



Northeast Ohio Regional Sewer District

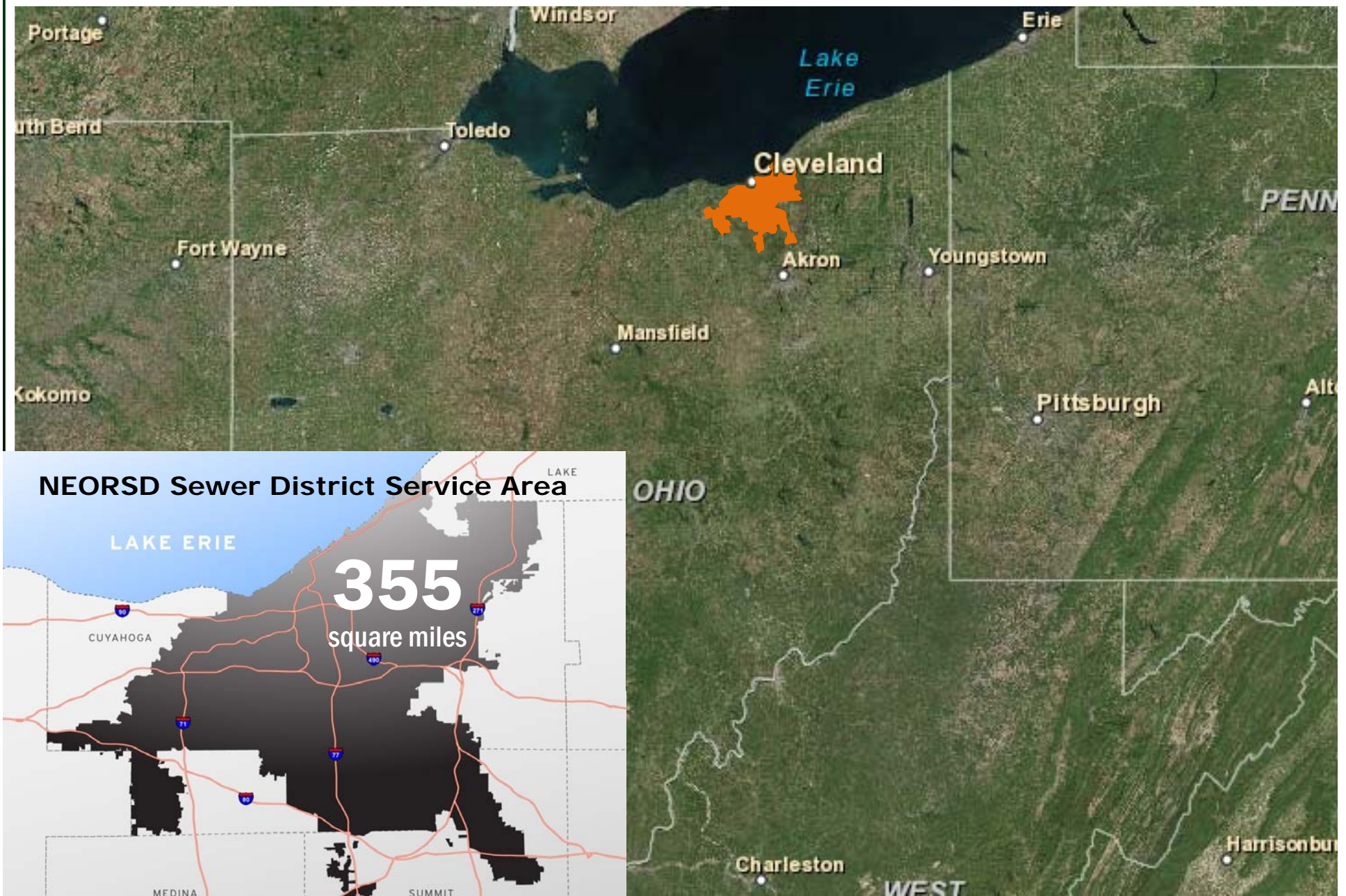
Solving Wet Weather Problems: Evolution of a Green Infrastructure Program



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Northeast Ohio Regional Sewer District: Who we are...

