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

3 Rivers Wet Weather

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

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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

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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

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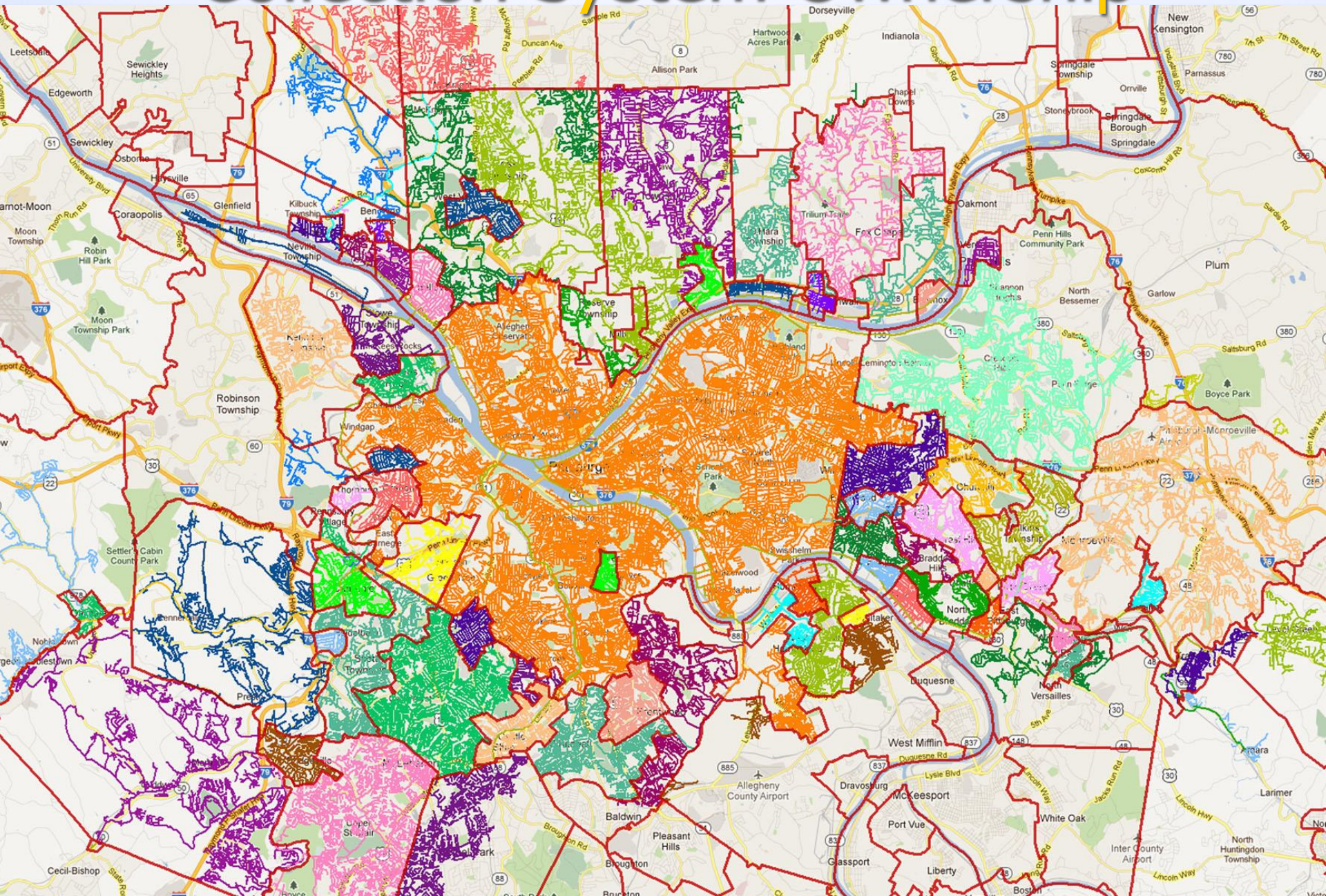
Collection System Ownership



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

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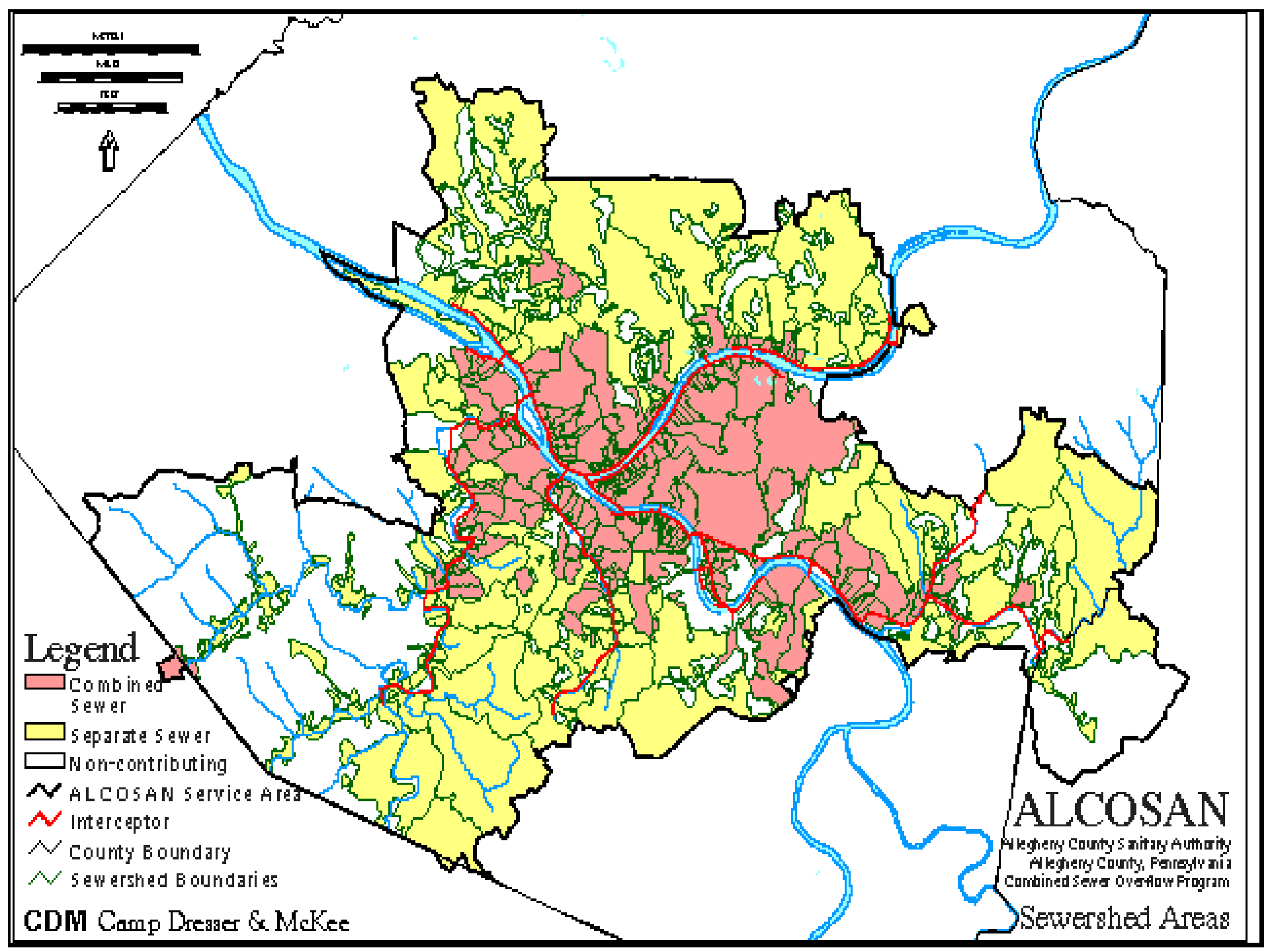
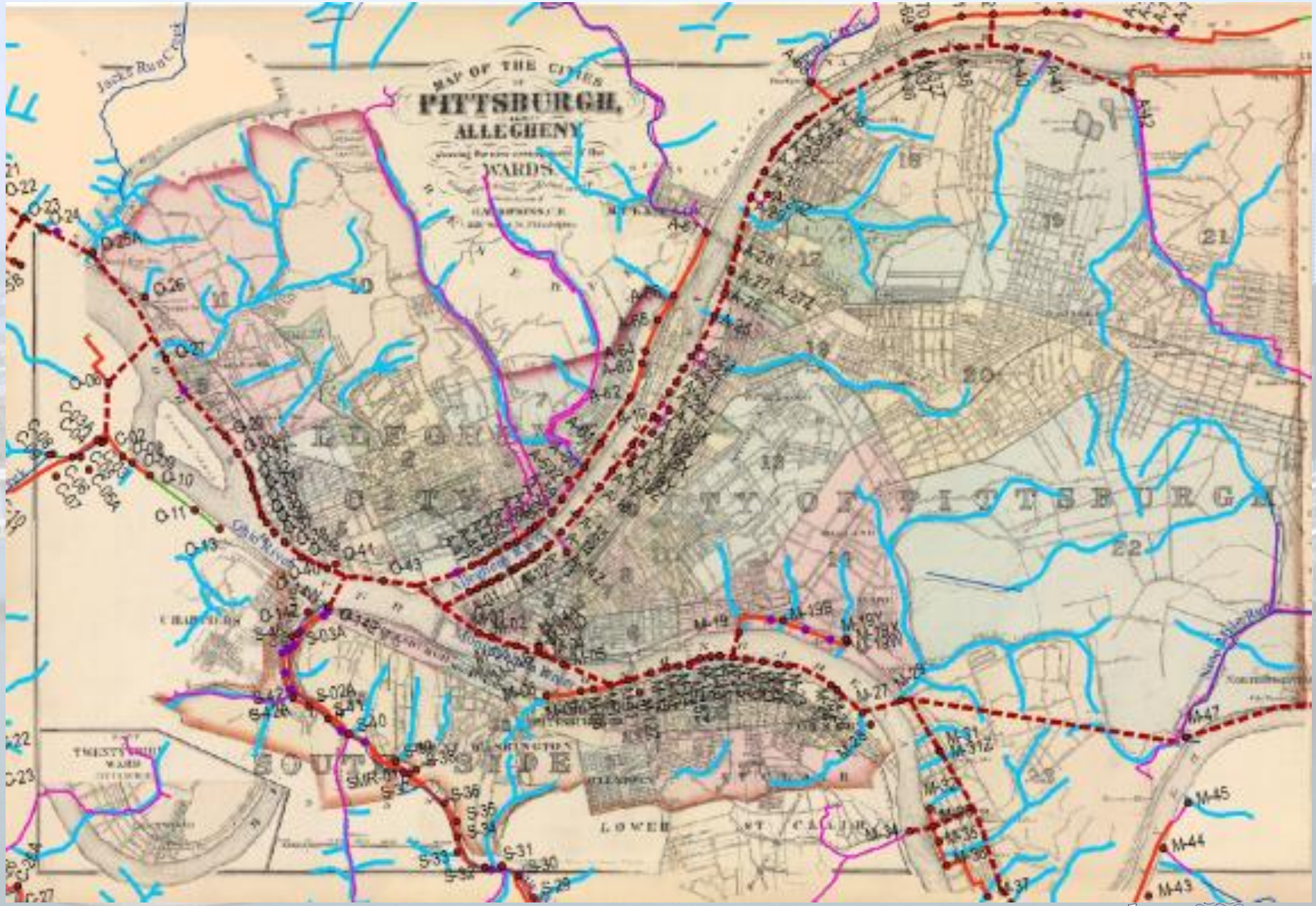

