STORMWATER LANDSCAPE MAINTENANCE Training Program

Brought to you by the White River Alliance & the following cities:

Noblesville • Carmel • Cicero • Fishers • Westfield

• Zionsville • Hamilton County • Pendleton • McCordsville

WELCOME!

Our Agenda for the Day

1. State of the Waters
2. HOAs: You Bought a Utility
   Landscapers: You Are Maintaining a Utility
3. Stormwater Infrastructure: Gray vs. Green
4. Landscaping with Native Plants
5. Invasive Plant Concerns & Helpful Local Programs
6. Lawn Care Considerations
7. Pond Design
8. Pond Maintenance
9. Inspections & Compliance Process
10. The Future of Stormwater Management & Enforcement
11. Wrap Up

Big thanks to our friends!

HAMILTON COUNTY
Soil & Water
CONSERVATION DISTRICT

ValentiHeld
CONTRACTOR/DEVELOPER

THE STATE OF OUR WATERS

Why Are We Here Today?

PROTECTING & IMPROVING WATER RESOURCES IN CENTRAL INDIANA

Jill Hoffmann
Executive Director

WHITE RIVER ALLIANCE

OUR ACTIVITIES AND IMPACT -
Empowering A Community To Act!

Choose Clean Water
LEARN MORE

STORM WATER ACTION TEAM

Let Me

Individual Opportunities for Action

Clear Choices Clean Water

Healthy Ample Water

Teach Me

STORMWATER LANDSCAPE MAINTENANCE Training Program

STORMWATER TRAINED INDIVIDUAL Contractor Certification

Technical Resources, Training, Stormwater Education

Workshops, Assessments, & Tools

INDIANA WATER SUMMIT

WHITE RIVER festival

Engaged Community

The White River Festival

Reach Me

WHITE RIVER DRAGON BOAT RACE & FESTIVAL

On-the-Ground Project Installation

Cost-share funds to landowners

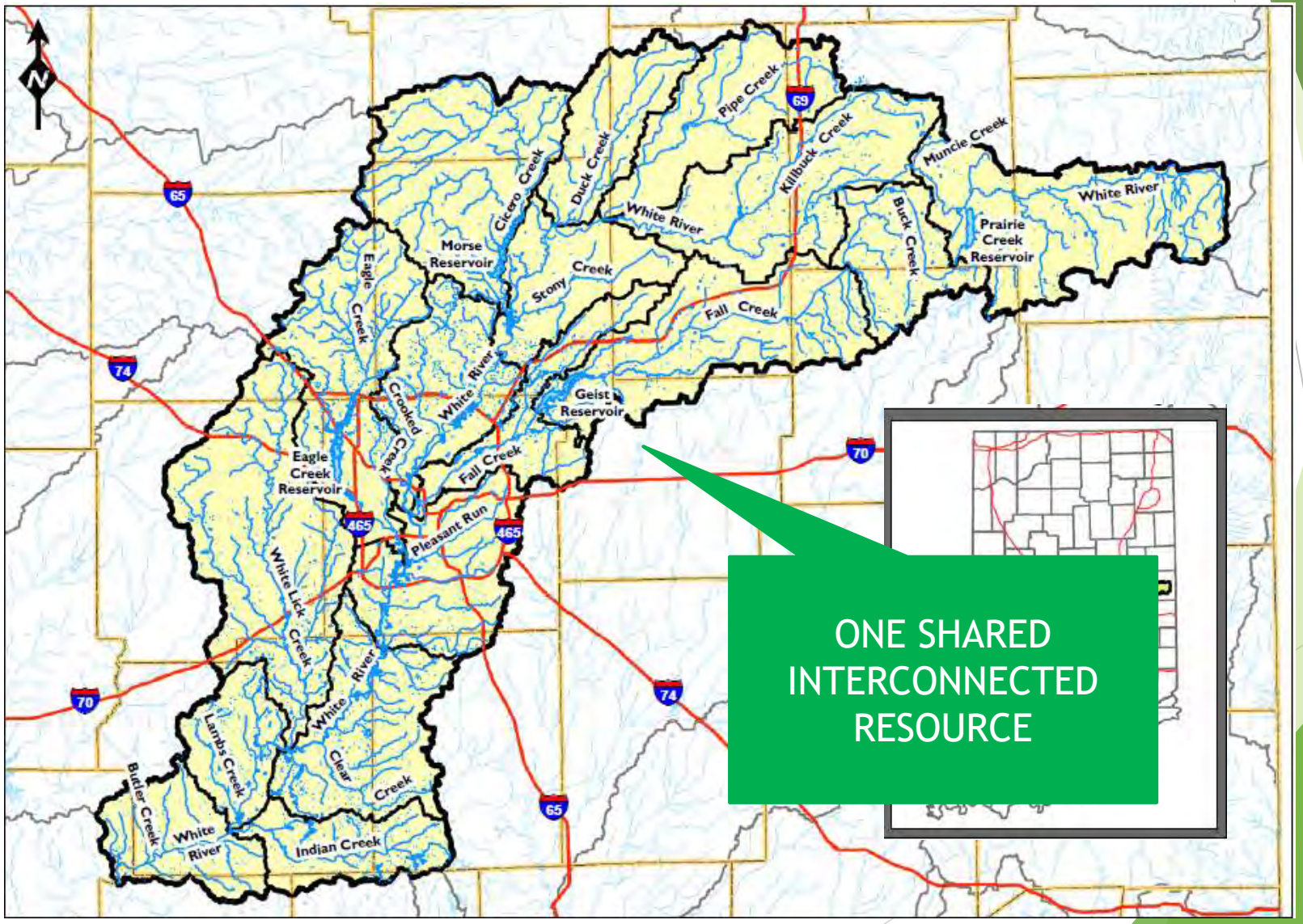
Healthy Shores INITIATIVE
Doing My Part for Cleaner Water

Help Me

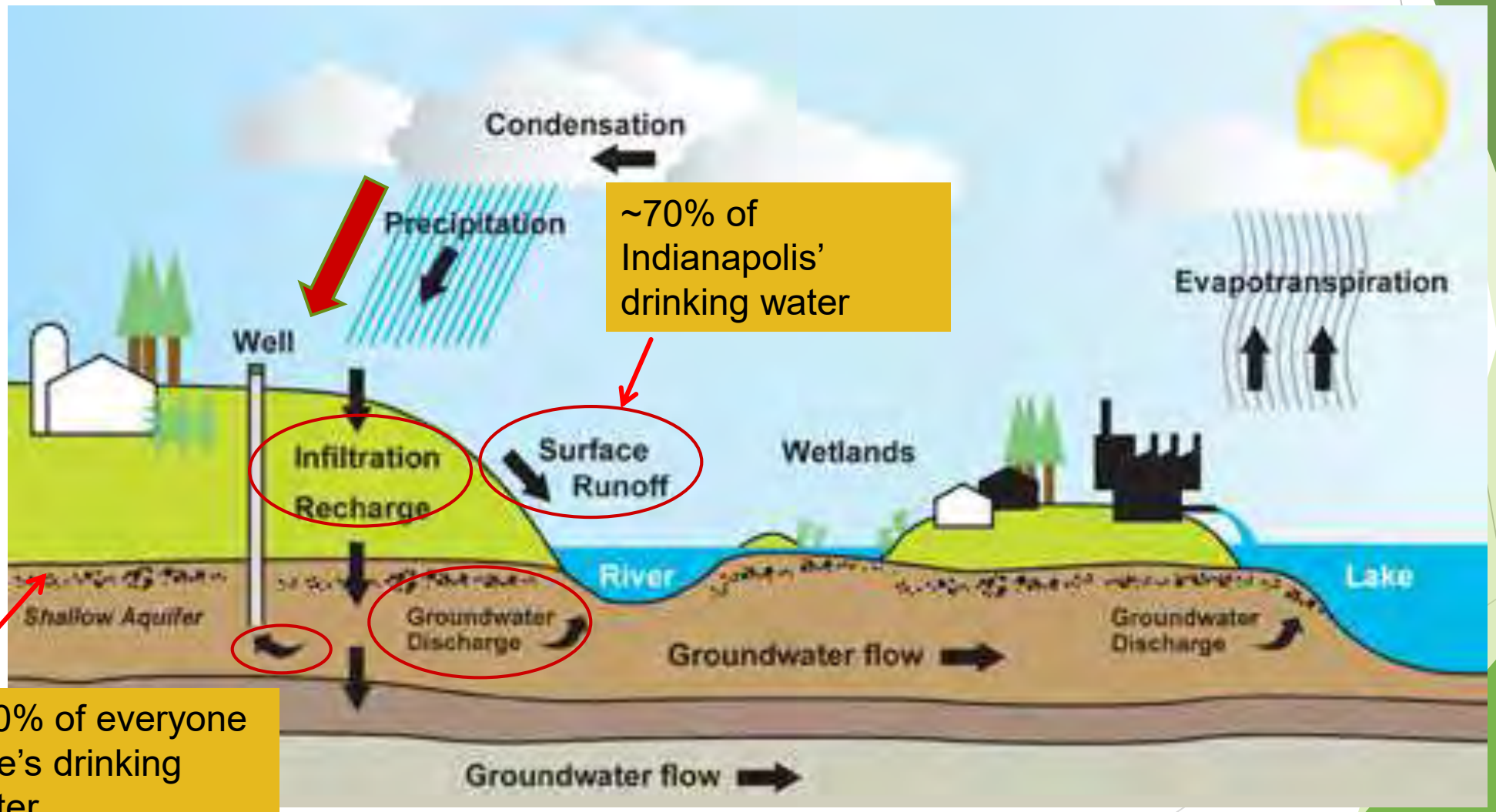
THE WHITE RIVER WATERSHED:

the area that impacts central indiana's water supply

- ✓ 1.7 million acres
- ✓ 4 major reservoirs
- ✓ 15 major tributaries
- ✓ Home to 1/3 of IN's population and its primary economic engines



