

Stormwater Pond Inspection and Maintenance



Charleston Area Stormwater Pond Conference
Trident Technical College, North Charleston, SC
May 22, 2014

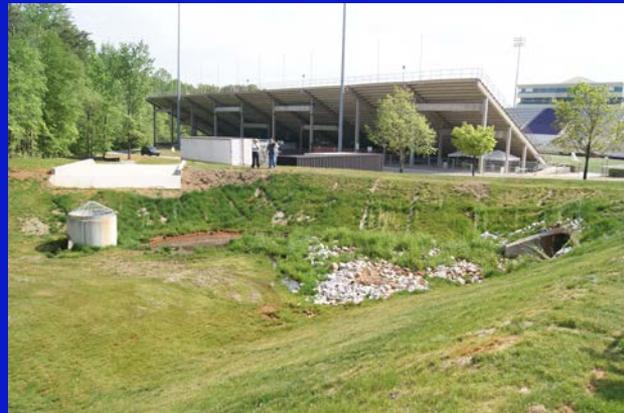


Good stormwater pond performance requires:

- Proper design and planning
- Appropriate pond and land management strategies
- Vegetation in the right places
- Routine and thorough inspection
- The “M” word = MAINTENANCE!!!

Components of a Stormwater Pond

- Inlet and outlet control structures
- Forebay?
- Permanent wet pool
- Temporary pool
- Aquatic bench or littoral shelf
- Emergency spillway
- Maintenance access



