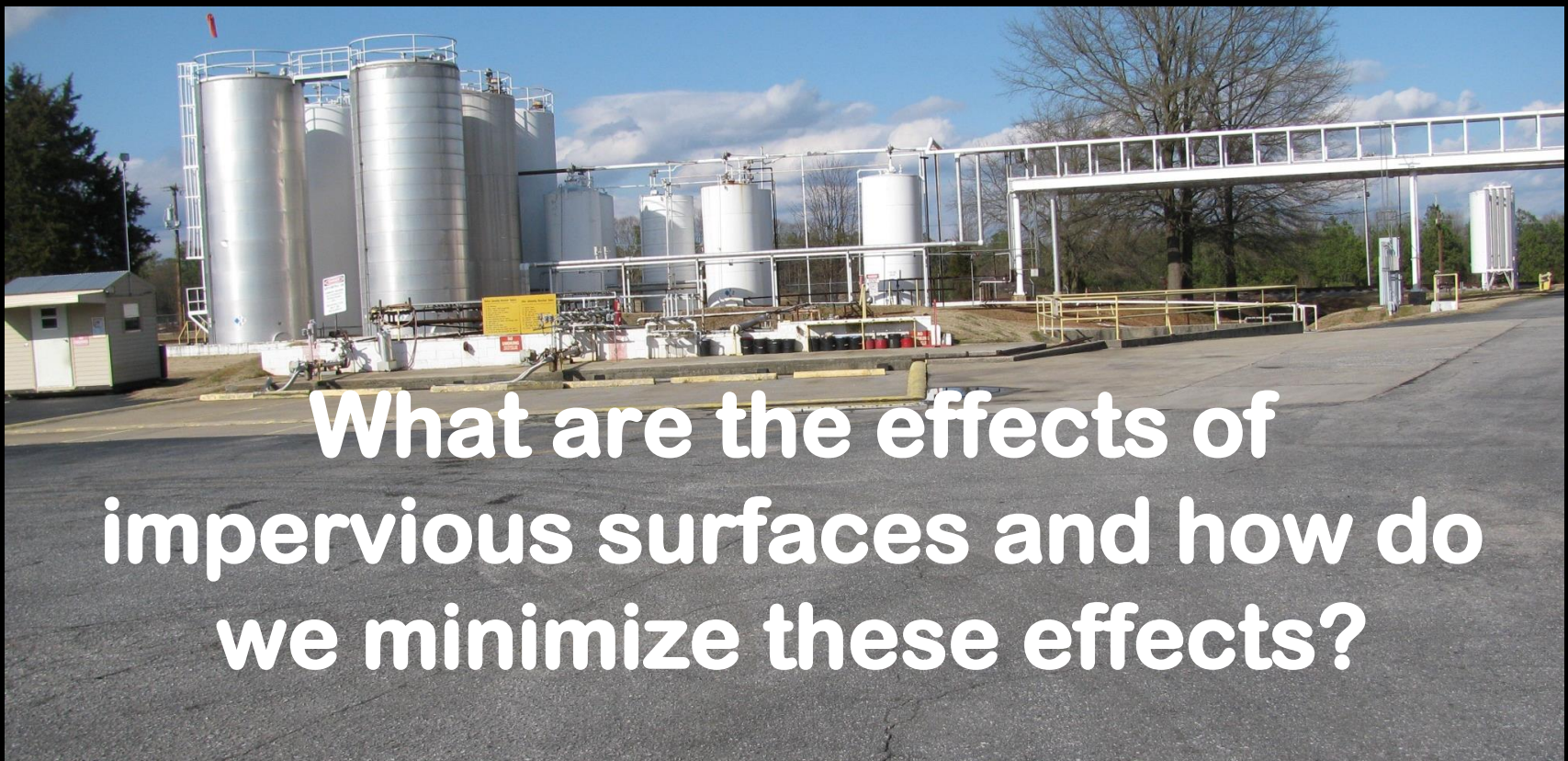




Industrial User's Training Part 3 - Greenville County NPDES Phase I Storm Water MS4 Permit