Ground & Surface Water Connections

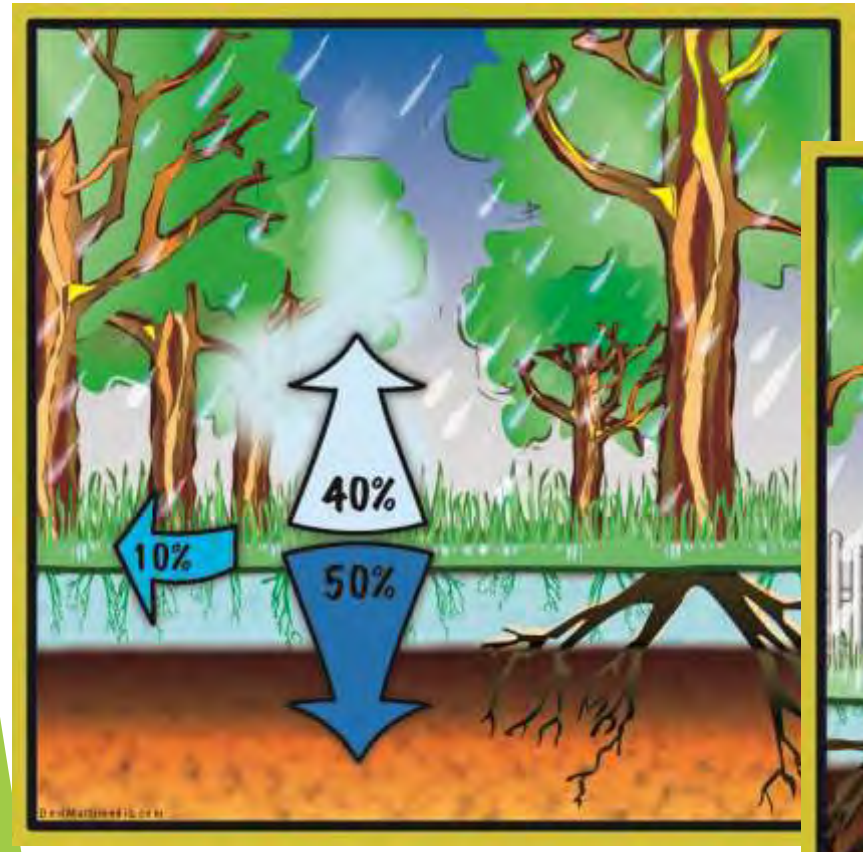


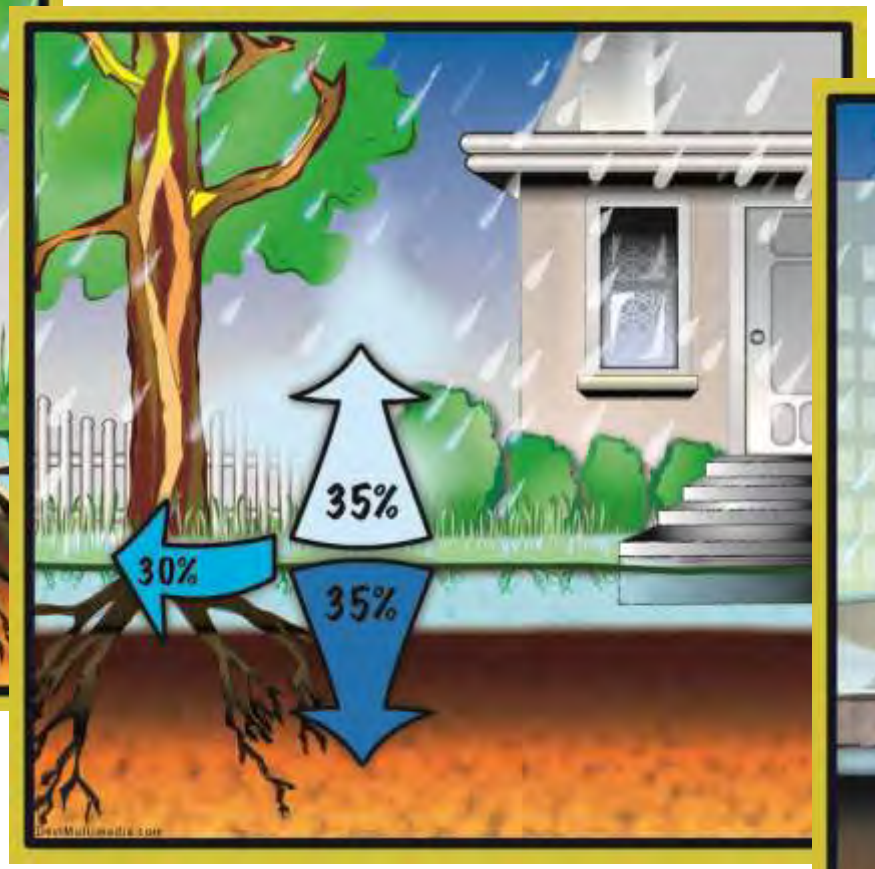
~70% of Indianapolis' drinking water

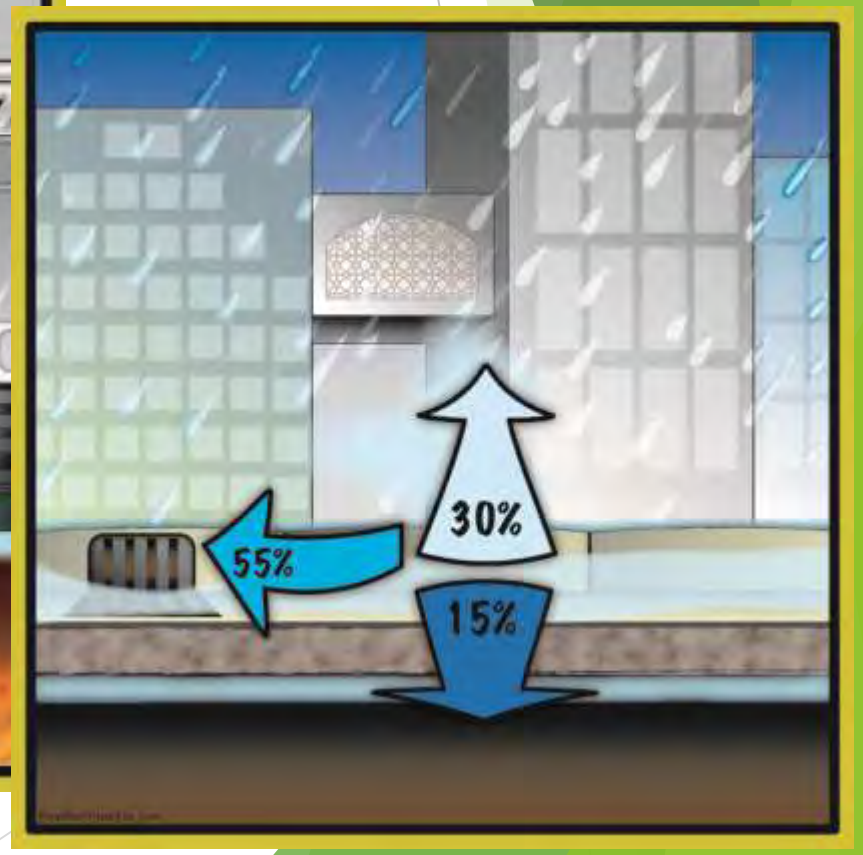
~90% of everyone else's drinking water

Impact of Development

PROBLEM # 1
Loss of a critical groundwater infiltration

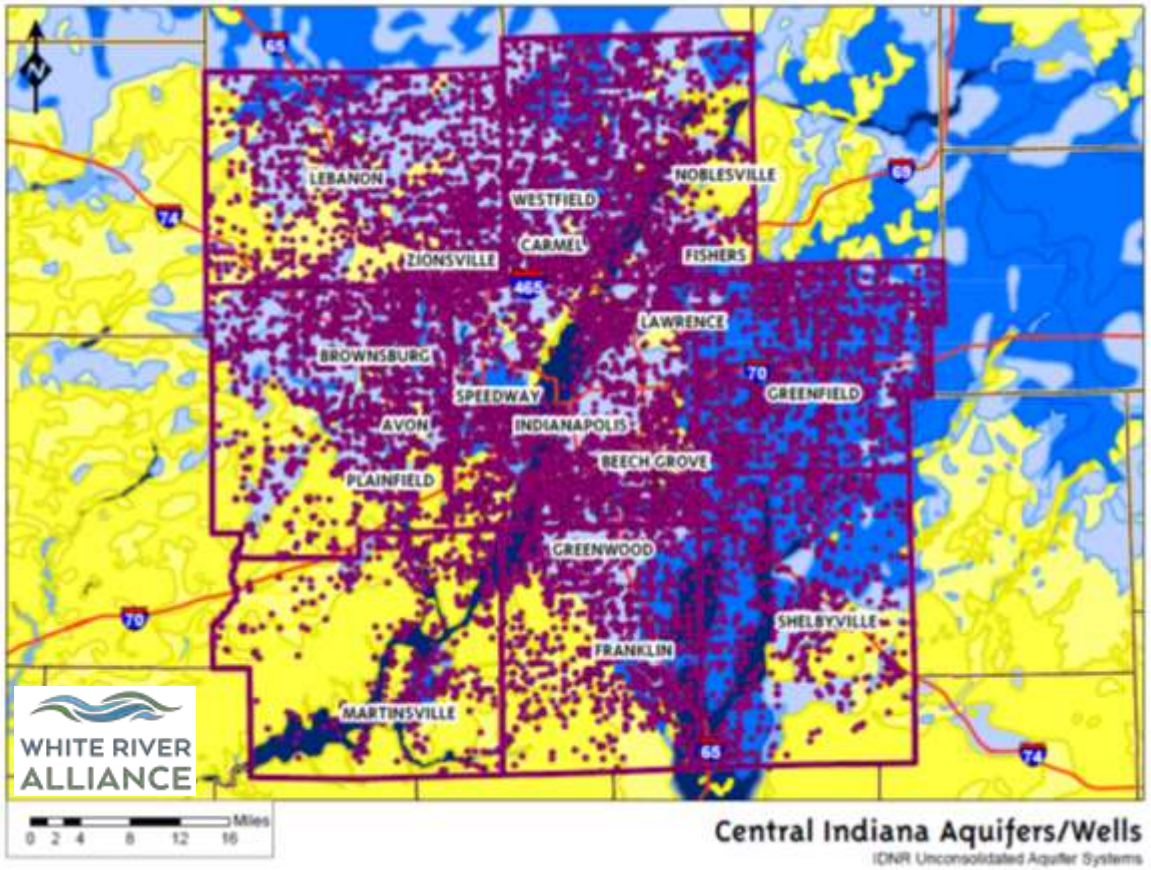






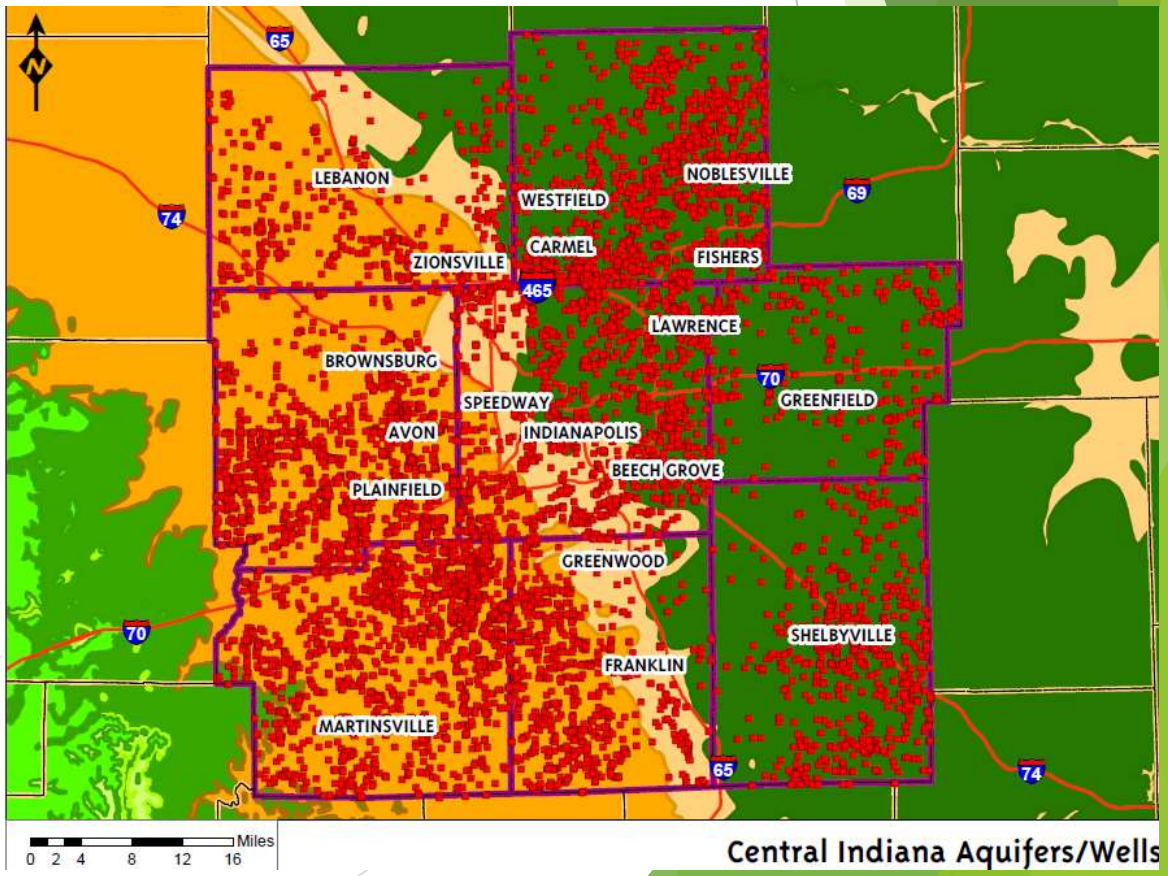
Individual and Industrial Wells Drawing on Groundwater