- Political subdivision of Ohio
- Created in 1972 by Court Order
 - Code of Regulations
 - Governed by seven Trustees
- Separate and distinct from the City of Cleveland and Cuyahoga County



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What We Do...

- Stormwater & sanitary services to 62 communities
 - 1 million customers
 - 90+ billion gallons treated annually
 - 200 MGD average flow at 3 wastewater treatment plants
 - 312 miles of interceptor sewers
 - 400 miles of Regional Stormwater System
- Water quality monitoring
- Lake Erie beach monitoring and maintenance

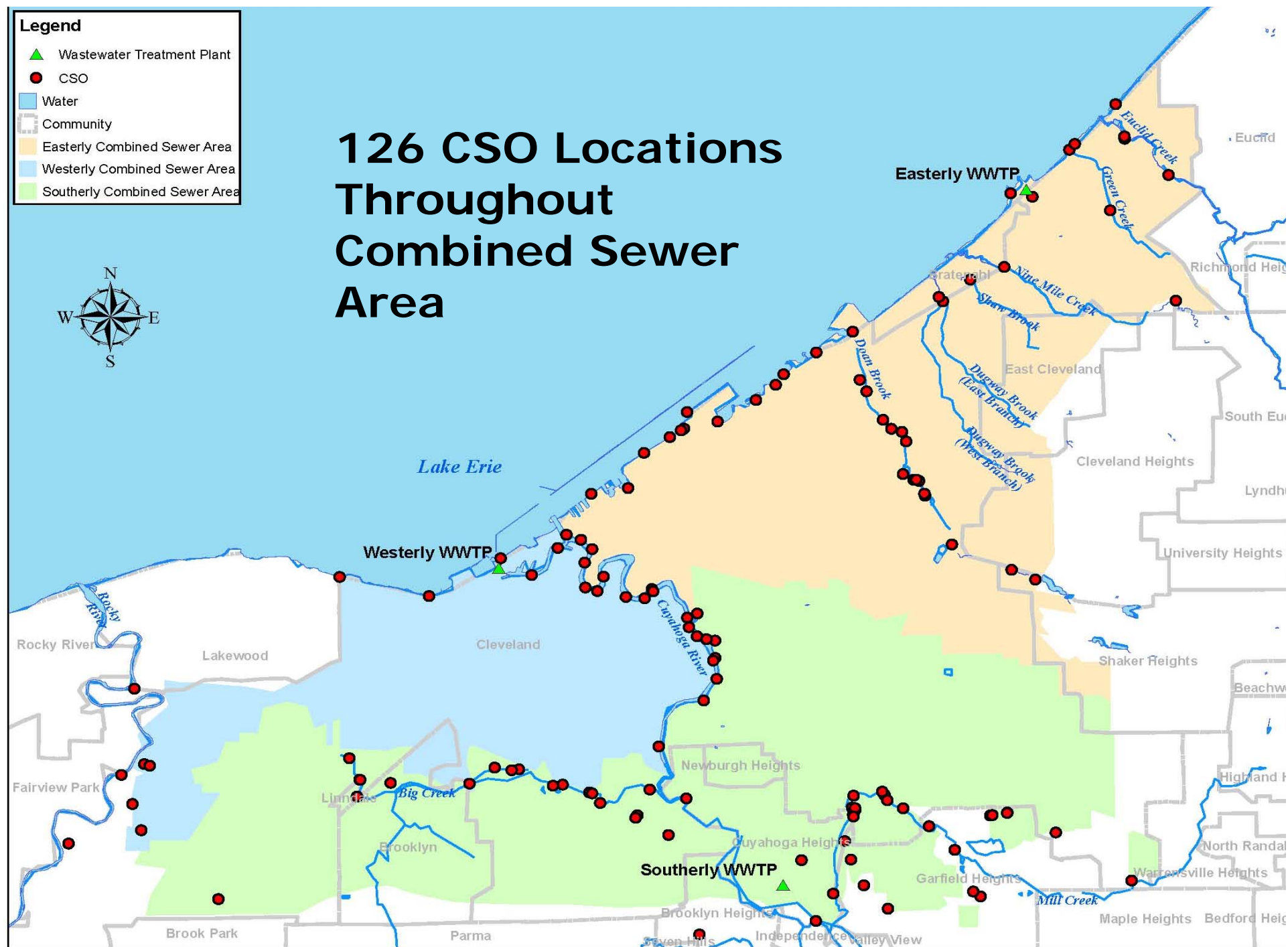


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Legend

- ▲ Wastewater Treatment Plant
- CSO
- Water
- Community
- Easterly Combined Sewer Area
- Westerly Combined Sewer Area
- Southerly Combined Sewer Area

