

# Selecting Stormwater Quality Controls

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# The Stormwater Phase II Permit (MCM 5)

## 4.2.5 Post-Construction Storm Water Management in New Development and Redevelopment

4.2.5.1 *Permit requirement.* The permittee shall develop, implement, and enforce a program to address the quality of long-term storm water runoff from new development and redevelopment projects that disturb greater than or equal to one acre, including projects less than one acre that are part of a larger common plan of development or sale, that discharge into the permittee's regulated small MS4. The permittee's program shall ensure that controls are in place that have been designed and implemented to prevent or minimize water quality impacts by reasonably mimicking pre-construction runoff conditions on all affected new development projects and by effectively utilizing water quality strategies and technologies on all affected redevelopment projects, to the maximum extent practicable. The permittee shall assess site characteristics at the beginning of the construction design phase to ensure adequate planning for storm water program compliance. The purpose for this approach is to arrive at designs and practices that provide for most effective water quality treatment through infiltration, flow rates and similar site-design opportunities. As part of the SWMP document, the post-construction runoff control program shall include the following information, at a minimum:



# The Phase II Permit (MCM5)

- Mimick pre-construction runoff conditions on new development, to MEP
- Effectively use water quality strategies and technologies on redevelopment, to MEP
- Assess site characteristics at the beginning of design phase
- Arrive at designs and practices that provide most effective water quality through infiltration, flow-rates, and site-design opportunities.



# New vs. Redevelopment

- New Development:
  - “Maintain pre-construction runoff condition” = LID
- Redevelopment:
  - “Utilize water quality strategies and technologies to the MEP” = Use green infrastructure to improve the runoff condition



# MSD Regulations

- Water treatment
  - TSS, metals, nutrients
- Volume Reduction
  - Hydrology of smaller storms
- Channel Protection
  - Extended detention of 1-yr storm
- Flood Protection
  - Peak flow detention (2 & 100-yr storms)



# MSD BMP Toolkit

[www.stlmsd.com](http://www.stlmsd.com)

BMP Technology	Performance/Function			
	Volume Reduction	Water Quality Treatment	Channel Protection Storage	Peak Flood Detention Storage
Bioretention	Yes	Yes	Yes	Yes
Porous Pavement	Yes	Yes	Yes	Qp <sub>v</sub> Reduction Only*
Rainwater Harvesting	Yes	WQ <sub>v</sub> Reduction Only	CP <sub>v</sub> Reduction Only*	Qp <sub>v</sub> Reduction Only*
Green Roof	Yes	WQ <sub>v</sub> Reduction Only	CP <sub>v</sub> Reduction Only*	Qp <sub>v</sub> Reduction Only*
Sheet Flow to Buffer (Credit)	Yes	Yes	CP <sub>v</sub> Reduction Only*	Qp <sub>v</sub> Reduction Only*
Sand/Perlite Filters	No	Yes	No	No
Stormwater Ponds and Wetlands	No	Yes	Yes	Yes
Proprietary BMPs	No	Technology Dependent	Technology Dependent	Technology Dependent
Open Channel Use (Credit)	No	Yes	No	No
Dry Detention Basin	No	No	Yes	Yes



# Volume Reduction

- Runoff volume is part of the “runoff condition”
  - MO permit emphasizes infiltration and similar practices that reduce runoff volume
  - EPA guidance specifically addresses runoff
    - “No discharge from storms <95<sup>th</sup> percentile daily rainfall”
    - “Reduce runoff: slow it down, spread it out, soak it in”
    - “LID works everywhere”
- Required practices
  - Bioretention (rain gardens), green roofs, rainwater harvesting, permeable pavements, sheet flow to buffers
- SW Management: it’s not just TSS, metals, and bacteria - volume is the new pollutant.





