

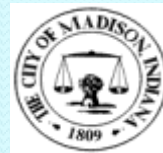
Post-Construction Stormwater Management Workshop -

*What you need to know to stay on the right side of
the law!*

December 14, 2010

Sponsored by:

Southern Indiana Stormwater Advisory Committee



Introduction

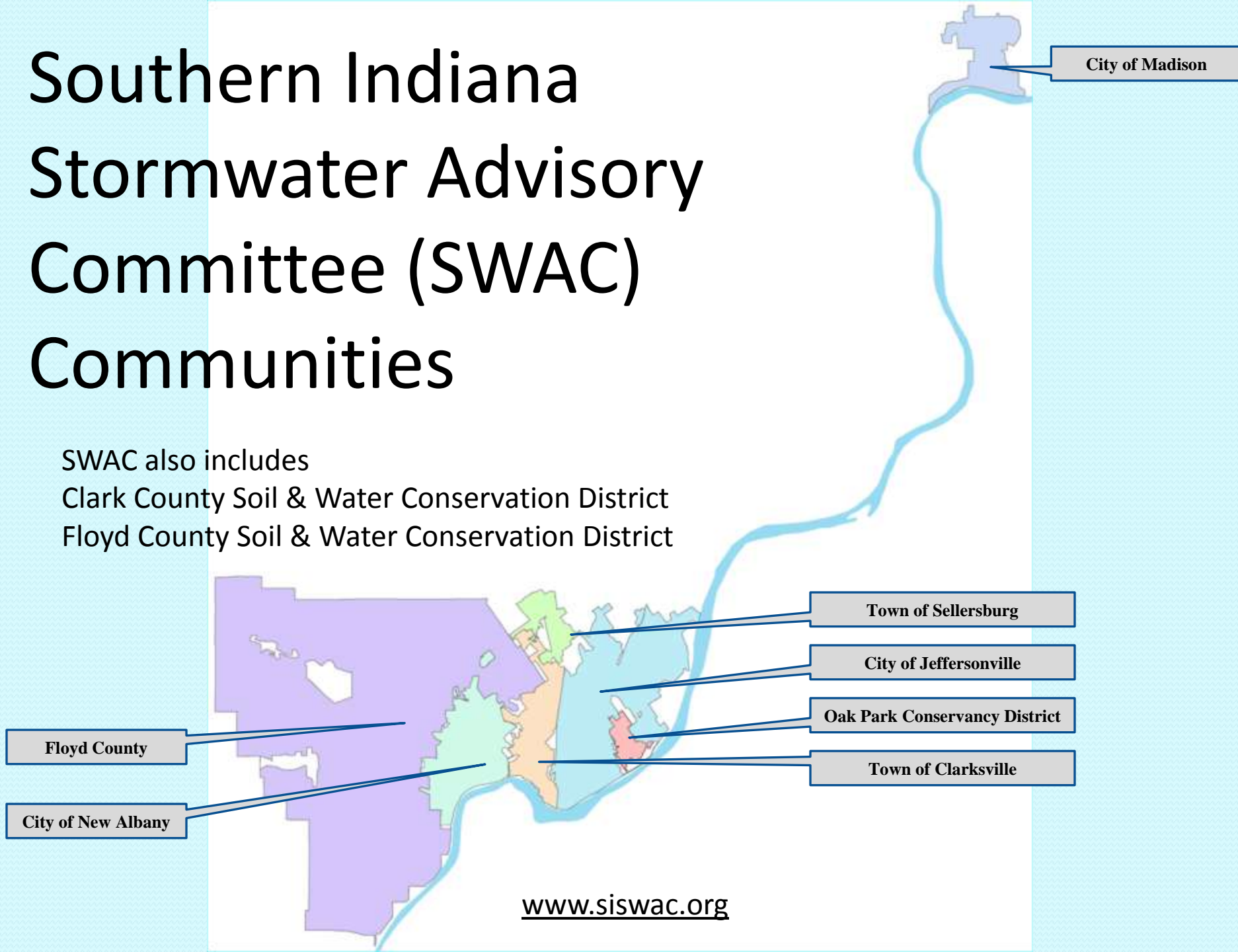
Steve Hall, Senior Associate
Stantec

Southern Indiana Stormwater Advisory Committee (SWAC) Communities

SWAC also includes

Clark County Soil & Water Conservation District

Floyd County Soil & Water Conservation District



City of Madison

Town of Sellersburg

City of Jeffersonville

Oak Park Conservancy District

Town of Clarksville

Floyd County

City of New Albany

www.siswac.org

Post Construction Workshop Goals

- Understand federal and state requirements
- Understand local ordinances
- Common Best Management Practices (BMPs)
- Introduce Green Infrastructure BMPs
- Understand Long Term Maintenance and Operation Agreements

Workshop Agenda

Registration / Morning Coffee	8:00 AM
Introduction / Opening Remarks Steve Hall, Stantec	8:30 AM
Post- Construction Requirements – <i>Real and Here to Stay!</i> Steve Hall, Stantec	8:40 AM
Regulations and Ordinances – <i>What you need to know to comply.</i> Bryan Wallace, Oak Park Conservancy District	9:00 AM
Break	9:30 AM
Best Management Practices for Post-Construction – <i>An overview of common post-construction BMPs and new green infrastructure BMPs.</i> John Malueg, Stantec	9:45 AM
Long Term Maintenance and Operation Agreements – <i>the plain English version.</i> Kevin Feder, Floyd County Soil and Water Conservation District	10:15 AM
Closing Remarks / Adjourn Steve Hall, Stantec	10:55 AM

Post- Construction Requirements – *Real and Here to Stay!*

- **Federal** requirements for Post Construction established by the US Environmental Protection Agency



- **State** requirements established by the Indiana Department of Environmental Management in “Rule 13”



- **Local** requirements established by local ordinance.

Post- Construction Requirements – *Real and Here to Stay!*

Federal Post Construction Requirements

- Develop, implement and enforce a program to address stormwater runoff from *new development* and *redevelopment* projects that disturb *one or more acres*.
- Includes projects *less than one acre* that are part of a larger common plan.
- Controls to prevent or minimize water quality impacts.

Post- Construction Requirements – *Real and Here to Stay!*

Federal Post Construction Requirements

- Use a combination of structural and / or non-structural BMPs
 - Structural BMPs – require construction, installation and maintenance, such as detention ponds and grass swales.
 - Non-Structural BMPs – program requirements that address stormwater quality, such as plans, ordinances and education.

Post- Construction Requirements – *Real and Here to Stay!*

Federal Post Construction Requirements

- Use an ordinance or other regulatory mechanism to address post construction runoff from new development and redevelopment.
- Ensure adequate long term operation and maintenance of BMPs

Post- Construction Requirements – *Real and Here to Stay!*

State Post Construction Requirements

- Includes all federal requirements, and several additional recommendations and requirements
- Encourage
 - Buffer strips, preserving streamside (riparian) zones
 - Create filter strips
 - Minimize land disturbance and surface imperviousness
 - Minimize directly connected impervious areas
 - Maximize open space
 - Direct growth away from sensitive areas

Post- Construction Requirements – *Real and Here to Stay!*

State Post Construction Requirements

- Infiltration practices not allowed in wellhead protection areas
- Discharges to sinkholes or fractured bedrock must be treated to meet Indiana groundwater quality standards
- As feasible, regulate flows to reduce outfall scour and streambank erosion
- As feasible, maintain vegetated filter strip along unvegetated swales
- Public and private / retail fueling areas that replace tanks must treat stormwater runoff

Post- Construction Requirements – *Real and Here to Stay!*

State Post Construction Requirements

- Personnel responsible for plan review, inspection, enforcement of Post Construction BMPs shall have annual training:
 - Appropriate control measures
 - Inspection protocols
 - Enforcement procedures
- MS4 must review program for adequacy and update as needed every 5 years.