126 CSO Locations Throughout Combined Sewer Area



Legacy Problems Combined Sewer Overflow



WARNING: OVERFLOW EVENT PUBLIC ADVISORY

STORMWATER AND SEWAGE OVERFLOWED TO THIS BEACH AREA ON _____, DATE & TIME

As a result, the beach area and water may have been affected.
Visitors – particularly children, the elderly, and those in ill health –
are advised to avoid contact with the water and debris.

FOR MORE INFORMATION ABOUT
COMBINED SEWER OVERFLOWS (CSOs):

NORTHEAST OHIO REGIONAL SEWER DISTRICT
CSO INFORMATION HOTLINE
(216) 432-7330 | www.NEORSO.org

FOR MORE INFORMATION ABOUT
WATER-RELATED HEALTH CONCERNS:

CLEVELAND DEPARTMENT
OF PUBLIC HEALTH (216) 664-4292
OHIO DEPARTMENT
OF HEALTH (614) 466-1390

THIS SIGNAGE IS PROVIDED AS A COURTESY OF THE NORTHEAST OHIO REGIONAL SEWER DISTRICT

WATER QUALITY NOWCAST: POOR

A "Nowcast" system is being tested on this beach to predict bacterial levels that may be present in the water.

POOR WATER QUALITY IS PREDICTED TODAY

based on conditions observed this morning. This means that bacteria levels are likely to be high. Swimming is not advised, especially for children, the elderly, and those in ill health. Full body water contact may result in illness.

NEORSO is a member of the
Cleveland Area Council of Governments
Cleveland Area Council of Governments
Cleveland Area Council of Governments
Cleveland Area Council of Governments

Northeast Ohio Regional Sewer District WET WEATHER PROGRAMS



- \$3 billion in 25 years
- CSO control
- Sewer fees
- Includes GI in CIP
- Funds GI grants
- \$38 million annually
- Flooding & erosion
- Impervious surface fee
- Incentivizes GI with Stormwater Fee Credits