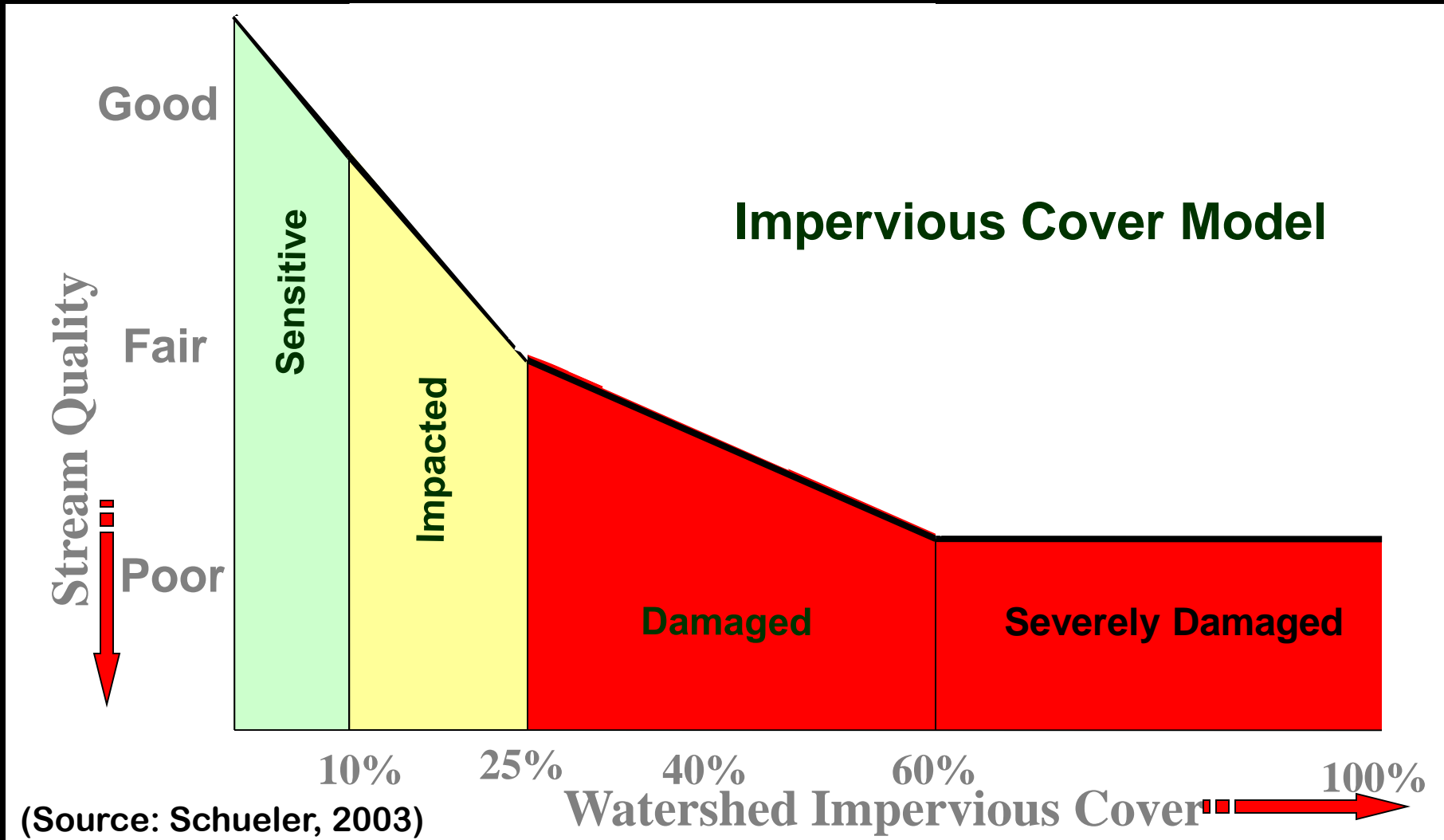


What is a watershed?

- **A watershed can be defined as the area of land that drains to a particular point along a stream.**
- **Topography is the key element affecting this area of land. The boundary of a watershed is defined by the highest elevations surrounding the stream. A drop of water falling outside of the boundary will drain to another watershed.**



Impervious Cover & Stream Quality





How do impervious surfaces affect the watershed?

- **Water that can not soak into the ground because of the construction of buildings, roads and parking lots flows with more speed and intensity during storm events because it is unable to percolate through the soil.**
- **This water carries sediment from un-vegetated areas and pollutants from anything it comes in contact with.**



What are the most common pollutants storm water comes in contact with?