Shallow aquifers



Deep aquifers

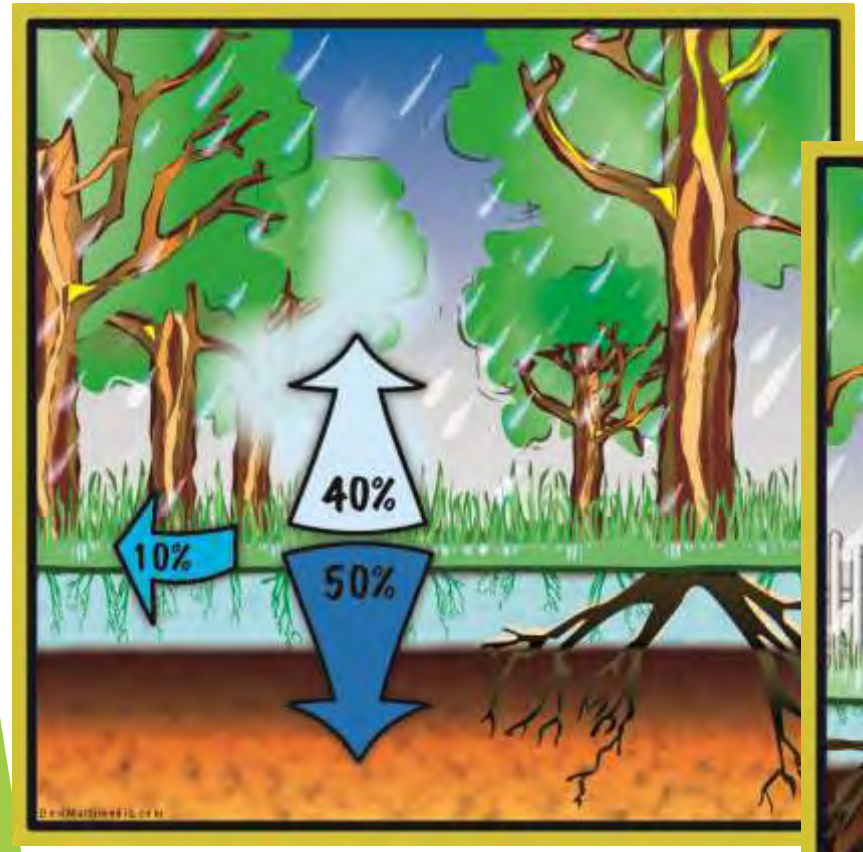
~ 70,000 wells

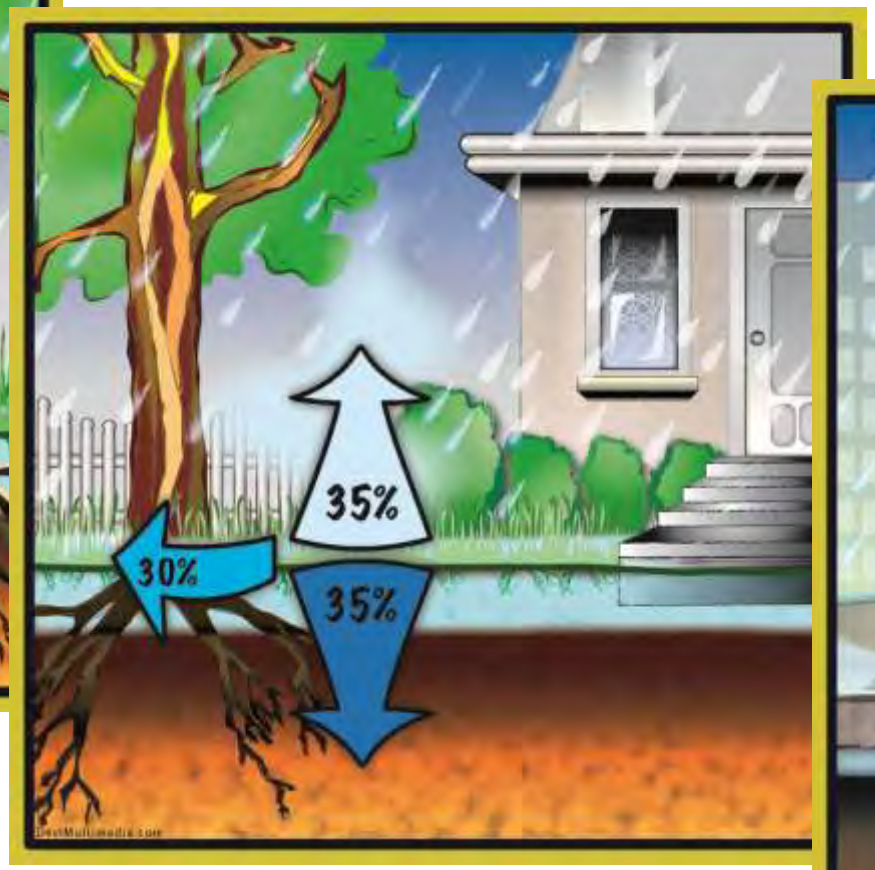


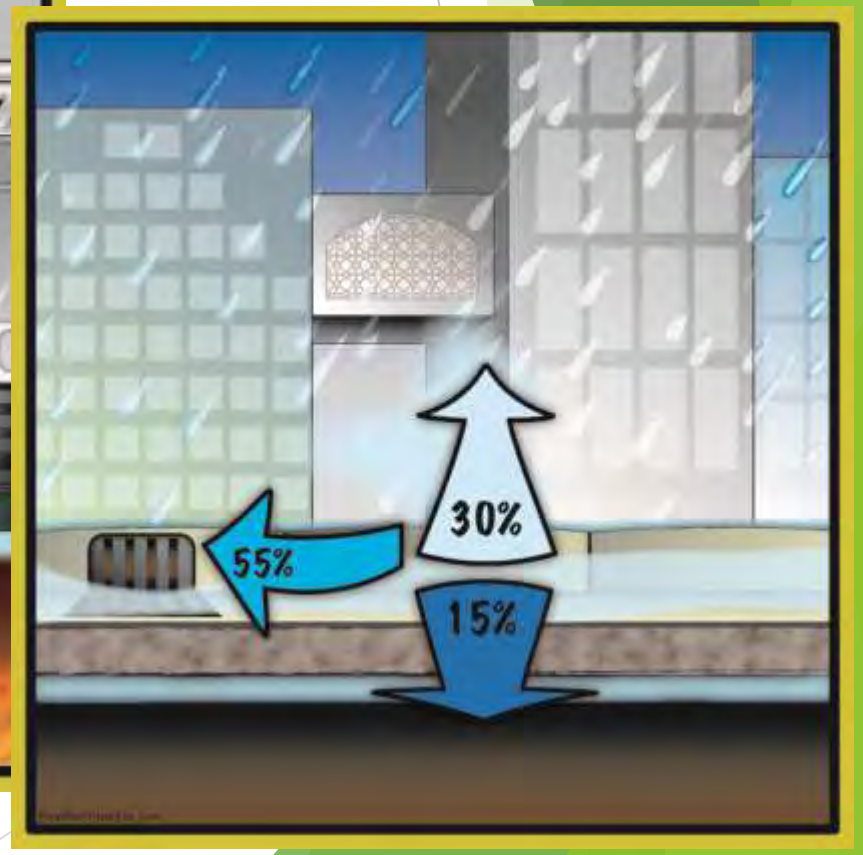
Impact of Development

PROBLEM # 1
Loss of a critical groundwater infiltration

PROBLEM #2 Increased pollution to surface water







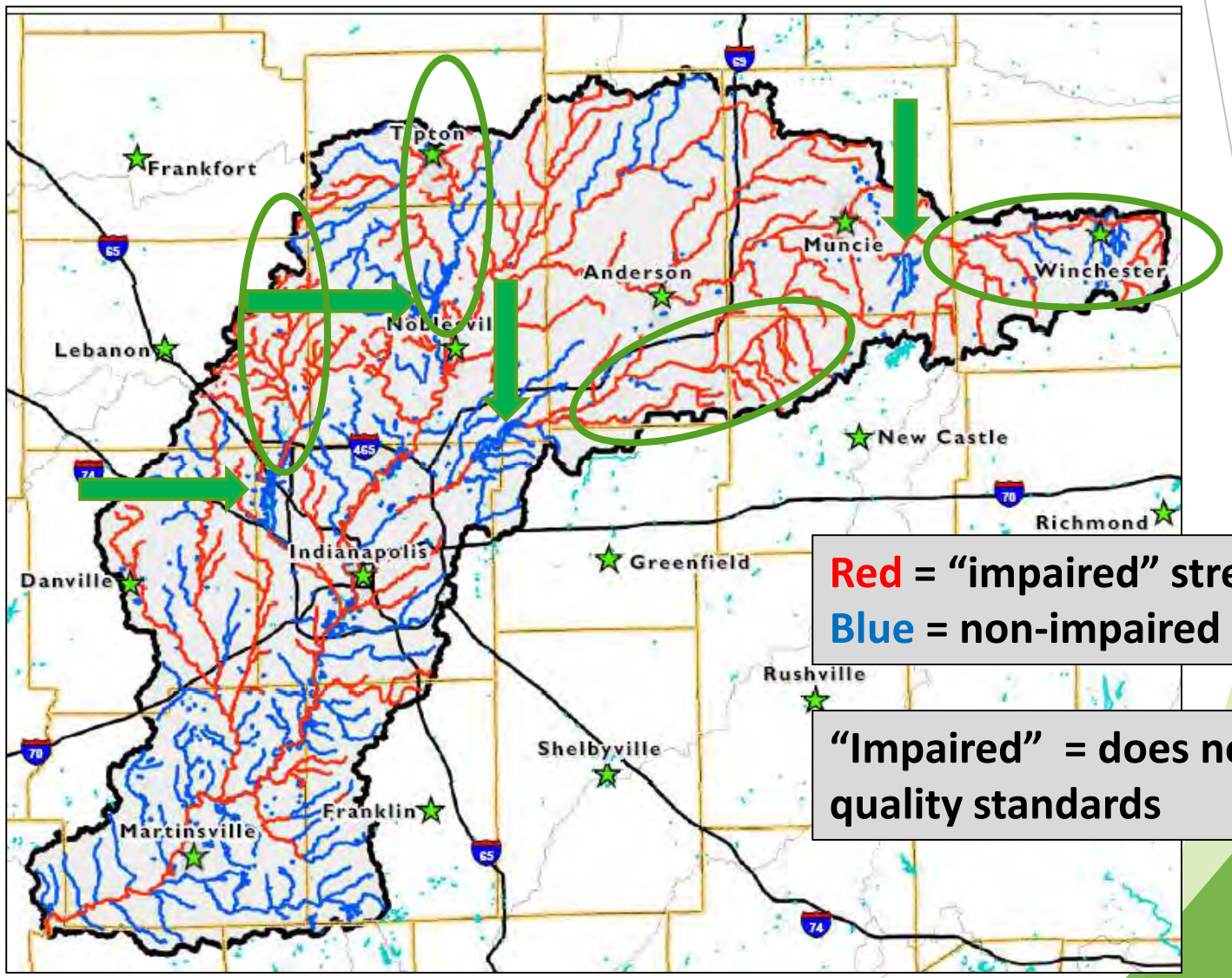
IT'S *JUST* RAIN…

1. Bacteria
2. Fertilizer
3. Pesticides
4. Sediment
5. Oils & Grease


GovBeat
Ohio's water crisis is a warning to all states
By Neena Satija, The Texas Tribune August 4
Advertisement

Water Quality Conditions & Threats

- Sediment
- Nutrients
- Bacteria & other pathogens
- Heavy metals
- Pharmaceuticals & other products
- Harmful algal blooms



Red = "impaired" streams
Blue = non-impaired or not monitored

"Impaired" = does not meet State water quality standards

Four Key Water Challenges

#1. Shortages are forecasted as early as 2030 without actions to the contrary

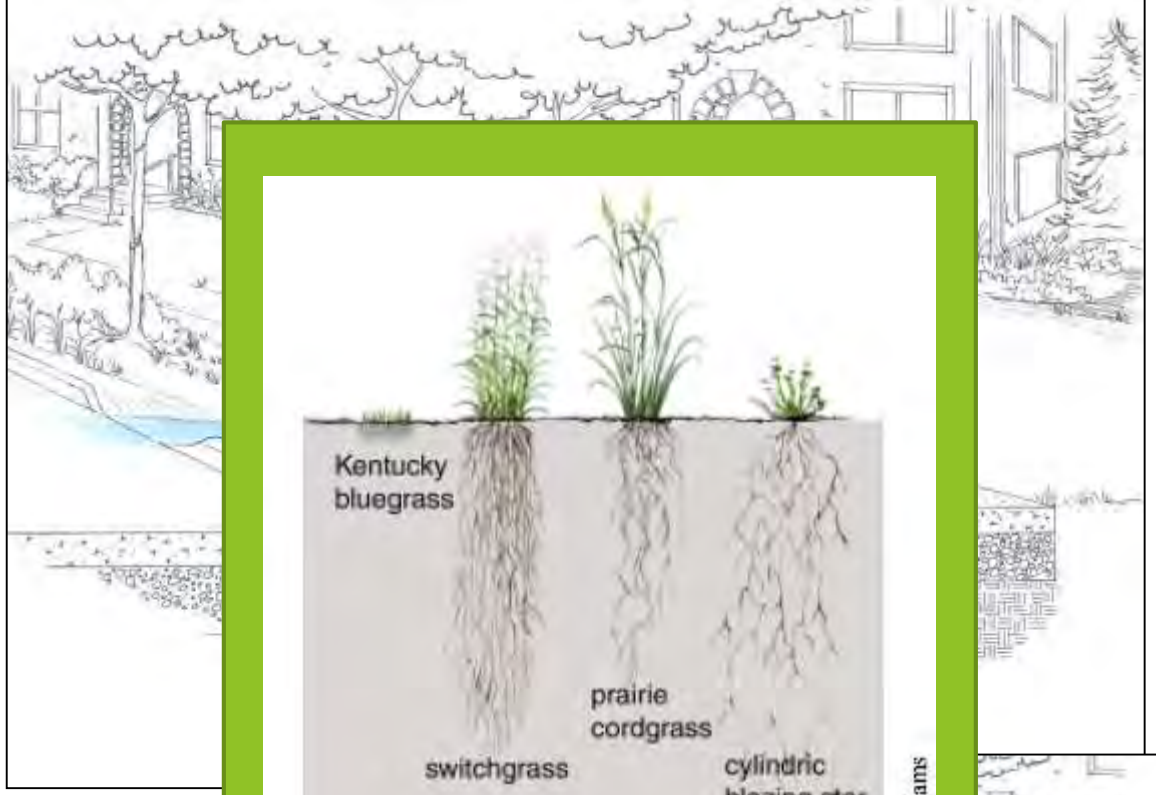
#2. Lots of people utilizing the surface water and groundwater resources with few policies protecting or coordinating them

#3. Current conditions presents risks to public health, flooding, water treatment costs, reduced supply, and recreational use limitations.

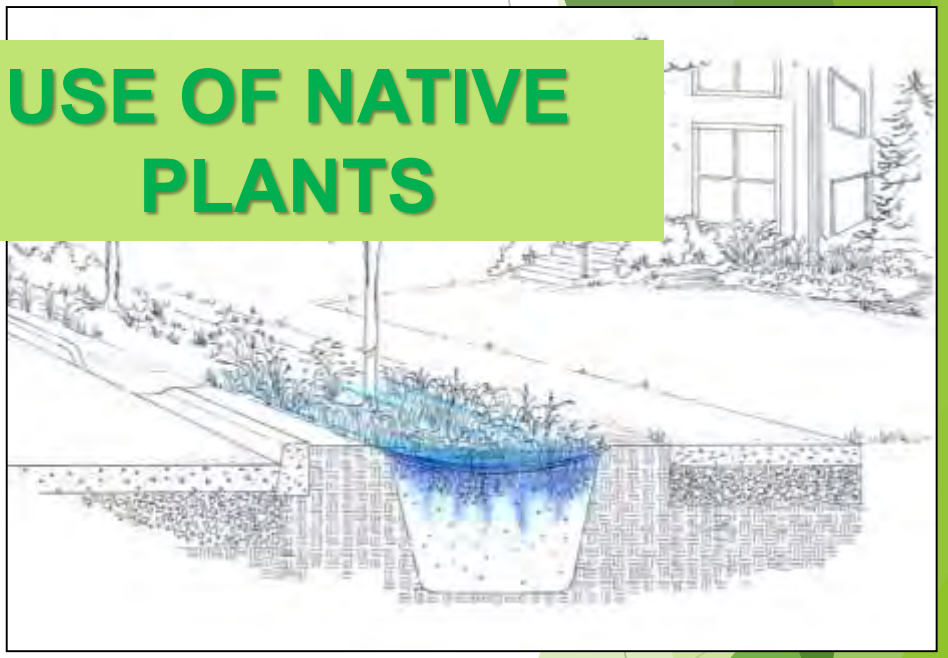
#4. Critical aging and failing infrastructure $15+ billlion in next 20 years in Indiana

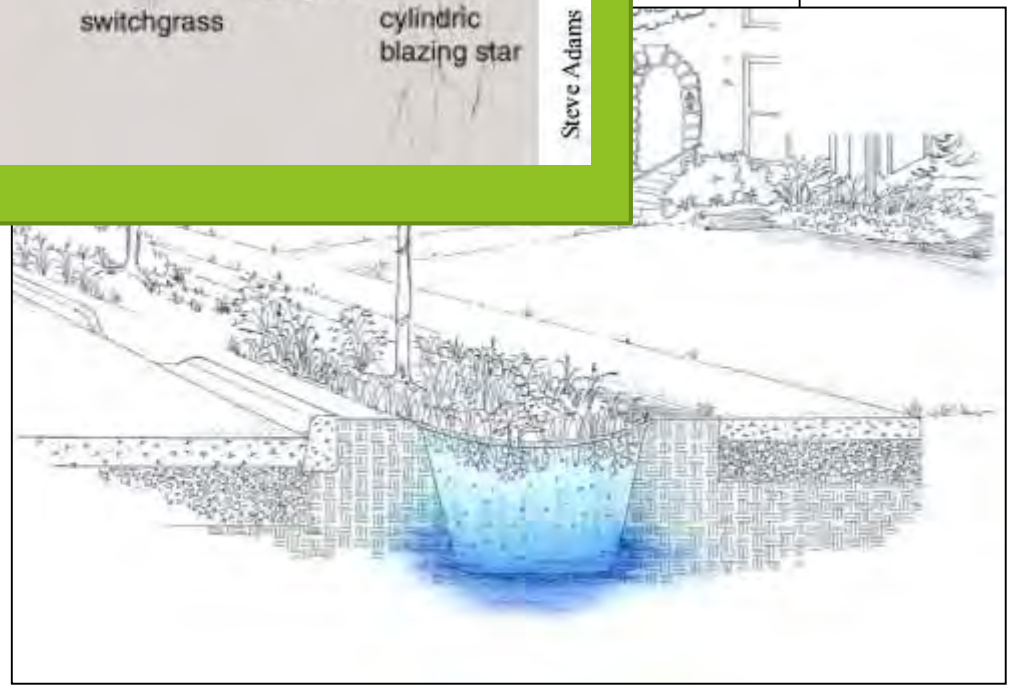
Sustainable Solutions Require Many People and Many Landscapes

Green Infrastructure



USE OF NATIVE PLANTS





Recharging Ground Water via Infiltration Practices

Sustainable Solutions Require Many People & Many Landscapes

WE NEED YOU TO DO YOUR PART…

now is the time for widespread landscape and social change!

