

An aerial photograph of Pittsburgh, Pennsylvania, showing the city skyline, the Allegheny River, and the Three Rivers Wet Weather park in the foreground. The text is overlaid on the image.

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

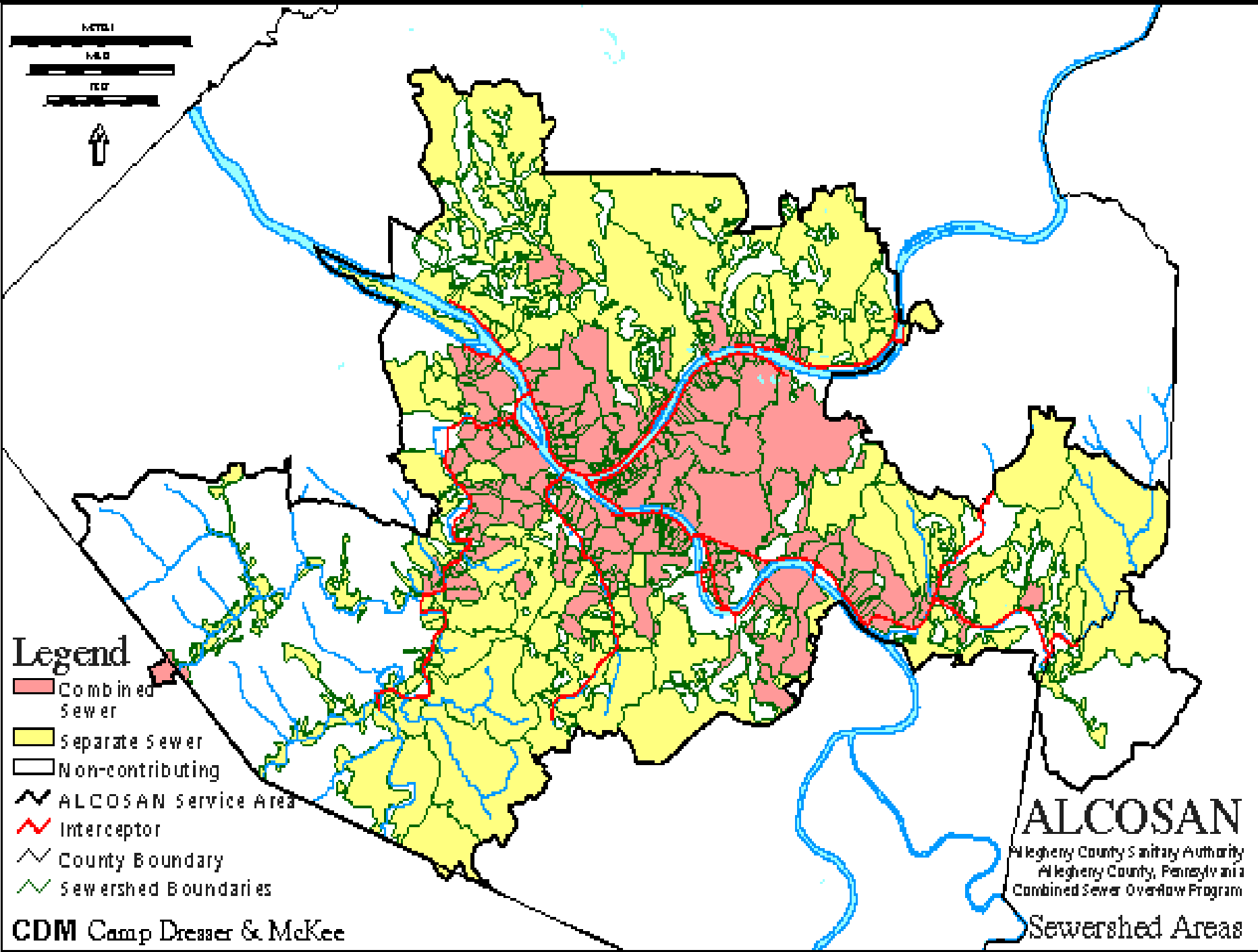
- ◆ Impedes regional economic development
- ◆ Directly affects Allegheny County's primary source of drinking water
- ◆ Results in river advisories nearly half of the 140-day recreational season
- ◆ As little as one-tenth of an inch of rain can cause sewage overflows
- ◆ Sewage overflow annually: 8 billion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