- Total Suspended Solids (TSS)
- Total Phosphorus (TP)
- Total Nitrogen (TN)
- Nitrate Nitrogen
- Heavy Metals
- Bacteria
- Copper (Cu)
- Lead (Pb)
- Zinc (Zn)
- Hydrocarbons (Oils & Greases)
- Organic Carbon
- Soluble Phosphorus (Soluble P)
- Chemical Oxygen Demand (COD)



The following Best Management Practices (BMPs) help minimize these pollutants getting to our waterways:

- **Wet ponds**
- **Dry Ponds**
- **Bioretention areas**
- **Enhanced Grass Swales**
- **Vegetative Conveyances**
- **Other Permanent Water Quality BMPs**



The Following Common Maintenance Items Apply to All Best Management Practices (BMPs)

- **Routinely inspect entire BMP including structural components such as inlet(s), outlet(s), emergency spillway, and riser (including orifice(s) and trash rack) and any other components**
- **Remove trash and debris**
- **Maintain a stable site to prevent erosion of sediment to the BMP – typically vegetation and planting area maintenance**



Wet Ponds

- **Wet storm water ponds are constructed storm water basins that have a permanent pool or micro-pool of water. Runoff from each rain event is detained and treated in the pool and released at a designed rate.**





BMP Wet Pond Maintenance

- **Routinely inspect pond and structural components – including inlet(s), outlet, emergency spillway, and riser – including orifice(s) and trash rack**
- **Remove trash and debris**
- **Maintain pond vegetation to prevent erosion of slopes**
- **Ensure stable outlet and emergency spillway**
- **Minimize mosquito potential by**
 - **preventing stagnant water – may require aeration or a fountain/pump**
 - **presence of fish and birds (not Canada geese)**



Dry Ponds

- **Provide temporary storage of storm water runoff to reduce downstream water quantity impacts.**
- **Designed to completely drain following a storm event and are normally dry between storm events.**
- **Less costly than wet ponds because less excavation is required.**





BMP Dry Pond Maintenance

- **Routinely inspect pond and structural components – including inlet(s), outlet, emergency spillway, and riser – including orifice(s) and trash rack**
- **Remove trash and debris**
- **Maintain pond vegetation to prevent erosion of slopes**
- **Ensure stable outlet and emergency spillway**
- **Ensure pond drains in an appropriate time – typically within 72 hours**
- **Prevent woody vegetation growth, especially around pond berms and outlet structures**



Bioretention Areas

- **Bioretention areas are designed to mimic natural forest ecosystems with a combination of soil filtration and plant uptake by utilizing a planting soil layer, mulch, plantings and a subsurface under drain system.**



<http://www.clemson.edu/extension/county/greenville/programs/horticulture/raingarden.html>



BMP Bioretention Area Maintenance

- **Routinely inspect bioretention area and structural components – including inlet(s), outlet, emergency spillway, under drain, and clean-outs**
- **Remove trash and debris**
- **Ensure stable outlet and inlet**
- **Maintain healthy vegetation**
- **Remove invasive plants**
- **Maintain mulch**



Enhanced Grass Swales

- **Conveyance channels engineered to capture, treat and release the storm water quality runoff volume from a particular drainage area. Enhanced swales are different from normal drainage swales in that they have a designed structure implemented in them to enhance detention and storm water pollutant removal.**





BMP Enhanced Grass Swale Maintenance

- **Routinely inspect enhanced grass swale and associated structural components (if present) – including inlet(s), outlet, level spreader, energy dissipators, check dams, and forebay**
- **Remove trash and debris**
- **Maintain swale vegetation to prevent erosion, ensure design vegetation height and type is maintained**
- **Inspect underdrain(s), if present**



Vegetative Conveyances

- **Open vegetative conveyances can be designed and installed as an alternative to curb and gutter and hard piping storm water conveyance systems. Vegetative conveyances improve water quality by providing partial pollutant removal as water is filtered by the vegetation and by the opportunity to infiltrate into the soil.**





BMP Vegetative Conveyance Maintenance

- **Routinely inspect vegetative conveyances and associated connection points to other BMPs or traditional pipe systems**
- **Remove trash and debris**
- **Maintain vegetation to prevent erosion**



Questions about Storm Water Management Structures?

- If you have general questions about what care and maintenance Greenville County requires for permanent structures contact the Land Development Division at 864-467-4610 or visit the website at: http://www.greenvillecounty.org/Land_Development/
- For help in developing a maintenance plan or for evaluating the condition of a storm water management structure contact a licensed Professional Engineer.



End of Part 3

To determine how much you learned and to document the completion of this training module, please complete Quiz 3.