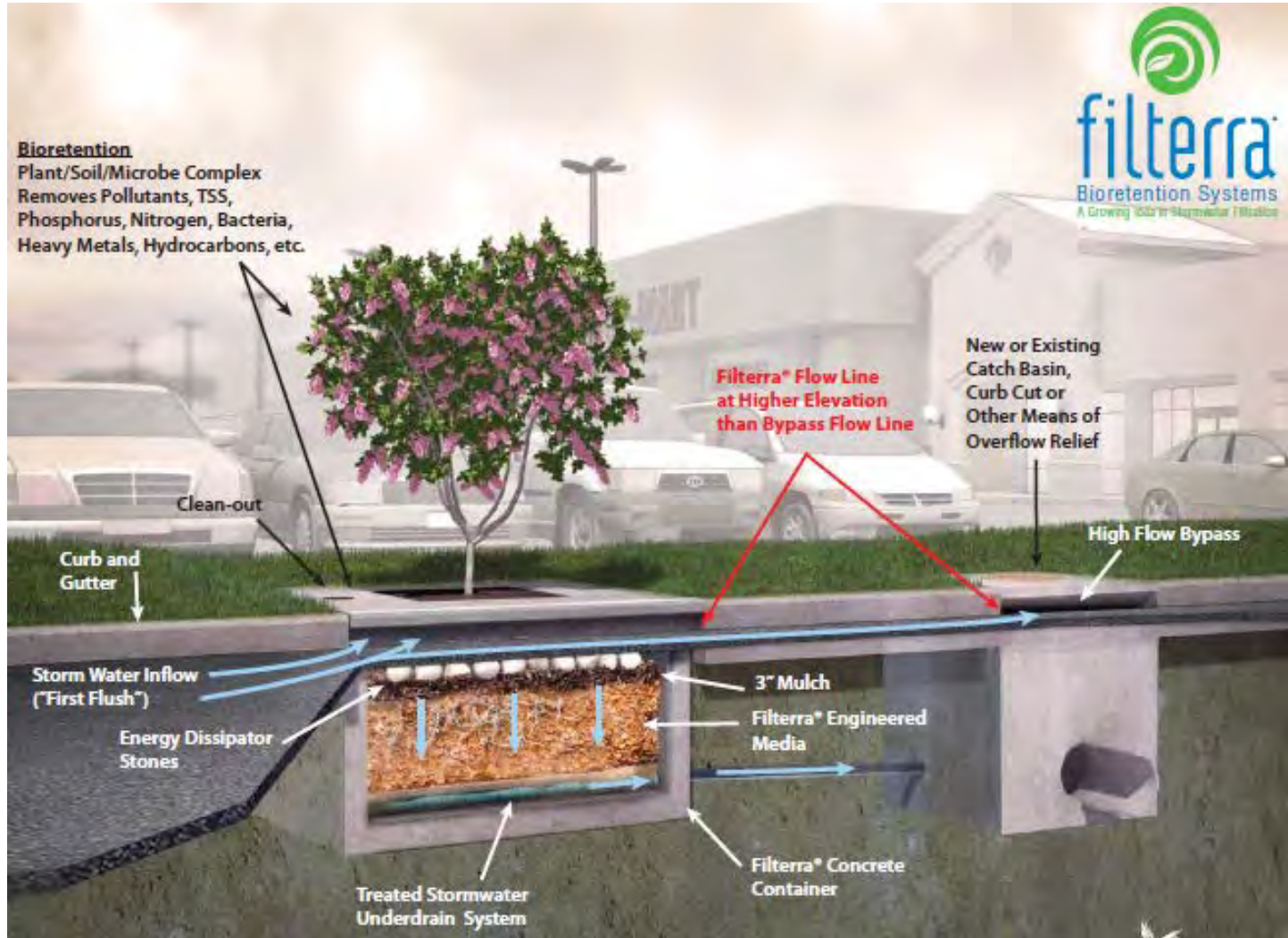
[ BUILDING RELATIONSHIPS.  
DESIGNING SOLUTIONS. ]

# PENN HILLS ELEMENTARY SCHOOL



[ BUILDING RELATIONSHIPS.  
DESIGNING SOLUTIONS. ]