Legend
Combined Sewer
Separate Sewer
Non-contributing
ALCOSAN Service Area
Interceptor
County Boundary
Sewershed Boundaries
CDM Camp Dresser & McKee
ALCOSAN
Allegheny County Sanitary Authority
Allegheny County, Pennsylvania
Combined Sewer Overflow Program
Sewershed Areas


MAP OF THE CITIES
PITTSBURGH,
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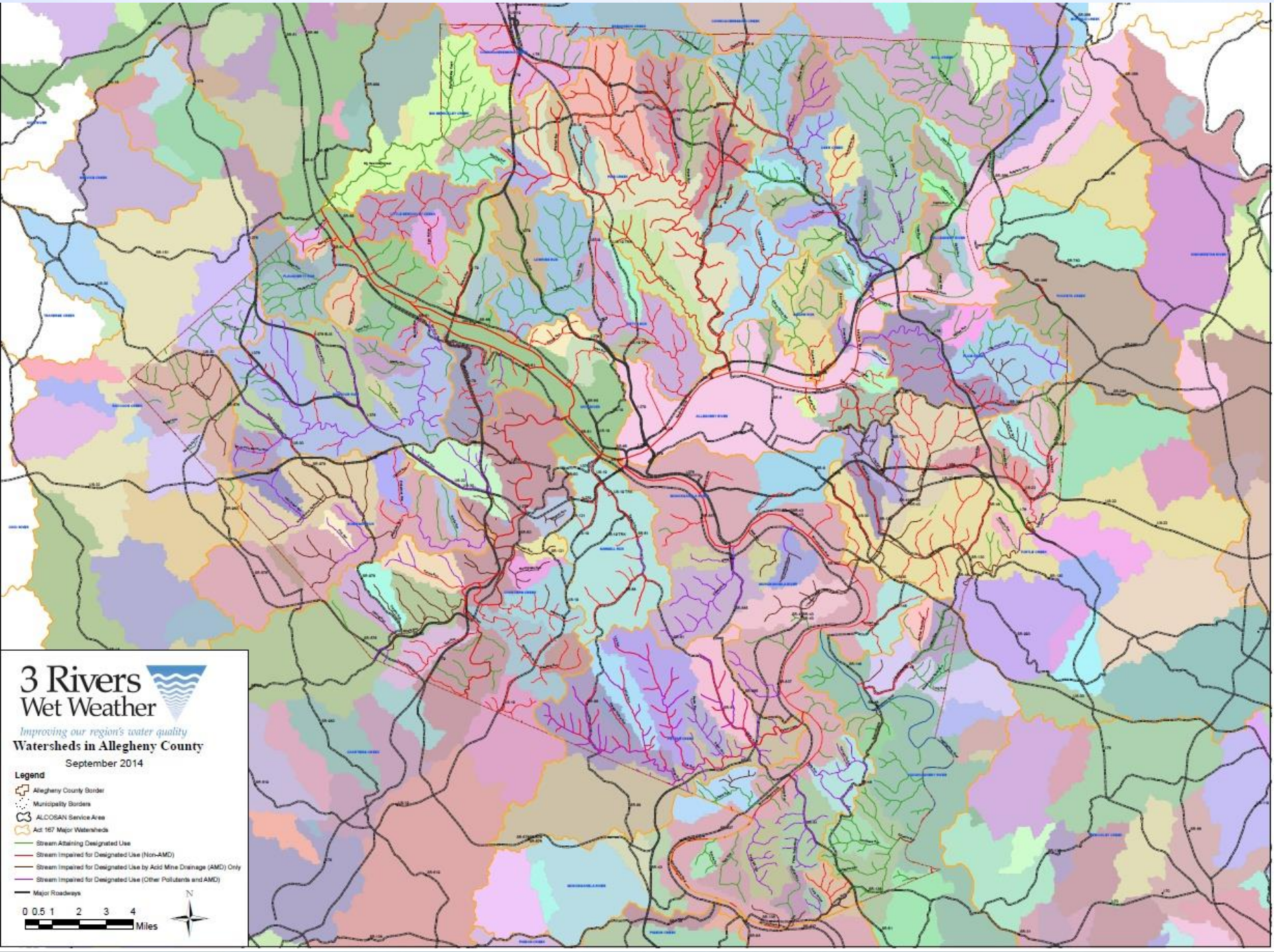
Wet Weather

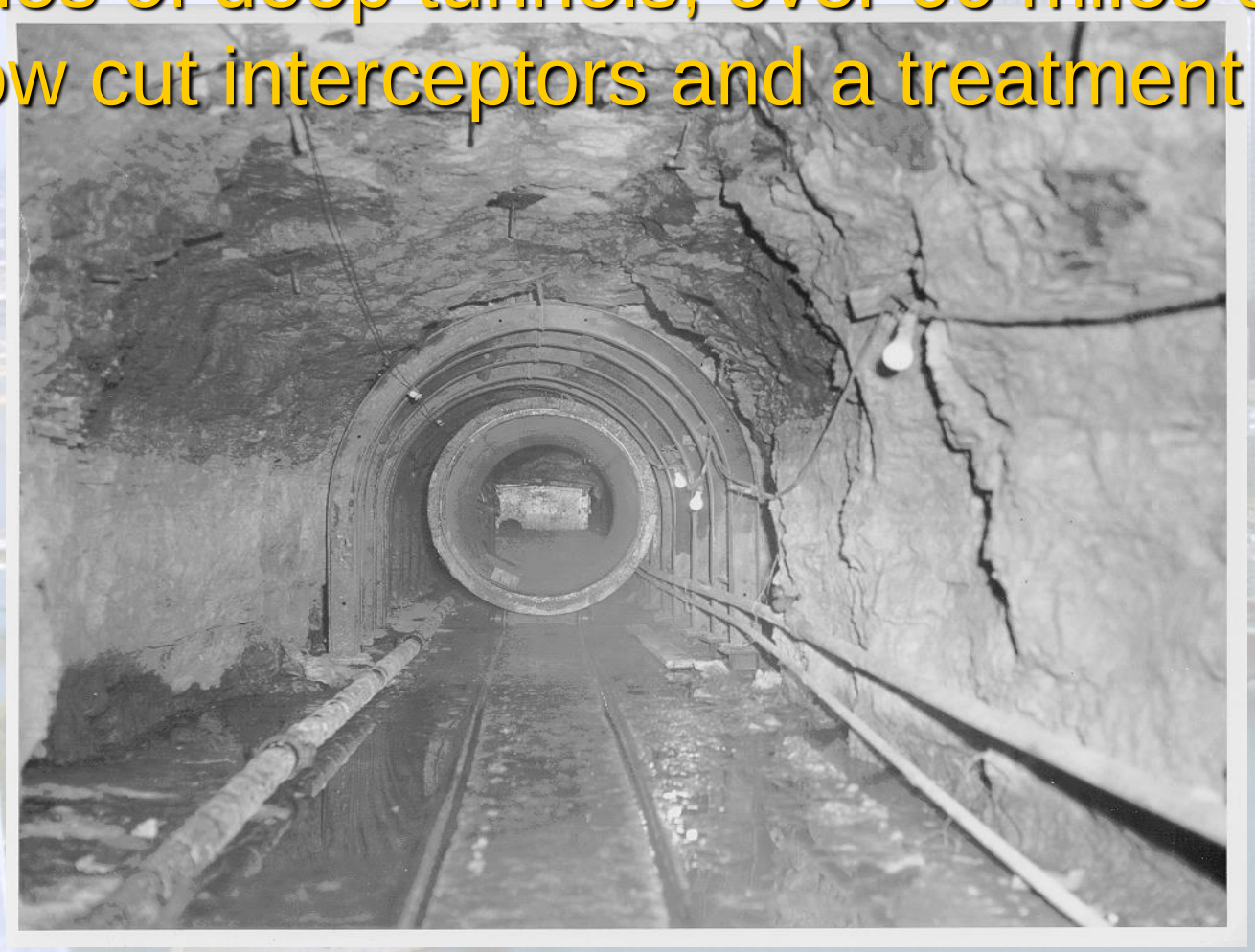

3 Rivers
Wet Weather
Improving our region's water quality
Watersheds in Allegheny County
September 2014
Legend
Allegheny County Border
Municipality Borders
ALCOSAN Service Area
Act 167 Major Watersheds
Stream Attaining Designated Use
Stream Impaired for Designated Use (Non-AMD)
Stream Impaired for Designated Use by Acid Mine Drainage (AMD) Only
Stream Impaired for Designated Use (Other Pollutants and AMD)
Major Roadways
0 0.5 1 2 3 4
Miles
N

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

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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