Pond Inlet and Outlet Structures

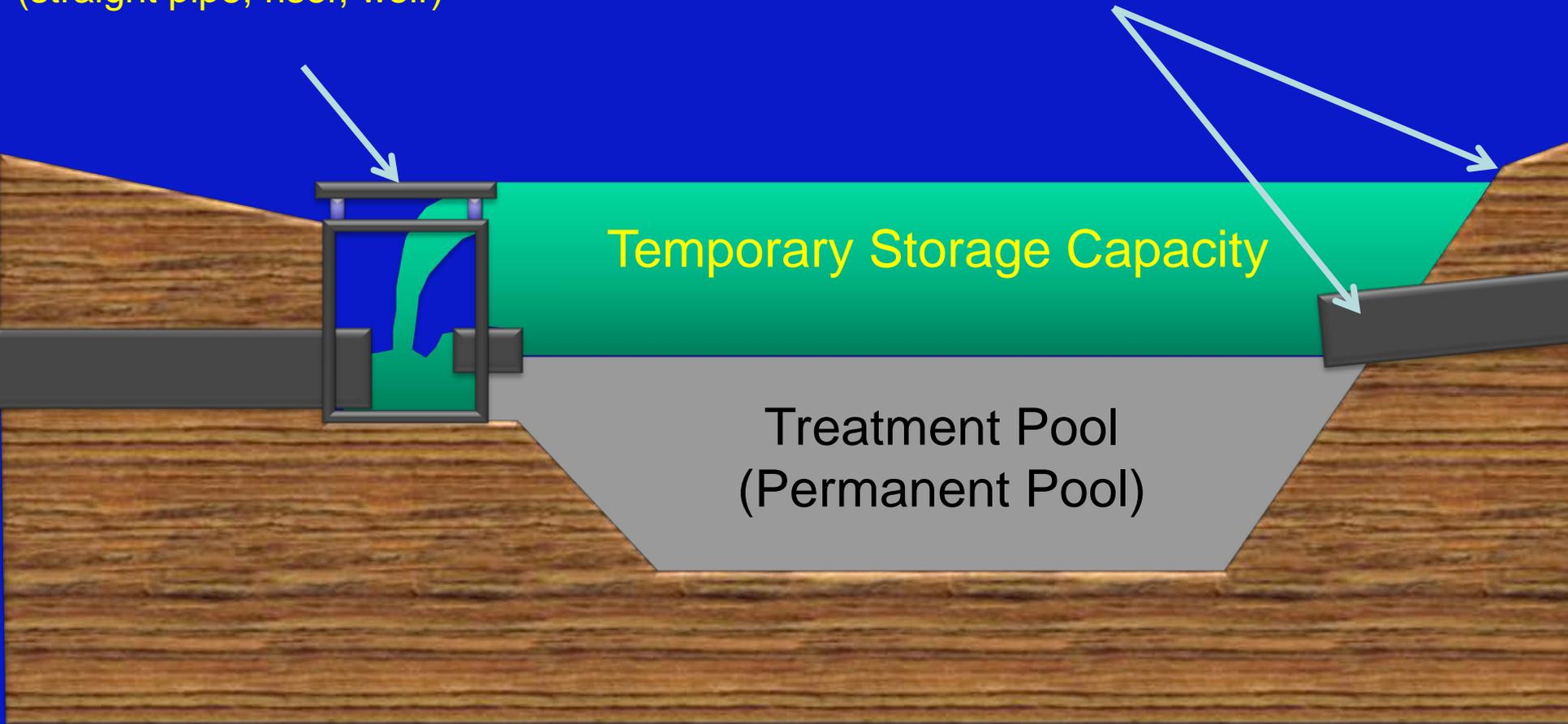


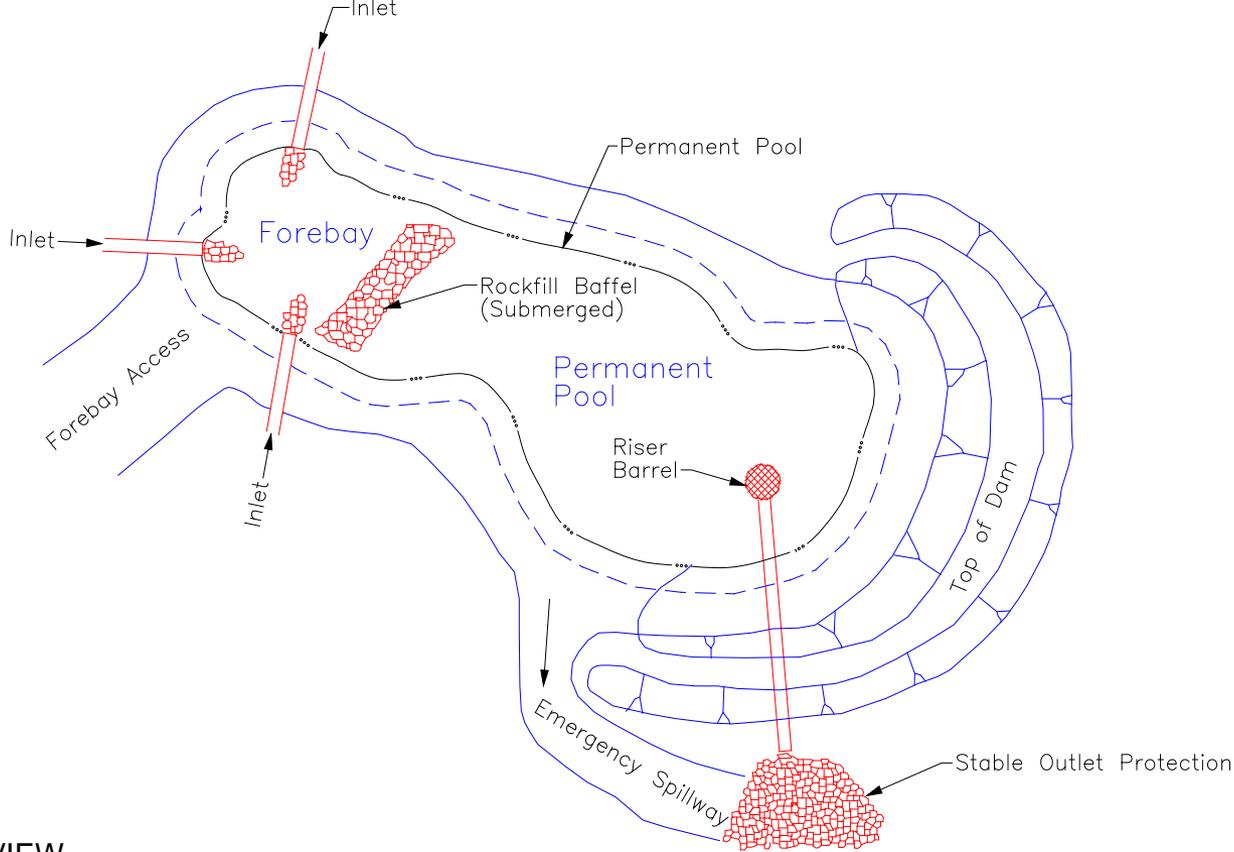
Wet Ponds with Forebays



**OUTLET CONTROL
STRUCTURE**
(straight pipe, riser, weir)

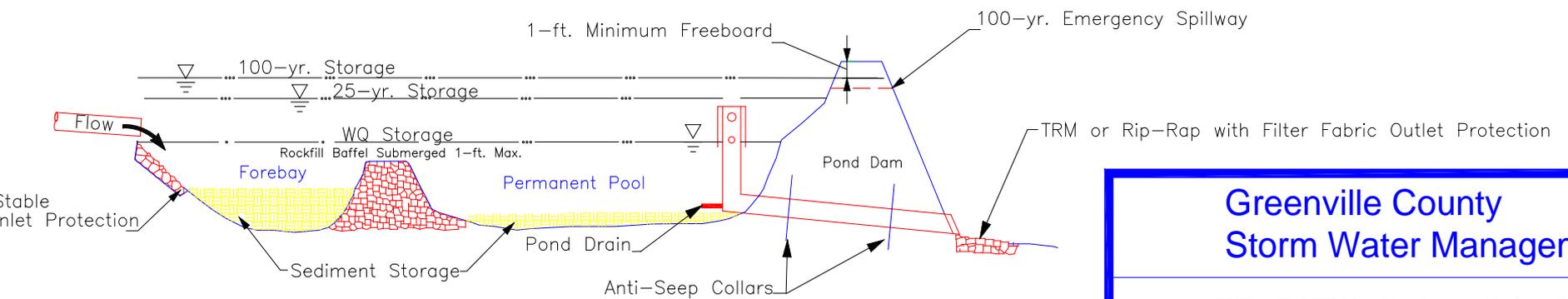
INLETS (from swales between
houses or catch basins in roads)





- Forebay
- Permanent wet pool
- Aquatic bench or littoral shelf
- Flow length
- Low flow orifice
- Emergency spillway
- Maintenance access

PLAN VIEW



**Greenville County
Storm Water Management**

WET DETENTION POND

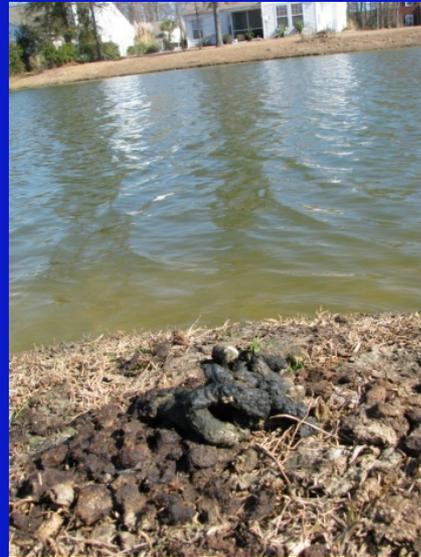
STANDARD DRAWING NO. WQ-01 Page 1 of 2

APPROVED BY: _____ JANUARY, 2018

PROFILE

Time for Inspection!

- Vegetation
- Nuisance animals / wildlife
- Water quality
- Pond structures
- Aeration devices
- Access and safety