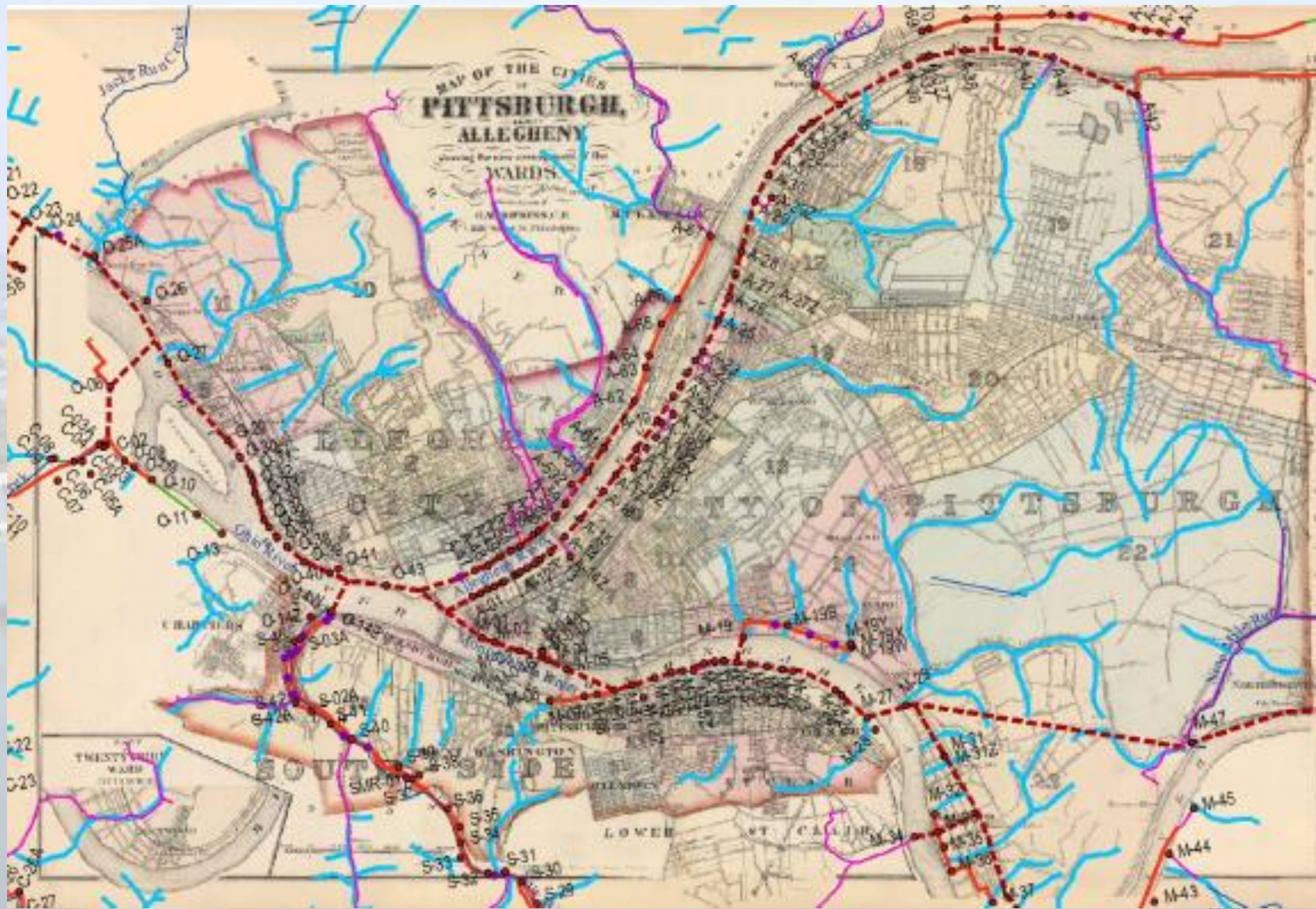
Background on the Wet Weather Issue

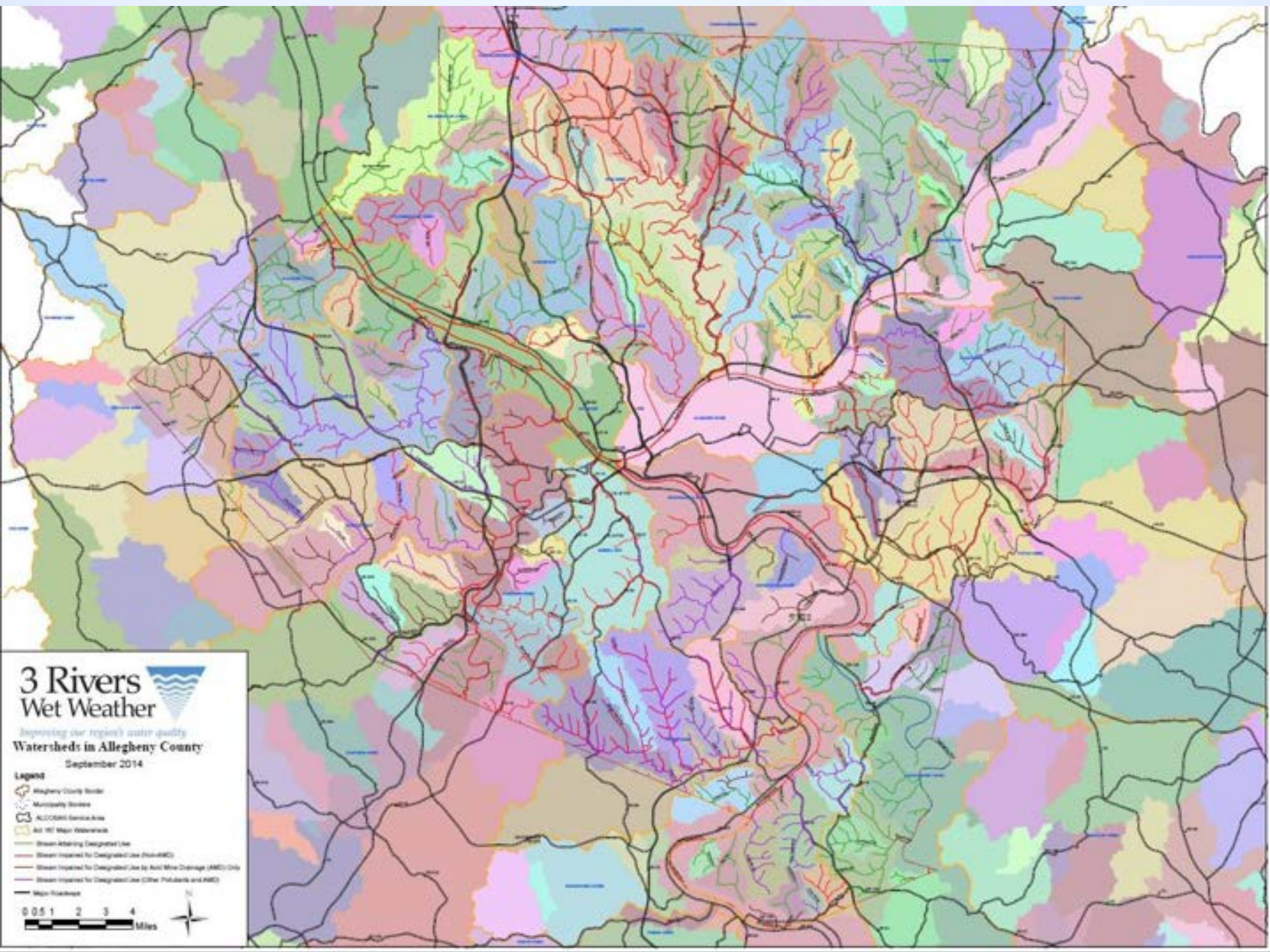
- ◆ 83 municipalities including the City of Pittsburgh serviced by ALCOSAN
 - ◆ Over 320,000 customers/900,000 population
 - ◆ Fragmented management of sewage infrastructure hinders development of a solution

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







3 Rivers Wet Weather



Improving our region's water quality
Watersheds in Allegheny County