Post- Construction Requirements – *Real and Here to Stay!*

Resources for State Post Construction Requirements

- State Post Construction requirements: 327 IAC 15-13-16
- Rule text:
<http://www.ai.org/legislative/iac/T03270/A00150.PDF>
- Indiana MS4 Guidance
http://www.in.gov/idem/files/permits_water_rule13guidance.pdf
- IDEM Stormwater Website
<http://www.in.gov/idem/4896.htm>



Questions?

Regulations and Ordinances – *What you need to know to comply.*

Bryan Wallace, Stormwater Superintendent
Oak Park Conservancy District



All Southern Indiana SWAC Communities have a Post-Construction Ordinance

- **Floyd County**

- Post construction ordinance is a modification to Construction Ordinance (2004-XVII)
- <http://www.floydcounty.in.gov/county%20offices/stormwater.htm>

- **City of New Albany**

- Chapter 56. Stormwater Management, Section 56.60-56.72
- <http://newalbany.in.gov/Ordinances/>

- **City of Jeffersonville**

- Ordinance #2005-OR-65, Ordinance #2010-OR-12
- <http://www.cityofjeff.net/eng/StormWaterMain.htm>

All Southern Indiana SWAC Communities have a Post-Construction Ordinance

- **City of Madison**
 - Chapter 55: Post Construction Stormwater Regulations
 - <http://www.madison-in.gov/city-of-madison-storm-water.php>
 - <http://www.amlegal.com> – Search on Stormwater
- **Town of Clarksville**
 - 2005 SW-03
 - <http://www.clarksvillesw.com/>
- **Town of Sellersburg**
 - Chapter 55, Section 55.50 to 55.63
 - <http://www.sellersburg.org/p/storm-water-and-our-community>
- **Oak Park Conservancy District**
 - Resolution #2005-06
 - <http://www.oakparkcd.us/page5.php>

All Southern Indiana SWAC Communities have a Post-Construction Ordinance

- Post Construction ordinances in Southern Indiana are similar but not the same!
- You must follow the local requirements to stay on the right side of the law!
- Contact the local MS4 coordinator or Soil and Water Conservation District if you need help understanding the requirements.

Key Provisions of Post-Construction Ordinances

- **Goals and Objectives**

- Protect public health, safety and welfare
 - Regulate & manage the stormwater system
 - Protect & preserve water quality, fish, wildlife habitat
- Compliance with federal & state stormwater regulations
 - Control pollutants from new development & redevelopment
 - Protect & enhance stormwater quality
 - Minimize damage to public or private facilities
 - Control maintenance costs
 - Encourage pleasing designs

Key Provisions of Post-Construction Ordinances

- **Authority and Right of Entry**

- MS4 entity or designated representative can enter
- Ready access all stormwater BMPs on the property
- Inspection, monitoring, sampling, inventory
- Records examination
- MS4 entity or designated representative must make necessary arrangements for sites / facilities with security measures
- Administrative search warrant may be sought if stormwater entity is refused entry onto the site

Key Provisions of Post-Construction Ordinances

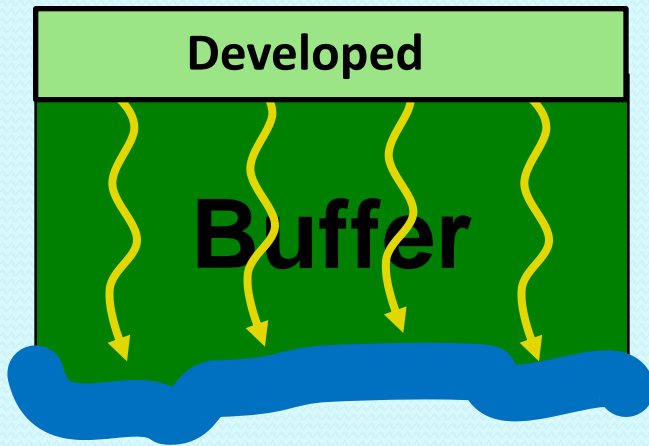
- **Post Construction Stormwater Pollution Prevention Plan**
 - Project description
 - Describe potential pollutant sources
 - Post construction Best Management Practices (BMPs)
 - Location
 - Dimensions
 - Detailed specifications
 - Construction details
 - Sequence of post construction BMP installation
 - BMP maintenance guidelines
 - Who will maintain BMP over the long term

Key Provisions of Post-Construction Ordinances

- **Post Construction Stormwater Pollution Prevention Plan**
 - Waterway buffer requirements
 - Land disturbance permitted but construction not permitted
 - Exemptions for road & utility crossings, pedestrian trails, walkways
 - Applies to all waterways draining 25 acres or more OR USGS blue line stream
 - Buffer is the larger of:
 - 25 feet beyond floodplain boundary defined by FEMA or approved Master Plan
 - 50 feet from top of waterway bank
 - May construct BMP in buffer

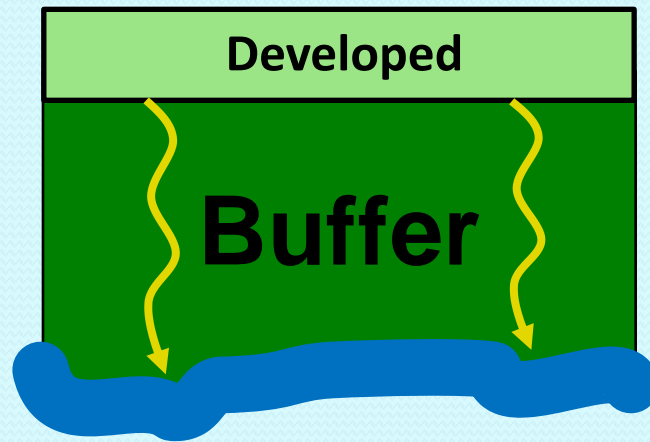
Water Quality Buffer versus Vegetated Screen