Stormwater Pond Semi-Annual Inspection Checklist*



Inspector: _____

Date: _____

Pond Number: _____

Inspection Items:	Checked?	Maintenance Needed?	Comments
	Y/N/NA	Y/N	
Vegetation (§ 4.0)			
1. Are the boundaries of the buffer being observed? <i>(no mowing to the edge, grass ≥ 6" tall)</i>			
2. Is your shoreline vegetation dominated by one or a few species?			
3. Is your surface water vegetation dominated by one or a few species?			
4. Is your underwater vegetation dominated by one or a few species?			
5. Is there an excessive amount of algae? <i>(less than 20% surface coverage is ideal)</i>			
Wildlife (§ 6.0)			
1. Are there signs of nuisance wildlife? <i>(Geese droppings, beaver dams, burrows, otter slides)</i>			
2. Are there areas of stagnant water that provide a breeding ground for mosquitoes?			
Water Quality (§ 7.0)			
1. Is there trash/debris in nearby storm drains?			
2. Is there trash/debris in the pond or on the shore?			
3. Does your shoreline show signs of erosion? <i>(undercutting, scouring, or slumping)</i>			
4. Are there signs of sedimentation in the pond? <i>(sediment accumulation in pond, decreased available pond volume)</i>			

Pond Structures (§ 1.0)			
1. Are there obstructions at inlets and outlets? <i>(trash, plant debris, construction materials)</i>			
2. Do inlet or outlet structures show signs of wear? <i>(cracked, corroded, or broken pipes)</i>			
Fountains and Aeration (§ 11.0)			
1. Is the aeration system functioning properly? <i>(water is circulating, diffuser is bubbling)</i>			
2. Have any fish kills been reported? <i>(stratification)</i>			
Access and Safety			
1. Is maintenance access to the pond and aeration system free of obstructions? <i>(no trees, no inaccessible fences or gates)</i>			
2. Are fences, gates, and locks in need of repair? <i>(broken or unlocked locks, gates, or fences)</i>			
3. Are there signs of vandalism/graffiti on or around pond structures?			

*Note: This checklist is presented to provide an example. Stormwater pond inspections may need to be performed more frequently and include other inspection items based on the unique conditions present at your pond. It is also good practice to inspect your pond after major storm events.

Credit: Sarah Rollins, College of Charleston MES Program and Clemson's Carolina Clear program

Vegetation

- Vegetated buffer boundaries?
- One species of shoreline plants?
- One species of surface water vegetation? Algae?
- One species of underwater plants? Algae?



Nuisance Wildlife

- Signs of nuisance wildlife?
- Geese and other waterfowl
- Muskrats
- Beavers
- Stagnant water and mosquitoes?



Nuisance Animals and By-Products

- Do not feed wildlife
- Scoop the poop!!



Water Quality

- Trash or debris in storm drains?
- Trash or debris in pond, on shore, or at inlets/outlets?
- Signs of erosion? Sedimentation?



Pond Structures

- Obstructions at inlets or outlets?
- Signs of wear at inlets or outlets?
- Signs of erosion at concentrated flows?



Fountains and Aeration

- Is the aeration system functioning properly?
- Have any fish kills been reported?



Access and Safety

- Is maintenance access to pond, forebay and other components free from obstruction?
- Are fences and/or gate in need of repair?
- Are locks functioning and secure?
- Signs of vandalism or graffiti??



Stormwater Management Strategies

The “M” word = MAINTENANCE!

- Municipal/county SMPs
- Who, what, when, how?
- Developer to homeowner
- HOA/POAs or homeowner?
- Ordinances or neighborhood covenants?
- Education and outreach programs available



Inlet/outlet/spillway Obstructions

- Remove obstructing debris
- Ensure upstream limbs, trash, and other debris are secure or removed
- Remove vegetation and sediment that interferes with flow

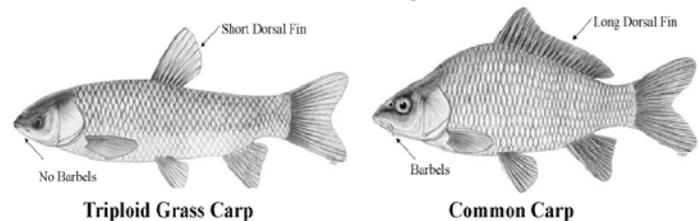


Aquatic Vegetation Removal

- Physical removal
- Chemical herbicides
- Biological control



THIS WATERBODY IS STOCKED WITH
STERILE TRIPLOID GRASS CARP
FOR THE CONTROL OF AQUATIC WEEDS



State Law Section 50-13-1630(D): It is unlawful to take grass carp from waters stocked as permitted by this section. Grass carp caught must be returned to the water immediately. Any bow hunting of grass carp will be classified as "take".

