Southwestern Pennsylvania: Water Quality Compliance through Collaboration

April 14, 2015
American Planning Association Spring Forum

John Schombert, Executive Director
3 Rivers Wet Weather
3 Rivers Wet Weather

- Founded as an independent nonprofit organization in 1998
- Manages federal and state funds to help communities address wet weather issues
- Educates municipal officials
- Cultivates inter-municipal partnerships for cost-effective regional watershed solutions
What We’ll Cover Today

- Background on the Wet Weather Issue
- Municipal Consent Orders, ALCOSAN Consent Decree & Regional Wet Weather Plan
- Strategies for Source Control, Flow Reduction & Green Infrastructure
- Regionalization of the municipal collection systems
Background on the Wet Weather Issue

- Impedes regional economic development
- Directly affects Allegheny County’s primary source of drinking water
- Results in river advisories nearly half of the 140-day recreational season
- As little as one-tenth of an inch of rain can cause sewage overflows
- Sewage overflow annually: 8 billion gallons
Background on the Wet Weather Issue

- 83 municipalities including the City of Pittsburgh serviced by ALCOSAN
- Over 320,000 customers/900,000 population
- Fragmented management of sewage infrastructure hinders development of a solution
The Problem

- Avg. rainfall in Pittsburgh annually: 37.5 inches
- Range of wet weather peak flow, per person:
  - 200-3,000 gallons per day
- As little as one-tenth of an inch of rain can cause sewage overflows
- During dry weather, 60% of the flow to the treatment plant is from inflow and infiltration
- Sewage overflow annually: 8 billion gallons
- ALCOSAN CSOs: 264 SSOs: 52
Deteriorated municipal collection systems
Controlled overflows: CSO or SSO?
Uncontrolled overflow: Manhole
1959: ALCOSAN becomes operational. 30 miles of deep tunnels, over 60 miles of shallow cut interceptors and a treatment plant.
Background on the Wet Weather Issue

♦ Largest municipal public works project ever undertaken by the region
  ♦ Potential $3.6 billion price tag for compliance with ALCOSAN consent decree

♦ Individual municipalities responsible for penalties for compliance
Municipalities sign consent orders in 2004

- Uniform, viable municipal consent order
- Reasonable deadlines
- No penalties for past violations
- State tap-in prohibitions lifted (with compliance)
- Assessment, critical repairs and planning
ALCOSAN Consent Decree

- Negotiated for 8 years with EPA and the U.S. Dept. of Justice
- Lodged in federal court in January 2008
- In the sanitary sewer systems (SSO), ALCOSAN will eliminate all sanitary sewer overflows
- In the combined sewer system (CSO), ALCOSAN must reduce overflows to 4-5 events a year
Current Status

♦ January 2013: ALCOSAN Wet Weather Plan Submitted to EPA
  ♦ Proposes $2 billion Recommended Plan

♦ July 2013: Municipalities submitted feasibility studies as required by municipal consent orders

♦ March 2014: EPA rejected plan
  ♦ Based on affordability
  ♦ Did not meet water quality goals
ALCOSAN Selected Plan

Expanded WWTP Capacity

<table>
<thead>
<tr>
<th>Type</th>
<th>Capacity</th>
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</thead>
<tbody>
<tr>
<td>Primary</td>
<td>600 MGD</td>
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<tr>
<td>Secondary</td>
<td>295 MGD</td>
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</table>

The alignment of all proposed conveyance and the location of all proposed facilities is preliminary and subject to change.
Figure 9-139: ALCOSAN Selected Alternative – Residential Indicators Showing Intra-Municipal Variations
ALCOSAN Recommended Plan

THE ALIGNMENT OF ALL PROPOSED CONVEYANCE AND THE LOCATION OF ALL PROPOSED FACILITIES IS PRELIMINARY AND SUBJECT TO CHANGE.
EPA’s response to ALCOSAN’s Plan

- Willing to consider a more flexible and adaptive plan with conditions:
  - Flow targets
  - Source control
  - Green infrastructure
  - Regionalization

- The region will receive an initial extension on the plan to 2032 to allow integration of these elements

- Progress will be evaluated by EPA every six years
Flow Targets

- System flow monitoring was conducted in 2008
- Computer models were created to identify hydraulic characteristics of the system
- Targets will be established for over 300 points of connection in the ALCOSAN system
Source Control

- During dry weather, 60% of the flow to the treatment plant is from inflow and infiltration.
- Elements to address source control include:
  - Stream removal projects
  - Storage and retention
  - Inflow/Infiltration removal
  - Flow isolation programs
  - Private lateral programs
Green Infrastructure
3RWW GI Project  
Candidate Municipal Project Evaluation Summary  
Nine Mile Run  
October 19, 2012

Total Combined Sewer Area  
785.08 acres  
Total Annual Combined Sewer Area Runoff (RainWays)  
237.25 MG

NOTE: RESULTS ASSUME UNDERFLOW FROM GI PROJECTS IS NOT RETURNED TO COMBINED SYSTEM.