September 2014

Legend

- Allegheny County Border
- Municipality Border
- ALCOA Service Area
- All 107 Major Watersheds
- Stream Impaired (Designated Use)
- Stream Impaired No Designated Use (Non-WQC)
- Stream Impaired No Designated Use by Acid Mine Drainage (AMD) Only
- Stream Impaired No Designated Use (Other Pollutants and AMD)
- Major Roadways



Deteriorated municipal collection systems



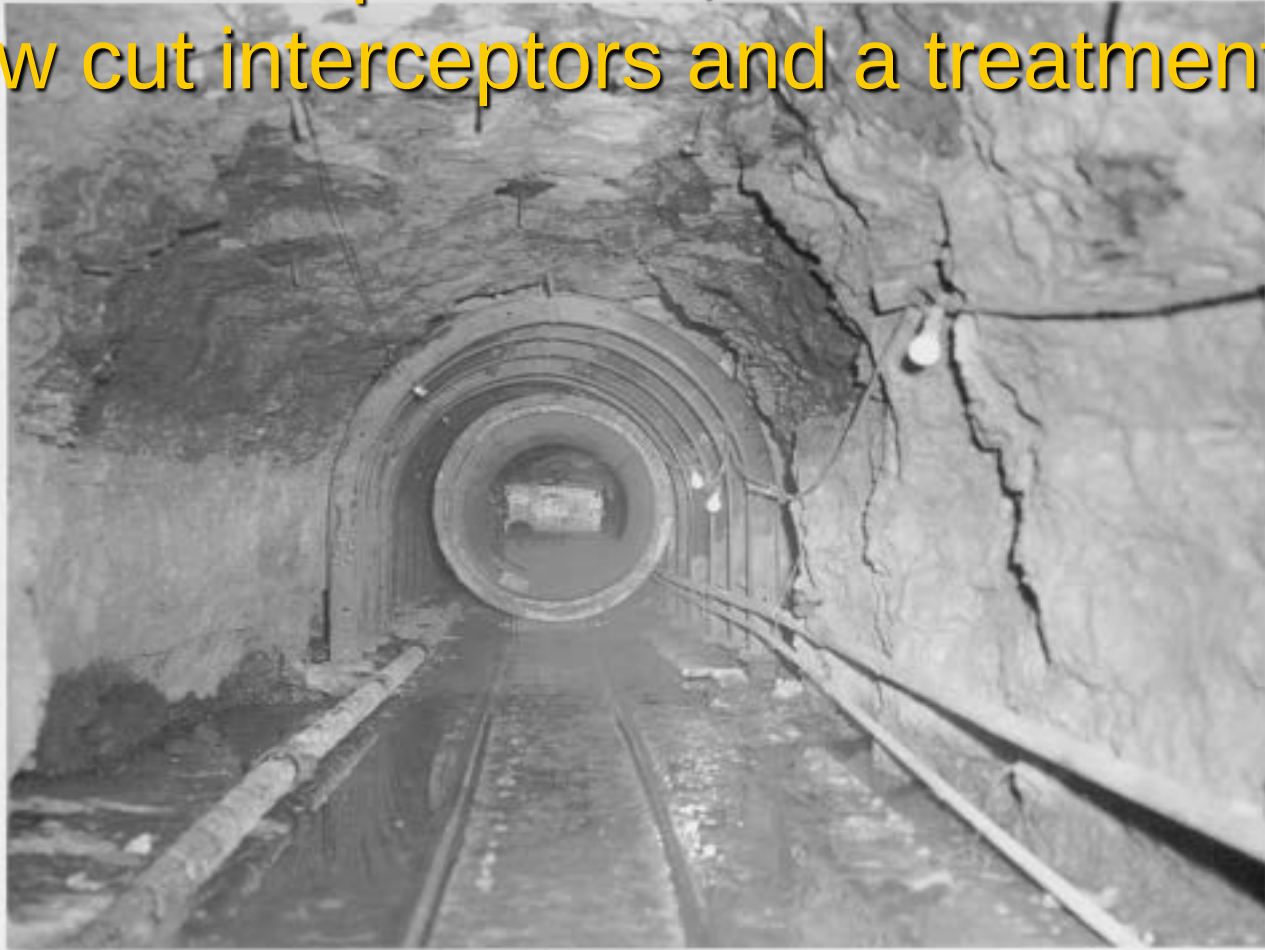
Controlled overflows: CSO or SSO?