YOU BOUGHT A UTILITY

Maintenance, Inspection, and Regulatory Issues

Regulatory stuff

“BIG Picture” federal, state & local mandates

Where do you fit in?

What do you need to do to be in compliance with the regulations?

Federal and State Regulations "Clean Water Act"

Circa 2004

New construction projects shall provide treatment to their stormwater runoff

A. Grey Infrastructure (BMP)
B. Green Infrastructure (BMP)

(BMP) = Best Management Practice

IDEM

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

EPA

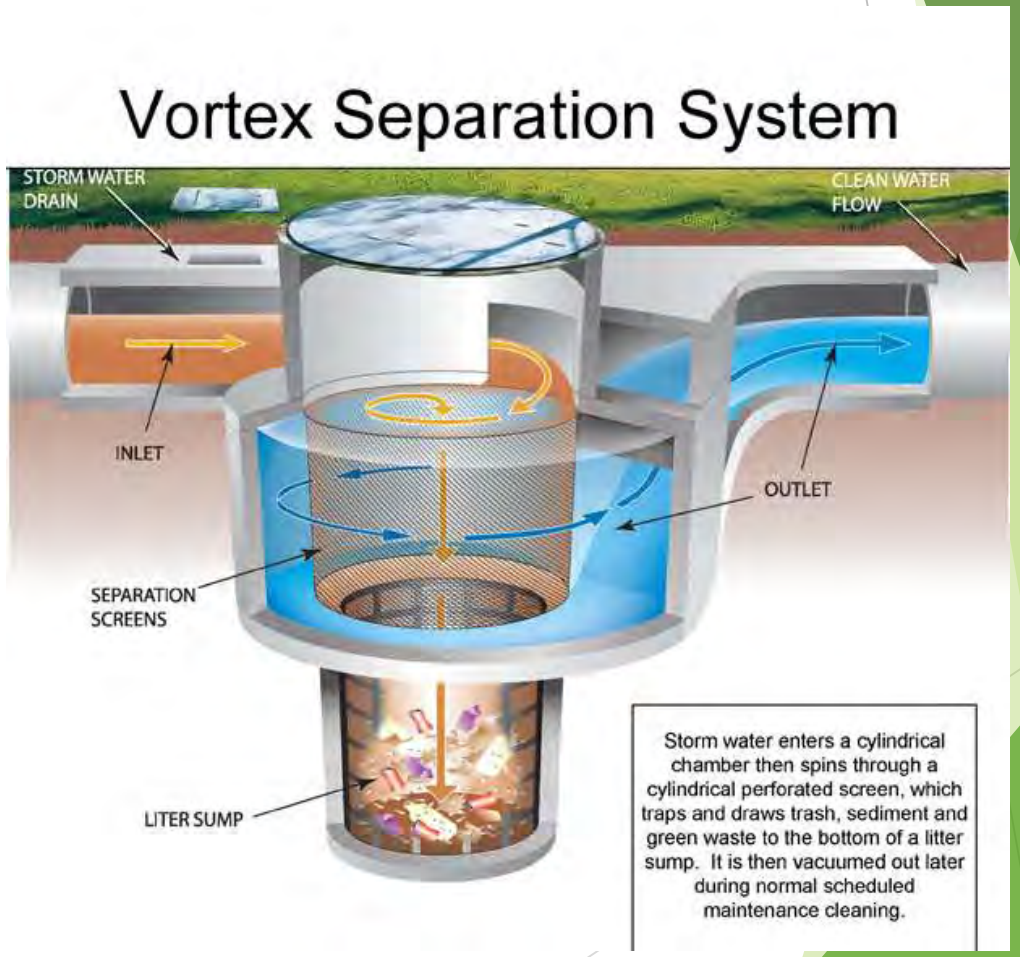
IDEM Requires Local Gov Oversight

IDEM requires Cities, Towns & Counties to;

A. Map & track each Best Management Practice (BMP) that is installed
B. Ensure routine maintenance is performed BY THE OWNER to safeguard proper function of the BMP.

WHAT NEEDS MAINTENANCE?

Things You Can't Easily See – Yet, they are regulated BMPs



Green Space & Common Areas

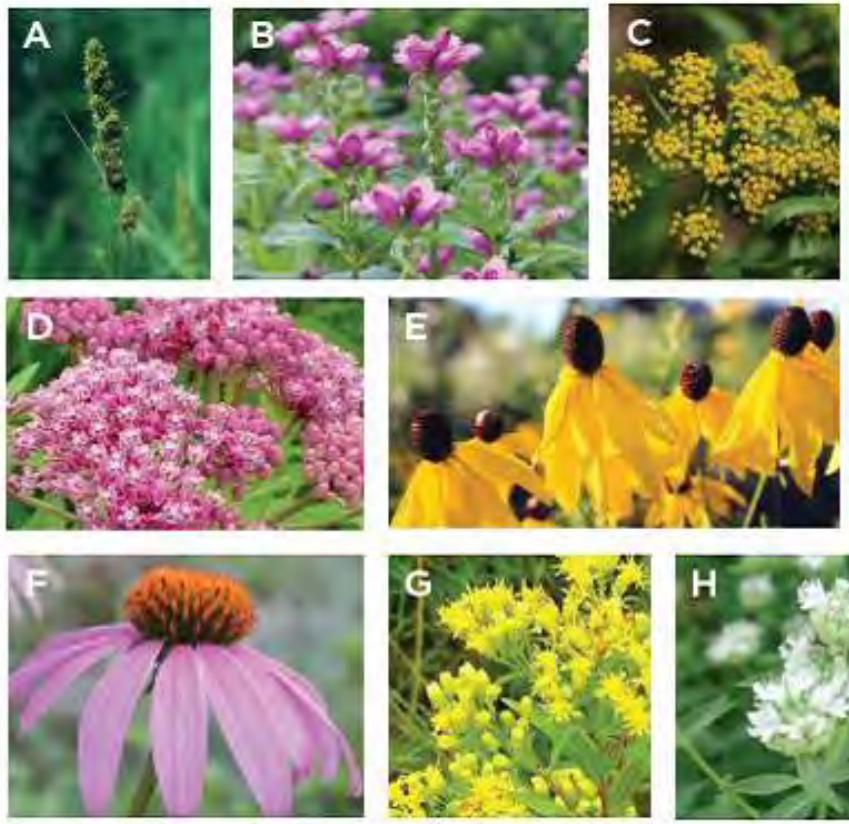
1. Storm water infrastructure
2. = > 2005, 2006 construction

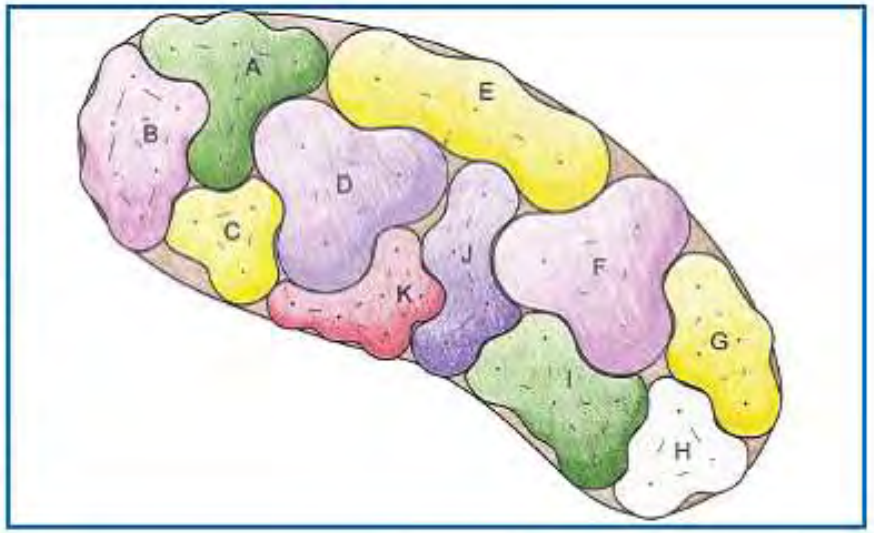
Likely a Regulated BMP

Who Does the Maintenance?

Maintenance, Inspection, and Regulatory Issues – YOUR ROLE

Green Infrastructure O&M MANUAL





Revised August 18, 2014
Revised October 22, 2014

NO SCALE

Green Infrastructure O&M MANUAL

BMP OPERATIONS AND MAINTENANCE MANUAL

NOBLE EAST
SECTION 1
NOBLESVILLE, INDIANA

Prepared for:

Boomerang Development
11911 Lakeside Drive
Fishers, IN 46038
(317) 849-7607

Schneider

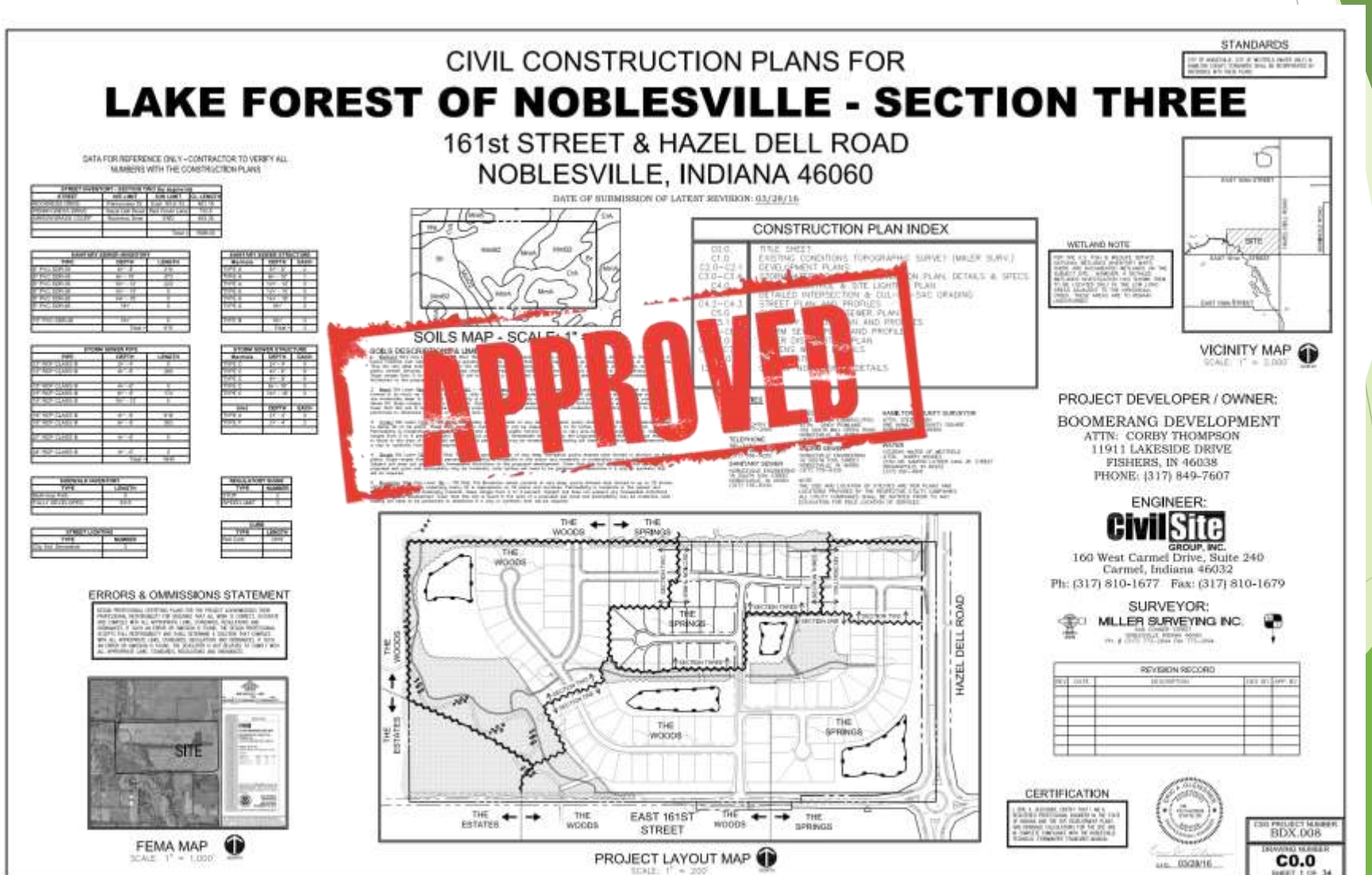
THE SCHNEIDER CORPORATION
Historic Fort Harrison
8901 Otis Avenue
Indianapolis, IN 46216-1037
317-826-7100

June 30, 2014
Revised August 18, 2014
Revised October 22, 2014

Post Construction BMP Inspection and Maintenance Program

Maintenance Item	Inspection Frequency	Maintenance
Pond Embankments and Emergency Spillways		
1) Vegetation	Annually and after major storm events	Reseed, fertilize and mow as needed. Mowing shall not blow excess clippings into the detention area. Remove invasive vegetation when it adversely affects the ability of the system to perform as a water quality control device.
2) Embankment	Annually and after major storm events	Repair erosion. Contact an engineer if leaks or seeps are noted on the embankment or abutments. Contact an engineer if bulging, sliding or cracking is noted.
3) Animal burrows	Annually	Remove animals and fill burrows when it adversely affects the ability of the system to perform as a water quality control device.
4) Under Drains	Annually	Clear blockages if any.
5) Emergency spillway	Annually	Remove obstructions. Repair erosion.
Outfall Pipe and Principal spillway		
Type: Reinforced concrete		
1) Outfall concrete end section	Annually and after major storm events	Remove blockage, debris, and sediment that collects in front of trash racks and end sections.
Treatment Areas		
1) Wet Detention	Monthly	Remove collected debris as needed. Remove sediment from retention area when it adversely affects the ability of the system to perform as a water quality and storm water runoff control device. For example, remove sediment in ponds when pond depths are 6 feet or less (designed pond depth is 8 feet).
Rip-Rap		
1) Rip-Rap	Semi-Annually and after major storm events	Remove collected debris and any vegetation in rip rap. Replace any rip rap that has been lost.