Overland Flow



Water Quality Benefit

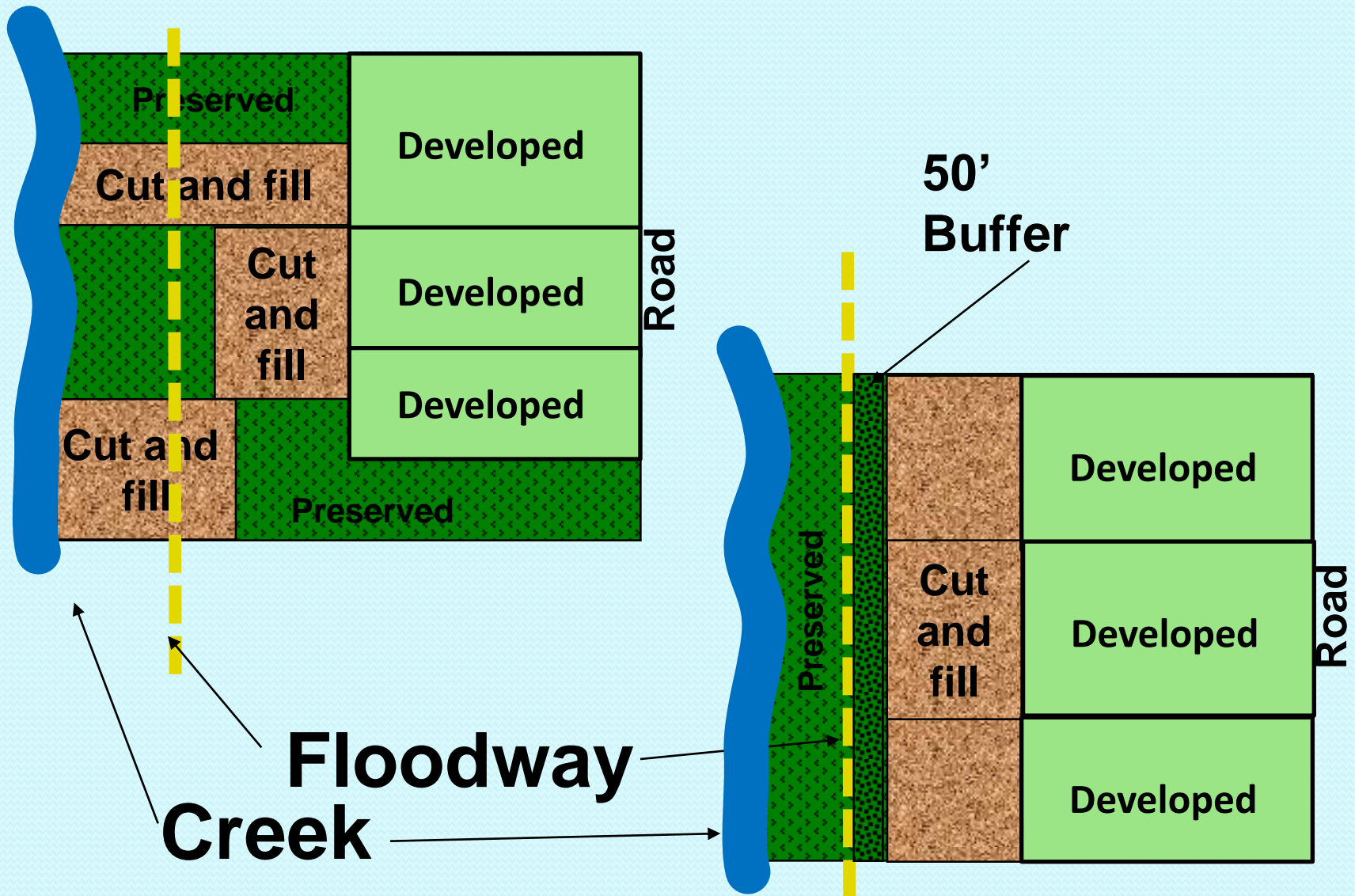
Piped or channel Flow



NO* Water Quality Benefit

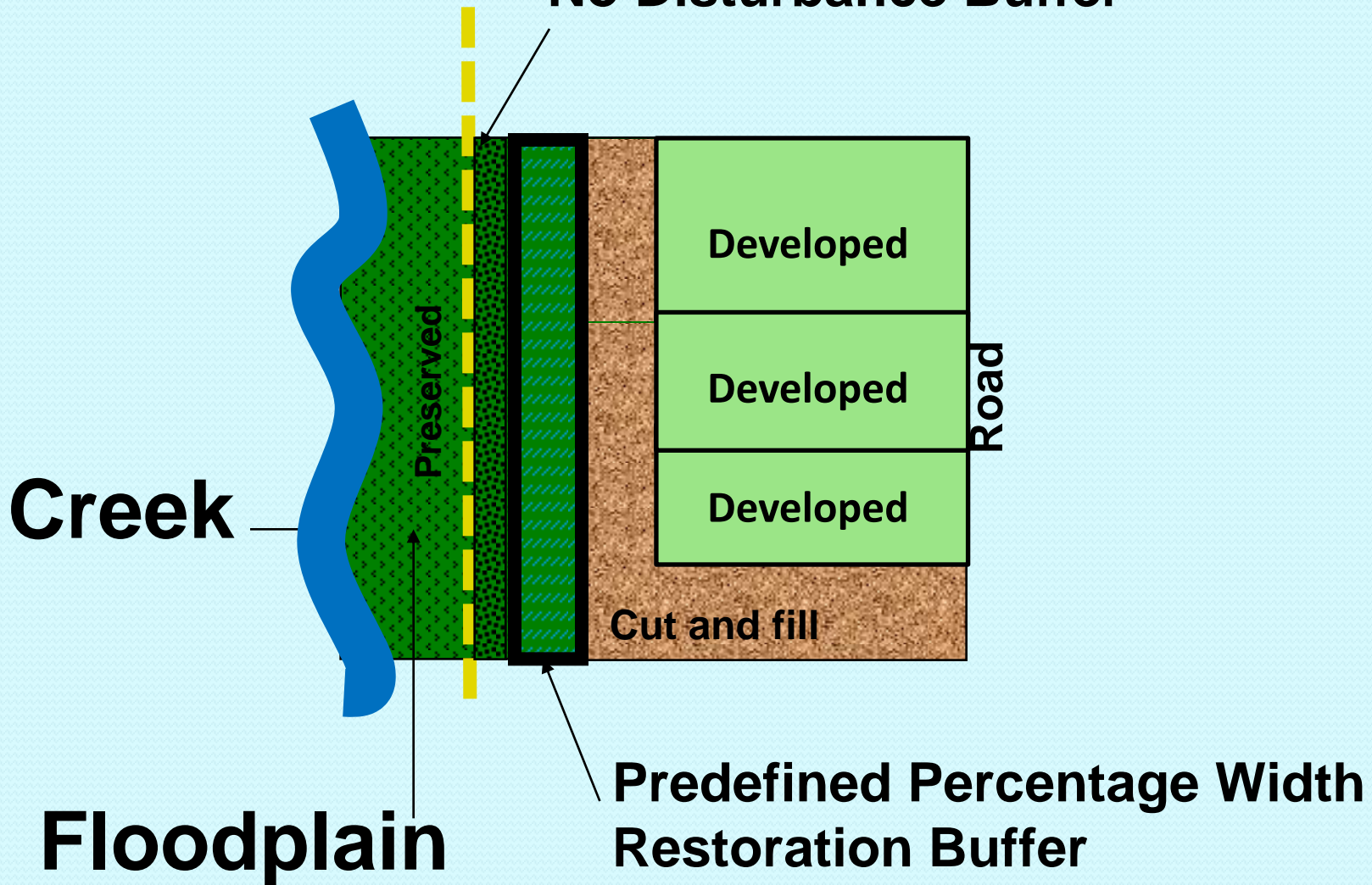
* Limited benefit from a swale

Buffers & Construction



Sizing Buffers

**Predefined
No Disturbance Buffer**



Key Provisions of Post-Construction Ordinances

- **Post Construction Stormwater Pollution Prevention Plan**
 - Long term operation and maintenance agreement
 - Stamped by an Indiana licensed Professional Engineer



Key Provisions of Post-Construction Ordinances

- **BMP Design Requirements and Criteria**

- Stormwater entity may develop or adopt guidance documents
 - Best Management Practices Stormwater Management Manual for Southern Indiana, September 2009
 - http://www.siswac.org/qpi_training.html
 - Indiana Stormwater Quality Manual
 - <http://www.in.gov/idem/4899.htm>
- Ordinances specify design / performance objectives
- Control discharge rate for specific design storms

Key Provisions of Post-Construction Ordinances

- **BMP Design Requirements and Criteria**

- Preference for bioengineering over hard alternatives (e.g., rip rap)
- Regional stormwater BMPs may be encouraged
- Additional requirements may be imposed for consistency with:
 - Stormwater Master Plan. Recent plans include:
 - City of New Albany
 - Town of Clarksville
 - City of Jeffersonville
 - Watershed Plan
 - Indian Creek – parts of Floyd County, not New Albany
 - Total Maximum Daily Load (TMDL)
 - None – yet!