SCDNR
Aquatic Nuisance Species Program
www.dnr.sc.gov/invasiveweeds/



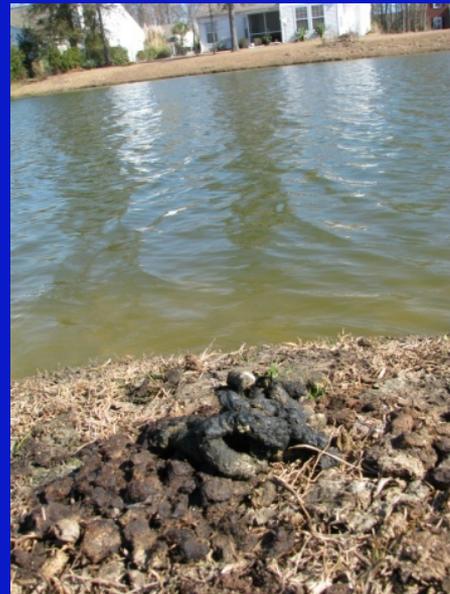
Shoreline Erosion

- Faster sedimentation
- Increased maintenance needs and costs
- Shorter pond life
- Water quality issues
- Critical to identify cause (wind/wave, concentrated flow, etc.)
- And correct it!



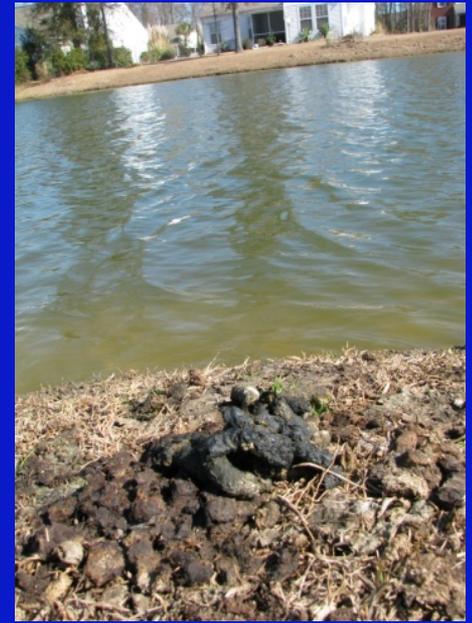
Erosive Hot Spots

- Inlets and outlets
- Forebay berm
- Emergency spillway
- Other concentrated flows



Water Quality

- Recognize pollutants and their sources
- Sediment = erosion?
- Turbidity = clarity
- Fecal matter = bacteria
- Algal blooms, including HABs = nutrients?
- Fish kills = low oxygen?
- Others?



Nutrient Loading and Eutrophication

- **Nitrogen & phosphorus** are major nutrients associated with **nonpoint source pollution**
- Waters can be **nitrogen-** or **phosphorus-limited**
- Can encourage **eutrophication**, which can potentially cause **algal blooms**, reduced dissolved oxygen (DO) levels
- Fish kills can be caused by **harmful algal blooms (HABs)** or **low DO**



Vegetated Buffers

- **Buffers**: corridors of native vegetation along rivers, streams, and tidal wetlands that protect waterways by providing a transition zone between upland development and adjoining surface waters (SC DHEC-OCRM, 2002).



Vegetated Buffers

- Prevent erosion
- Long lasting
- Low maintenance
- Adaptable
- Self-sustaining
- Provide added water quality treatment



Stormwater Pond Buffers

- Vegetated buffer strips
- Don't mow to the edge
- Stormwater collection and pre-treatment
- Littoral shelves or aquatic “benches”