Green Infrastructure approved construction plans



Detention Pond Operation, Maintenance, and Management Inspection Checklist

Project: _____

Location: _____

Date: _____ **Time:** _____

Inspector: _____ **Title:** _____

Signature: _____

Maintenance Item	Satisfactory/ Unsatisfactory	Comments
1. Embankment and emergency spillway		
Healthy vegetation with at least 85% ground cover.		
No signs of erosion on embankment.		
No animal burrows.		
Embankment is free of cracking, bulging, or sliding.		
Embankment is free of woody vegetation.		
Embankment is free of leaks or seeps		
Emergency spillway is clear of obstructions.		
Vertical/horizontal alignment of top of dam "As-Built"		
2. Riser and principal spillway		
Low flow outlet free of obstruction.		
Trash rack is not blocked or damaged.		
Riser is free of excessive sediment buildup		
Outlet pipe is in good condition.		
Control valve is operational		
Outfall channels are stable and free of scouring.		

Green Infrastructure INSPECTIONS

Post-Construction BMP Inspection Checklist Detention pond

Detention Pond Operation, Maintenance, and Management Inspection Checklist

Project: _____

Location: _____

Date: _____ **Time:** _____

Inspector: _____ **Title:** _____

Signature: _____

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Trash rack is not blocked or damaged.		
Riser is free of excessive sediment buildup		
Outlet pipe is in good condition.		
Control valve is operational		
Outfall channels are stable and free of scouring.		

- Identify items that are Unsatisfactory or Marginal
- Schedule appropriate maintenance or corrective action for unsatisfactory
- Re-Inspect and Document that the BMP is back in compliance
- Submit Annual Reports to Local Jurisdiction

Enforcement Example

December 4, 2019

My Neighborhood
Attn: HOA Manager
1234 Anywhere Drive
Anywhere, IN 12345

Notice of Violation

Re: STORMWATER BMP MAINTENANCE

Mr. Manager,

Our records indicate that the Storm Water Quality BMP #HOA#7511 in your neighborhood is not in compliance with the local code as we have not received the required annual self-inspection forms.

Additionally, the City inspector has completed a site visit and determined that this BMP does not meet the minimum standard necessary for the stormwater quality BMP to function properly and will require additional maintenance.

You are required to contact our office within 15 days and submit a written plan to bring this back in to compliance within 45 days. Please reference Case # 149/954 in all correspondence.

Kind Regards,

Clyde Inspector

Clyde City Inspector
City of Anywhere

City of Anywhere USA

A Manual to Help You Better Understand it All

QUESTIONS?

Contact Local Stormwater Staff

Jason Armour
Stormwater Engineer/MS4 Coordinator
City of Fishers
317-595-3461
armourjt@fishers.in.us

John Thomas
Storm Water Administrator
City of Carmel
317-571-2441
jthomas@carmel.in.gov

Tim Stottlemyer
MS4 Coordinator
City of Noblesville
(317) 776-6330 x 2615
Tstottlemyer@noblesville.in.us

Michael Susong
Assistant Superintendent - Stormwater
Zionsville Street and Stormwater Department
(317) 873-4544
Stormwater@zionsville-in.gov

NEXT PRESENTATIONS

Michael Susong

Traditional Gray Stormwater Infrastructure

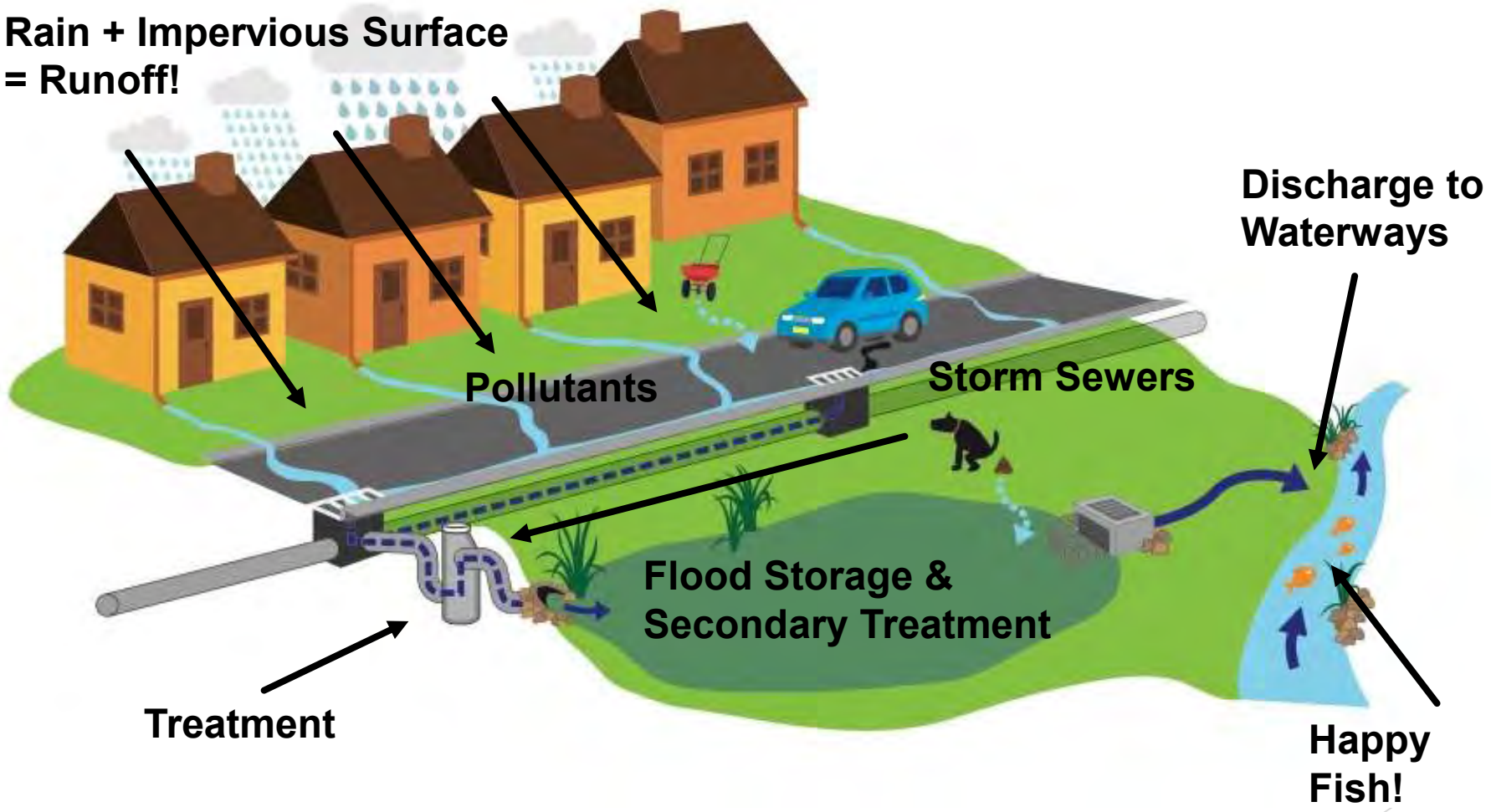
John Thomas

Green Stormwater Infrastructure

TRADITIONAL STORMWATER MANAGEMENT

Gray Infrastructure = Pipes & Ponds

PIPES TO POND – HOW IT WORKS



PIPES TO POND – HOW IT WORKS

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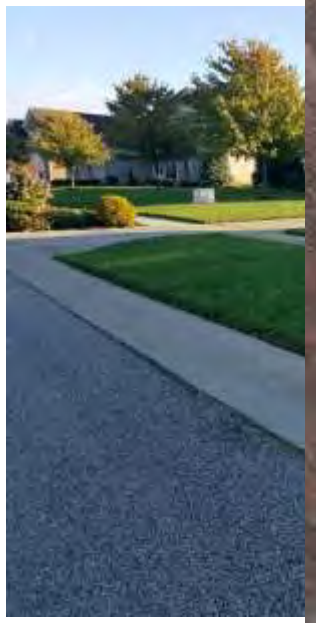


PIPES TO POND – SWALES

Ponds – Wet and Dry

NOT ALL PONDS ARE BMPS

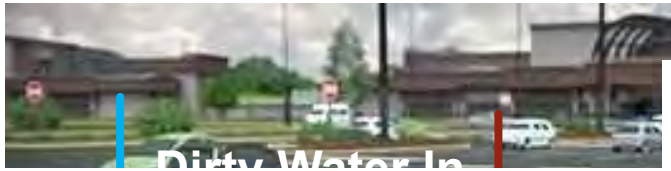
FOREBAYS AND SEDIMENT PRETREATMENT

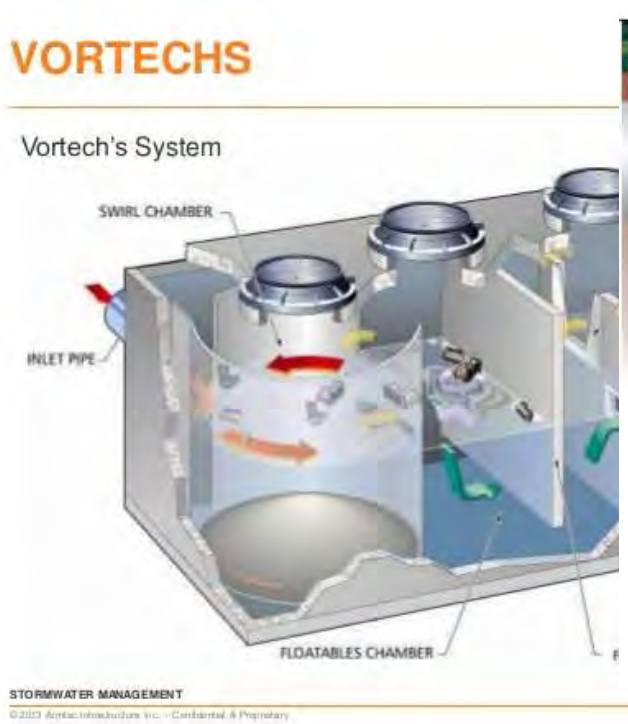
PIPES TO POND: COMMON MAINTENANCE ISSUES

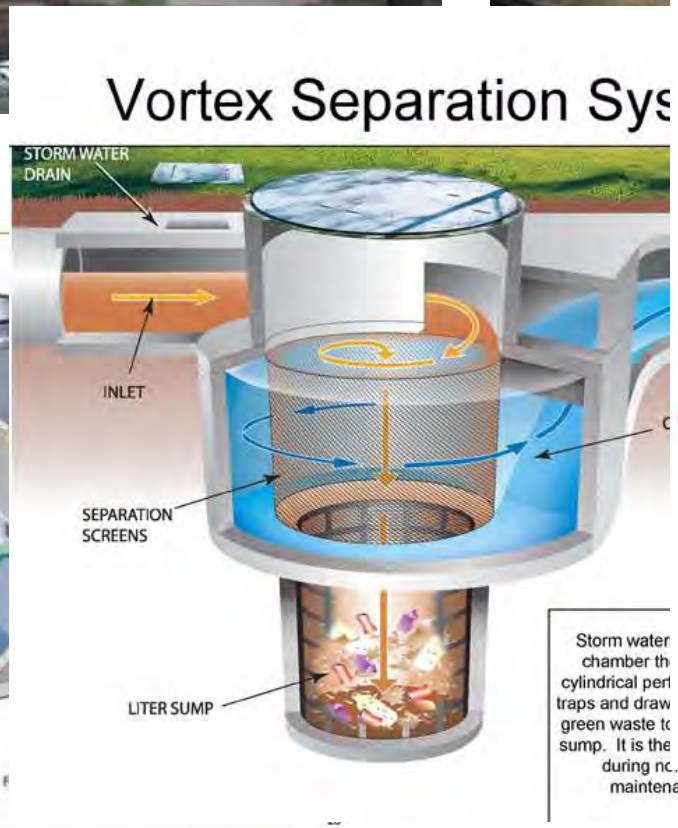
MAINTENANCE

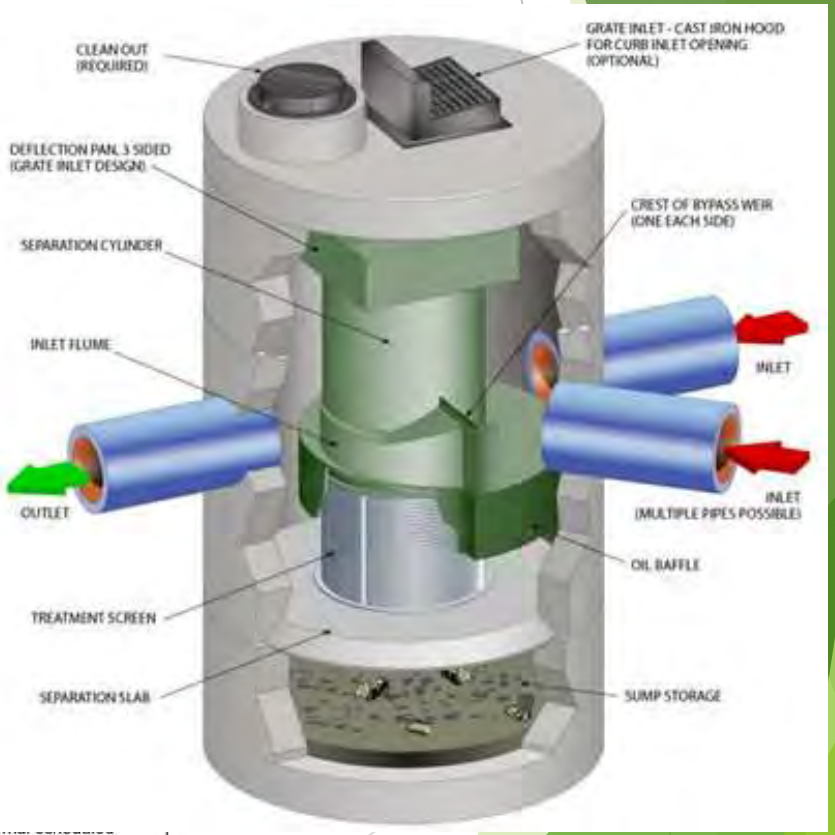
- Weeds and algae
- Bank erosion
- Sedimentation

PIPES TO POND – MECHANICAL UNITS









PIPES TO POND – MECHANICAL UNITS

PIPES TO POND:
MECHANICAL UNIT INSPECTION

PIPES TO POND: MECHANICAL UNIT INSPECTION

PIPES TO POND:
MECHANICAL UNIT REPAIR

NON-TRADITIONAL STORMWATER MANAGEMENT

Green Infrastructure = Plants & Pervious Surfaces

TYPES OF GREEN INFRASTRUCTURE

- Naturalized Detention Basins / Swales
- Naturalized Buffers
- Infiltration Trenches
- Permeable Pavement and Pavers