Key Provisions of Post-Construction Ordinances

More about Total Maximum Daily Load (TMDL)

- A TMDL is a water quality improvement plan for waters that have been classified by the state as “impaired”.
- TMDLs are regulatory documents that can include enhanced or new requirements for stormwater communities and you!
- TMDL applies to all watershed areas & tributaries that drain to the impaired stream
- There are 18 impaired streams in SWAC communities as of 2008. New list to be issued by state for 2010.
- TMDLs may make it more difficult & expensive to comply

Key Provisions of Post-Construction Ordinances

- **BMP Ownership and Easements**

- BMPs that service private property, subdivisions, commercial or industrial facilities are privately owned
 - Owner must maintain BMP
 - Owner must maintain an easement for access to BMP
 - Stormwater entity may perform emergency maintenance & repair
- BMPs on public property, regional BMPs or BMPs that have been dedicated to stormwater entity are publicly owned
 - Stormwater entity must maintain BMP

Key Provisions of Post-Construction Ordinances

- **Stormwater Permit Closure**
 - A written request for permit closure is received
 - Stormwater entity must accept:
 - Site conditions – based on inspection
 - As-built drawings
 - **Long-term Operation and Maintenance Agreement**

The Stormwater Permit is open until
Notice of Termination is received!

Key Provisions of Post-Construction Ordinances

- **Owner performed inspection and maintenance**
 - Inspections of post-construction BMPs must be performed by a Qualified Professional Inspector
 - Inspect BMP at least annually, or as per Long Term Operation and Maintenance Agreement
 - Use approved checklist
 - Maintain documentation

If the inspection is not documented,
it didn't happen!

Key Provisions of Post-Construction Ordinances

- **Qualified Professional Inspector**

- Must register with stormwater entity
- Demonstrate knowledge of stormwater treatment, operations, maintenance
- Meet one or more of the qualifications below:
 - Local Qualified Professional Inspector training offered on-line and classes 2x per year
 - Indiana licensed professional engineer (PE) with stormwater experience
 - Certified Professional in Stormwater Quality Control (CPSQC)

Key Provisions of Post-Construction Ordinances

- **Stormwater entity inspection and maintenance**
 - Stormwater entity or designated representative may inspect privately held BMPs
 - Can accept BMP condition, or notify of failure to comply with Long Term Operation and Maintenance Agreement
 - May result in revisions to Long Term Operation and Maintenance Agreement
 - Owner required to perform maintenance and repairs
 - Stormwater entity may perform emergency repairs and recover costs
 - Inspection documents become part of the public record

Key Provisions of Post-Construction Ordinances

- **Enforcement and Penalties**

- Generally same as Construction Ordinances
- Penalties \$500 to \$2,500
- Penalties escalate for complex and / or repeat offenses
- Stormwater entity may withhold future permits
- Stormwater entity may require a maintenance bond

- **Appeals**

- Permit holder may appeal enforcement actions

Post-Construction Ordinances – What you need to know to comply

- All Southern Indiana MS4 communities have Post Construction ordinances
- Ordinances are similar but not the same so know LOCAL requirements
- Contact MS4 Coordinator or SWCD with questions
- Post Construction Stormwater Pollution Prevention Plan (SWPPP) required
- Long Term Operation and Maintenance Agreement required
- Regular inspection and maintenance required



Questions?



Best Management Practices for Post-Construction – *An overview of common post-construction BMPs and new green infrastructure BMPs.*

John Malueg, Principal
Stantec

Post Construction BMPs - Permanent Infrastructure

- Address long-term stormwater management objectives and requirements, not controlling runoff from construction activities
- Designed for lasting water quality and quantity control
- Contractor responsible for maintenance until construction is complete, then owner is responsible

Post Construction BMPs – Design Requirements and Criteria

- Reduce Total Suspended Solids from first flush or
- Capture and treat at least 0.5 inch precipitation from contributing area.
- Reduce or buffer increase in runoff temperature.
- Design to address flow rate over the entire runoff discharge period and volume of discharge.

Most Common Permanent BMPs

1. Detention / Retention Ponds
2. Underground Detention / Retention
3. Infiltration Practices
4. Oil / Water Separators

Detention vs. Retention

- Detention is short-term storage
- Holds water temporarily, controls rate of flow
- Collects water and releases slowly into system at pre-development rates through weir / other outlet structure

Detention vs. Retention

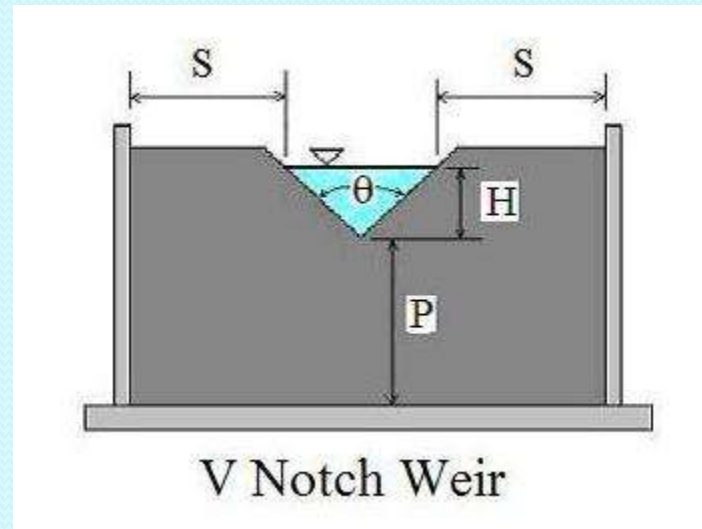
- Retention is long-term storage and treatment
 - Levels go up and down, but always some water
- Essentially a small lake with vegetation
- Permanent water volume allows sediment and other contaminants to settle out
- “Wet detention” is generally preferred in this area because of bedrock conditions
 - Outlet allows some controlled loss
 - Permanent pool maintained below outlet level

Designing Detention / Retention Ponds

- Include forebay at inlet of pond
 - Easier to dredge for sediment / other pollutants
 - Reduces maintenance costs
- Include baffle, skimmer and grease trap if there is potential for oil and grease in runoff
- Use V-notch weir or perforated riser at outlet to reduce potential for clogging
 - Include overflow outlet for large storms when using perforated riser

Post Construction BMPs – Design Requirements and Criteria

- Outlet structure is a V-notch weir or similar to control discharge rates for the 2, 10 and 100 year design storm*



Note: Design storm requirements vary by community. Check local requirements!

Installing and Maintaining Detention / Retention Ponds

- Must be built to engineer's design specs
- Remove solids when 10-15% of capacity is filled
- If used for sediment basin during construction, clean out accumulated sediment and regrade
- Remove floatables and other debris / pollutants from inlets, outlets and skimmers
- Trim or harvest pond vegetation as appropriate and mow grassy areas



A well maintained retention pond can be an asset to the development.