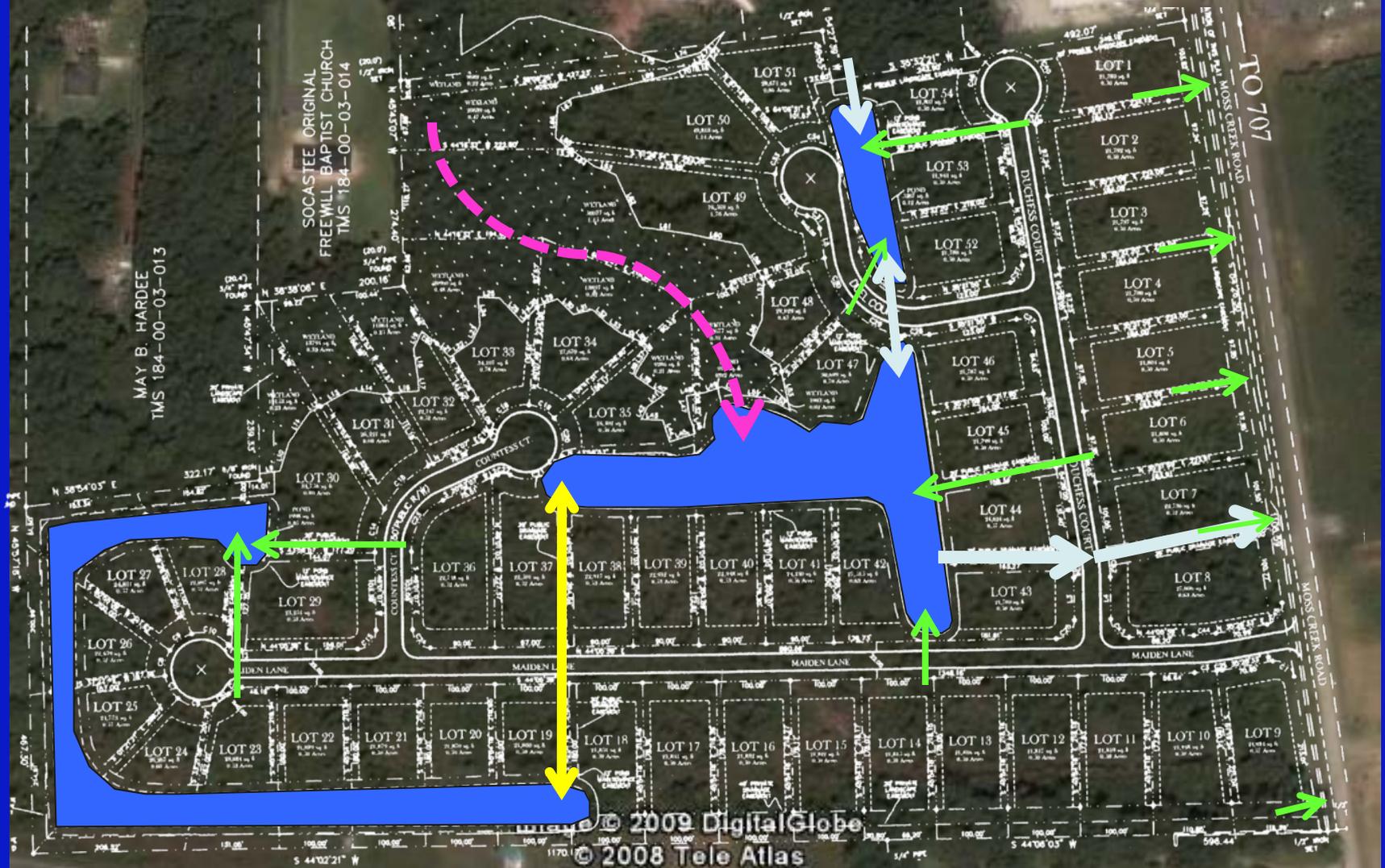
“Bottom-Line” Benefit of Buffers = **TO PROTECT WATER QUALITY!**





huh much better!!!
This looks like a great place for
a vegetated buffer strip...