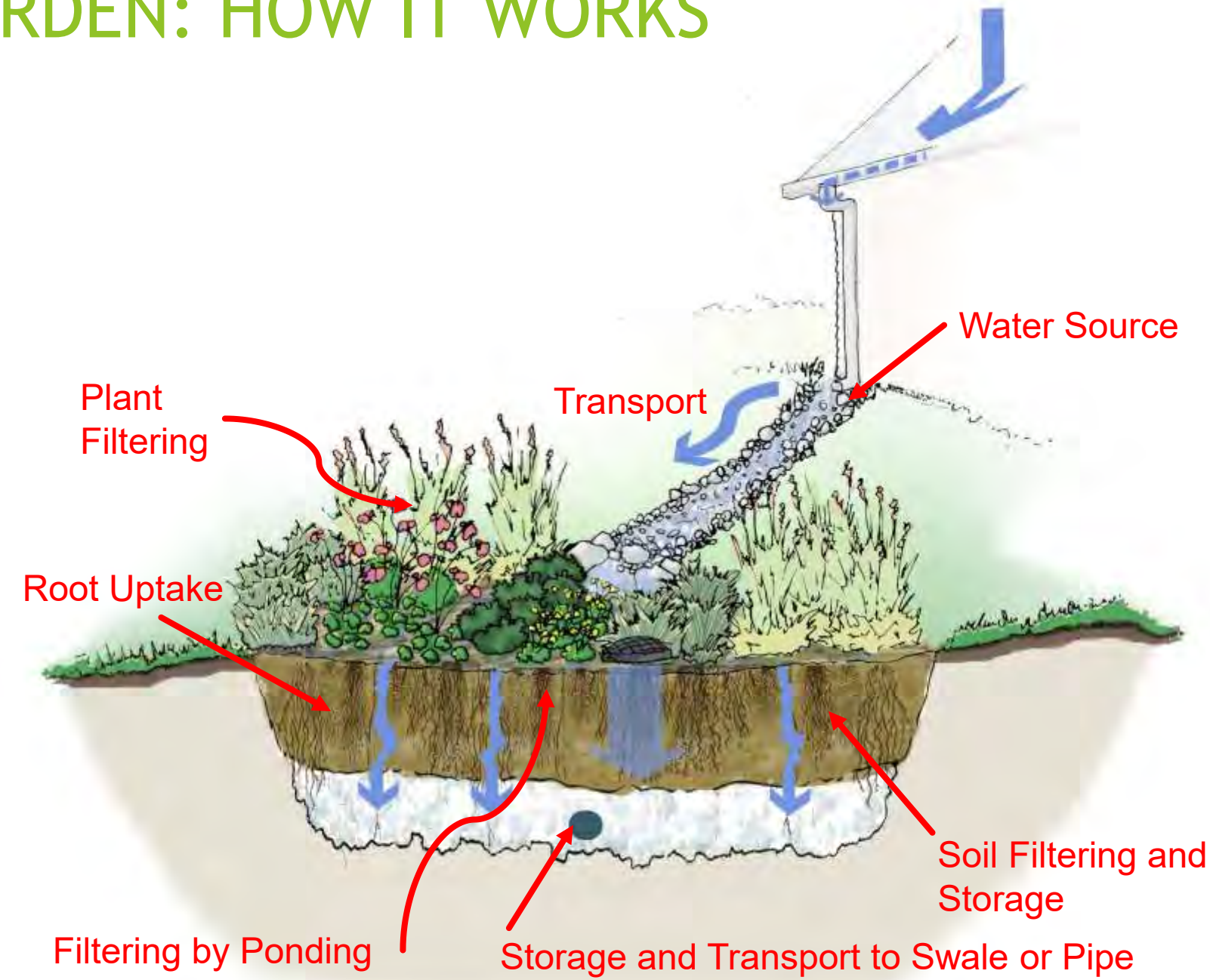
NATURALIZED DETENTION BASINS

- RAIN GARDENS
  - Smaller basins used often on residential lots or park settings
- BIO-RETENTION
  - Larger basins used in large commercial and residential developments as the main storage and treatment practice for the development
- BIO-SWALES
  - Designed and constructed drainage flow paths along roadways or through properties that treat and transport rain runoff

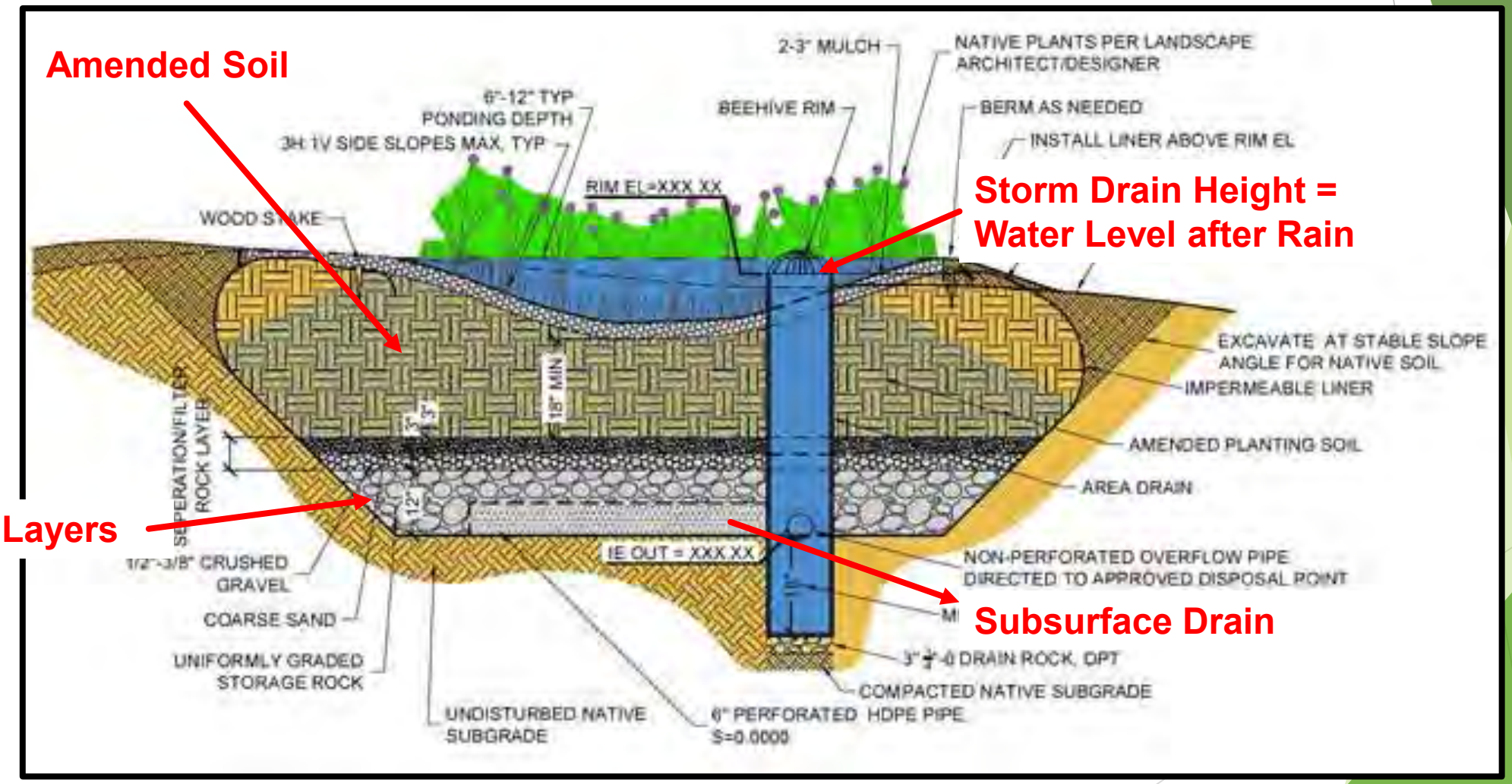
RAIN GARDENS

RAIN GARDEN: HOW IT WORKS

Primary Function: Treatment and Storage



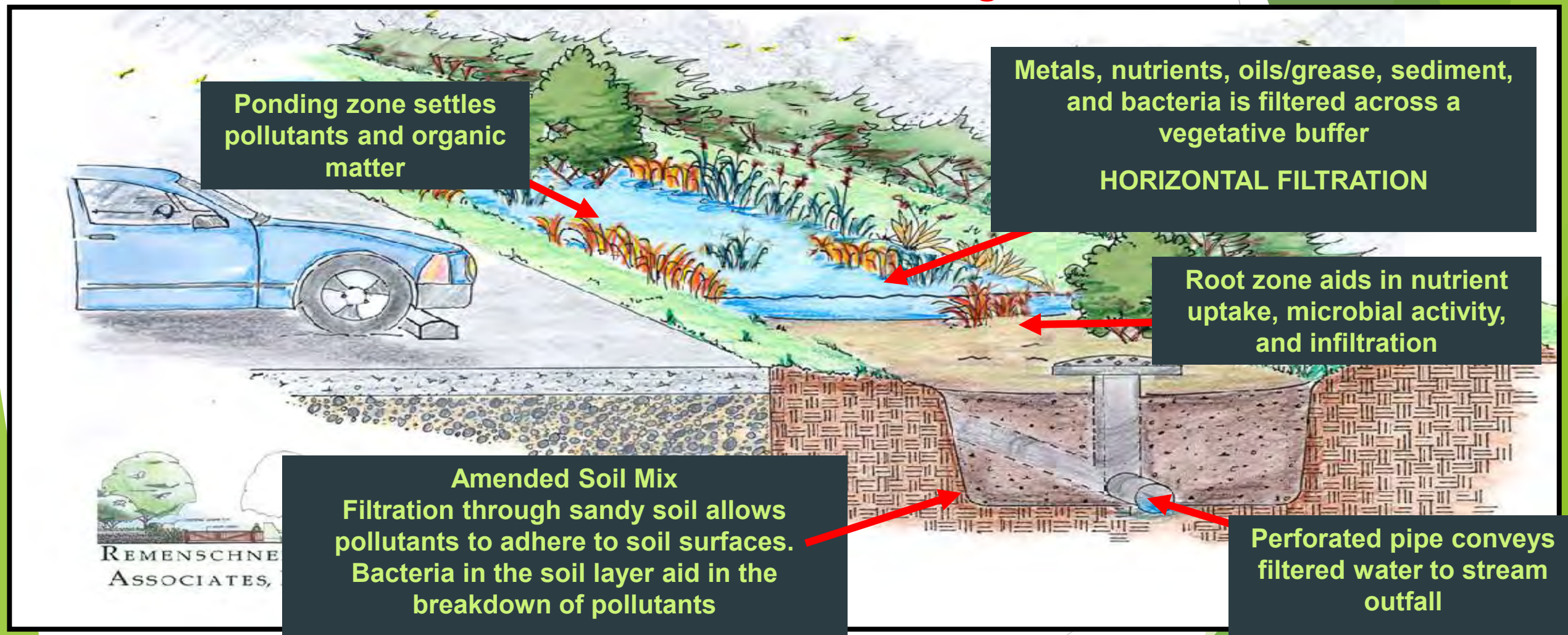
RAIN GARDEN SIDE VIEW



BIORETENTION

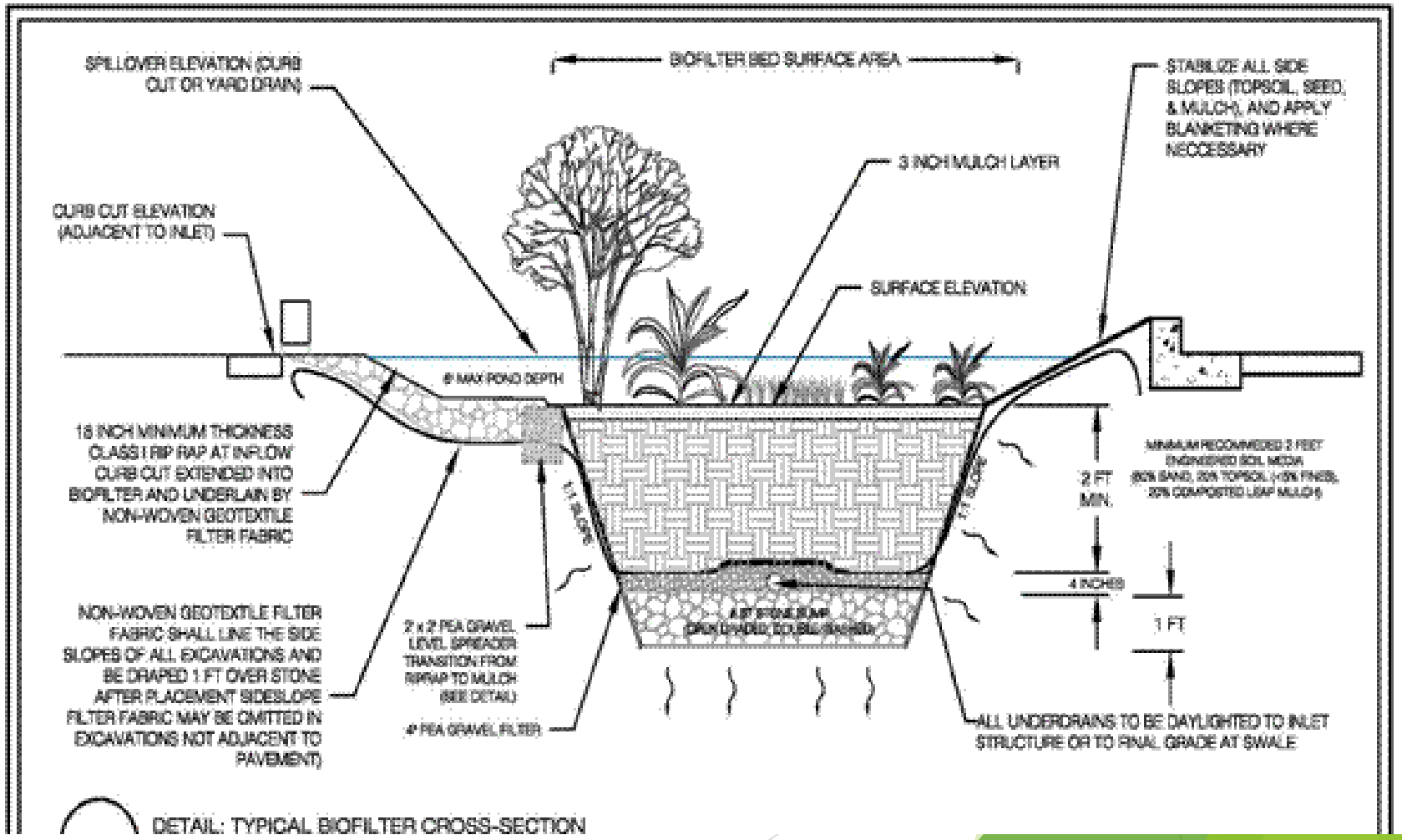
BIORETENTION: HOW IT WORKS

Primary Function: Treatment and Storage



BIORETENTION SIDE VIEW

- **Construction Plans / O& M Manual Details**
  - **Provide these details to maintenance Contractors for guidance**