Underground Detention / Retention

- Suited for areas where land value or other space-limiting criteria prohibits use of large-area ponds
- Underground systems capture and store runoff during rain event
- Stored water can be released at pre-development rates, either through outlet or infiltration

Designing Underground Detention / Retention

- Can include concrete vaults or pipe / tank system
- Does not control water quality – pretreatment should be included at inlet
 - Vault chamber, hydrodynamic oil / water separator
- Include trash rack or other debris control at inlets / outlet
- Include bypass for high flow

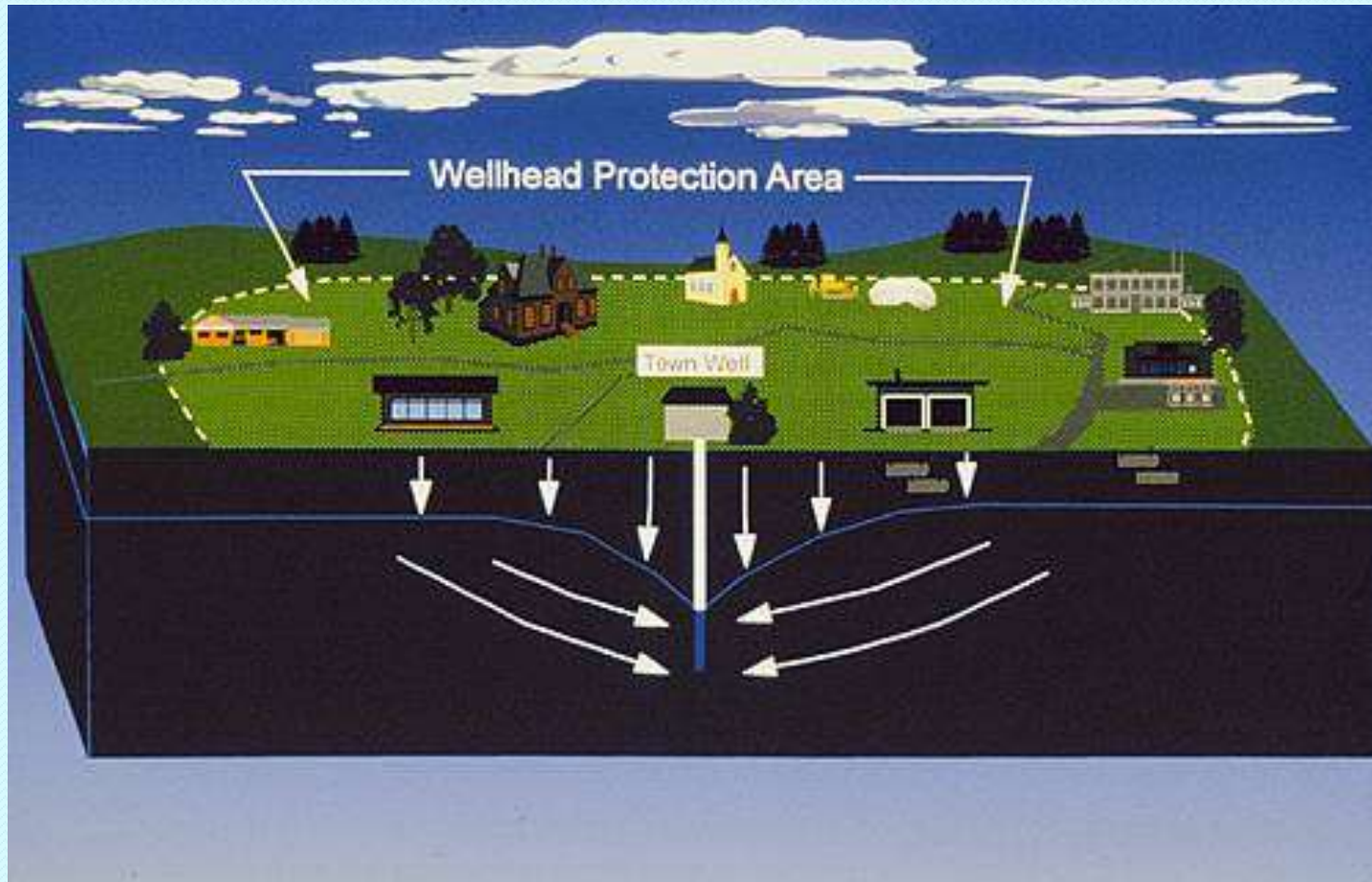
Underground Detention / Retention



Infiltration Practices

- Water flows into ground rather than into system, reducing runoff and increasing groundwater recharge
- Includes porous pavement, dry wells, infiltration trenches
- **CANNOT** be used in wellhead protection areas;
- **Should not** be used in near foundations, septic tanks, drain fields, unstable slopes
- **Must be** treated to meet Indiana Groundwater Standards if discharging to sinkhole or fractured bedrock
 - Water does not go deep enough, long enough to be cleansed naturally
 - Can dramatically increase the rate of sinkhole growth

Wellhead Protection Areas



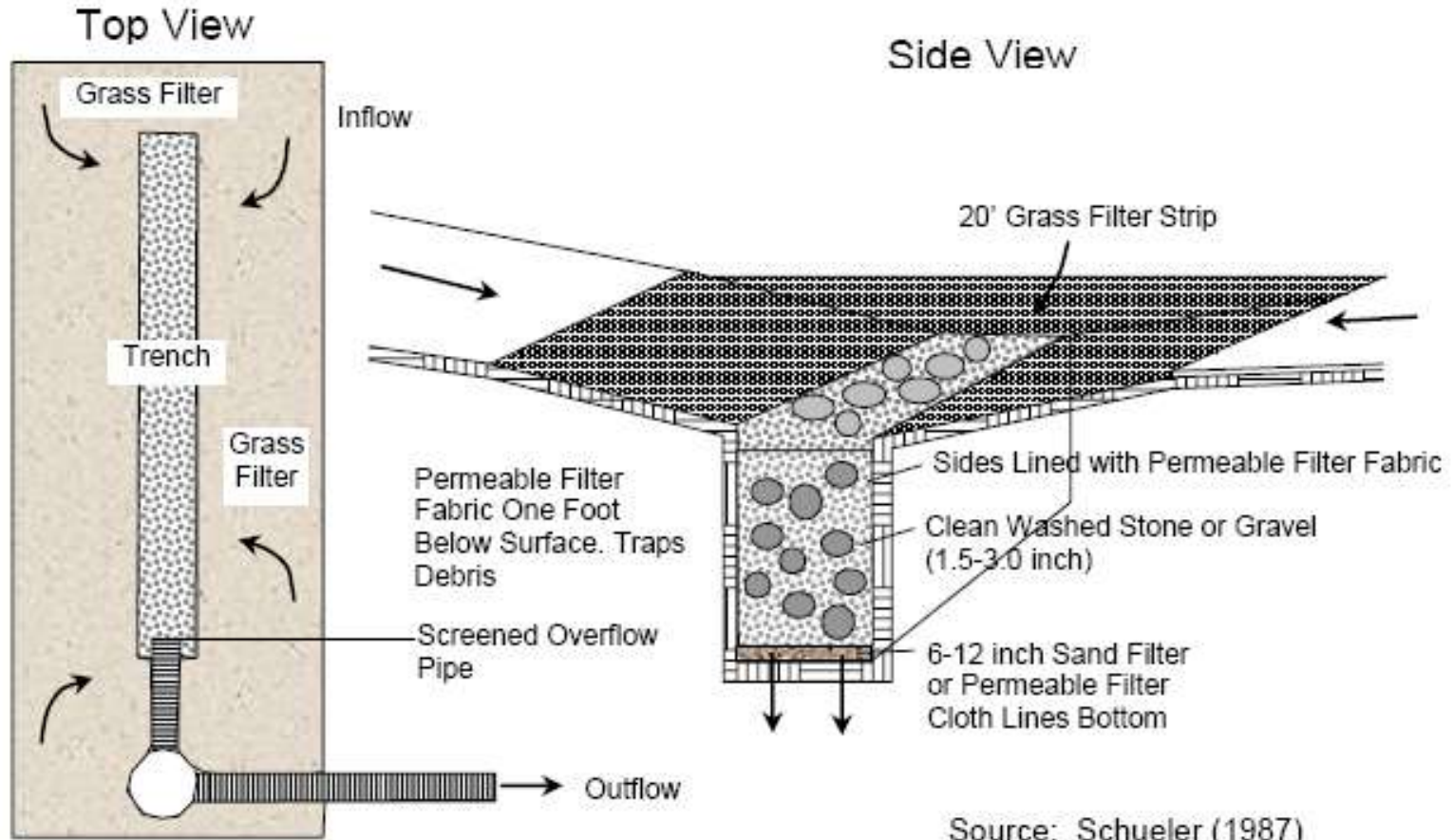
Designing Infiltration Practices

- Emergency overflow / bypass for larger storms is required
- Observation wells required in trenches every 50-100'
- Include pretreatment in trenches and wells in fine, silty soils
 - Vegetated buffer, grass / sand filters, permeable filter fabric, screens