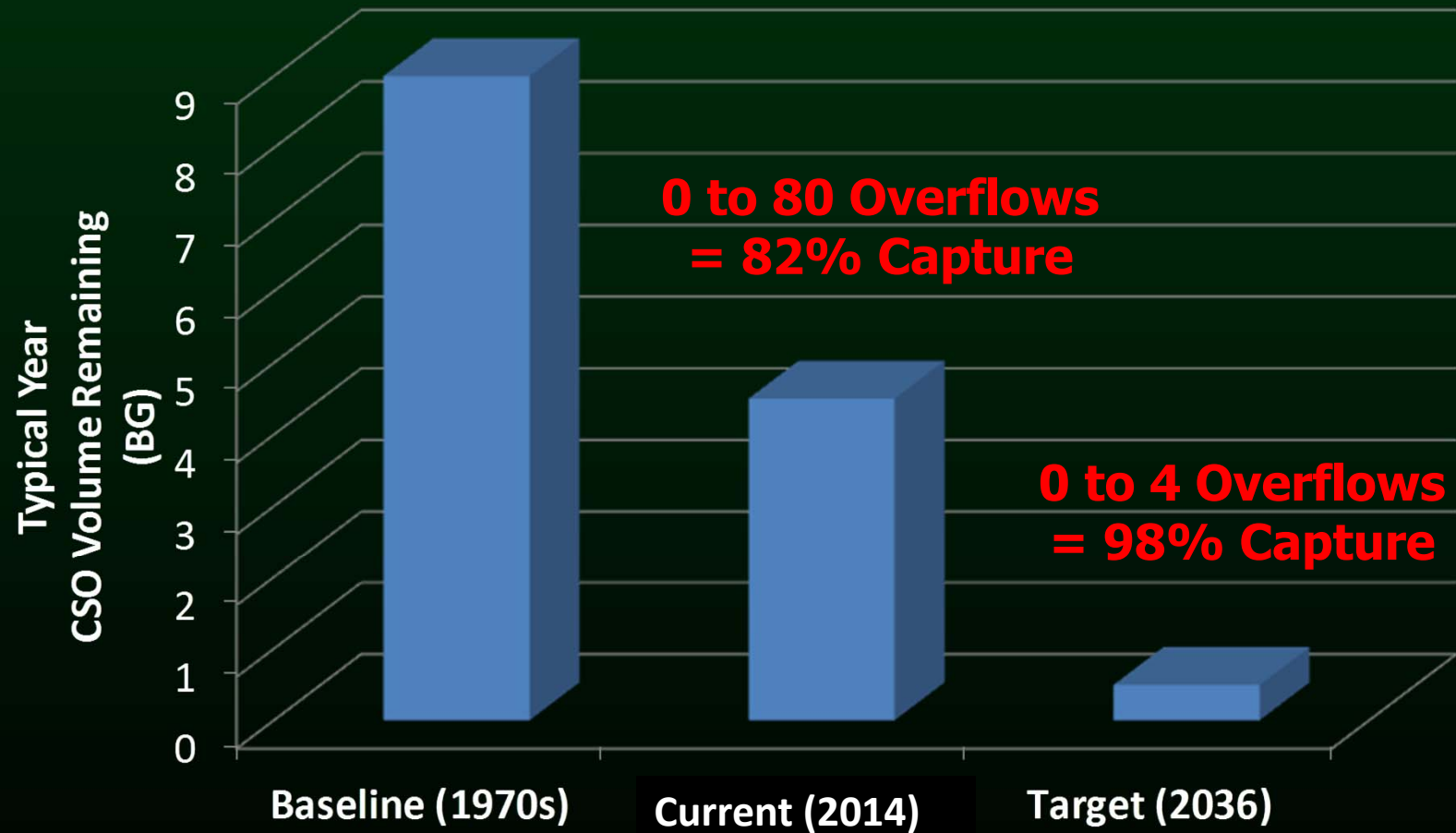


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Consent Decree Requires Northeast Ohio's CSO Problem Reduced in 25 Years



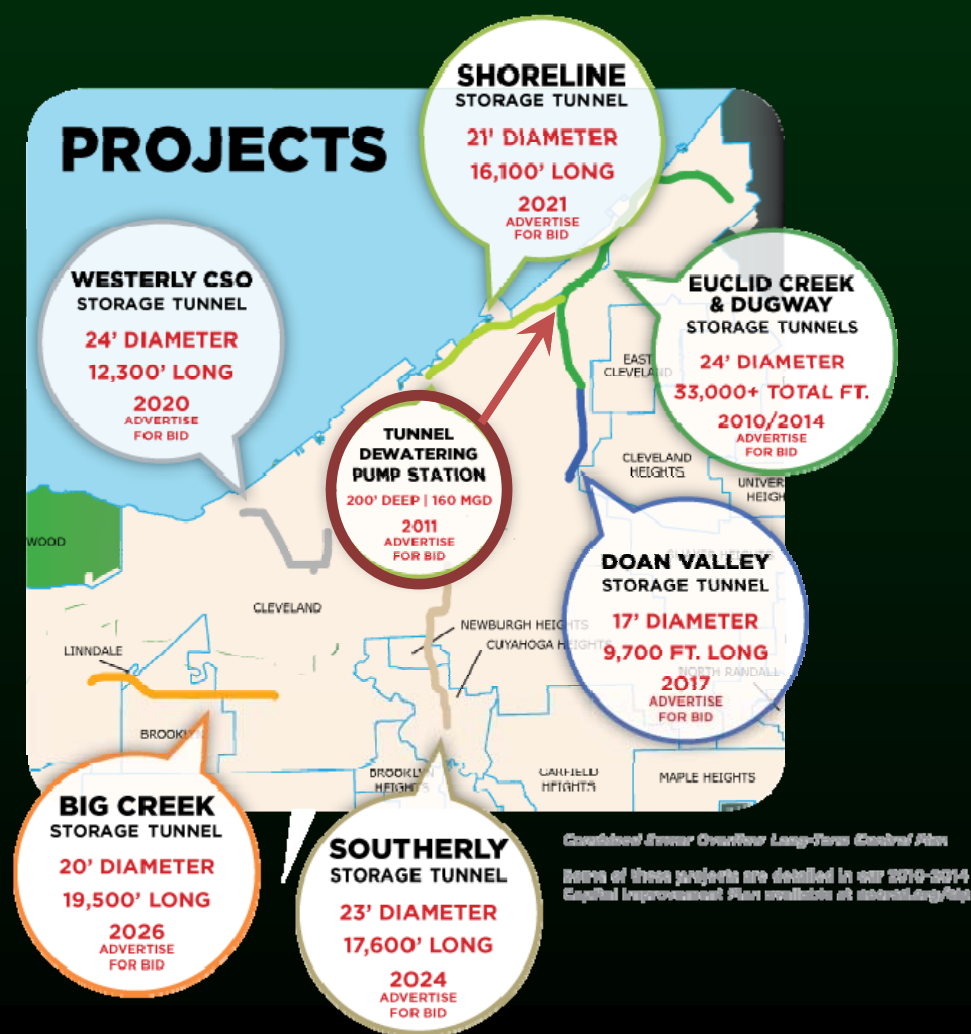
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Project Clean Lake: THE GRAY