BIOSWALES IN THE LANDSCAPE

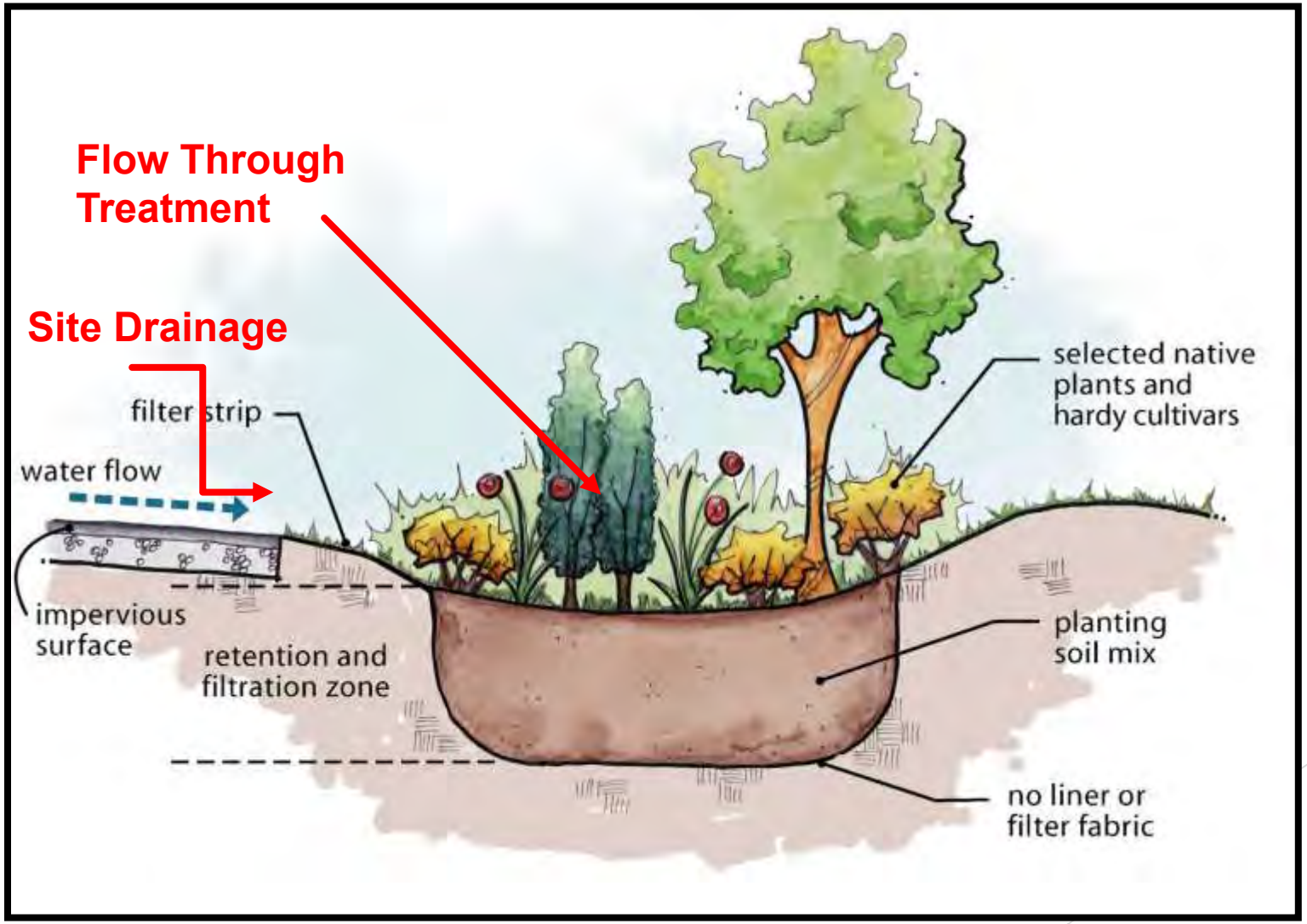
FLOW

Flow

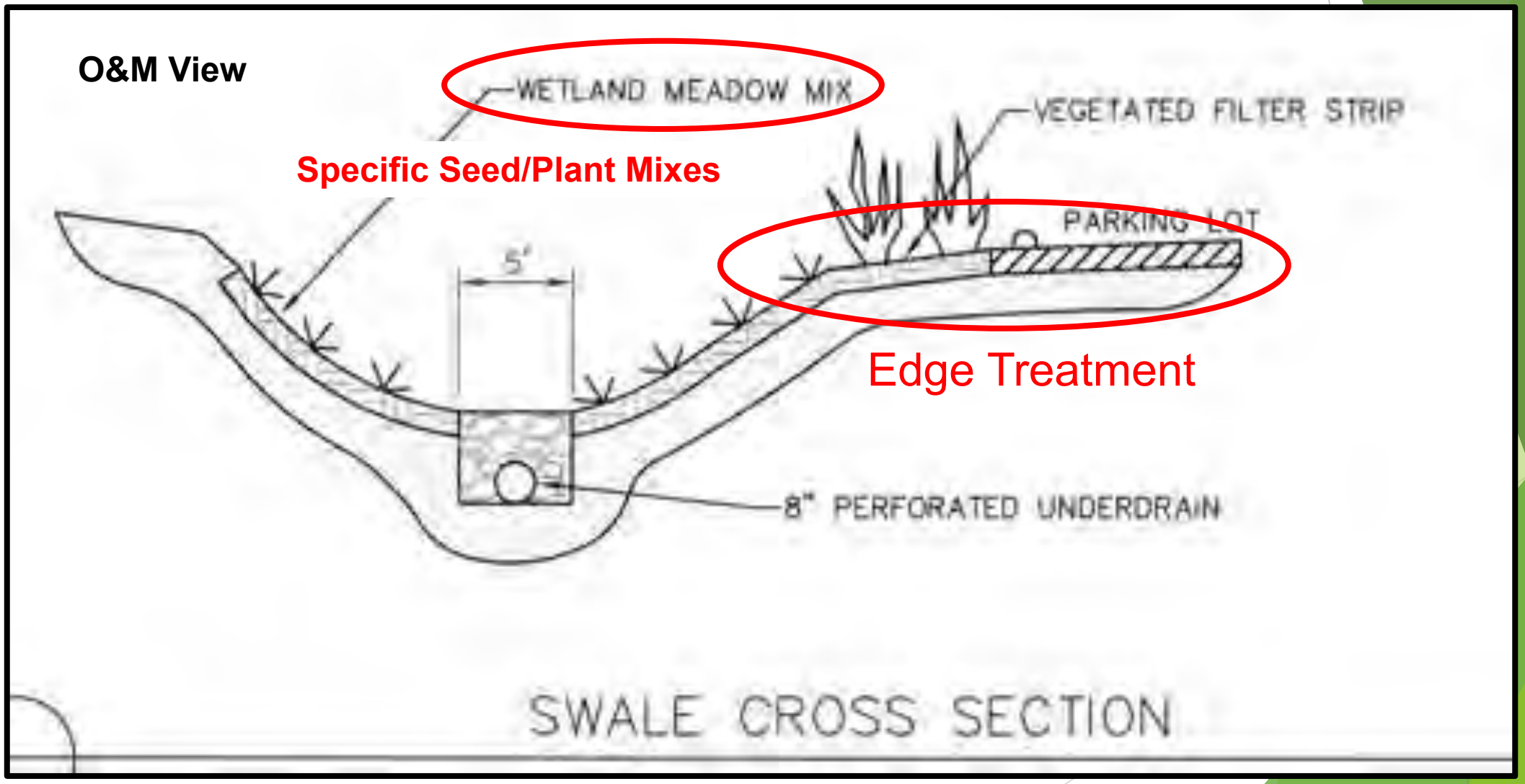
Flow

BIOSWALES: HOW IT WORKS

Primary Functions: Treatment and Flow Conveyance



BIOSWALE SIDE VIEW

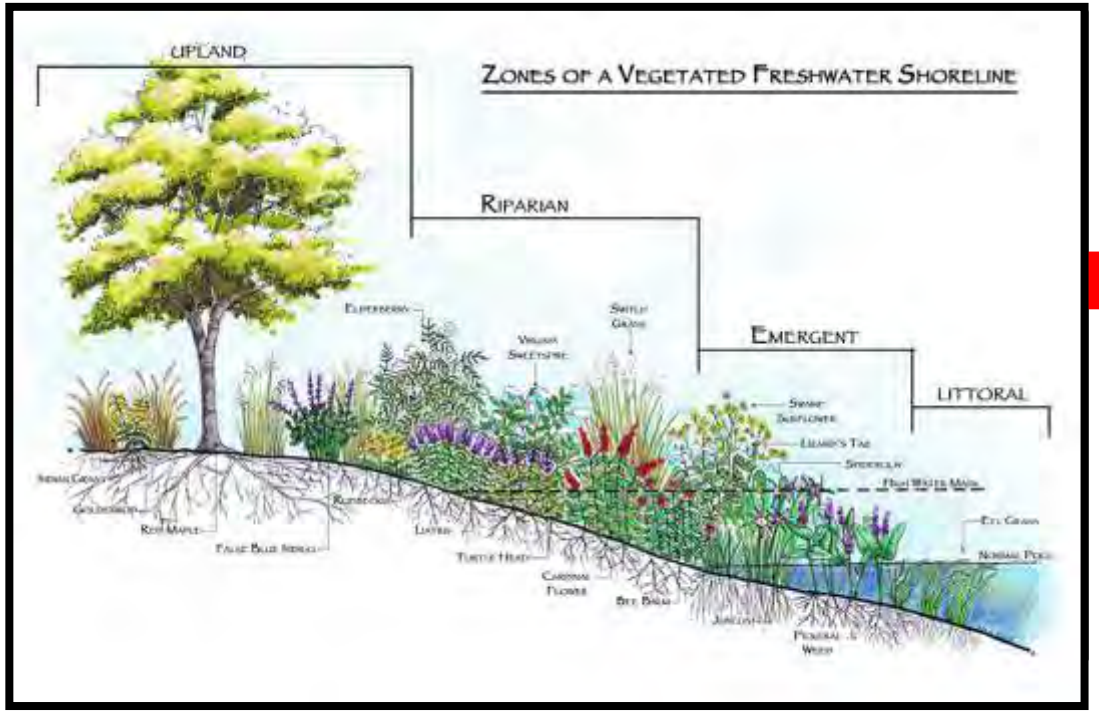


Naturalized Basin Maintenance

- **Vegetation Management**
  - Invasive Species
  - Replant
  - Planting Zones
  - Remove excess organic matter
  - Trash
- **Sediment Buildup - Fix Cause**
  - Basin Erosion
  - Drainage Area Inputs
  - Upstream BMP needs maintenance

- **Excessive Ponding - Standing Water for more than 4 or 5 days**
  - Sedimentation – Clay
  - Amended Soil Issue
  - Compaction
  - Clogging - Subsurface Drain/Underdrain/French Drain
    - Access from clean out or outlet structure
  - High/Low Spots
  - Blocked Outlet
  - Filter Fabric

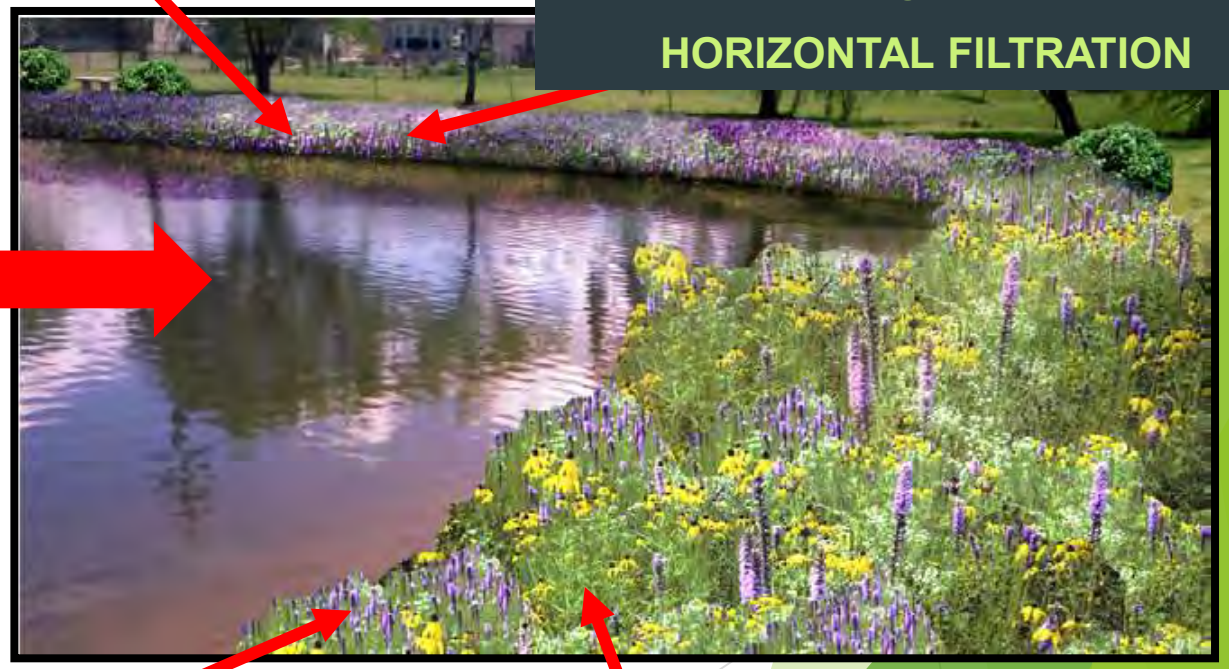
NATURALIZED BUFFERS: HOW THEY WORK



Shoreline protected with deep roots and reduced wave action

Metals, nutrients, oils/grease, sediment, and bacteria is filtered across a vegetative buffer