Installing and Maintaining Infiltration Practices

- Use light equipment to avoid compacting soil
- Protect surface during construction to avoid excessive cleaning
- Remove debris, accumulated sediment
 - If there is standing water 72 hours after rain event, the system isn't working
 - Till grassy infiltration surfaces with rotary tiller

Infiltration Trench



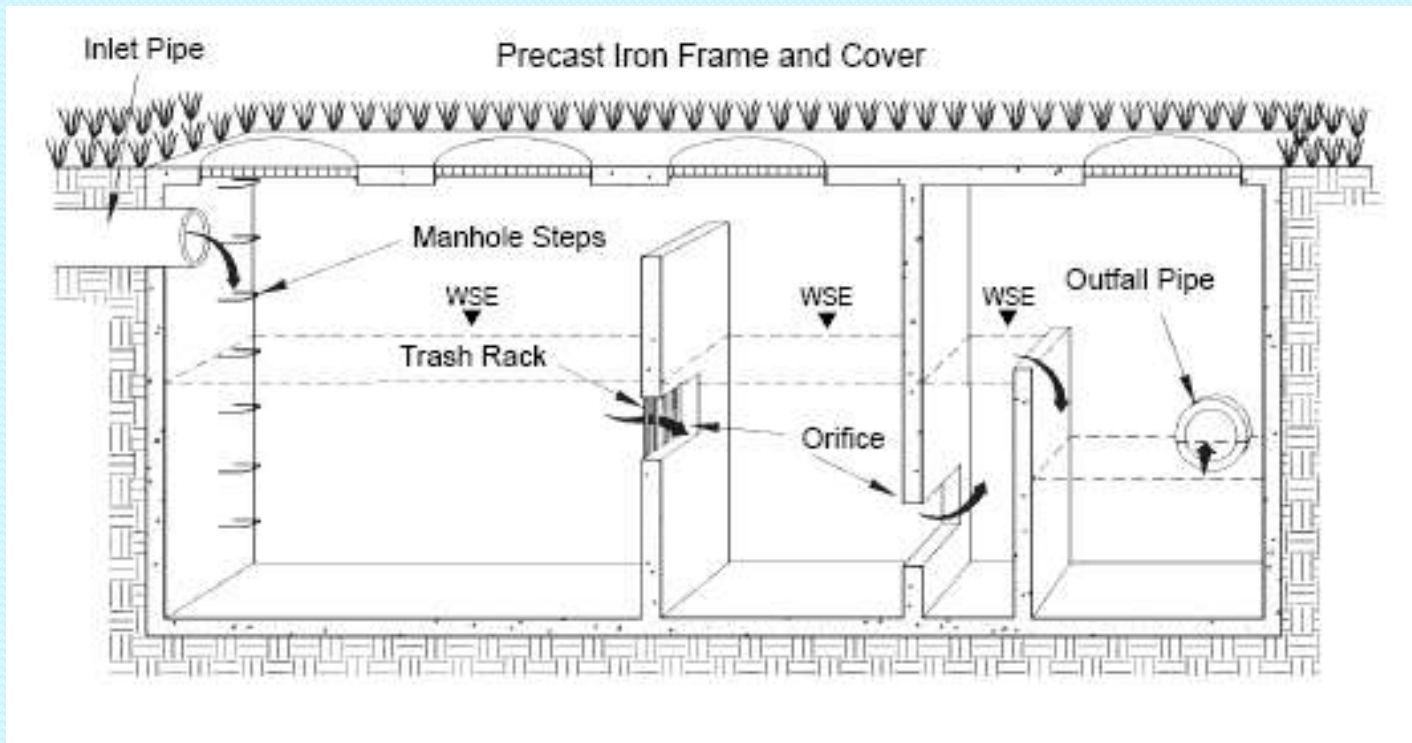
Oil / Water Separators

- Remove hydrocarbons (petroleum-based compounds, oil and grease)
- Can also remove floatables, sediment and other pollutants
- Useful where oil / grease concentrations high, source control ineffective
 - Vehicle maintenance / repair / washing facilities
 - Gas stations
 - Airfields / marinas
- Future requirement for all fueling stations

Designing Oil / Water Separators

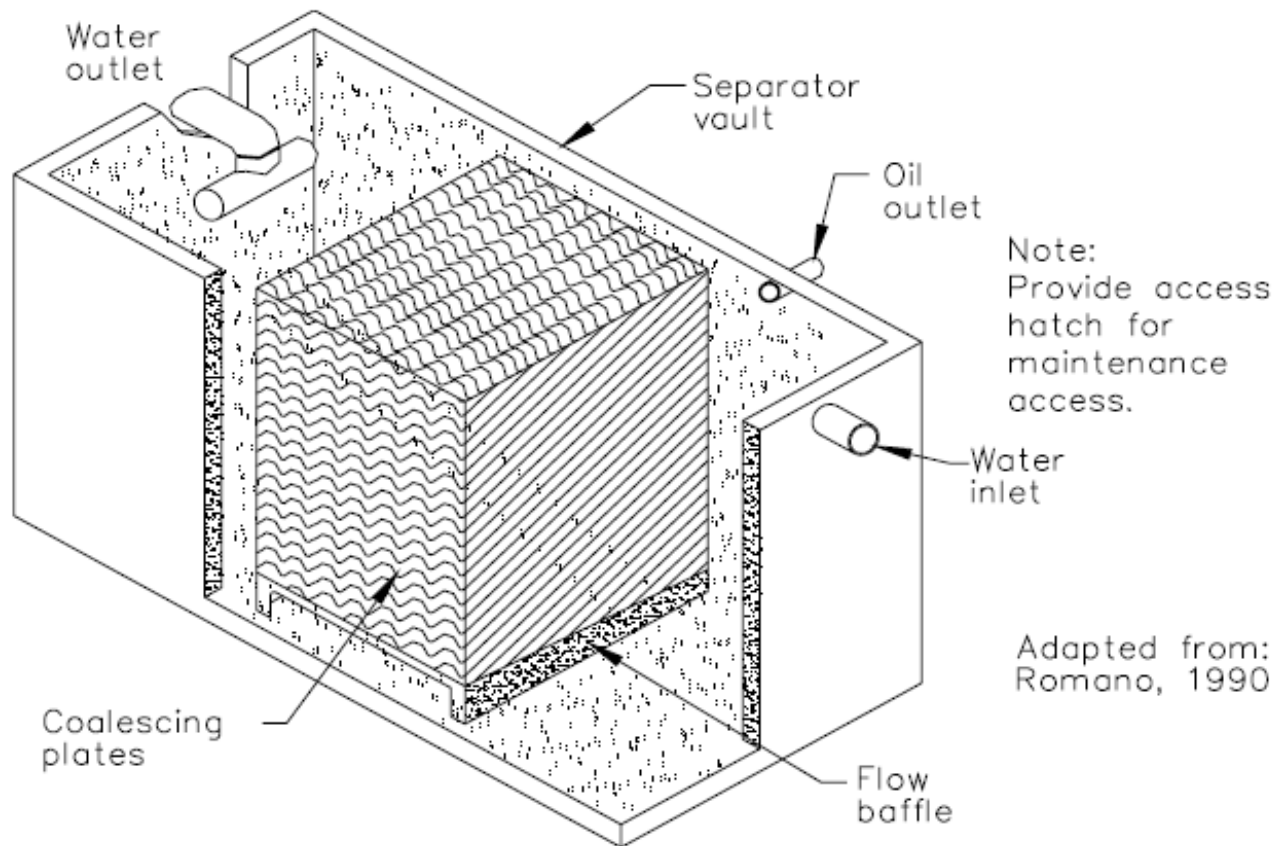
- Must have ability to bypass or convey large storm events without damaging system, exceeding design flow capacity or resuspending pollutants
- Conventional gravity separator
 - Similar to long septic tank or wastewater primary sedimentation tank
- Coalescing plate interceptor (CPI)
 - Similar to gravity separator, with closely spaced plates to enhance removal efficiencies