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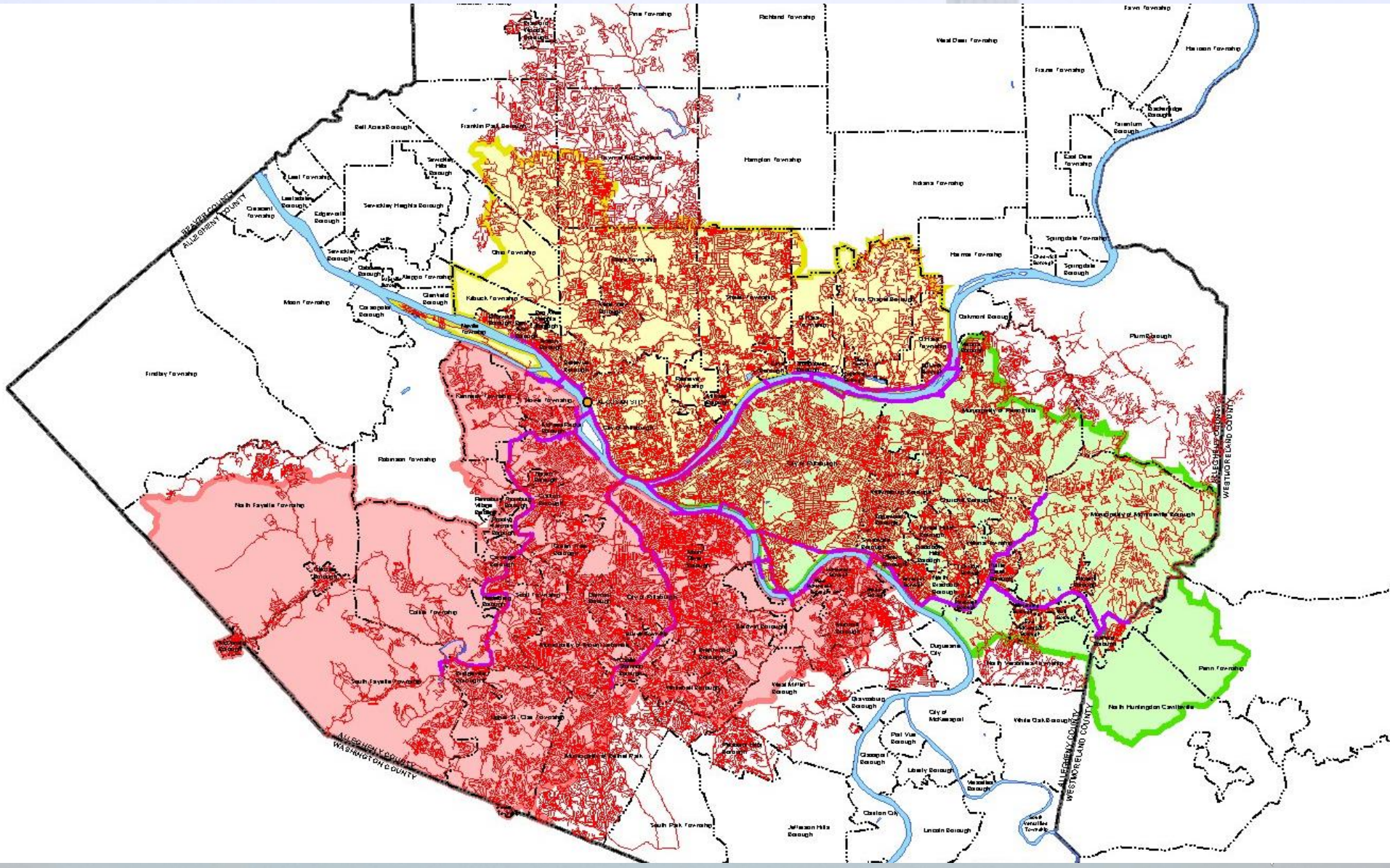
ALCOSAN Service Area



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

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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

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ALCOSAN Selected Plan

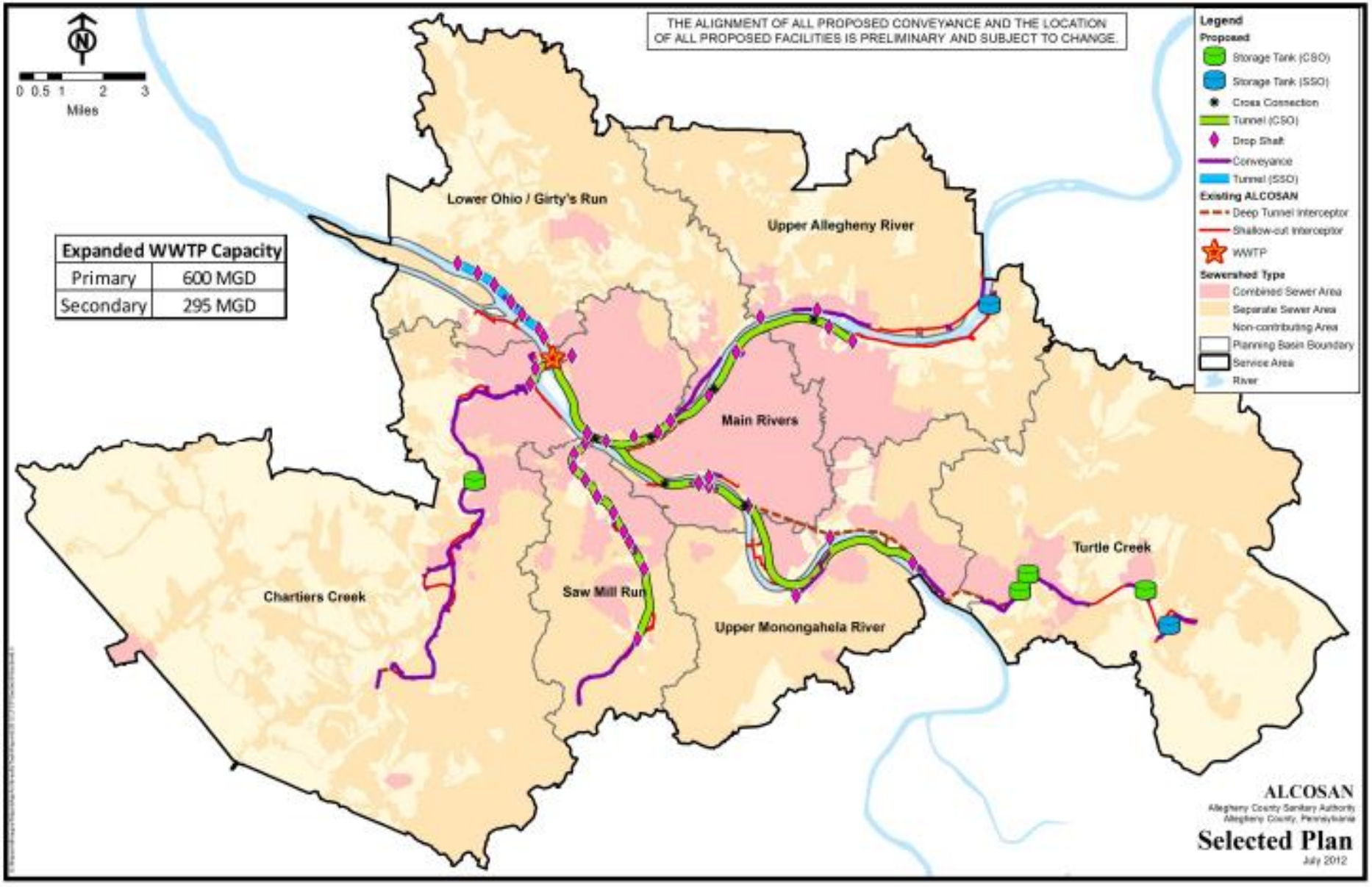
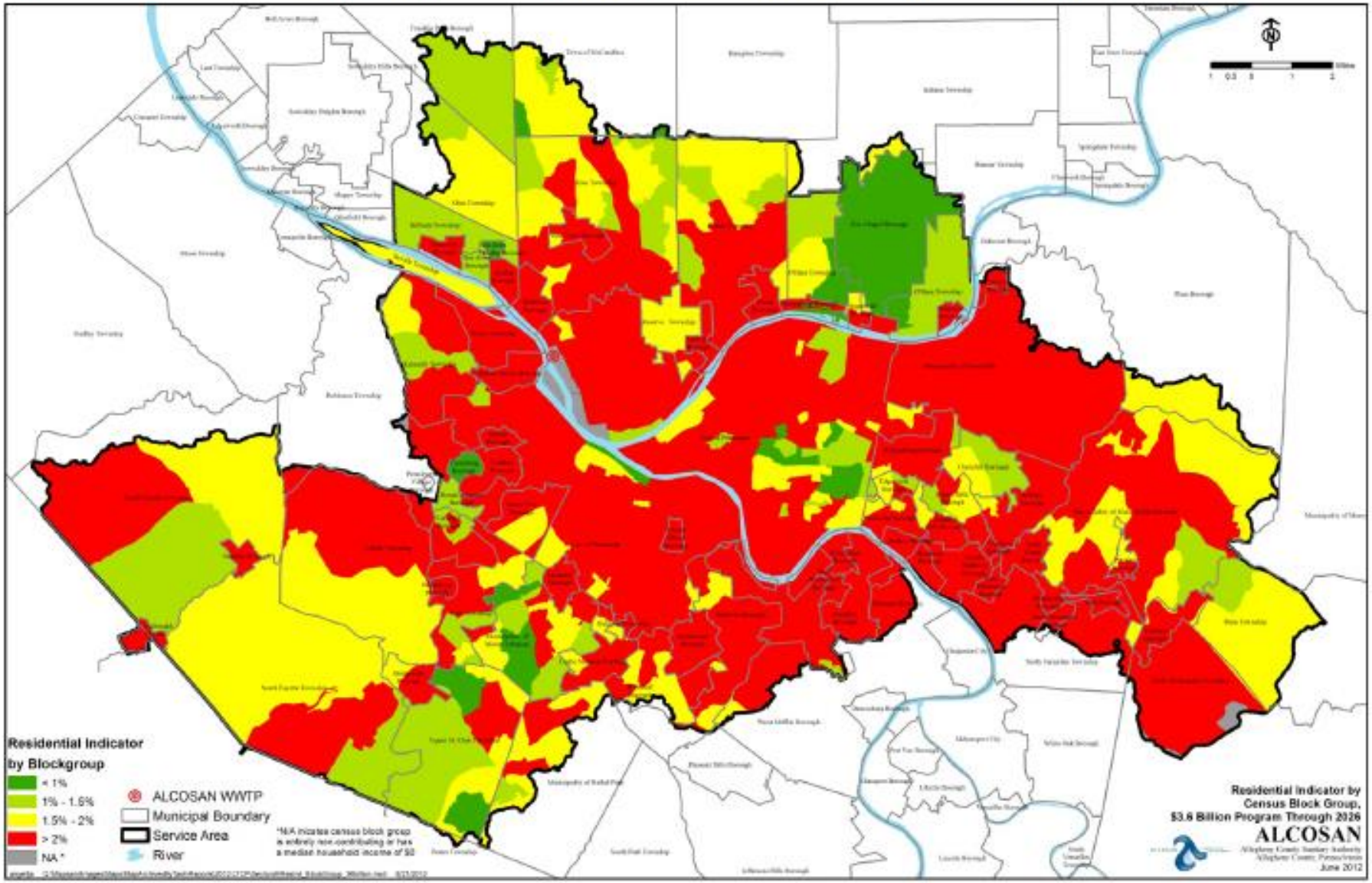