Uncontrolled overflow: Manhole



1959: ALCOSAN becomes operational.
30 miles of deep tunnels, over 60 miles of
shallow cut interceptors and a treatment plant



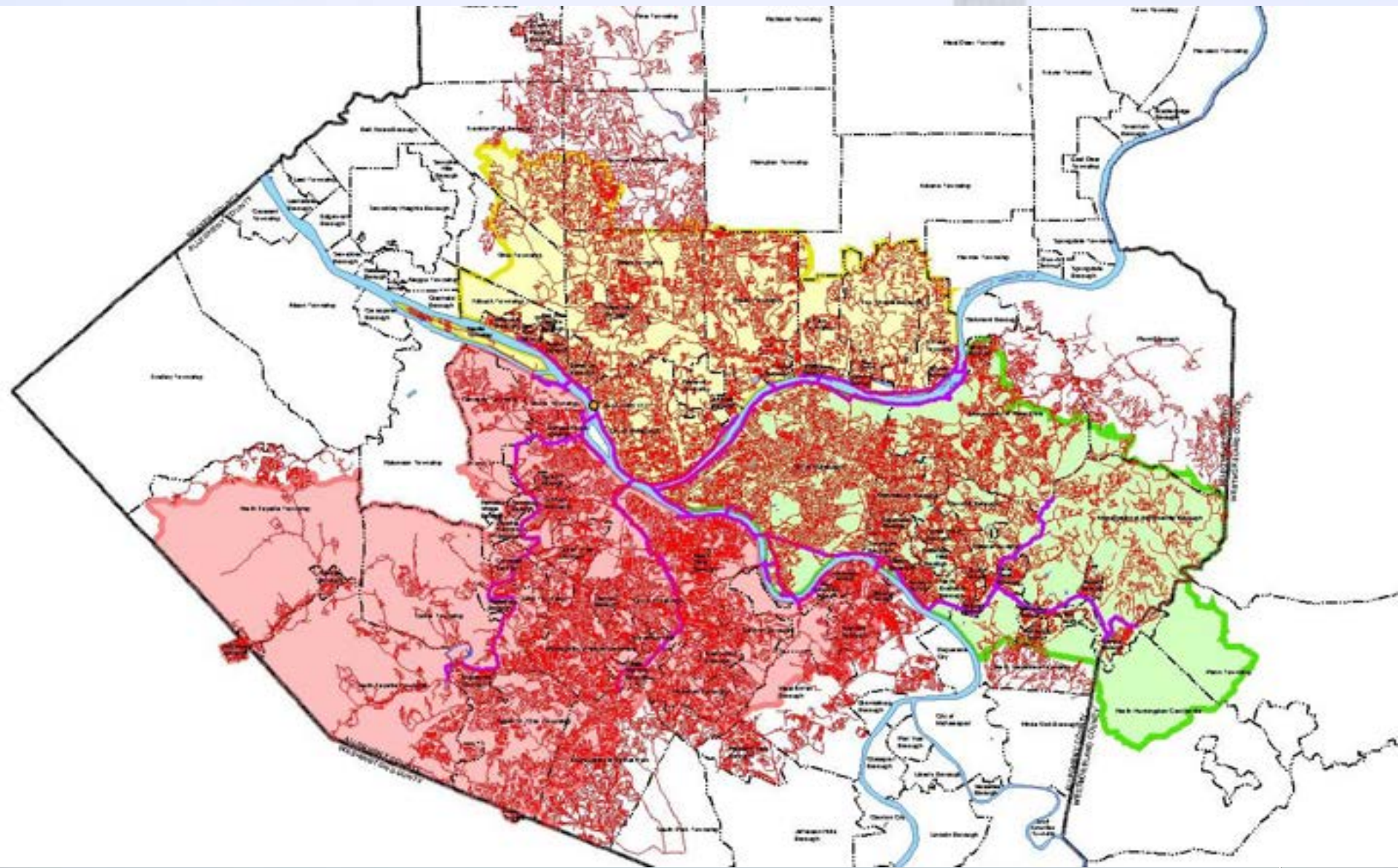
Background on the Wet Weather Issue

- ◆ 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

Administrative Consent Order

- ◆ 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 Service Area



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

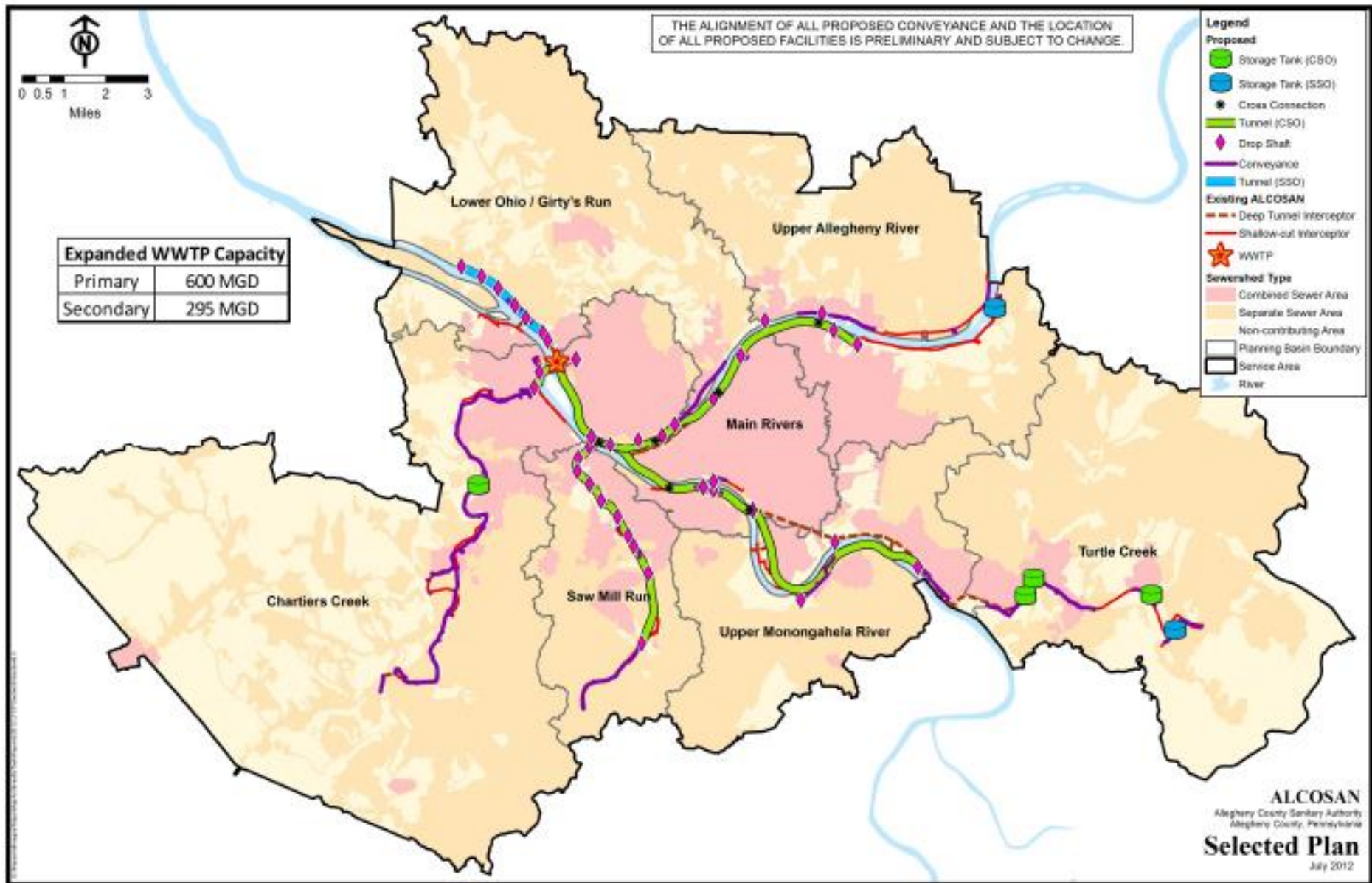
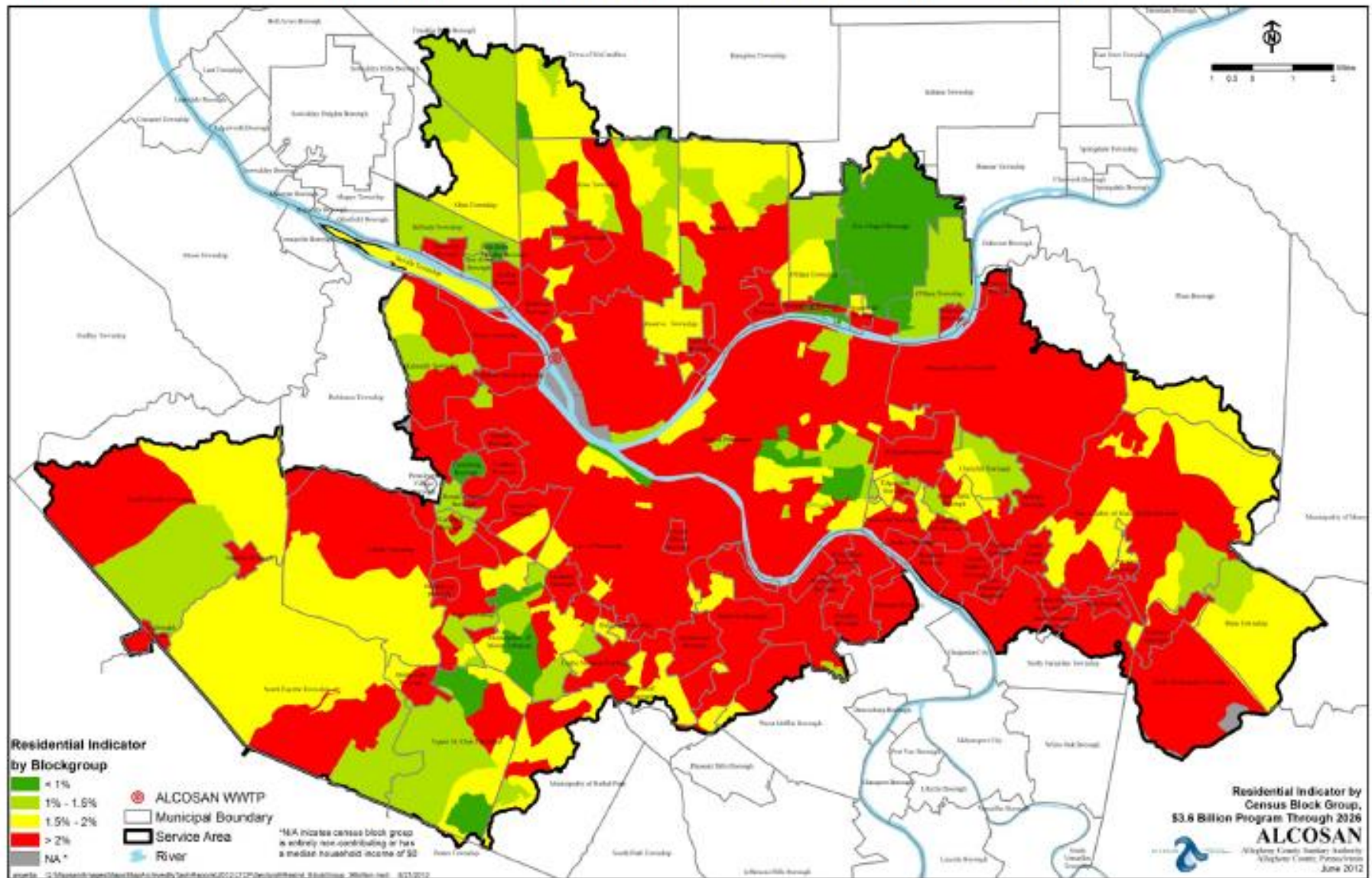


Figure 9-139: ALCOSAN Selected Alternative – Residential Indicators Showing Intra-Municipal Variations