# PENN HILLS ELEMENTARY SCHOOL



# PITTSBURGH INTERNATIONAL BUSINESS PARK



**PITTSBURGH INTERNATIONAL BUSINESS PARK**  
MOON TOWNSHIP, PENNSYLVANIA

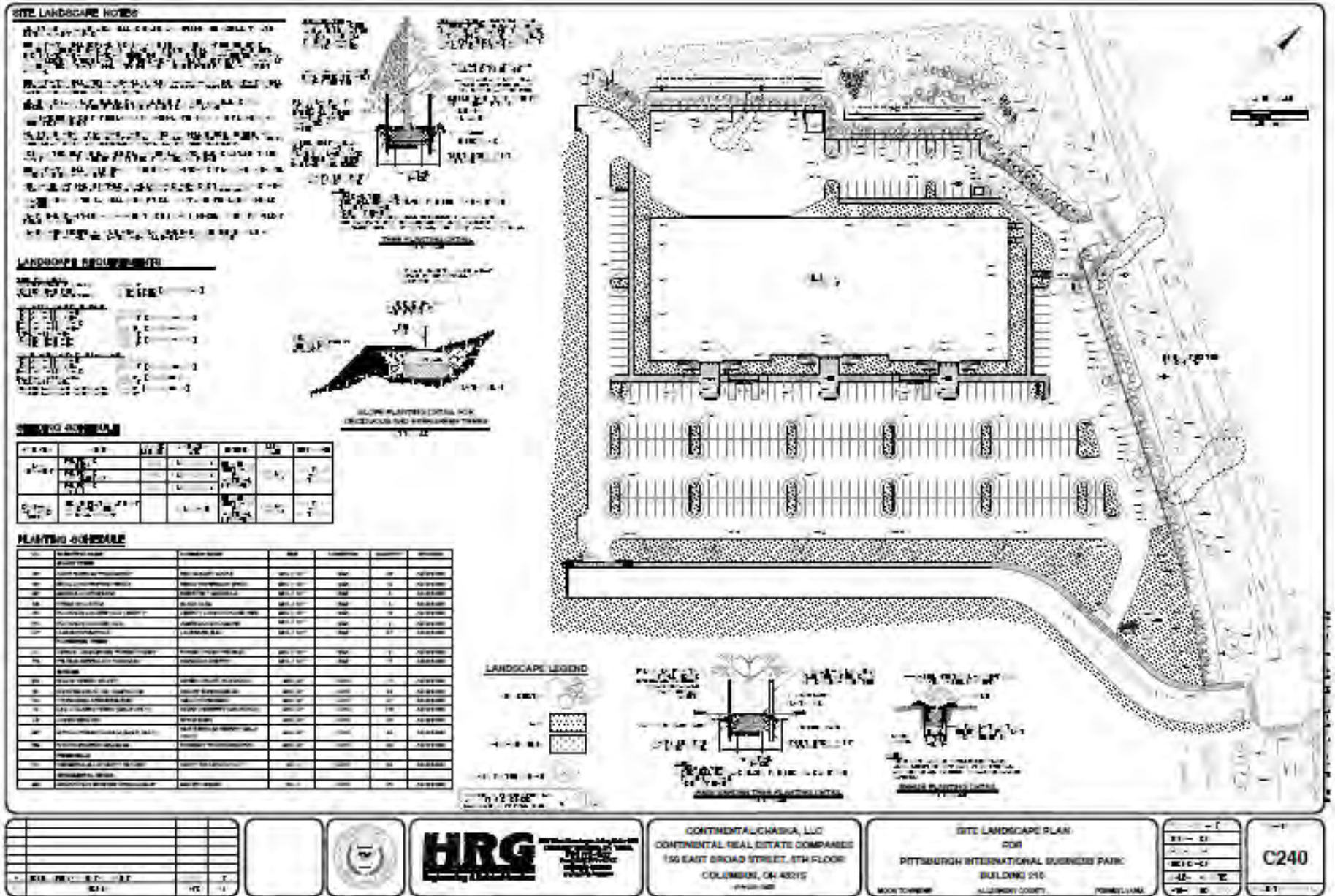


]| BUILDING RELATIONSHIPS.  
DESIGNING SOLUTIONS. ]|

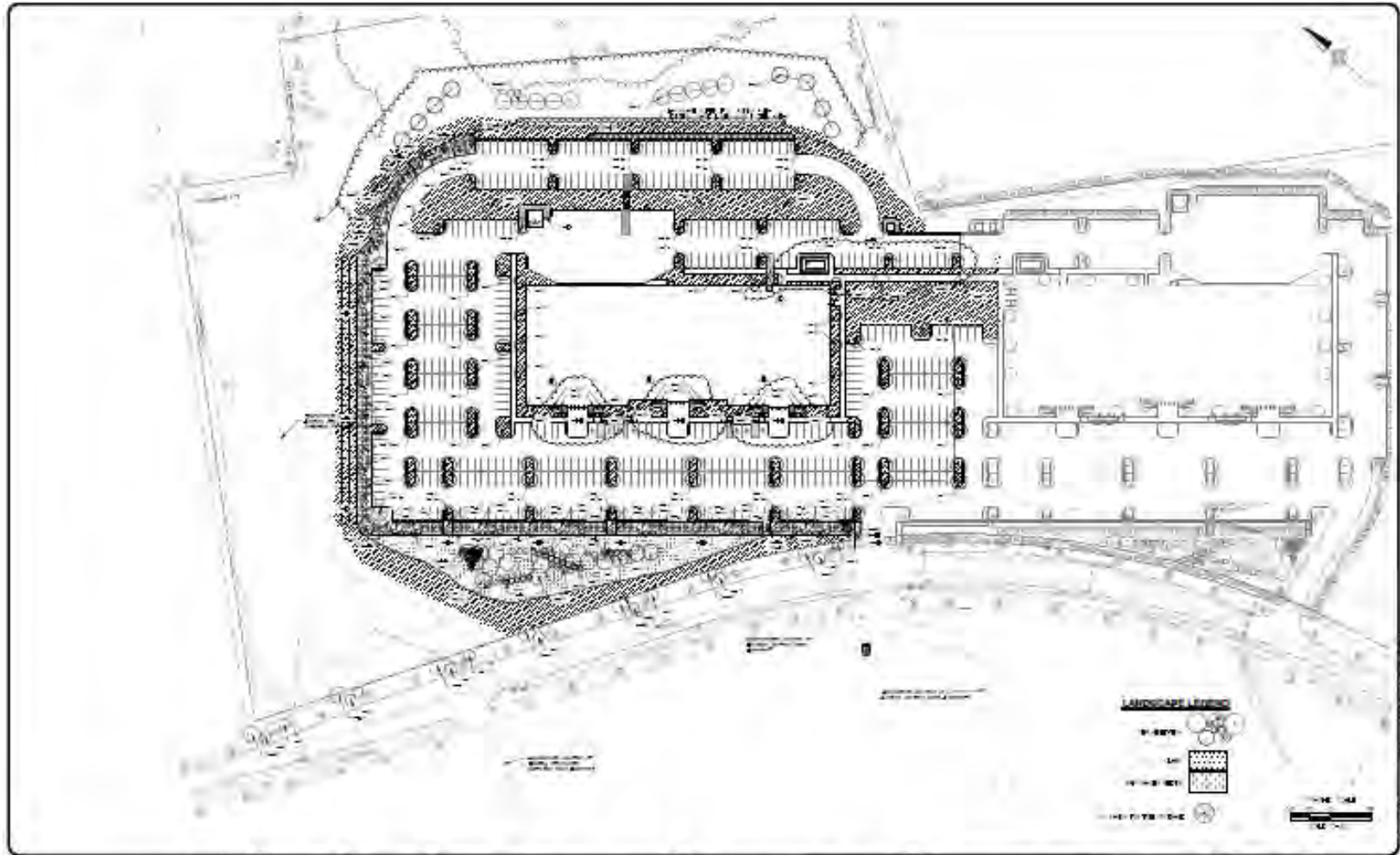




# PITTSBURGH INTERNATIONAL BUSINESS PARK



# PITTSBURGH INTERNATIONAL BUSINESS PARK



NO.	DESCRIPTION	DATE	BY
1	ISSUED FOR PERMITTING	08/14/19	HRG
2	ISSUED FOR CONSTRUCTION	08/14/19	HRG
3	ISSUED FOR AS-BUILT	08/14/19	HRG
4	ISSUED FOR FINAL	08/14/19	HRG



CONTINENTAL CHASSA, LLC  
 CONTINENTAL REAL ESTATE COMPANIES  
 100 EAST BROAD STREET, 8TH FLOOR  
 COLUMBUS, OH 43215  
 614.466.6666

SITE LANDSCAPE PLAN  
 FOR  
 PITTSBURGH INTERNATIONAL BUSINESS PARK  
 BUILDING 110  
 MOUNTAIN VIEW, ALLEGANY COUNTY, PENNSYLVANIA

PROJECT NO. C230  
 SHEET NO. 1 OF 19  
 DATE: 8/14/19

**HRG**  
 Herbert, Rowland & Grubic, Inc.  
 Engineering & Related Services  
 AN EMPLOYEE-OWNED COMPANY

[ BUILDING RELATIONSHIPS.  
 DESIGNING SOLUTIONS. ]

# PITTSBURGH INTERNATIONAL BUSINESS PARK



**HRG**  
Herbert, Rowland & Grubic, Inc.  
Engineering & Related Services  
AN EMPLOYEE-OWNED COMPANY

[ BUILDING RELATIONSHIPS.  
DESIGNING SOLUTIONS. ]

# PITTSBURGH INTERNATIONAL BUSINESS PARK



[ BUILDING RELATIONSHIPS.  
DESIGNING SOLUTIONS. ]

# Questions