<table>
<thead>
<tr>
<th>Candidate GI Project Parameters</th>
<th>Permeable Pavement</th>
<th>Bioretention</th>
<th>Infiltration Basin</th>
<th>Grass Swales***</th>
<th>Vegetated Filter Strips</th>
<th>Constructed Wetland</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effective Design Area of GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)</td>
<td>3.86</td>
<td>1.51</td>
<td>0.09</td>
<td>0.00</td>
<td>0.00</td>
<td>0.02</td>
<td>5.47</td>
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<tr>
<td>Number of Candidate GI Projects</td>
<td>46</td>
<td>264</td>
<td>9</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>321</td>
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<tr>
<td>Portion of Drainage Area Tributary to Candidate GI Projects (acres)</td>
<td>77.50</td>
<td>77.74</td>
<td>4.58</td>
<td>0.00</td>
<td>0.00</td>
<td>1.31</td>
<td>161.12</td>
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<tr>
<td>Annual Combined Sewer Area Runoff Captured (MG)*</td>
<td>30.19</td>
<td>18.93</td>
<td>1.49</td>
<td>0.00</td>
<td>0.00</td>
<td>0.28</td>
<td>50.88</td>
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<tr>
<td>Combined Sewer Area Runoff Capture (%)</td>
<td>12.7%</td>
<td>8.0%</td>
<td>0.6%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.1%</td>
<td>21.4%</td>
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</tbody>
</table>

Opinion of Probable Cost****

<table>
<thead>
<tr>
<th></th>
<th>Construction Cost</th>
<th>O/M Cost (20 years)</th>
<th>Present Worth Cost**</th>
<th>Present Worth Cost per Drainage Area Treated (acres)</th>
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<tbody>
<tr>
<td></td>
<td>$ 1,869,000</td>
<td>$ 1,455,000</td>
<td>$ 53,000</td>
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<tr>
<td></td>
<td>$ 74,000</td>
<td>$ 88,000</td>
<td>$ 6,000</td>
<td>-</td>
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<tr>
<td></td>
<td>$ 1,935,000</td>
<td>$ 1,534,000</td>
<td>$ 59,000</td>
<td>-</td>
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<td></td>
<td>$ 25,000</td>
<td>$ 20,000</td>
<td>$ 13,000</td>
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<td>$ 2,000</td>
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<td>$ 3,379,000</td>
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<td>$ 160,000</td>
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<td>$ 3,530,000</td>
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*Capture value assumes all catch basins / inlets in tributary drainage area are closed off and all roof leaders in tributary drainage area are disconnected.

**Present Worth calculated assuming a 20 year term at 1% interest.

***Capture values for these Candidate GI Projects were negligible in this subcatchment.

****3RWW RAINWAYS TOOL BMP COST: EXCLUDES SEPARATION COSTS TO DIVERT FLOW TO GI PROJECT AND TO OUTLET UNDERFLOW FROM GI PROJECT.
Regulator MH.07-IRO-OF

Introduction

This report summarizes all projects that are published and are part of the above stated regulator. Additional information can be found in the report Appendices. All numbers are reported on an annualized basis.

Characteristics

Total Drainage Area: 641.7 acres
Number of Projects: 7
Total Cost: $117,000
Total Green Infrastructure Project Area: 70.8 acres
Total GI Project Impervious Area: 22.5 acres

System Assessment

<table>
<thead>
<tr>
<th>POC</th>
<th>Reg. ID</th>
<th>No. of Overflows per Year</th>
<th>Overflow Volume (MGPY)</th>
<th>No. of Overflows per Year</th>
<th>Overflow Volume (MGPY)</th>
<th>No. of Overflows per Year</th>
<th>Overflow Volume (MGPY)</th>
<th>No. of Overflows per Year</th>
<th>Overflow Volume (MGPY)</th>
<th>No. of Overflows per Year</th>
<th>Overflow Volume (MGPY)</th>
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<tbody>
<tr>
<td>A-07-00</td>
<td>MH.07-IRO-OF</td>
<td>5</td>
<td>2.910e-1</td>
<td>5</td>
<td>2.829e-1</td>
<td>5</td>
<td>2.269e-1</td>
<td>4</td>
<td>1.663e-1</td>
<td>2</td>
<td>2.690e-2</td>
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Green Infrastructure Performance