Gravity Separator



NRVC 1992

Coalescing Plate Interceptor



Installing and Maintaining Oil / Water Separators

- Must be maintained according to plan and specifications
- Without plan and fiscal support
 - **THE SYSTEM WILL FAIL**
 - **Potentially WORSE than no treatment at all**

Permanent Green Infrastructure BMPs

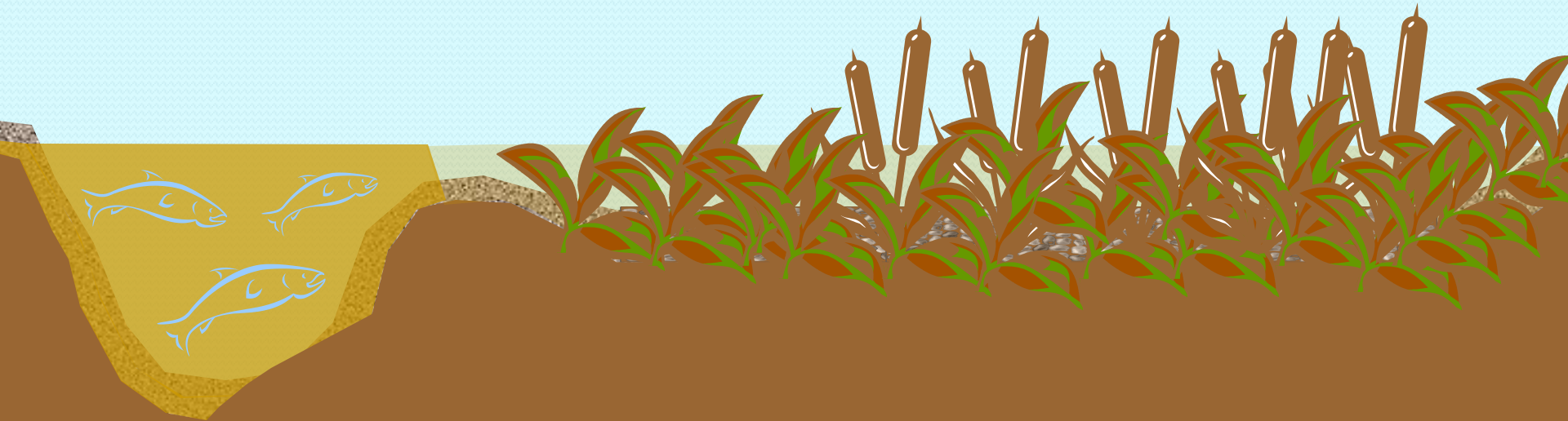
- Constructed Wetland
- Stream Restoration
- Porous Pavement
- Rain Garden
- Grass Paving
- Grassed Swales
- Scour Stop

Constructed Wetlands

- Imitates processes in natural wetlands
- Water, plants, animals, microorganisms and the environment interact to improve water quality with slow infiltration that works well in karst areas
- Especially good for nutrients, hydrocarbons, and some metals
- Ideal for large tributary areas
- More aesthetically pleasing than some other permanent BMPs

Constructed Wetlands

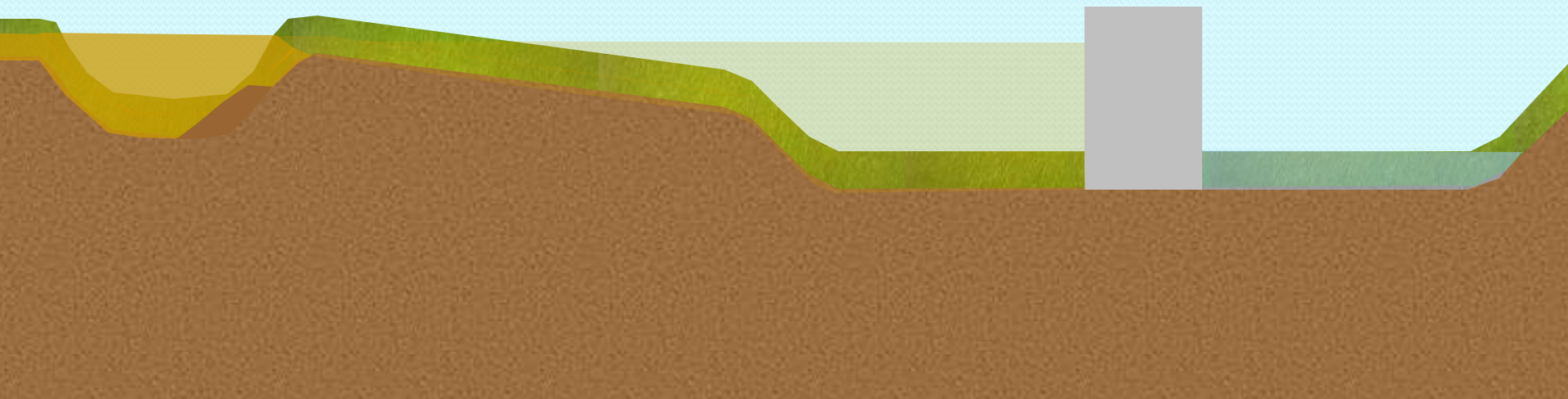
Constructed wetlands are designed to mimic natural wetlands and are used to treat wastewater effluent, stormwater runoff, and agricultural runoff. They are effective in removing suspended solids, nutrients, and organic matter from the water.



Post-Construction Treatment Train

Detention pond, filtration, sand filtration, and sedimentation

- carries water away
- Less difficult to access and maintain than detention pond
- Makes sediment removal more efficient



Stream Restoration / Stabilization

- Can help address flooding, stream bank erosion
- Water quality benefit
- Opportunity for recreational uses

Failing stream in Charlotte, NC

- Severely eroding bank
- Excessive sediment
- No stream side vegetation to protect banks



Stream Restoration – Oak Park Conservancy District Project



Porous Pavement

- Easy-to-use infiltration practice
- Has been in use over 20 years
- Design improvements have eliminated many previous concerns
 - Bedding material provides drainage to avoid freeze/thaw problems
 - Proper maintenance (annual sweeping) prevents clogging
 - Able to carry same load as regular concrete
 - Costs ~10% more than traditional concrete

Porous Pavement



Porous Pavers



Alternative Pavements: Porous Asphalt

- Reduces runoff and promotes infiltration
- May require treatment prior to infiltration if sensitive aquifer is below.