Figure 9-139: ALCOSAN Selected Alternative – Residential Indicators Showing Intra-Municipal Variations



ALCOSAN Recommended Plan

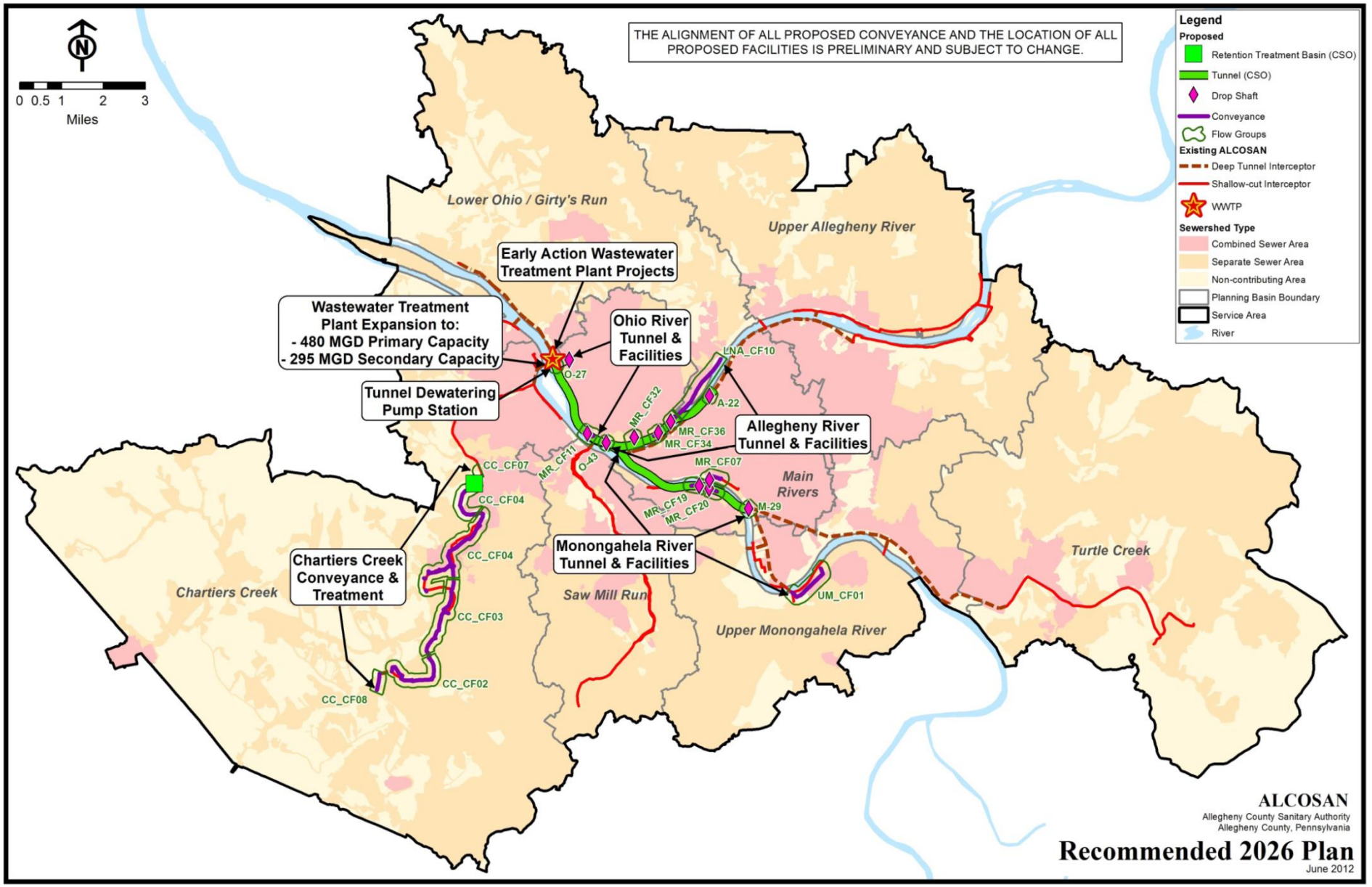


Figure 11-11: Projected 2027 Residential Indicators by Census Block Group

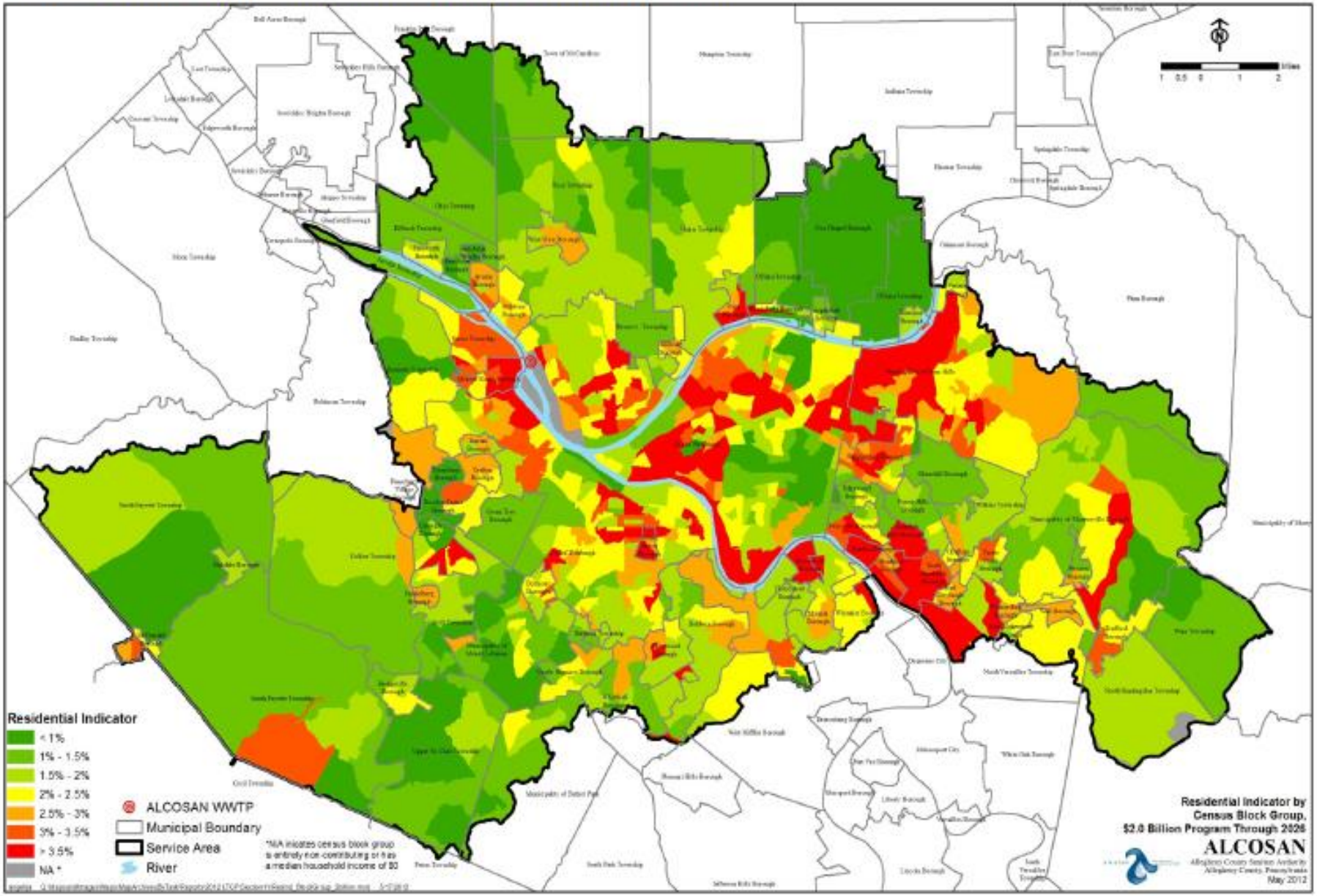
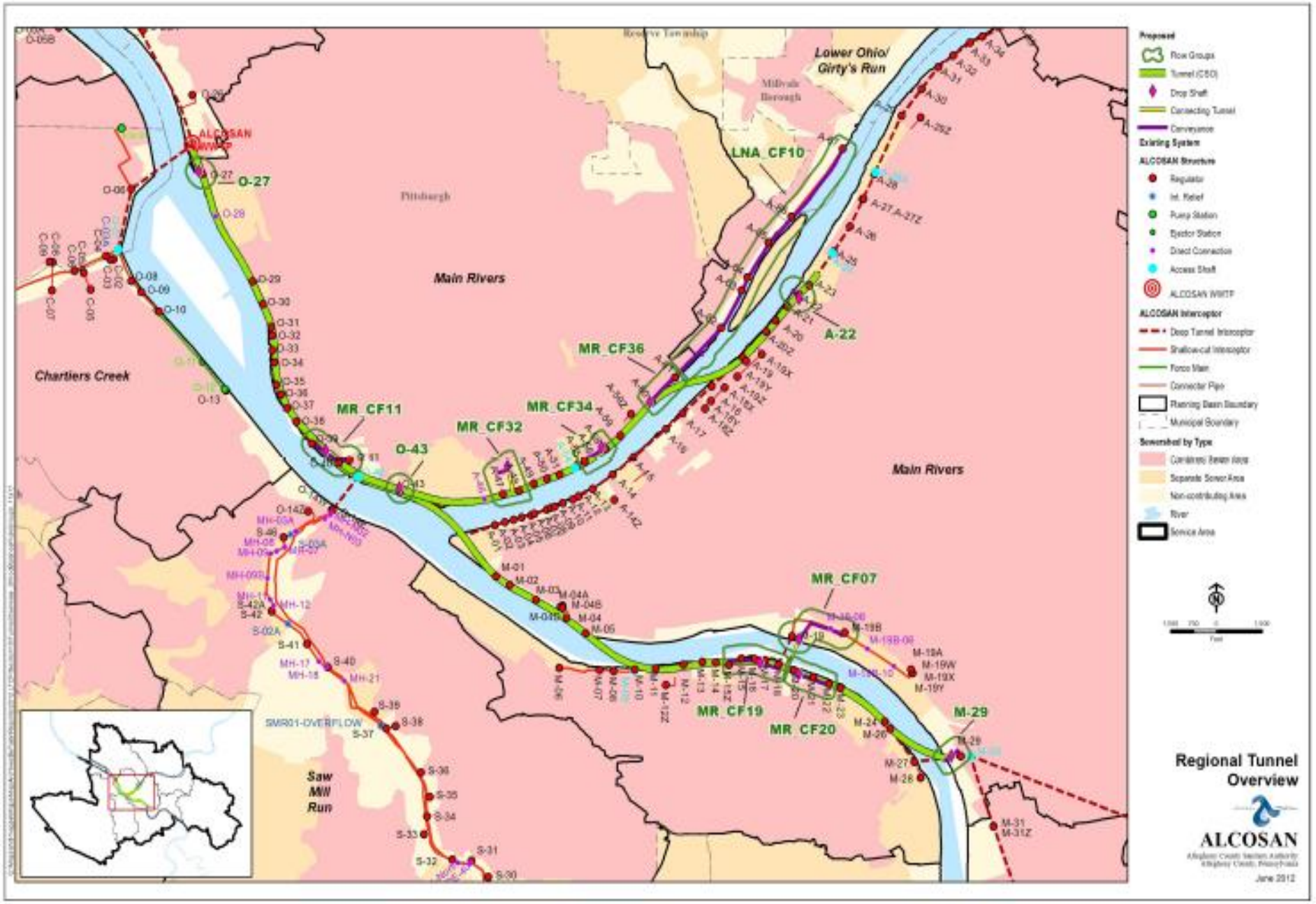