<table>
<thead>
<tr>
<th>Project</th>
<th>Area (acres)</th>
<th>Total Runoff Pre-BMP (acre-ft)</th>
<th>Number of Gls</th>
<th>GI Reduction (%)</th>
<th>Total Runoff Captured (acre-ft)</th>
<th>GI Capacity (acre-in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GR_Lb_1343890_BR</td>
<td>13.1</td>
<td>11.5</td>
<td>1</td>
<td>12.2</td>
<td>1.4</td>
<td>0.396</td>
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<td>GR_Lb_1343895_BR</td>
<td>5</td>
<td>8.2</td>
<td>1</td>
<td>23.2</td>
<td>1.4</td>
<td>0.727</td>
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<td>GR_Lb_1343860_BR</td>
<td>13.6</td>
<td>11</td>
<td>1</td>
<td>4.7</td>
<td>0.5</td>
<td>0.263</td>
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<td>GR_Lb_1343836_BR</td>
<td>3.9</td>
<td>5.6</td>
<td>1</td>
<td>21</td>
<td>1.2</td>
<td>0.593</td>
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<tr>
<td>GR_Lb_1343824_BR</td>
<td>20.3</td>
<td>13.9</td>
<td>1</td>
<td>1.1</td>
<td>0.2</td>
<td>0.077</td>
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<tr>
<td>GR_Lb_1343818_BR</td>
<td>9.7</td>
<td>11.8</td>
<td>1</td>
<td>0.5</td>
<td>0.1</td>
<td>0.033</td>
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<td>GR_Lb_1343767_BR</td>
<td>5</td>
<td>7.6</td>
<td>1</td>
<td>5.1</td>
<td>0.4</td>
<td>0.196</td>
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<tr>
<td>Total runoff pre-green infrastructure</td>
<td>67.6 acre-feet (2.203e+1 MGPY)</td>
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<tr>
<td>Total Reduction within GI</td>
<td>7.6 %</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Total Runoff Captured</td>
<td>5.1 acre-ft (1.877e+0 MGPY)</td>
<td></td>
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<tr>
<td>Total GI Outlets</td>
<td>62.5 acre-ft (2.189e+1 MGPY)</td>
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<td></td>
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<tr>
<td>Total GI Capacity</td>
<td>0.19 acre-ft (6.207e+0 Million Gallons)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Number of CSOs Prevented</td>
<td>0 (0 %)</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Overflow Volume Reduced</td>
<td>0.02 acre-ft (5.005e-3 MGPY)</td>
<td></td>
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</tr>
</tbody>
</table>
Evaluation Tools

• EPA’s System for Urban Stormwater Treatment and Analysis Integration (SUSTAIN) best management practices (BMP) site selection tool module

• 3RWW RainWays© Engineer’s/Planner’s Tool

Welcome to RainWays, the 3 Rivers Wet Weather green infrastructure tool created to support the planning and implementation of green solutions to address the region’s wet weather problems. Property owners will find the necessary tools to determine the best green infrastructure options for their homes or businesses. Engineers and planners will find a more technical tool that helps to determine the impact of green infrastructure in public spaces. Together these tools will help to capture stormwater, reduce sewage overflows, improve water quality and human health, enhance groundwater recharge, and increase property values. In short, RainWays can help us change our waterways.
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Step 1: Enter project name.
My house project

Step 2: Enter your address (e.g. 3901 Penn Ave. 15224) and click on the search button below it.
3901 Penn Avenue 15224

Step 3: Draw property boundary by clicking on each corner of your property. (To adjust view, hover over satellite button and select/deselect 45-degree angle.)

Step 4: Click on the icon to confirm your boundary selection.
Select your green infrastructure.

Annual Runoff: 71,156 gal.

Reduction: 0 gals.
Area Treated: 0 sq. ft.

<table>
<thead>
<tr>
<th>Reduction (gals.)</th>
<th>Area (sq.ft)</th>
<th>% area treated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yard</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Paved</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Roof</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Total Green Practices: 0
Total Costs($): $0

Roof Area: 1441 SQ.FT.
Yard Area: 6145 SQ.FT.
Paved Area: 1451 SQ.FT.
March 2013: Sewer Regionalization Evaluation Report released

- 40-member panel of stakeholders formed in September 2011
- Chaired by Dr. Jared Cohon, CMU president
- Coordinated by Allegheny Conference
Regionalization Study
Recommendations:

- Governance changes to promote partnership and multijurisdictional decision-making
- Transfer of approximately 200 miles of inter-municipal conveyance lines and wet weather control facilities to ALCOSAN
- Financial incentives to promote flow control
- Consolidation of wastewater collection systems
- Consolidation of stormwater collection systems
- Conversion to integrated municipal stormwater and wastewater planning
Sewer Regionalization Implementation Committee

- Establish a process for the transfer of multi-municipal trunk sewers and wet weather control facilities to ALCOSAN
- Develop position papers to address voluntary regionalization of municipal collection systems
- Supported by subcommittees addressing legal, finance, communications, source reduction and collection system management
- Completed tasks by 2014
Regionalization of Municipal Sewer Collection System

- Multi-municipal trunk sewer transfer is a critical step in improving regional water quality
- Most cost-effective approach: ALCOSAN assumes responsibility for implementation of wet weather projects and continued O&M of trunk lines
- Transfer cost of wet weather projects associated with municipal trunk sewers into the ALCOSAN rate structure
- Compliance with the Clean Water Act
Draft transfer agreements have been completed
Communication strategy to be implemented by 3RWW and CONNECT
Transfer process will be refined and implemented through 2015
ALCOSAN will budget for complete trunk sewer transfer in 2016
Moving Forward

♦ Continued ownership by more than 83 municipal governments is not a sustainable model.

♦ Wet Weather Plan implementation must occur under consolidated management to be cost-effective.
Questions

John Schombert, Executive Director
3 Rivers Wet Weather
jschombert@3rww.org
412-578-7962

www.3riverswetweather.org