ALCOSAN Recommended Plan

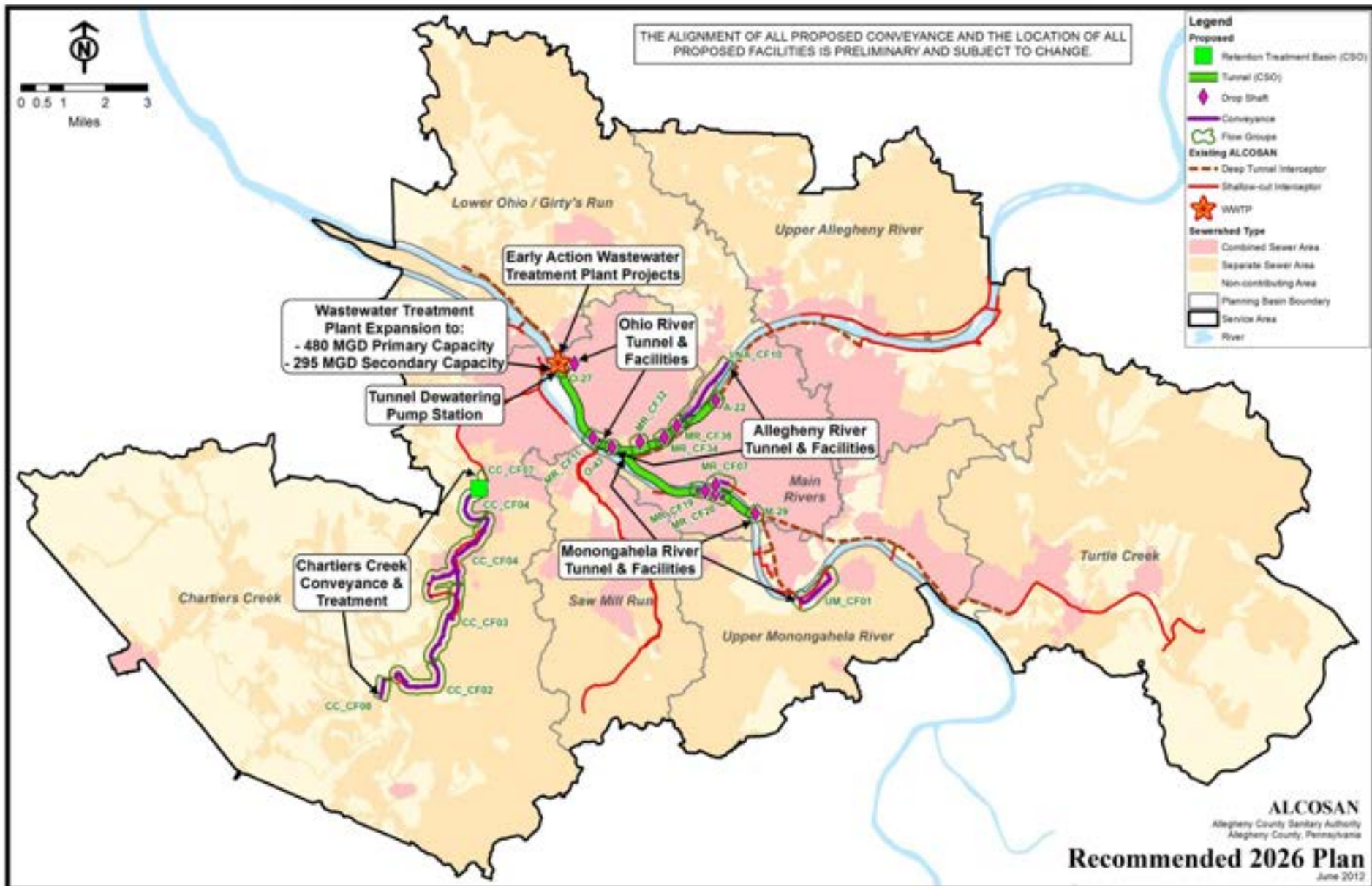


Figure 11-11: Projected 2027 Residential Indicators by Census Block Group

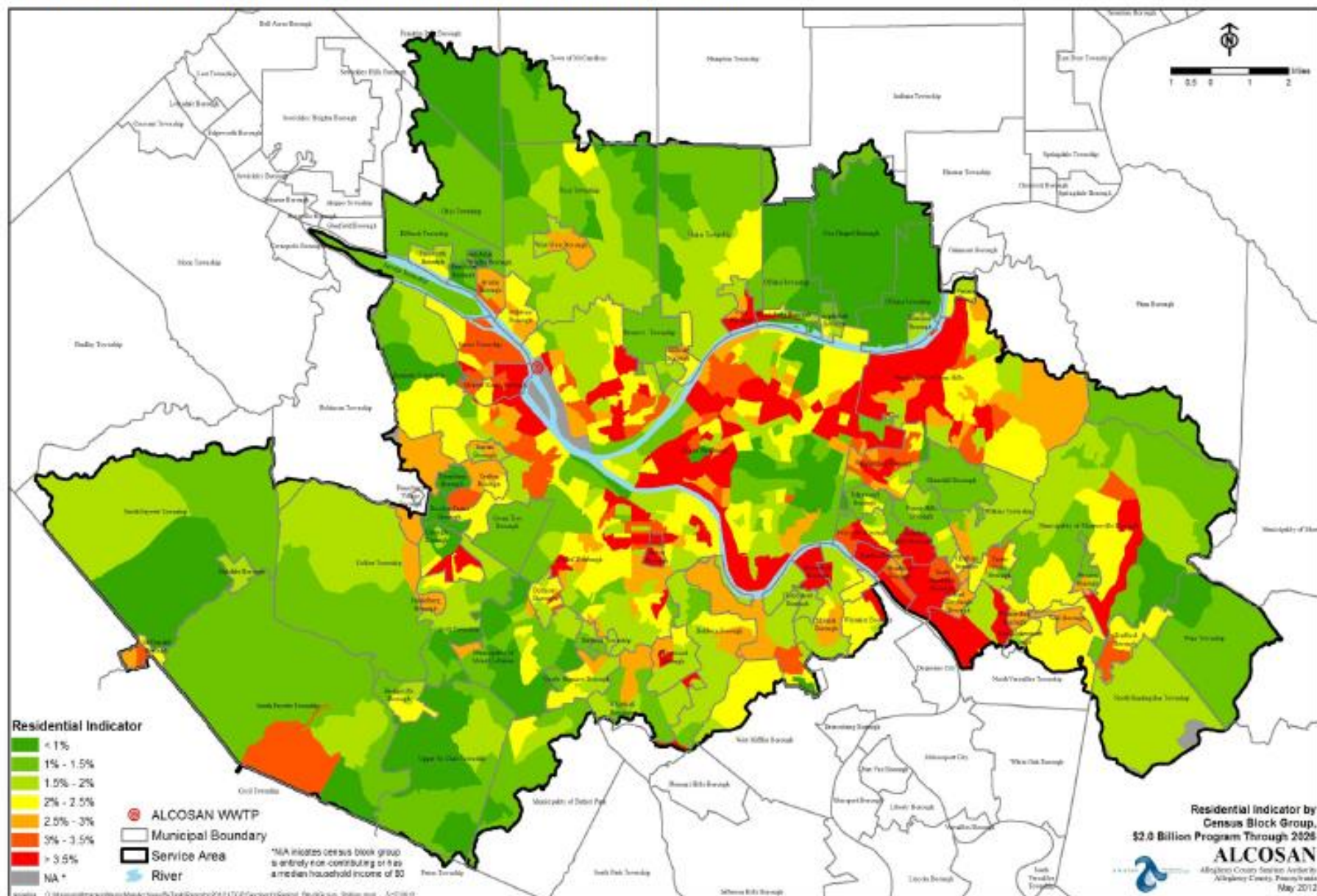
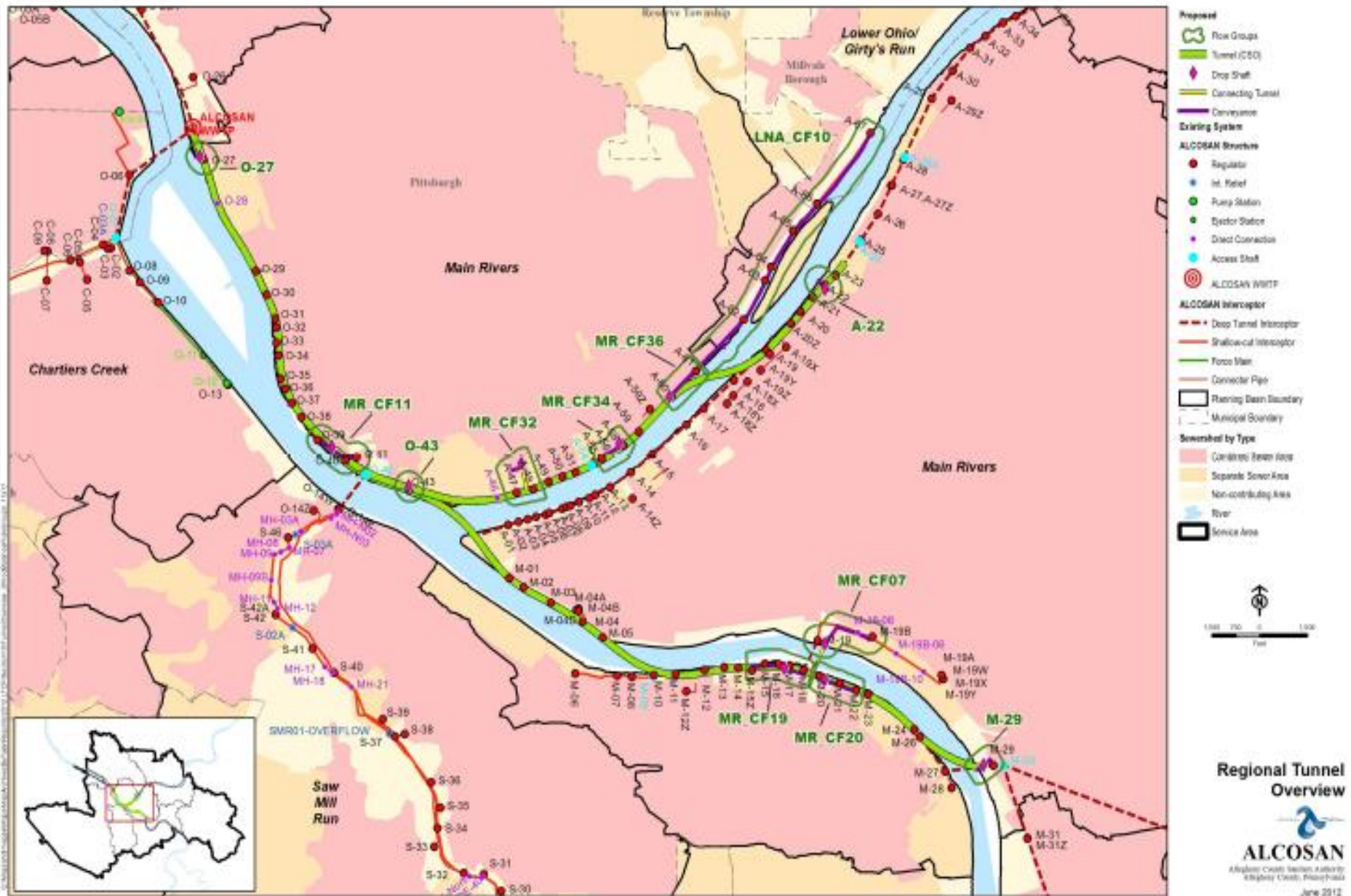