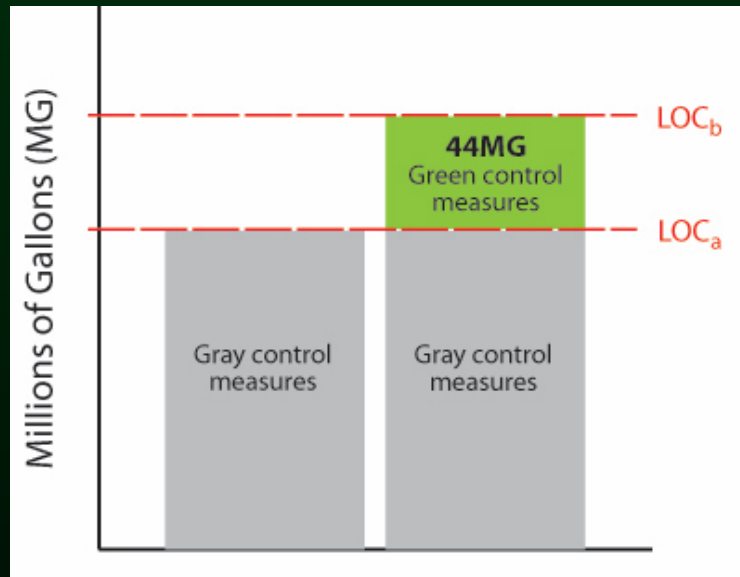
Deep Storage Tunnels Play Key Role



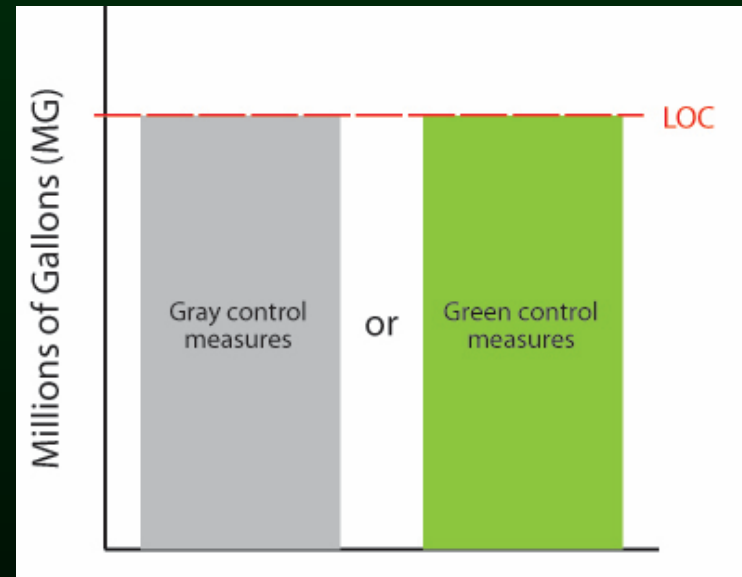
7 tunnel systems

- 21 miles
- 17' to 24' diameter
- 100' to 200' deep
- Three deep tunnel pump stations
- Drop structures
- Near-surface sewers