Figure 10-4: Proposed Regional Tunnel Extent for Recommended 2026 Plan



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

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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

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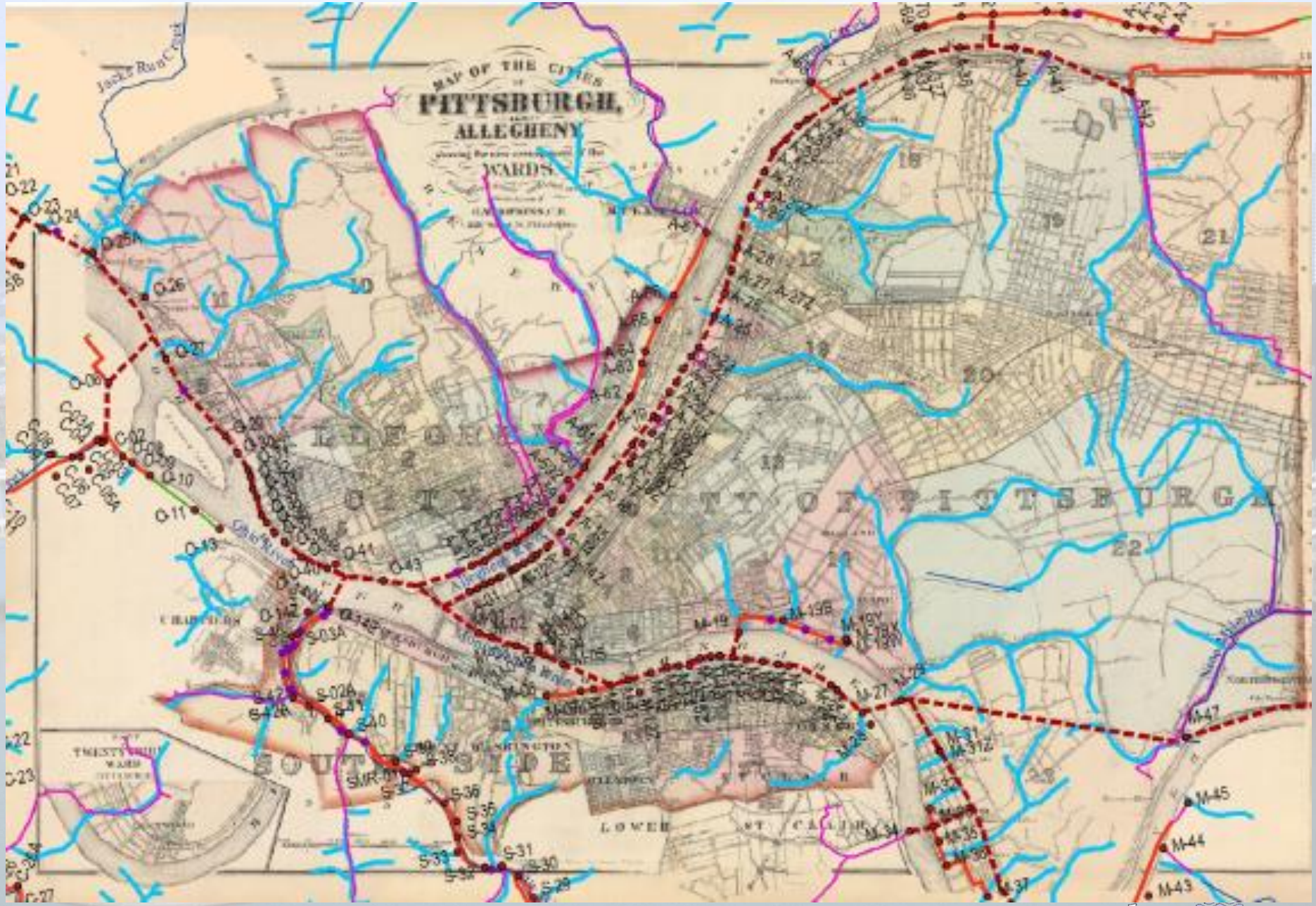
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SOUTH SIDE
LOWER
Jacks Run
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Ohio River
Monongahela River
Allegheny River