HORIZONTAL FILTRATION

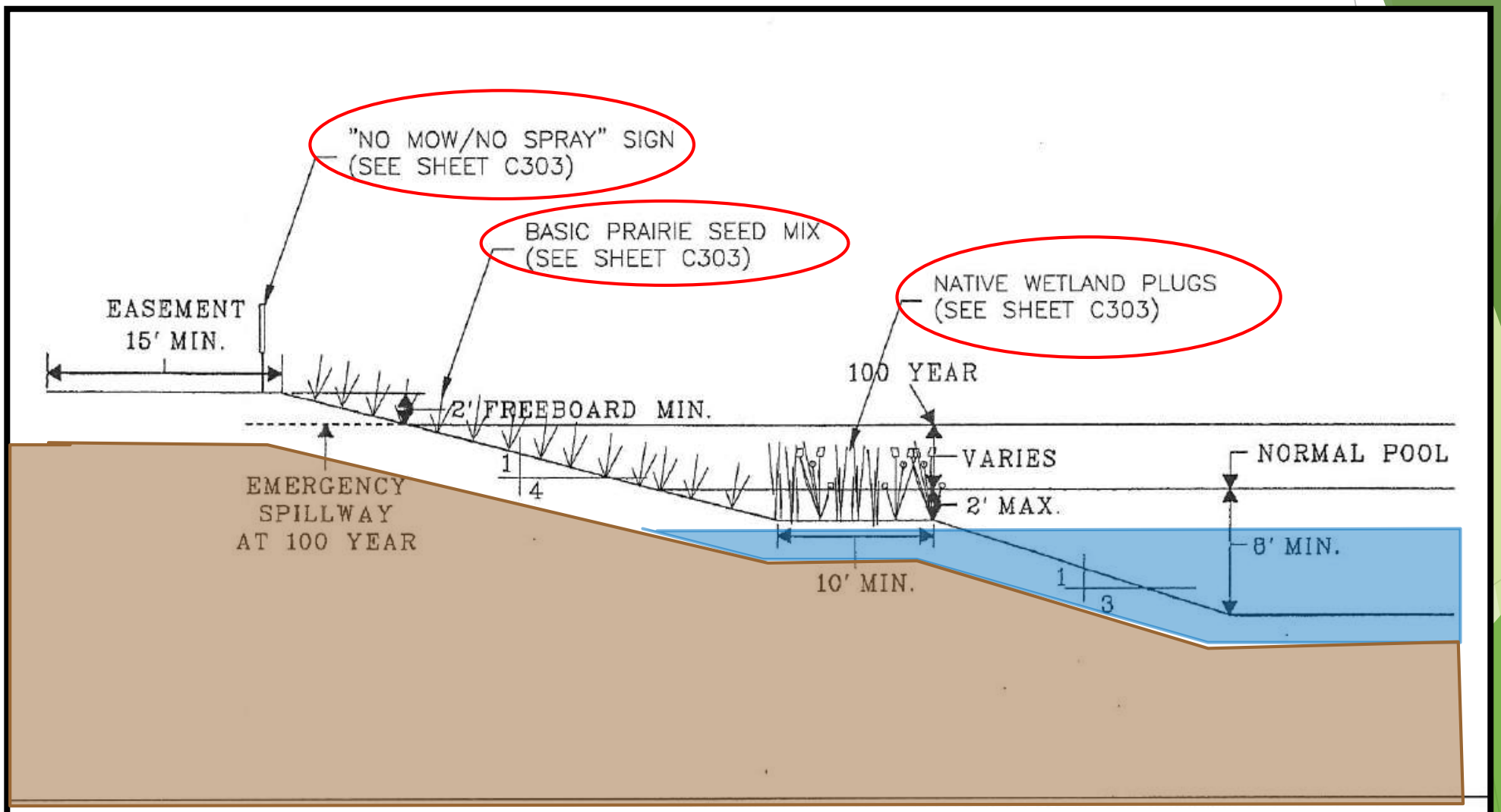


Rough edge deters geese (plays on fear of predators)

Root zone aids in nutrient uptake, microbial activity, and infiltration

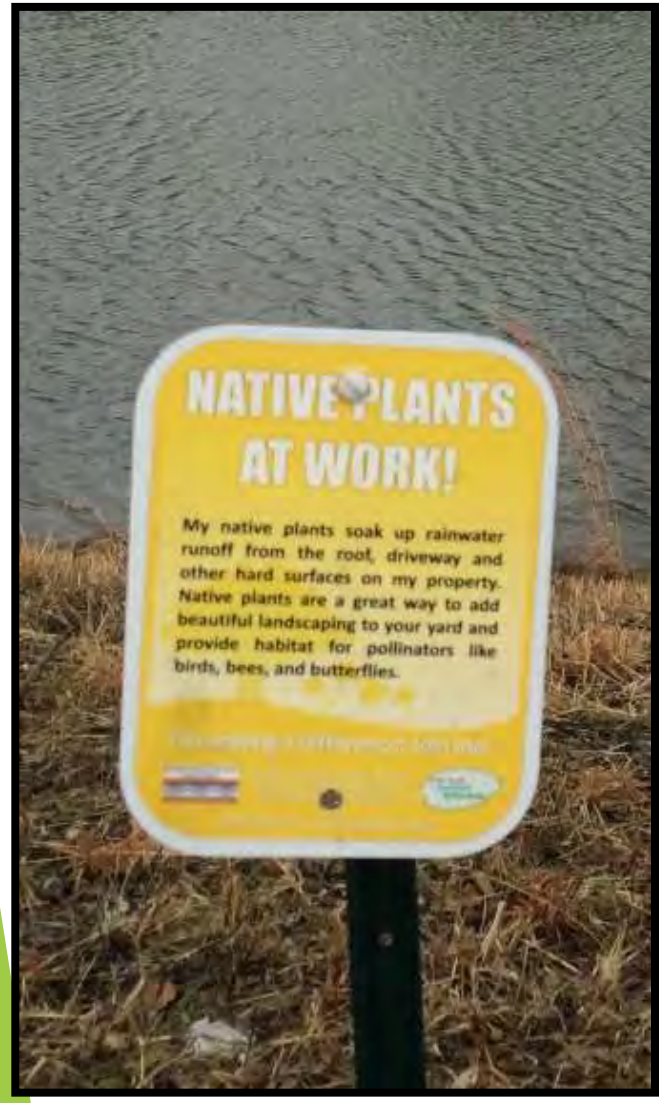
NATURALIZED BUFFERS IN THE LANDSCAPE: PONDS & STREAM BANKS

NATURALIZED BUFFER STANDARDS



POST CONSTRUCTION BMP PLANTINGS

NATURALIZED BUFFER PROTECTION



NATURALIZED BUFFER MAINTENANCE

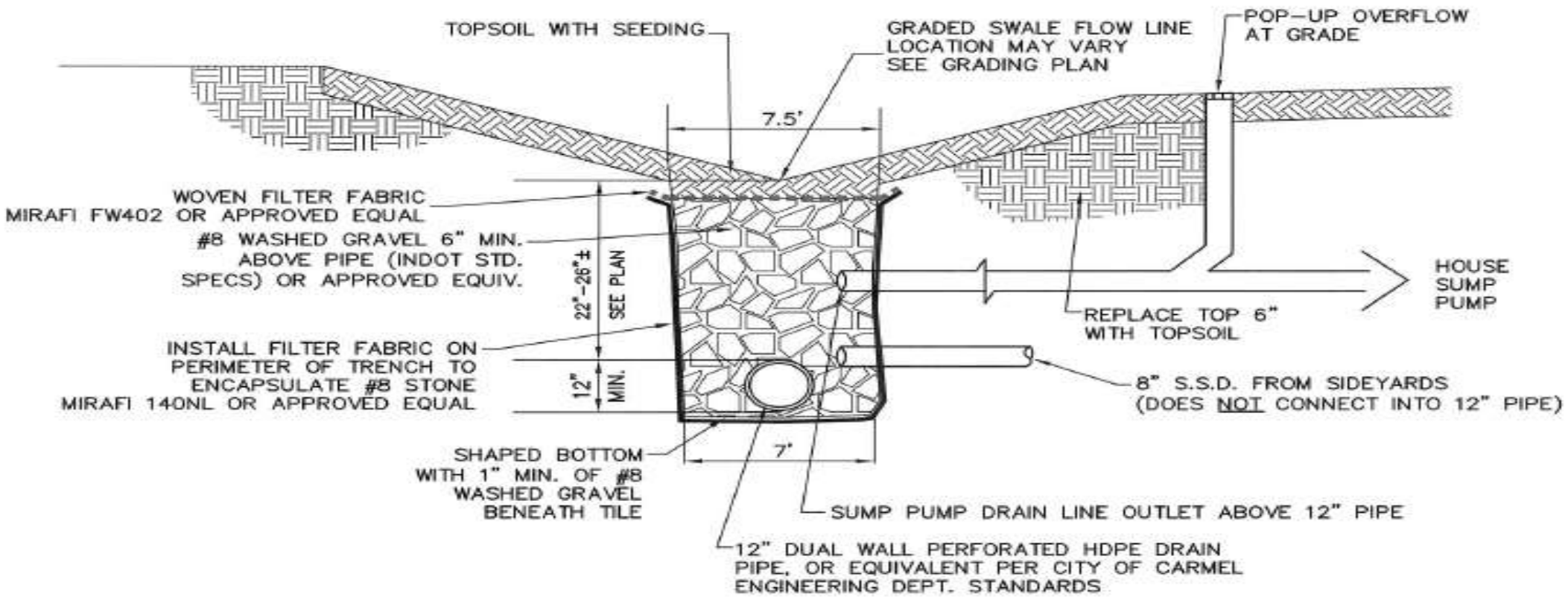
- Remove weeds throughout year
- Mow once per year or prescribed burn
  - Mowing in Spring allows for wildlife habitat through winter
  - Remove cuttings from pond area
  - Make sure mowers are side discharging up the bank
  - Coordinate burn with local fire department

- Ensure protection signage is in place and legible
- Repair erosion spots
- Cattail removal
  - Hand pulling, Rake, Mowing / Cutting, Dredging, Flooding / Freezing

Infiltration Trenches

- Think of a BIG French Drain / Dry Well
  - Large Excavation filled with stone
  - Exposed or Covered

INFILTRATION TRENCH: HOW IT WORKS



Infiltration Trench

INFILTRATION TRENCH

INFILTRATION TRENCH

- Home Connections
  - Sump
  - Roof
  - Area Inlets
  - Cleanouts

O&M MANUAL

Shoshone Drive Residential Redevelopment

SE Corner of Shoshone Drive & Oswego Road
Carmel, Indiana 46032

Job #: 08L-001

Date: 10/24/17
Revised: 04/18/17
Revised: 05/03/17
Revised: 05/22/17

Prepared by: Kyle Blanck
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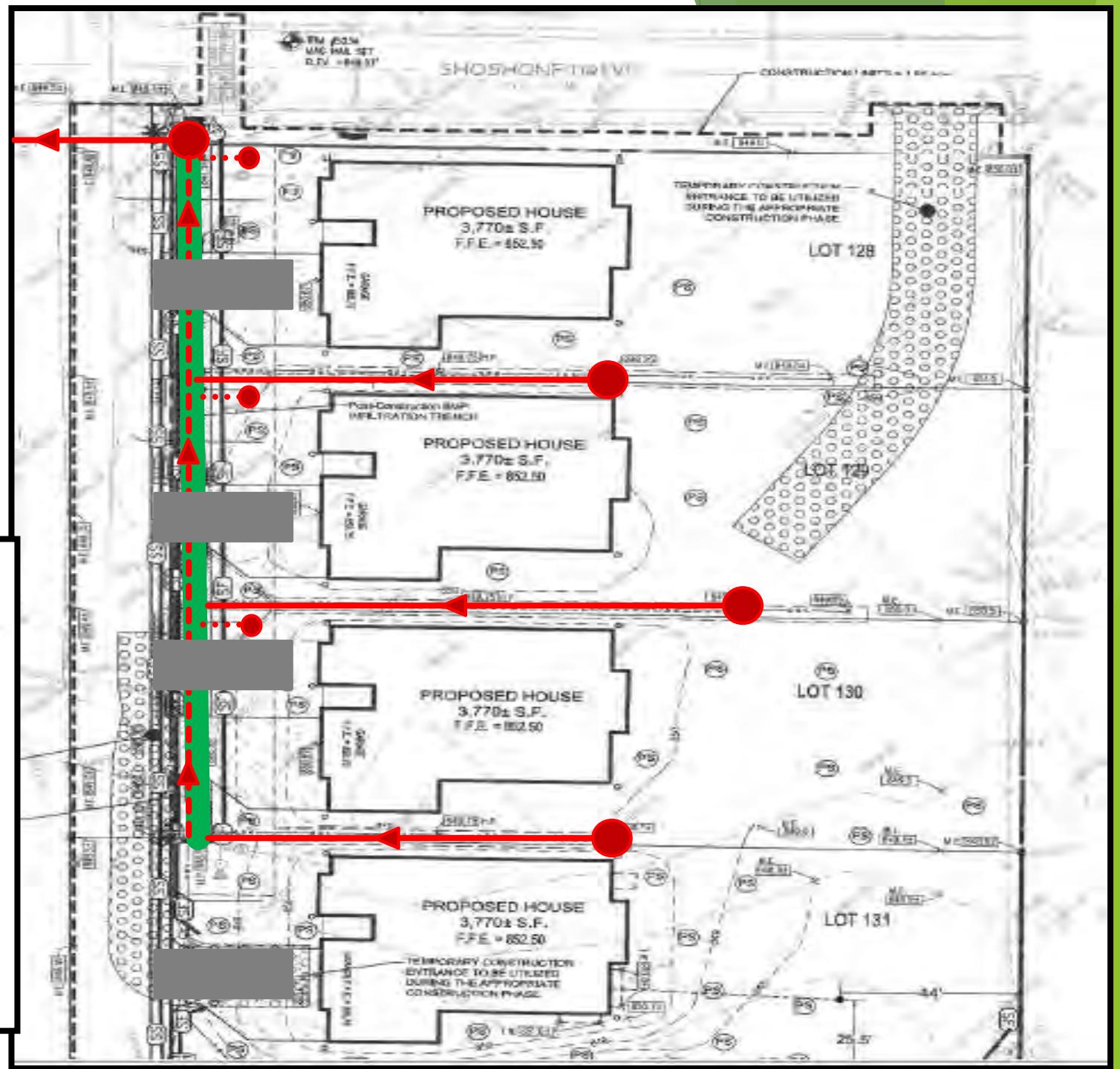

INFILTRATION TRENCH