Disconnecting Rooftop Drainage

- Route roof runoff to pervious areas, such as lawns, swales or rain gardens to allow infiltration
- Erosion control may be needed at downspouts or use rain barrels

Town of Clarksville Rain Garden



City of Jeffersonville – Preservation Park Green Infrastructure

- Undulating path of **permeable pavers** to allow stormwater infiltration to ground below;
- **Two rain gardens** to receive runoff from Preservation Station roof and surface runoff along the path;
- Additional color and texture provided by rain garden plants;



Alternative Pavements: Grass Paving

- Semi-pervious cover for infrequent or light traffic areas
- Improved aesthetics over pavement
- Applications include overflow parking, fire lanes, golf cart paths
- Indistinguishable from other grassy areas

Alternatives to Curb & Gutter

- Raise height of roadway / parking area and divert runoff into adjacent lawns or landscaped areas
- Utilize swales along roadways



Grassed Swales

- Filter stormwater and provide temporary retention
- Use in low to moderate density development
- Use slopes of 5% or less, for greater than 2%, include a series of check dams
- Channel slope should not exceed 2:1

Grassed Swales – City of Jeffersonville



Outfall Protection – Oak Park Conservancy District



Post-Construction Treatment Trains

- As with construction BMPs, post-construction BMPs appear to be more effective in series
 - Dry detention → wet detention
 - Forebay / baffle → wet / dry detention
 - Wet detention → wetland
 - Oil / water separator → wetland

What is Low-Impact Development?

- Uses more natural systems to handle stormwater runoff
- Smaller-scale, distributed BMPs
- Maximizes rainfall infiltration where it falls
- Focused on detention and infiltration
- Multiple benefits in addition to stormwater control
- Treat at site level first, then regional if needed
- Ultimately creates less runoff to manage

Developer Benefits of Low-Impact Development

- Often less expensive, better aesthetics and greater property value than conventional methods
 - Many BMPs double as site landscaping
 - Minimal clearing, grading, road construction = lower development costs
- Minimizes need for expensive, extensive stormwater runoff systems, which can minimize maintenance needs

Low-Impact Development Resources

- www.epa.gov/nps/lid
- www.cwp.org
- www.stormwatercenter.net
- www.lowimpactdevelopment.org
- www.lid-stormwater.net
- www.huduser.org/publications/destech/lowimpactdevl.html
- www.usgbc.org



Questions?

Long Term Maintenance and Operation Agreements – *The plain English version.*

Kevin Feder, Urban Conservation Specialist
Floyd County Soil and Water Conservation District

Long-Term Operations and Maintenance Agreement

- Requirement of Post-Construction SWPPP
- Required to receive Notice of Termination for Stormwater Permit
- Assigns responsibility for maintenance (Landowner, Homeowner's Association, Town, City, County) including length of responsibility, transfers
- Becomes part of the property deed – responsibility for stormwater BMP transfers to new owners.

Long-Term Operations and Maintenance Agreement

- Inspections performed by a Qualified Professional
- Document inspections
 - Operational and functional status of BMP
 - Used and remaining capacity
 - Identify repairs, sediment / debris removal, replacement
 - Results of field or laboratory analyses
 - Actions to prevent premature system failure
 - Actions needed to prevent stormwater pollution from leaving the site

Long-Term Operations and Maintenance Agreement

- If owner fails to maintain BMPs, MS4 entity may perform maintenance
- Owner must reimburse MS4
- Lien may be applied for failure to reimburse MS4

BMP Maintenance: Retention

- Inspect at least annually and after extreme events
- Remove floatables, trash, debris
- Remove sediments
- Check for, and repair, erosion
- Control mosquitoes
- Maintain oxygen levels
- Remove nuisance species
- Maintain permanent pool, skimmer devices, inlet and outlet structures

BMP Maintenance: Sediment Disposal

- Clean sediment can be used as fill in appropriate areas
- Do not spread sediment:
 - Within high water area of BMP
 - Another BMP
 - Creek or other waterway
 - Stream buffer
 - Where it will be resuspended and carried to a waterway or BMP
- Check with local landfill or construction / demolition landfill

BMP Maintenance: Sediment Disposal

- Test the sediment and consult with IDEM for disposal if BMP serves:
 - Industrial
 - Manufacturing
 - Large commercial areas
 - Automotive maintenance
 - Large parking areas
 - Areas where pollutants could accumulate in the BMP

BMP Maintenance: Retention Aesthetics

- Maintain signage, walkways, picnic areas
- Mowing / vegetation management important
- May need to manage geese
- Functioning BMP that is not maintained can be an eyesore!
- Well maintained BMP can be an asset!

BMP Maintenance: Detention

- Check annually and after each extreme event
- Maintain vegetation on banks and bottom
- Check for erosion and repair as needed
- Upstream erosion may trigger intensive maintenance!
- Remove sediment when accumulation reaches 6 inches or if re-suspension is observed or likely.

BMP Maintenance: Underground Detention/ Retention

- Follow manufacturer's and vendor's advice.
- Be aware of safety for confined space entry.



BMP Maintenance: Infiltration Systems

- Inspect annually and after extreme events
- If there is standing water after 72 hours – clean the facility
- Use a plug aerator or tilling to restore infiltration capacity
- Use light equipment to avoid compaction
- Rotary tiller generally works well
- Sediment removal and aesthetics considerations same as Dry / Wet Detention

BMP Maintenance: Oil / Water Separator

- Inspect as per manufacturer's recommendation or:
 - Inspect filter systems at least 2x per year
 - Inspect separation systems at least 4x per year
 - After major storms
 - More frequently if upstream soil disturbance may clog unit
- Perform maintenance if water persists in the basin 40 hours or more after a storm
- Remove floatables

BMP Maintenance: Oil / Water Separator

- Remove sediment from settling basin when 4 inches accumulates
- Remove sediment from filter when ½ inch accumulates
- Test sediments and dispose as per IDEM recommendations
- Cleaning / maintaining lengthens BMP lifespan and lowers maintenance costs
- Poorly maintained BMP may cause or contribute to stormwater pollution

Non-Routine BMP Maintenance

- Component Replacement
 - Pumps, switches, and other mechanical components
 - Check dams, earthworks such as embankments and side slopes, or concrete structures

Concerns for Long-Term Operations and Maintenance

- Upstream Conditions
 - Condition of the watershed upstream of the facility can significantly impact the amount of sediment and other pollutants that a facility must manage
- Safety
 - Since BMPs often involve water retention, the safety of nearby residents/customers must be considered, including maintaining appropriate fencing and signage

Concerns for Long-Term Operations and Maintenance

- Need for Professional Involvement
 - While some maintenance can be undertaken by a non-professional, BMPs are water treatment facilities and a professional should be consulted regularly

Concerns for Long-Term Operations and Maintenance

- Typical costs for BMP Maintenance

Best Management Practice	Monthly Maintenance Cost
Retention pond	3% of capital cost
Dry detention	3% of capital cost
Infiltration	Negligible
Biofilter, Swales, Filter Strips	10% of installation
Stream buffer	Negligible
Constructed wetlands	3% of capital cost
Oil / Water Separator	Variable



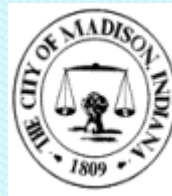
Questions?

Closing Remarks

Steve Hall, Senior Associate
Stantec

Thank you for participating in the
workshop!

From the Southern Indiana
Stormwater Advisory Committee



Visit our website: www.siswac.org