CSO Consent Decree includes Two options for Green Infrastructure



Appendix 3: "Gray plus Green"
(District submitted Green Infrastructure
Plan December 2011)



Appendix 4: "Gray vs. Green"
(Opportunity to "right-size" gray using green)

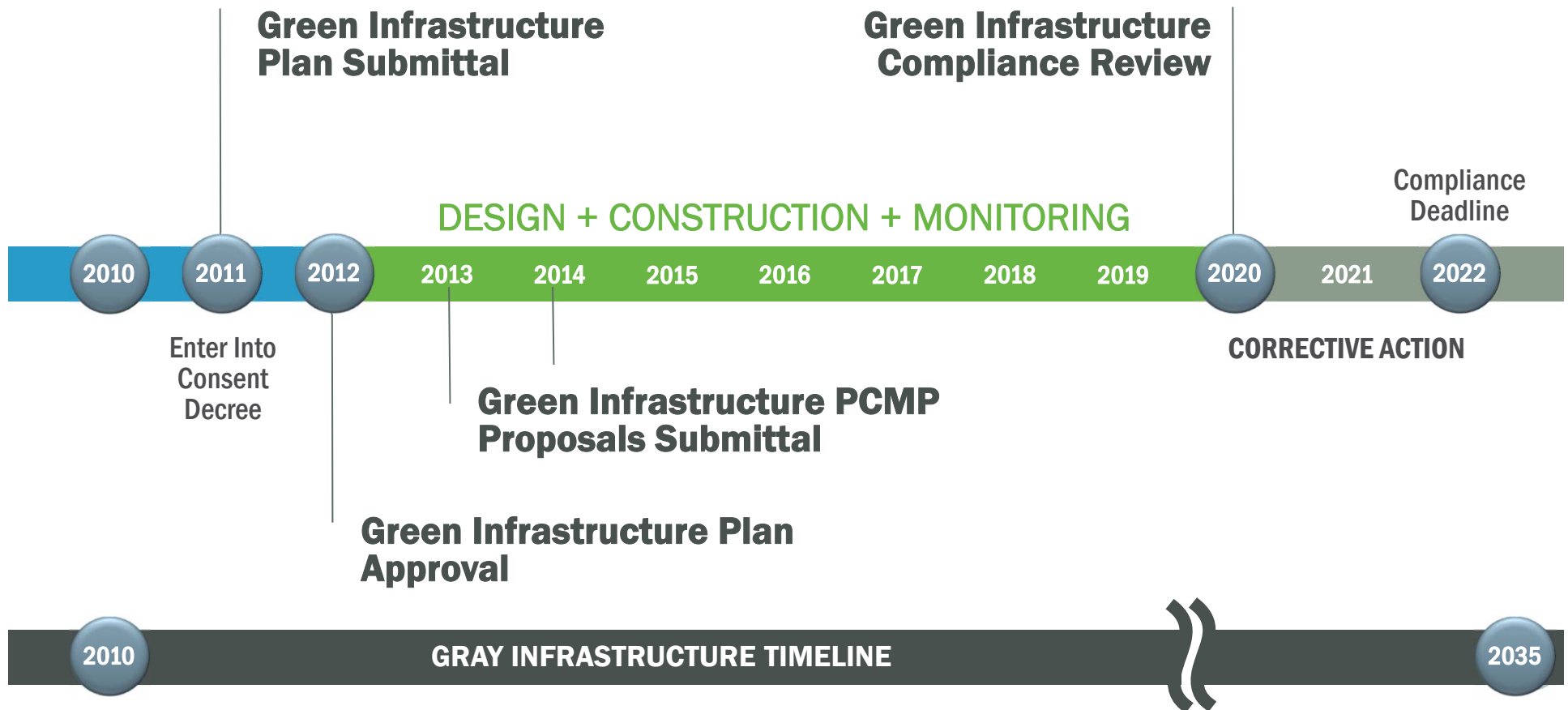


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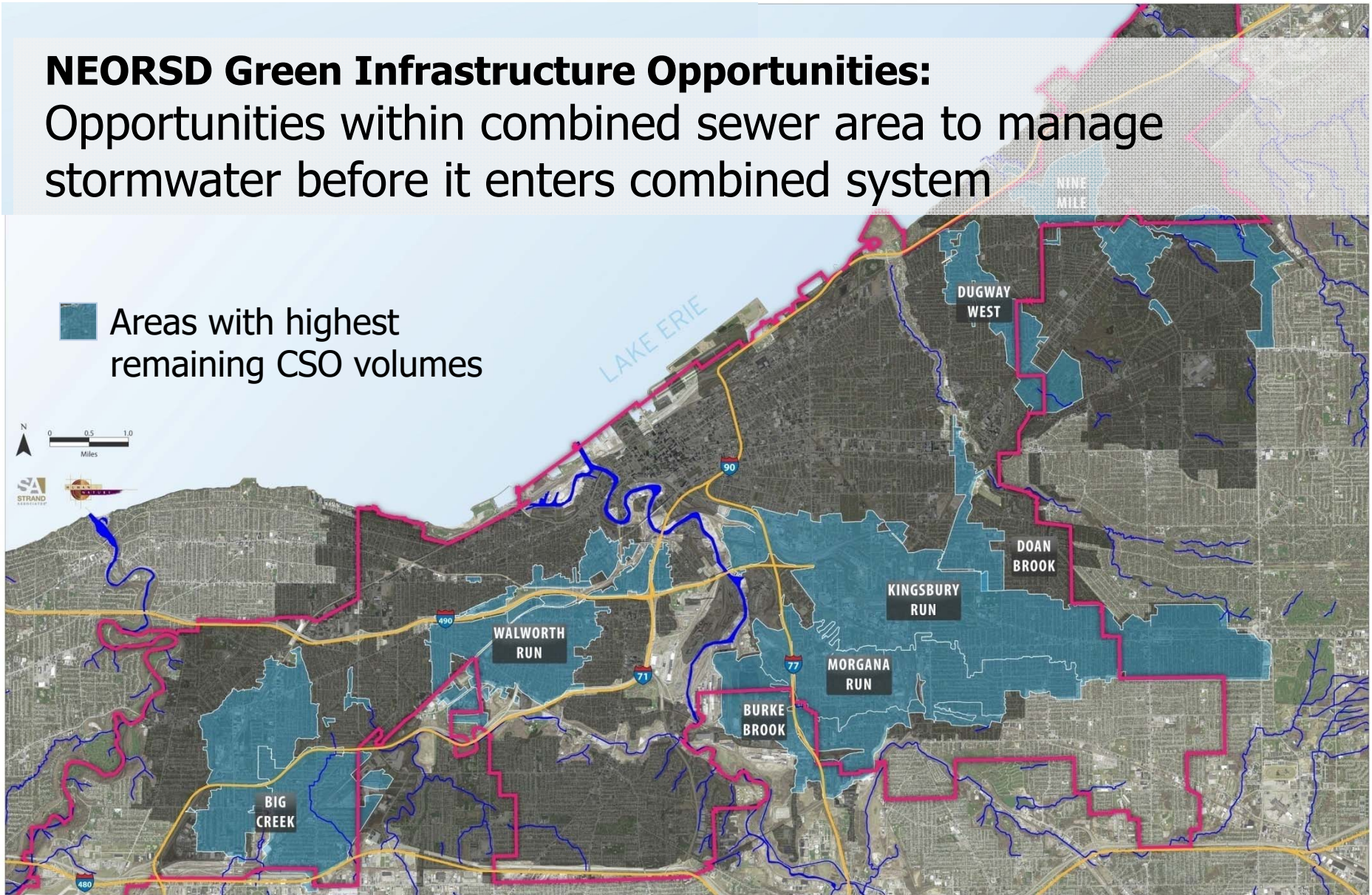
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Consent Decree timeline for GI required under Appendix 3



NEORSD Green Infrastructure Opportunities: Opportunities within combined sewer area to manage stormwater before it enters combined system

 Areas with highest
remaining CSO volumes



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NEORSD Green Infrastructure Project Locations