Wet Weather

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

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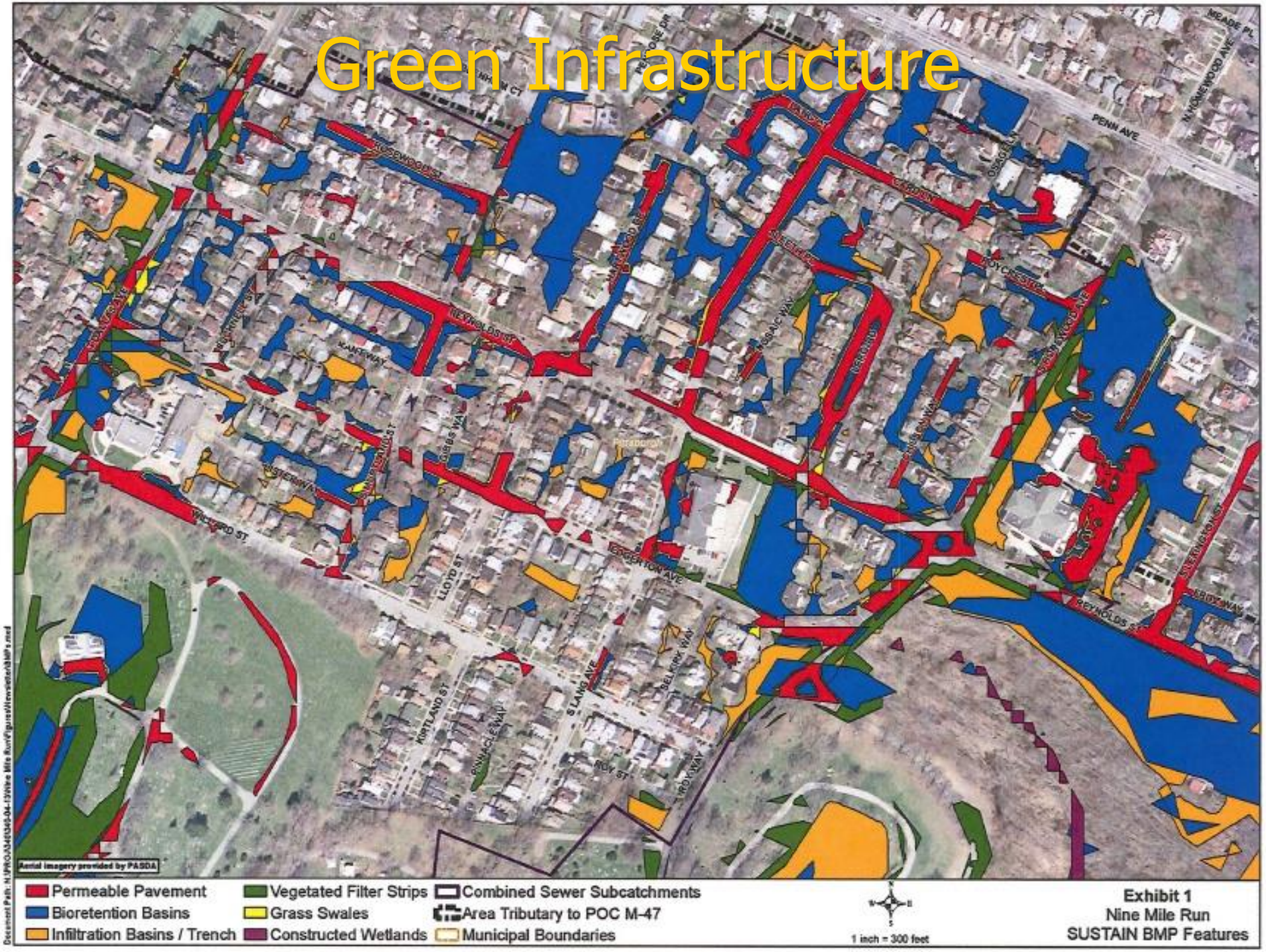
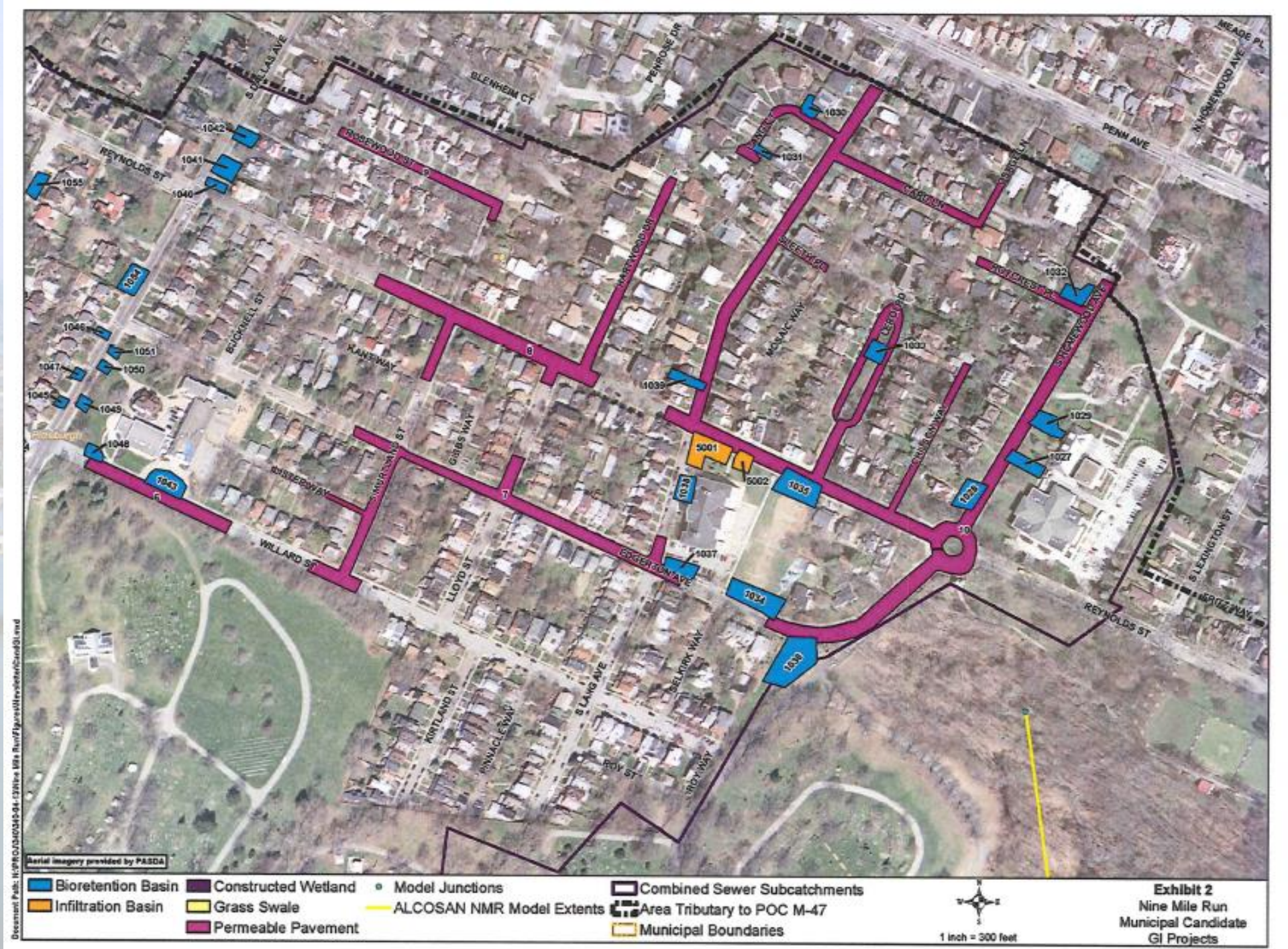
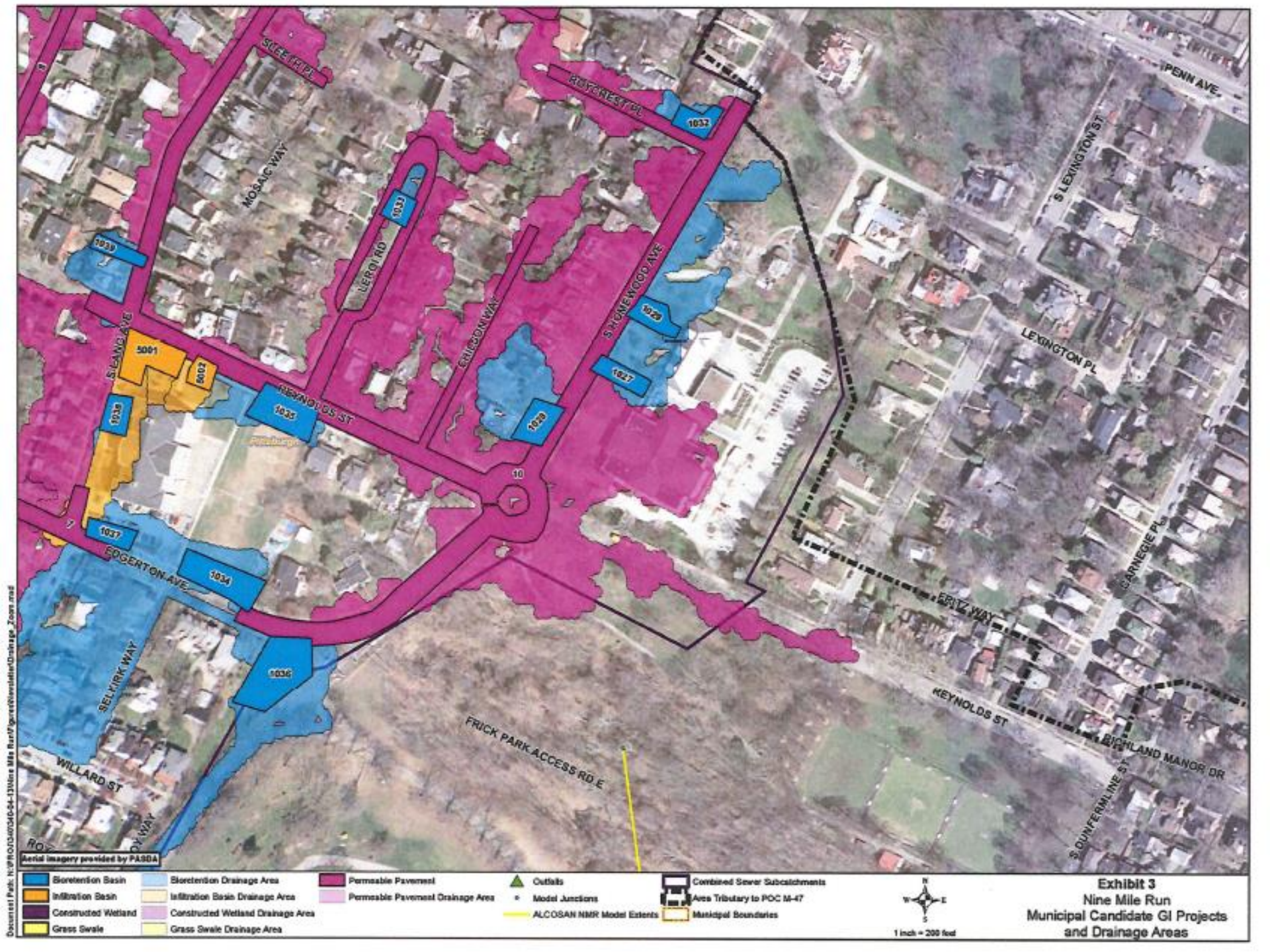
Green Infrastructure




Aerial imagery provided by PASDA
Bioretention Basin
Infiltration Basin
Constructed Wetland
Grass Swale
Permeable Pavement
Model Junctions
ALCOSAN NMR Model Extents
Combined Sewer Subcatchments
Area Tributary to POC M-47
Municipal Boundaries
1 inch = 300 feet
Exhibit 2
Nine Mile Run
Municipal Candidate
GI Projects


SLEE HILL PL
REYCREST PL
MOSAIC WAY
LEROI RD
ERIDON WAY
S HOMEWOOD AVE
PENN AVE
S LEXINGTON ST
LEXINGTON PL
CARNEGIE PL
FRITZ WAY
KEYNOLDS ST
HIGHLAND MANOR DR
S DUNFERMLINE ST
SLEIGH AVE
REYNOLDS ST
EDGERTON AVE
SELKIRK WAY
WILLARD ST
FRICK PARK ACCESS RD E
1032
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5001
5002
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1037
1034
1036
Aerial imagery provided by PASDA
Bioretention Basin
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Bioretention Drainage Area
Infiltration Basin Drainage Area
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Permeable Pavement
Permeable Pavement Drainage Area
Outfalls
Model Junctions
ALCOSAN NMR Model Extents
Combined Sewer Subcatchments
Area Tributary to POC M-47
Municipal Boundaries
N
W
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S
1 inch = 200 feet
Exhibit 3
Nine Mile Run
Municipal Candidate GI Projects
and Drainage Areas

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 negligable 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