# Early Planning is Critical

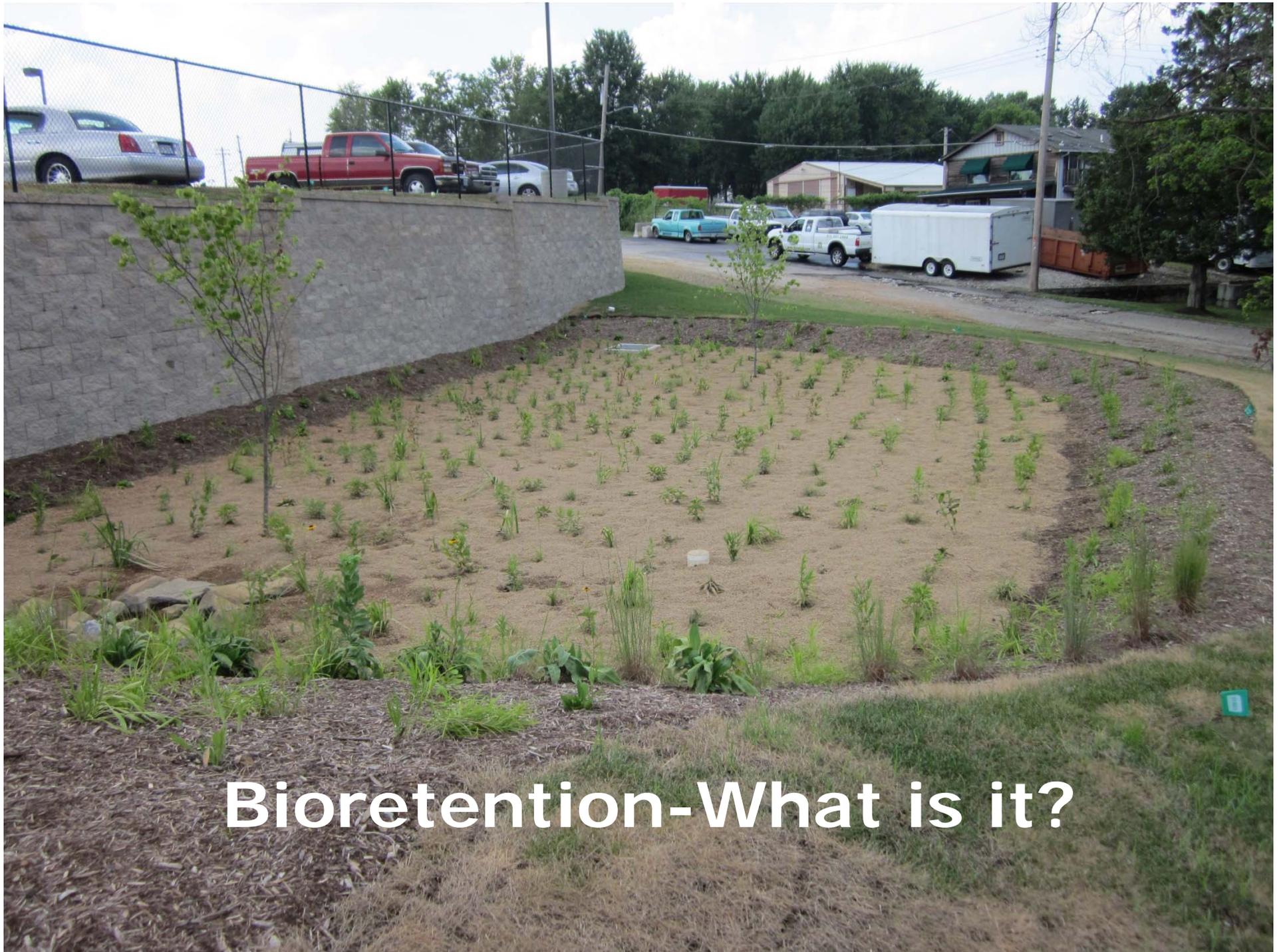
- Site Design Guide
  - ID existing natural resources
  - Develop a concept development plan
  - Coordinate construction & post-construction BMPs
- Greenspace: it's important to site design
- Lessons:
  - Have a water quality plan with the land disturbance plan
  - Integrating greenspace and impervious area saves dollars & headaches



# Rain Gardens & Bioretention

- MSD Toolkit References
  - Bioretention
- GI Guide References
  - Bioretention
  - Rain gardens
  - Tree box and tree vault
  - Bioswales





**Bioretention-What is it?**



**Bioretention-Does it work?**

# Rain Garden



QUALITY  
SERVICE  
ALWAYS



# Bioswales



QUALITY  
SERVICE  
ALWAYS



# Permeable Pavement

- MSD Toolkit References
  - Porous Pavement
    - Porous Asphalt
    - Permeable Concrete
    - Permeable Interlocking Concrete Pavers
- GI Guide References
  - Pervious Pavements



# Porous Asphalt



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# Permeable Concrete



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# PICP



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# Rainwater Harvesting

- MSD Toolkit References
  - Rainwater Harvesting
- GI Guide References
  - Rain Barrels
  - Cisterns