Stormwater Pond Routing

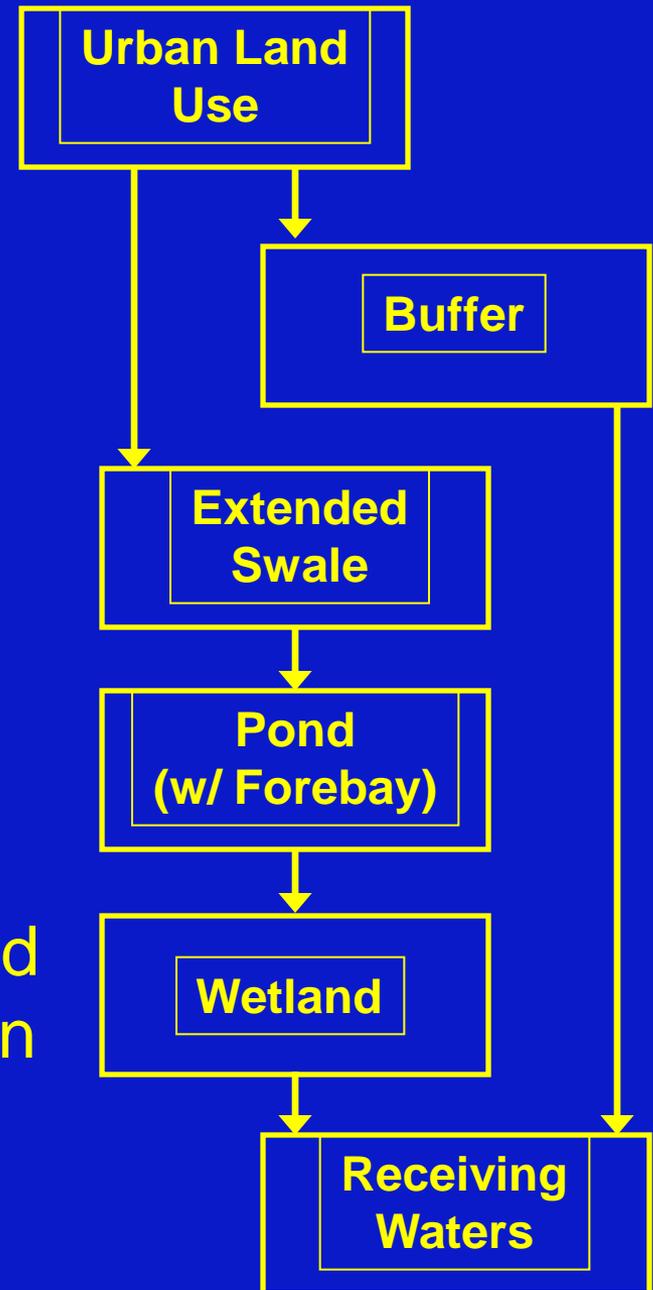


Credit: Ben Powell, Clemson University

100%

Get on and ride the “Treatment Train”!!

- Some BMPs are better than others for certain pollutants
- Consider the connectivity of BMPs
- Front-end sediment collection; i.e., forebays or traps
- Vegetated BMPs can be overloaded so should be toward the end of train



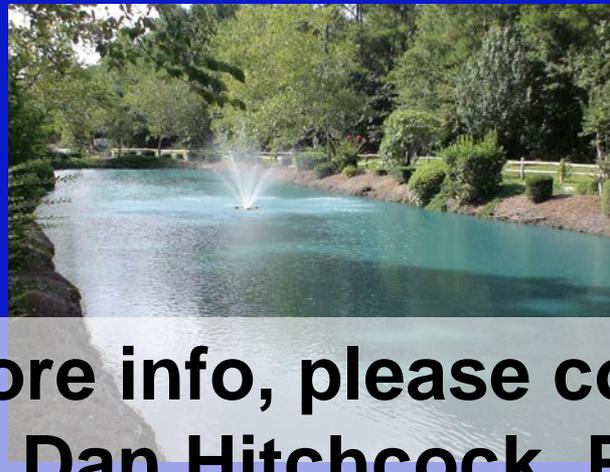
Complimentary or Alternative Stormwater Management Practices

- **Conveyance:**
 - Open channel (swales and ditches)
- **Storage:**
 - Stormwater wetlands
 - Rainwater harvesting
 - Green roofs
- **Infiltration**
 - Pervious surfaces
 - Rain gardens or Bioretention





??? Questions ???



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