Determining and Analyzing Storm Water Outfalls Using GIS

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Outline

• SD1 History
• Regional Storm Water Management Program
• Storm Water Outfalls
• Determining Where Outfalls Discharge
• Ownership of Outfalls
• Open Outfalls and Spatial Analyst
SD1 History

• Second largest public sewer utility in Kentucky
  – Established in 1946
  – Expanded responsibilities in 1994
  – Entered into Federal Court Order mandate with U.S. EPA in 2007

• Sanitary Stats
  – Service Area of more than 220 square miles
  – 1600 miles of sanitary sewer lines
  – 145 pump stations, 2 treatment plants
  – 15 flood control pump stations
  – Approximately 100,000 customer accounts
Regional Storm Water Management Program

- 1998 SD1 asked to serve as a regional storm water management agency
  - In response to local flooding problems
  - EPA Phase II regulations were on the horizon.

- SD1 Initiated Program in 2003
  - Interlocal Agreements with more than 30 Northern Kentucky communities
  - NPDES Storm Water Phase II Regs

- Began Assuming Ownership Over Storm Water Assets in 2009
  - Almost 29,000 structures
  - 400 miles of storm sewer
Storm Water Outfalls

• What is an outfall?
  – The point where storm water outlets to waters of the United States.
    • Closed
    • Open
  – Not considered an outfall
    • Drains to Combined Sewers
Examples of Storm Water Outfalls

Closed Outfall

Piped Storm System

Outfall

Blue-Line Stream
Examples of Storm Water Outfalls

Open Outfall

- Drainage Swale
- Outfall
- Blue-Line Stream
Examples of Storm Water Outfalls

• Guidelines
  – Not every pipe outlet is an outfall
  – An outfall cannot drain into another outfall
Storm Water Outfalls

• Why keep track?
  – NPDES Storm Water Phase II Regulations
  – Dry Weather Inspection

• Major Outfalls
  – Pipe opening 36” or greater
  – 7.07 square feet or greater
  – Draining area of more than 50 acres
Determining Where Outfalls Discharge

- **Storm Water Layer**
  - System wide inventory in 2002
  - 108,000 structures & 640 miles of pipe
  - 9,790 outfalls

- ‘Waters of the Commonwealth’
  - Blue-Line Streams

- **Challenges**
  - 1) Ownership of Outfalls
  - 2) 40,000 structures added
Determining Where Outfalls Discharge
Ownership of Outfalls

- **Challenge One**
  - Previous ownership assignment (Private vs. Public)
  - System wide ownership survey
  - Asset Transfer Agreements
Determining Where Outfalls Discharge
Adding New Structures

• Challenge Two
  – Export layer containing only discharge points
  – ‘Select by Location’
    • Buffer on Blue-Line Layer
  – Desktop Exercise
Open Outfalls and Spatial Analyst

• Major Open Outfalls
Open Outfalls and Spatial Analyst

- Required Data
  - DEM (Digital Elevation Model)
  - Feature Pour Point Data
Open Outfalls and Spatial Analyst
Open Outfalls and Spatial Analyst

- Convert Raster to Polygon
Open Outfalls and Spatial Analyst

Calculate Area
Open Outfalls and Spatial Analyst

Convert Square Feet to Acres
Open Outfalls and Spatial Analyst

126.47 acres
Results

• Original Inventory: 9,790 outfalls

• Ownership & New Development
  – SD1: 3,532 outfalls (213 Major)
  – KYTC (State of Kentucky): 670 outfalls (74)

• Open Outfalls
  – SD1: 44 outfalls (12)
  – KYTC: 32 outfalls (15)
Results

Northern Kentucky Regional Phase II Program

MS4 Designated Storm Water Outfalls

Legend
- MS4 Designated Outfalls
- Major Outfalls (225)
- Minor Outfalls (3,350)
- SW Permit Compliance Area
- Streams
- County Boundary

Watersheds
- North Basin
  - Dry Creek
  - Elighs Creek
  - Ohio River North
  - Pleasant Run Creek
  - Sand Run
  - Woolper Creek
- Central Basin
  - Banklick Creek
  - Licking River
  - Three-mile Creek
- West Basin
  - Big Bone Creek
  - Gunpowder Creek
  - Ohio River West
- East Basin
  - Fournie Creek
  - Ohio River East
  - Twelvermile Creek
  - Taylor Creek

Note: The MS4 designated outfalls are open system and closed system outfalls (approximately 3,575) that discharge to "blue-line" streams. The MS4 designated outfalls do not include any KYTC or privately owned outfalls.

Data Source - GIS Layers

MS4 Designated Outfalls
These outfalls were preliminarily defined (ownership) as part of the infrastructure transfer and are subject to change until the transfer process is successfully completed for all co-permitters.
Questions?

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