# Rainwater Harvesting

- Cisterns
  - SCM →



- Rain Barrels
  - Public Outreach →



# Green Roofs



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# Wetlands and Wet Ponds

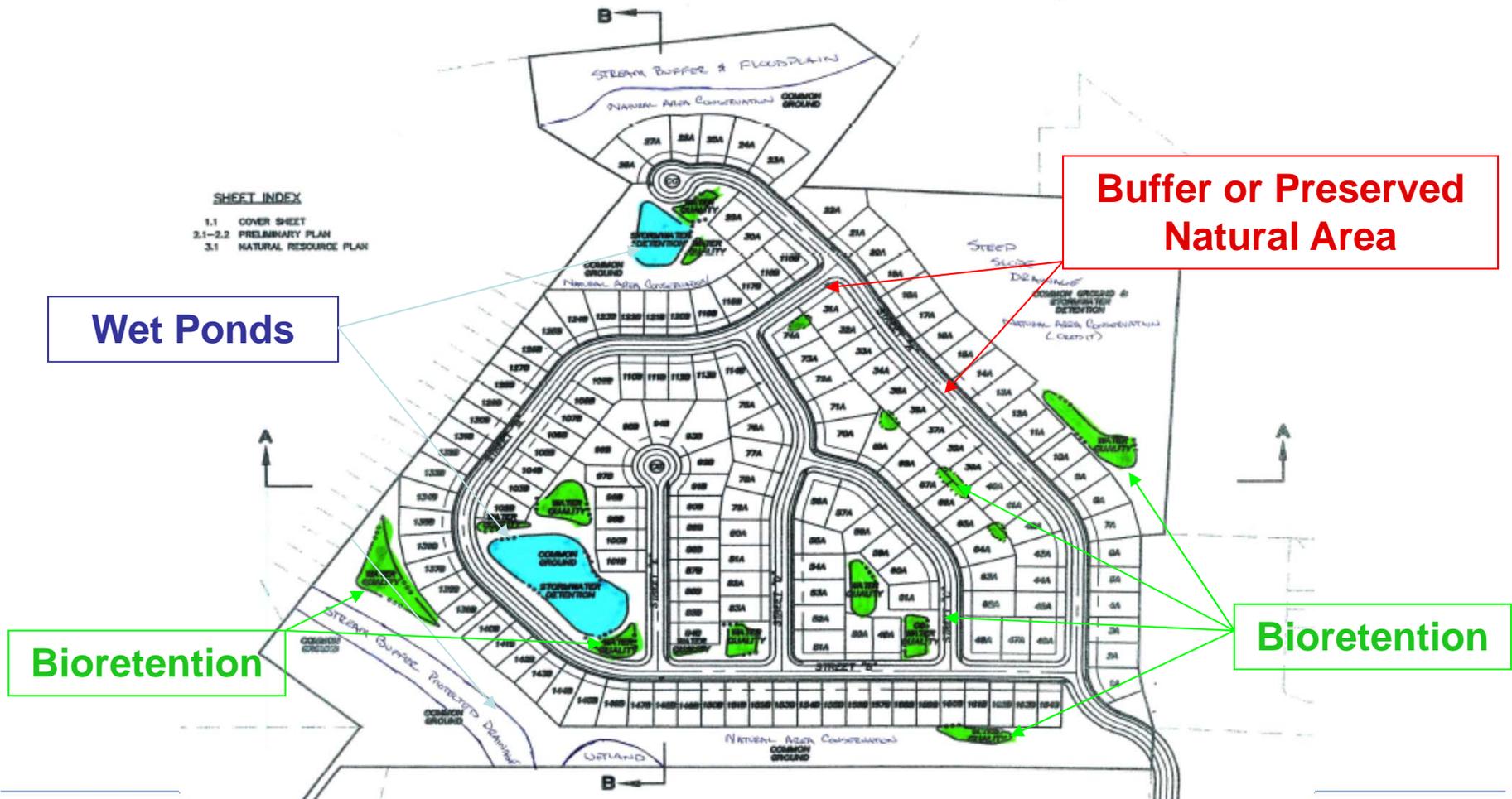
**Pre-Stormwater Quality  
“Retention” Pond**



**Stormwater Quality  
Wet Pond**



# Integrated Green Infrastructure



**QUALITY SERVICE ALWAYS**



# Benefit of Green Infrastructure

- Use planning strategies to identify, protect, and enjoy natural resources
- Use multiple stormwater control practices within the watershed, to better mimic natural runoff conditions
- Wetlands and ponds at the lower end of the watershed provide channel protection, flood detention, **and recreation!**