Figure 10-4: Proposed Regional Tunnel Extent for Recommended 2026 Plan



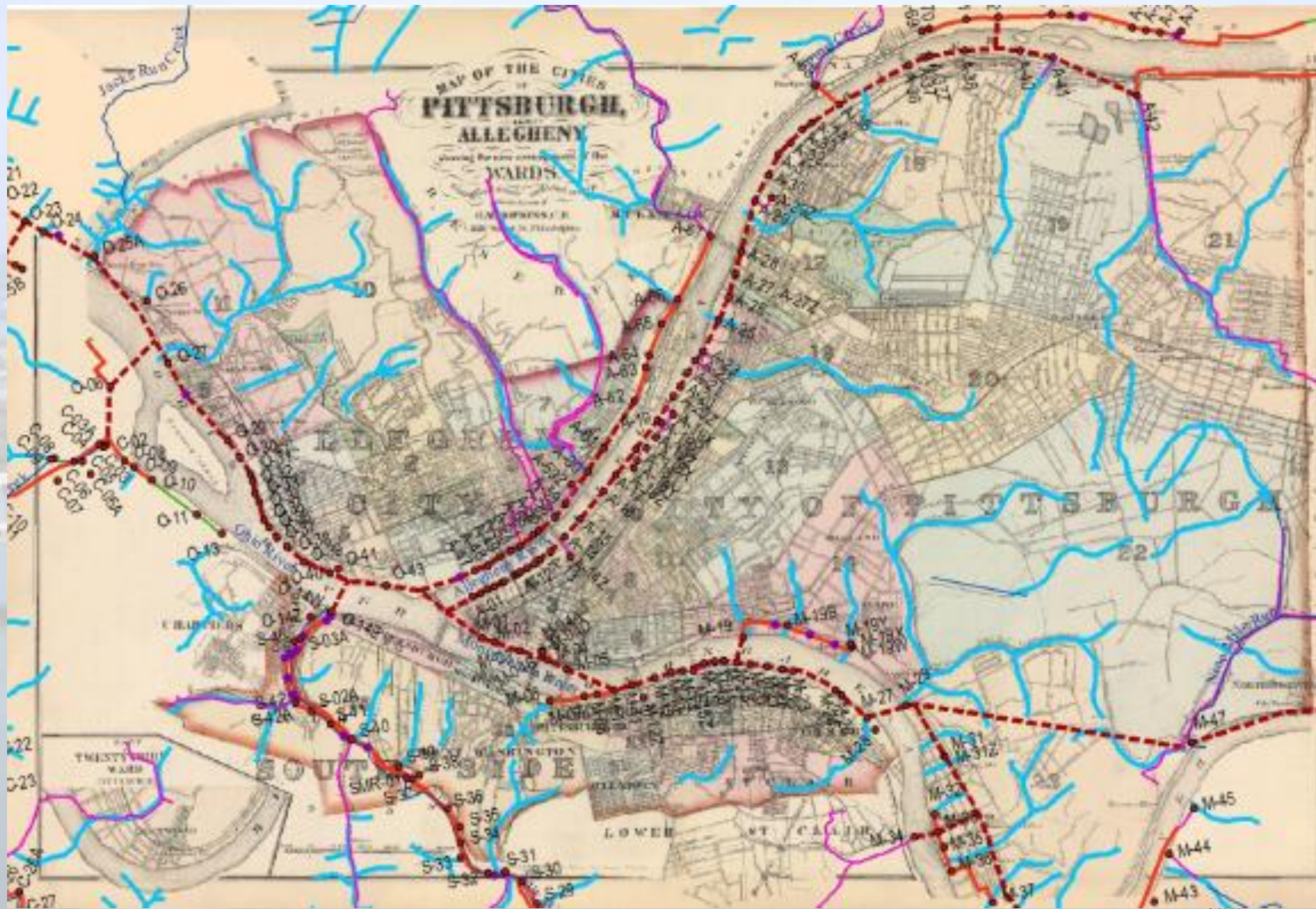
EPA Municipal Update

June 17, 2014

- ◆ 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



Aerial imagery provided by PASDA

- | | | |
|--|--|---|
| ■ Permeable Pavement | ■ Vegetated Filter Strips | □ Combined Sewer Subcatchments |
| ■ Bioretention Basins | ■ Grass Swales | Area Tributary to POC M-47 |
| ■ Infiltration Basins / Trench | ■ Constructed Wetlands | □ Municipal Boundaries |

1 inch = 300 feet

Exhibit 1
 Nine Mile Run
 SUSTAIN BMP Features

Document Path: H:\P\03\04535\04_12\09\Nine Mile Run\GIS\BMP\Exhibit1\Map1.mxd

**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.

Candidate GI Project Parameters	Permeable Pavement	Bioretention	Infiltration Basin	Grass Swales***	Vegetated Filter Strips	Constructed Wetland	Totals
Effective Design Area of Candidate GI Projects Used to Capture First 1.0 inch of Runoff from Tributary Drainage Area (acres)	3.86	1.51	0.09	0.00	0.00	0.02	5.47
Number of Candidate GI Projects	46	264	9	1	0	1	321
Portion of Drainage Area Tributary to Candidate GI Projects (acres)	77.50	77.74	4.58	0.00	0.00	1.31	161.12
Annual Combined Sewer Area Runoff Captured (MG)*	30.19	18.93	1.49	0.00	0.00	0.28	50.88
Combined Sewer Area Runoff Capture (%)	12.7%	8.0%	0.6%	0.0%	0.0%	0.1%	21.4%
Opinion of Probable Cost****							
Construction Cost	\$ 1,869,000	\$ 1,455,000	\$ 53,000	\$ -	\$ -	\$ 2,000	\$ 3,379,000
O/M Cost (20 years)	\$ 74,000	\$ 88,000	\$ 6,000	\$ -	\$ -	\$ -	\$ 168,000
Present Worth Cost**	\$ 1,935,000	\$ 1,534,000	\$ 59,000	\$ -	\$ -	\$ 2,000	\$ 3,530,000
Present Worth Cost per Drainage Area Treated (acres)	\$ 25,000	\$ 20,000	\$ 13,000	\$ -	\$ -	\$ 2,000	\$ 22,000

*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.

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: 70.6 acres
 Total GI Project Impervious Area: 22.5 acres

System Assessment

POC	Reg. ID	Storage Capacity									
		0.000e+0 M Gallon		3.485e-1 M Gallon		8.712e-1 M Gallon		1.742e+0 M Gallon		5.227e+0 M Gallon	
		No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)	No. of Overflows per Year	Overflow Volume (MGPY)
A-87-00	MH.07-IRO-OF	5	2.910e-1	5	2.629e-1	5	2.290e-1	4	1.663e-1	2	2.090e-2

Green Infrastructure Performance

Project	Area (acres)	Total Runoff Pre-BMP (acre-ft)	Number of GIs	GI Reduction (%)	Total Runoff Captured (acre-ft)	GI Capacity (acre-in)
GR_LBs_1343890_BR	13.1	11.5	1	12.2	1.4	0.396
GR_LBs_1343865_BR	5	6.2	1	23.2	1.4	0.727
GR_LBs_1343860_BR	13.6	11	1	4.7	0.6	0.263
GR_LBs_1343835_BR	3.9	5.6	1	21	1.2	0.593
GR_LBs_1343824_BR	20.3	13.9	1	1.1	0.2	0.077
GR_LBs_1343818_BR	9.7	11.8	1	0.5	0.1	0.033
GR_LBs_1343787_BR	5	7.6	1	5.1	0.4	0.196
Total runoff pre-green infrastructure	67.6 acre-feet (2.203e+1 MGPY)					
Total Reduction within GI	7.6 %					
Total Runoff Captured	5.1 acre-ft (1.677e+0 MGPY)					
Total GI Outlets	62.5 acre-ft (2.169e+1 MGPY)					
Total GI Capacity	0.19 acre-ft (6.207e-2 Million Gallons)					
Number of CSOs Prevented	0 (0 %)					
Overflow Volume Reduced	0.02 acre-ft (5.005e-3 MGPY)					