EXHIBIT 5C

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

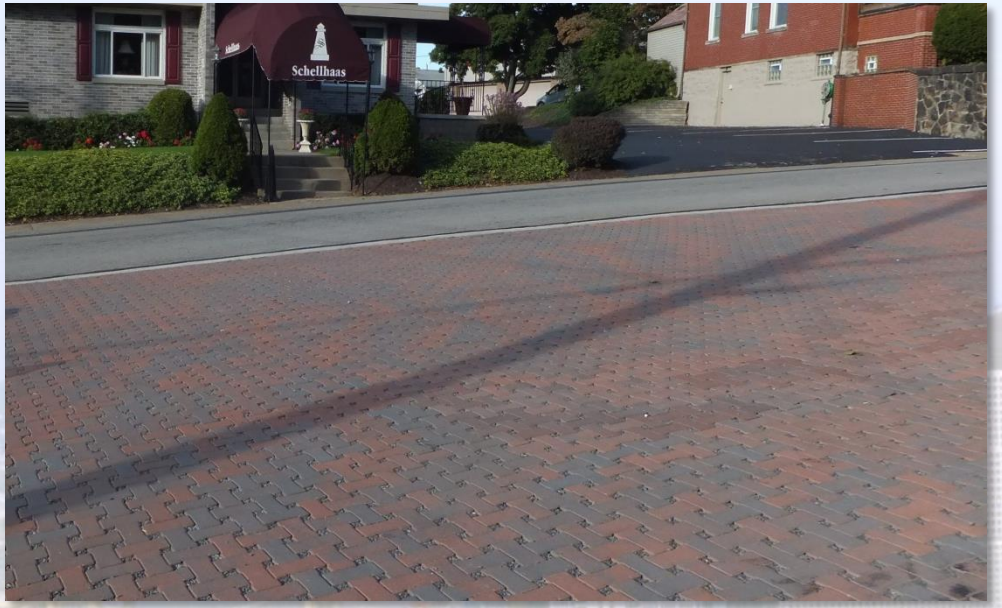
System Assessment

		Storage Capacity									
		0.000e+0 M Gallon		3.485e-1 M Gallon		6.712e-1 M Gallon		1.742e+0 M Gallon		5.227e+0 M Gallon	
POC	Reg. ID	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-67-00	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	6	6.2	1	23.2	1.4	0.727
GR_LBs_1343860_BR	13.6	11	1	4.7	0.5	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_1343767_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 (2.189e+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)

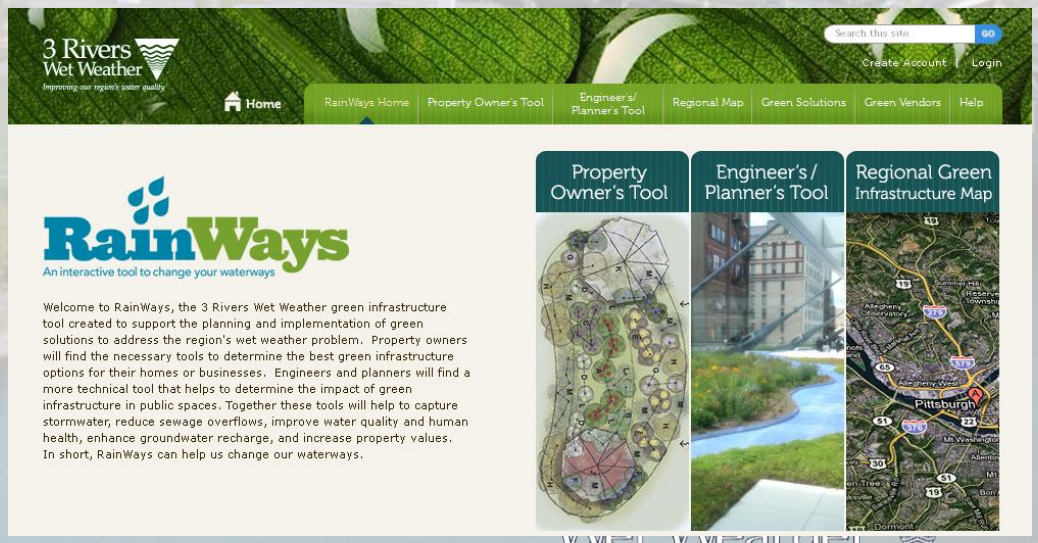

Schellhaas


JUN 22 2011

Evaluation Tools

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

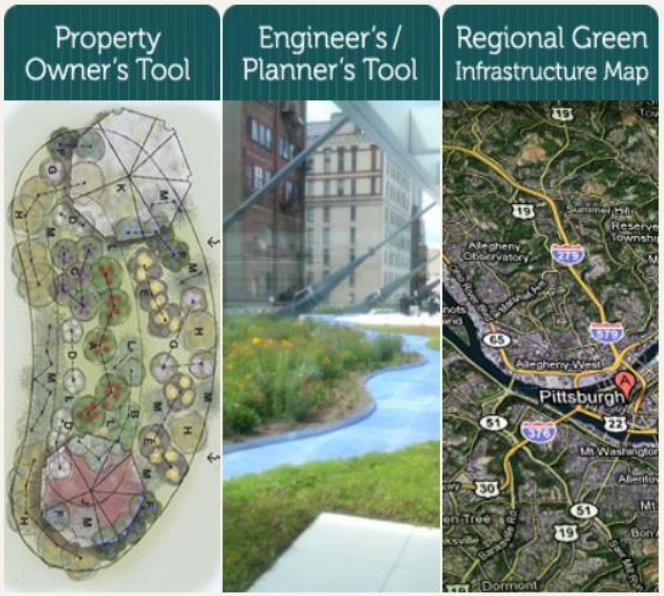
- 3RWW RainWays© Engineer's/Planner's Tool



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.



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

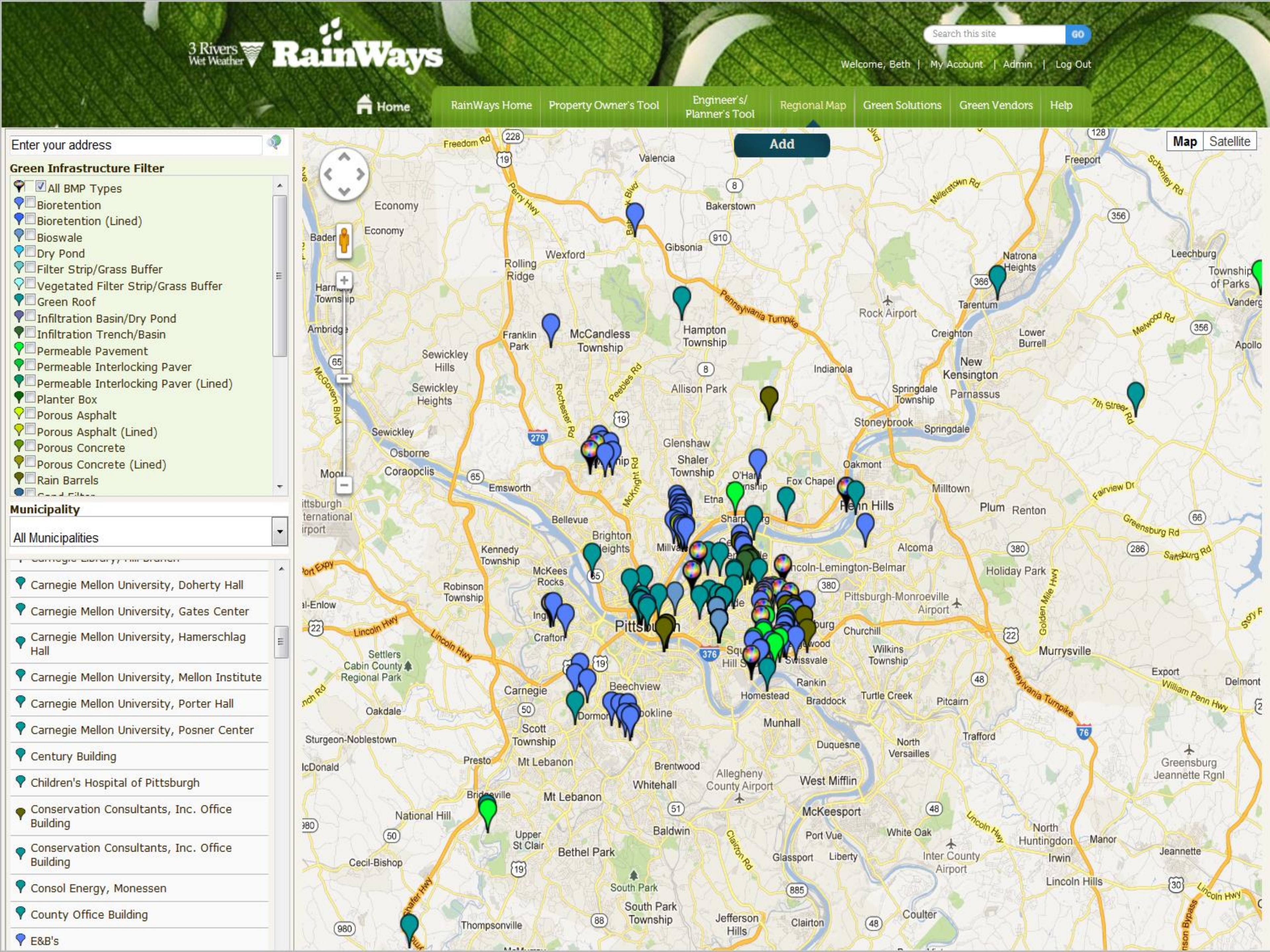
Annual Runoff: 71,156 gal.

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.