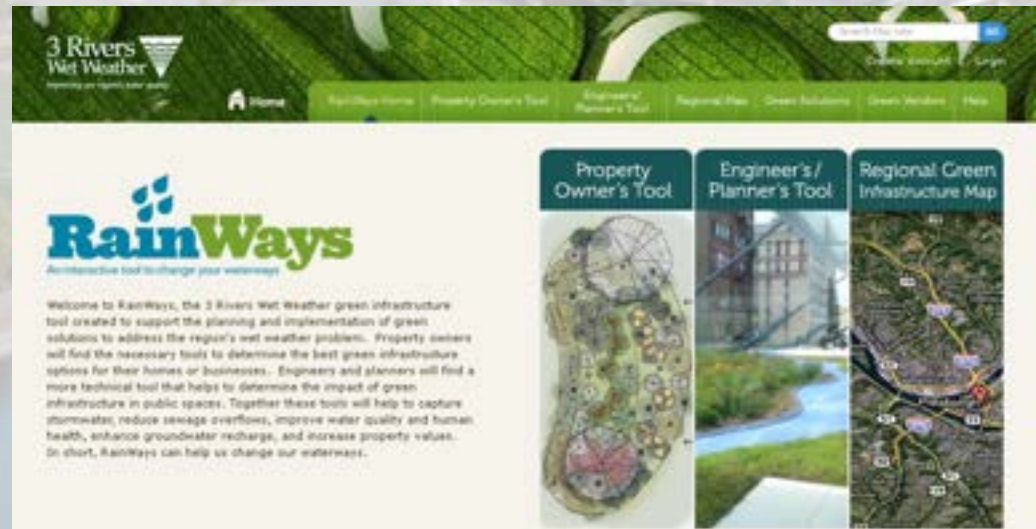


Evaluation Tools

- 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



RainWays

An interactive tool to change your waterways

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 problem. 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.

Property Owner's Tool



Engineer's / Planner's Tool



Regional Green Infrastructure Map



Rain Garden Contest

Know of a community or residential rain garden that is particularly beautiful and effective? Enter it into the Three Rivers Rain Garden Alliance contest.

[Learn More](#)

Allegheny County Act 167 Plan

Participate in the county-wide Act 167 stormwater management plan, which helps to protect residents from flooding and pollution risks associated with stormwater.

[Learn More](#)

Spotlight on green infrastructure

Can a green roof be both functional and beautiful? See how the Allegheny County Office Building accomplishes both. [Learn more.](#)

Welcome, Beth

[Admin](#)

[Update Account](#)

[Logout](#)

Find

Select

Plan



Step 1: Enter project name.

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

Step 2: 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 3: Click on the icon to confirm your boundary selection. 

Step 4: [Select](#) your green infrastructure.



Annual Runoff: 71,156 gal.



Reduction: 0 gals.

Area Treated: 0 sq. ft.

	Reduction (gals.)	Area (sq.ft)	% area treated
Yard	0	0	0
Paved	0	0	0
Roof	0	0	0

Total Green Practices: 0

Total Costs(\$): \$0

Roof Area: 1441 SQ.FT.

Yard Area: 6145 SQ.FT.

Paved Area: 1451 SQ.FT.



Enter your address

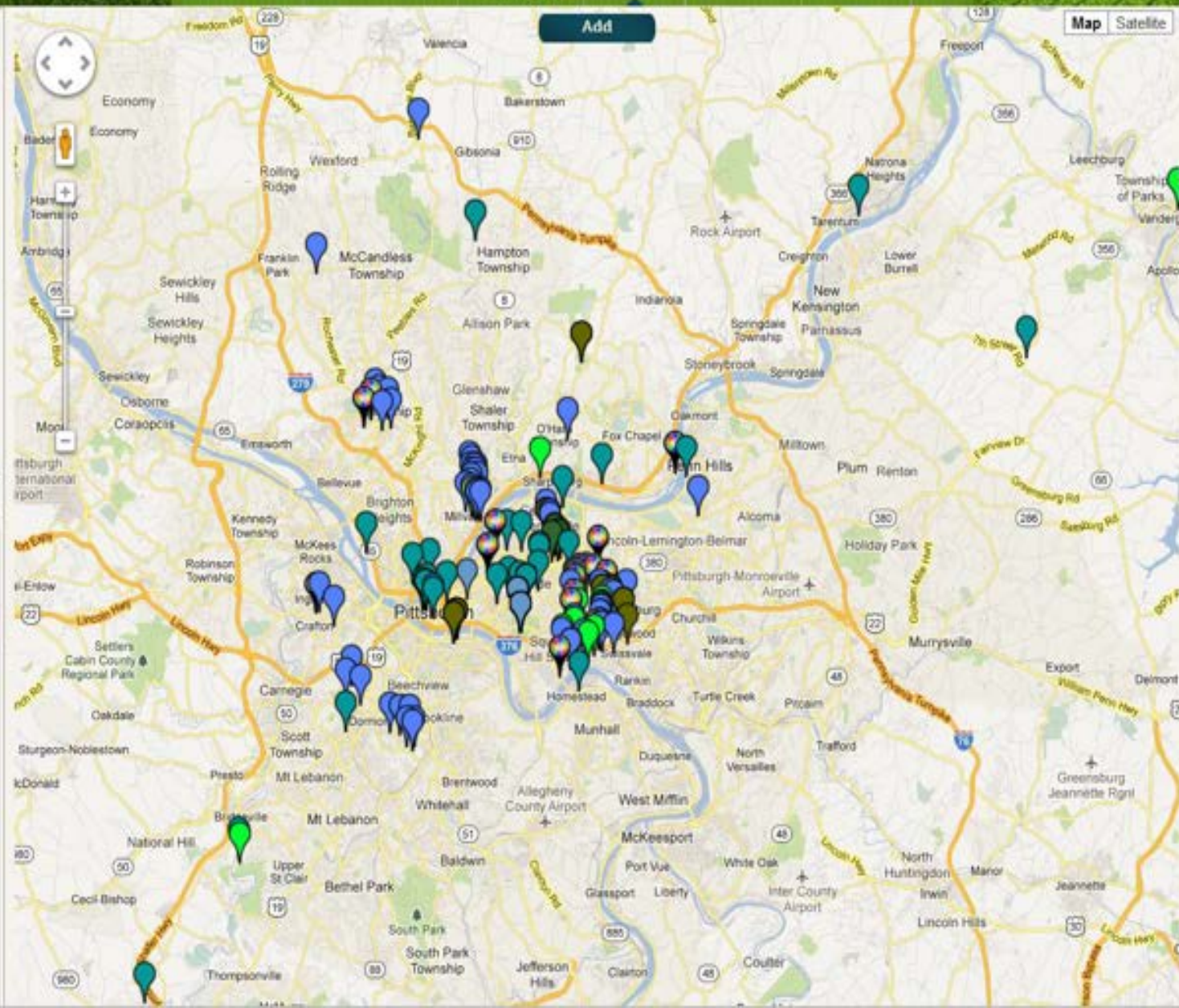
Green Infrastructure Filter

- ☒ All BMP Types
- ☐ Bioretention
- ☐ Bioretention (Lined)
- ☐ Bioswale
- ☐ Dry Pond
- ☐ Filter Strip/Grass Buffer
- ☐ Vegetated Filter Strip/Grass Buffer
- ☐ Green Roof
- ☐ Infiltration Basin/Dry Pond
- ☐ Infiltration Trench/Basin
- ☐ Permeable Pavement
- ☐ Permeable Interlocking Paver
- ☐ Permeable Interlocking Paver (Lined)
- ☐ Planter Box
- ☐ Porous Asphalt
- ☐ Porous Asphalt (Lined)
- ☐ Porous Concrete
- ☐ Porous Concrete (Lined)
- ☐ Rain Barrels
- ☐ Road Closures

Municipality

All Municipalities

- ☐ Carnegie Mellon University, Doherty Hall
- ☐ Carnegie Mellon University, Gates Center
- ☐ Carnegie Mellon University, Hamerschlag Hall
- ☐ Carnegie Mellon University, Mellon Institute
- ☐ Carnegie Mellon University, Porter Hall
- ☐ Carnegie Mellon University, Posner Center
- ☐ Century Building
- ☐ Children's Hospital of Pittsburgh
- ☐ Conservation Consultants, Inc. Office Building
- ☐ Conservation Consultants, Inc. Office Building
- ☐ Consol Energy, Monessen
- ☐ County Office Building
- ☐ E&B's



Regionalization

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:

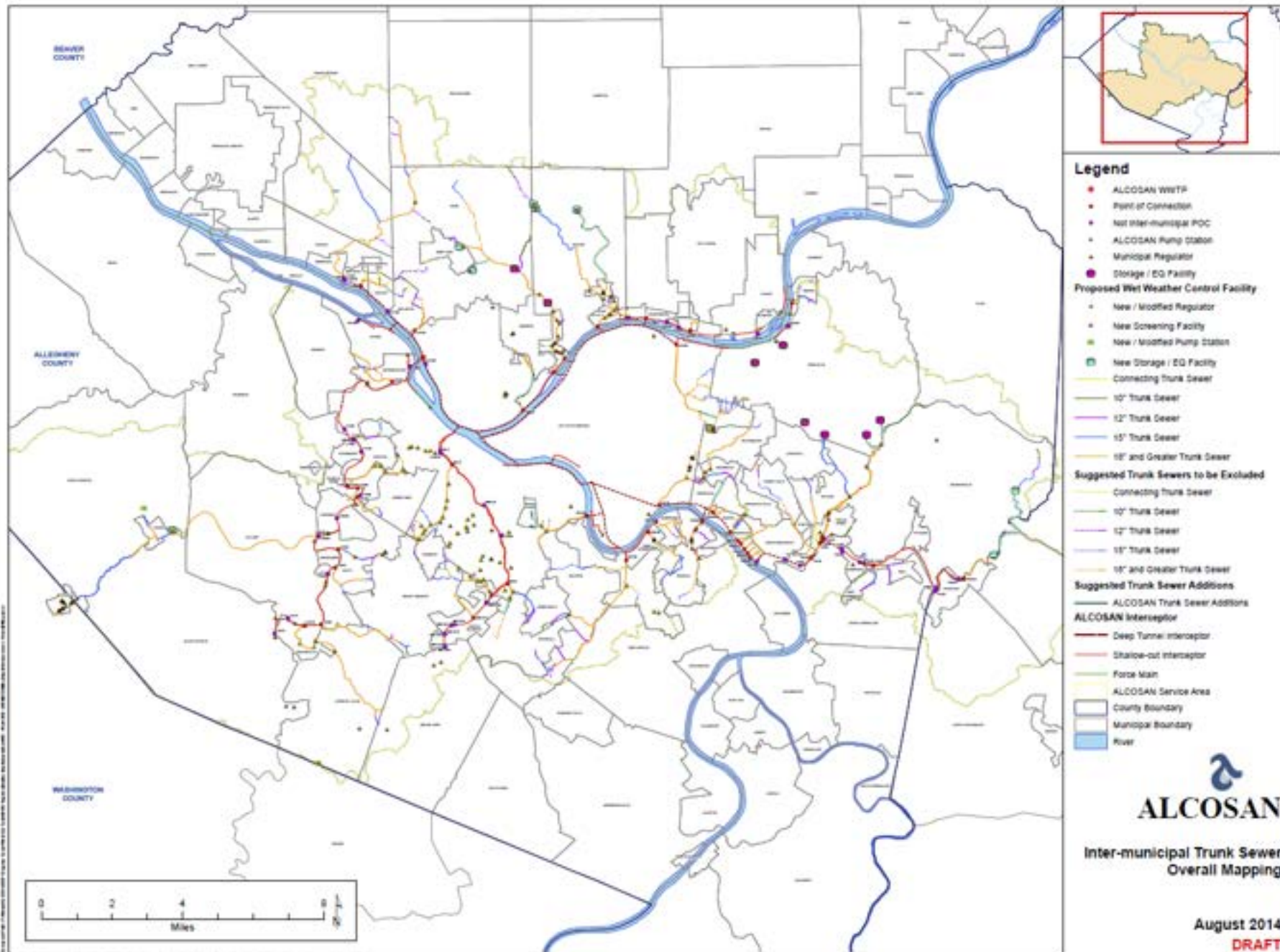
- ◆ Governance changes to promote partnership and multijurisdictional decision-making
- ◆ Transfer of approximately 200 miles of inter-municipal conveyance lines and wet weather control facilities to ALCOSAN
- ◆ Financial incentives to promote flow control
- ◆ Consolidation of wastewater collection systems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

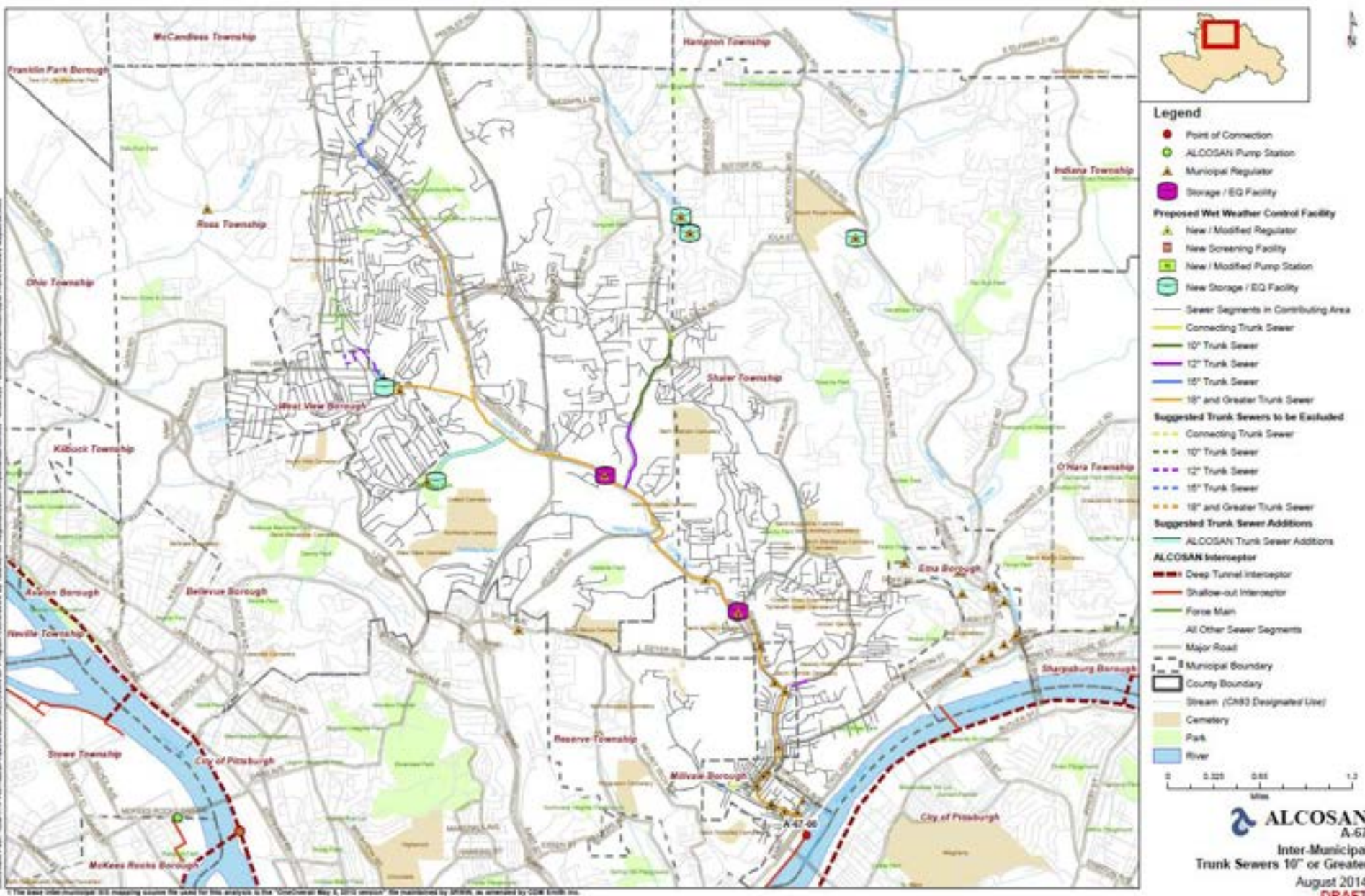
Sewer Regionalization Implementation Committee

- ◆ 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





Regionalization of Municipal Sewer Collection System

- ◆ 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

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