3 Rivers Wet Weather
RainWays
Search this site
GO
Welcome, Beth | My Account | Admin | Log Out
Home
RainWays Home
Property Owner's Tool
Engineer's/ Planner's Tool
Regional Map
Green Solutions
Green Vendors
Help
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
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
Add
Map
Satellite
Valencia
Freeport
Bakerstown
Economy
Gibsonia
Wexford
Rolling Ridge
Natrona Heights
Leechburg
Tarentum
Rock Airport
McCandless Township
Hampton Township
Franklin Park
Creighton
Lower Burrell
New Kensington
Parnassus
Allison Park
Indianola
Springdale Township
Springdale
Sewickley Hills
Sewickley Heights
Sewickley
Osborne
Coraopolis
Glenshaw
Shaler Township
Stoneybrook
Oakmont
Fox Chapel
Penn Hills
Milltown
Plum
Renton
Emsworth
Bellevue
Etna
Kennedy Township
McKees Rocks
Brighton Heights
Alcoma
Holiday Park
Robinson Township
Pittsburgh
Pittsburgh-Monroeville Airport
Churchill
Murrysville
Crafton
Wilkins Township
Swissvale
Rankin
Settlers Cabin County Regional Park
Carnegie
Beechview
Homestead
Braddock
Turtle Creek
Pitcairn
Export
Delmont
Oakdale
Scott Township
Munhall
Duquesne
North Versailles
Trafford
Sturgeon-Noblestown
Mt Lebanon
Brentwood
Allegheny County Airport
West Mifflin
Greensburg Jeannette Rgnl
Whitehall
McKeesport
National Hill
Baldwin
Port Vue
White Oak
North Huntingdon
Manor
Upper St Clair
Bethel Park
Glassport
Liberty
Inter County Airport
Irwin
Jeannette
Cecil-Bishop
Lincoln Hills
South Park
South Park Township
Jefferson Hills
Clairton
Coulter
Thompsonville
Pennsylvania Turnpike
Lincoln Hwy
Freedom Rd
Perry Hwy
Milerstown Rd
William Penn Hwy
Greensburg Rd

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

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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

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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

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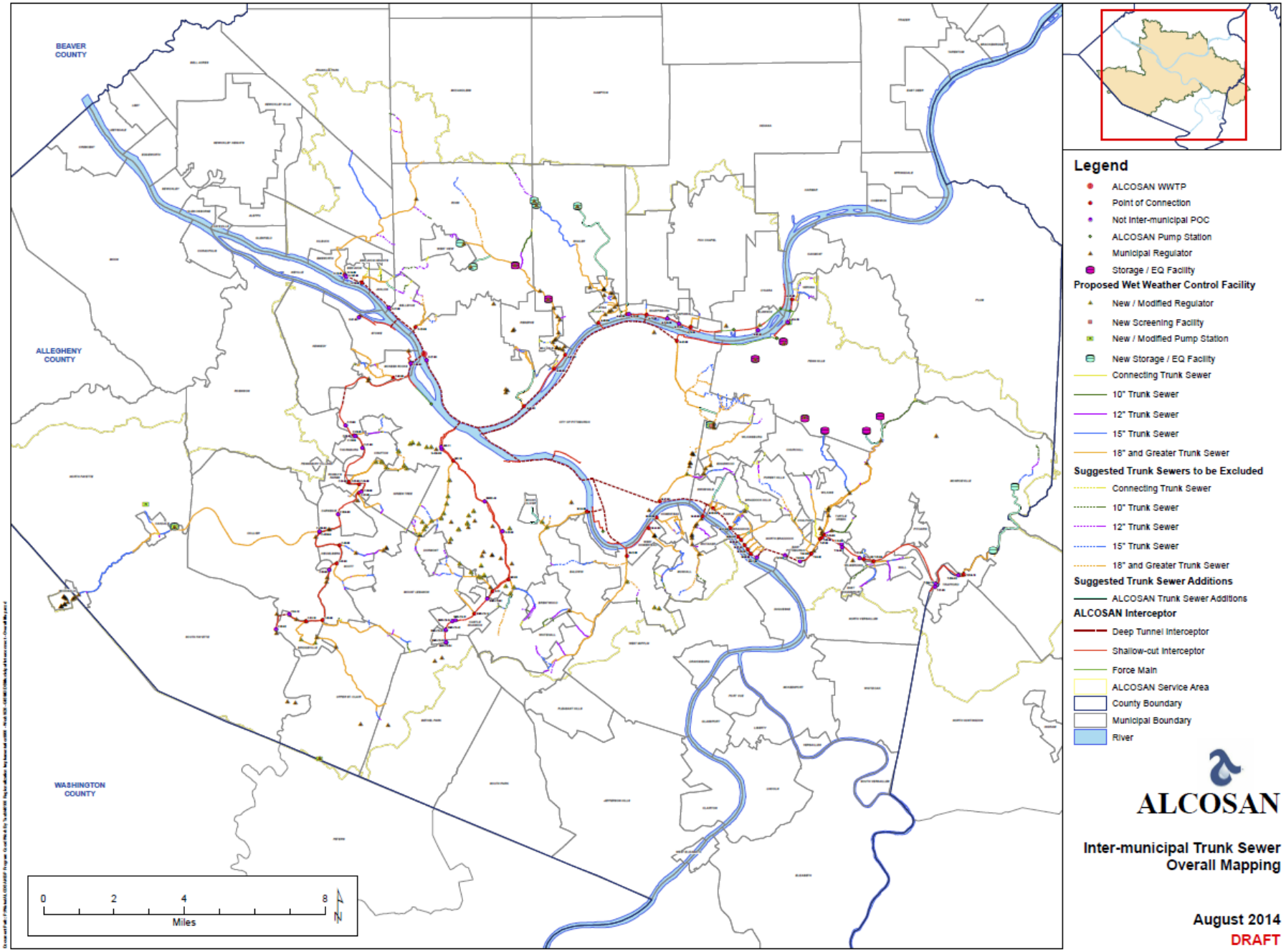
Regionalization of Municipal Sewer Collection System

- 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

3 Rivers Wet Weather


BEAVER COUNTY
ALLEGHENY COUNTY
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2
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ALCOSAN WWTP
Point of Connection
Not Inter-municipal POC
ALCOSAN Pump Station
Municipal Regulator
Storage / EQ Facility
Proposed Wet Weather Control Facility
New / Modified Regulator
New Screening Facility
New / Modified Pump Station
New Storage / EQ Facility
Connecting Trunk Sewer
10" Trunk Sewer
12" Trunk Sewer
15" Trunk Sewer
18" and Greater Trunk Sewer
Suggested Trunk Sewers to be Excluded
Connecting Trunk Sewer
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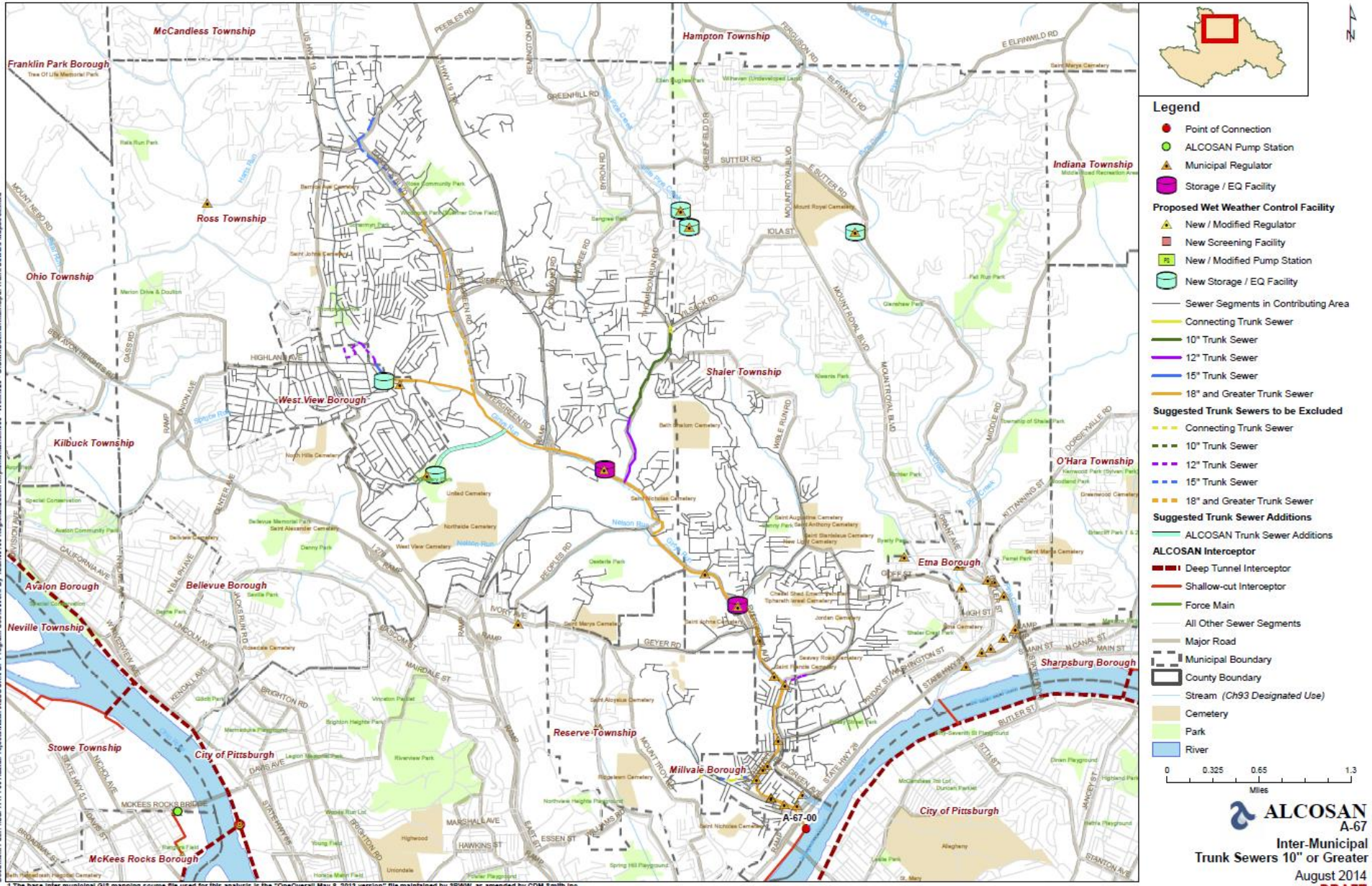
Suggested Trunk Sewer Additions
ALCOSAN Trunk Sewer Additions
ALCOSAN Interceptor
Deep Tunnel Interceptor
Shallow-cut Interceptor
Force Main
ALCOSAN Service Area
County Boundary
Municipal Boundary
River
ALCOSAN
Inter-municipal Trunk Sewer
Overall Mapping
August 2014
DRAFT



1 The base inter-municipal GIS mapping source file used for this analysis is the "OneOverall May 8, 2013 version" file maintained by 3RWW, as amended by CDM Smith Inc.

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

3 Rivers Wet Weather

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

3 Rivers Wet Weather

Questions

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