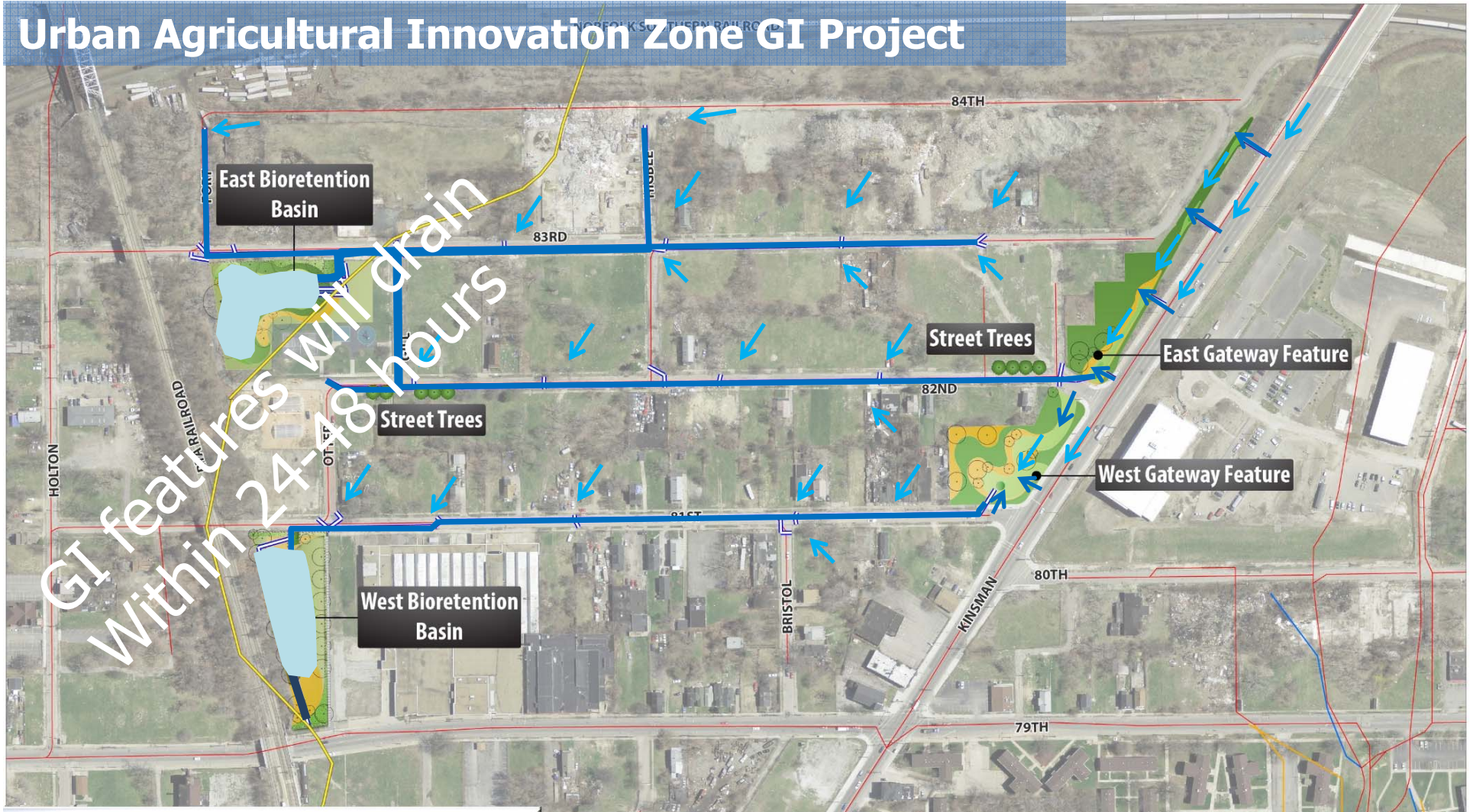


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Urban Agricultural Innovation Zone GI Project



RTA & Hillside Community Park



RID ALL GREEN PARTNERSHIP

Urban Agriculture and Youth Education



KINSMAN FARM

EST 2011



Understanding volume controlled by GI: Urban Agriculture Innovation zone

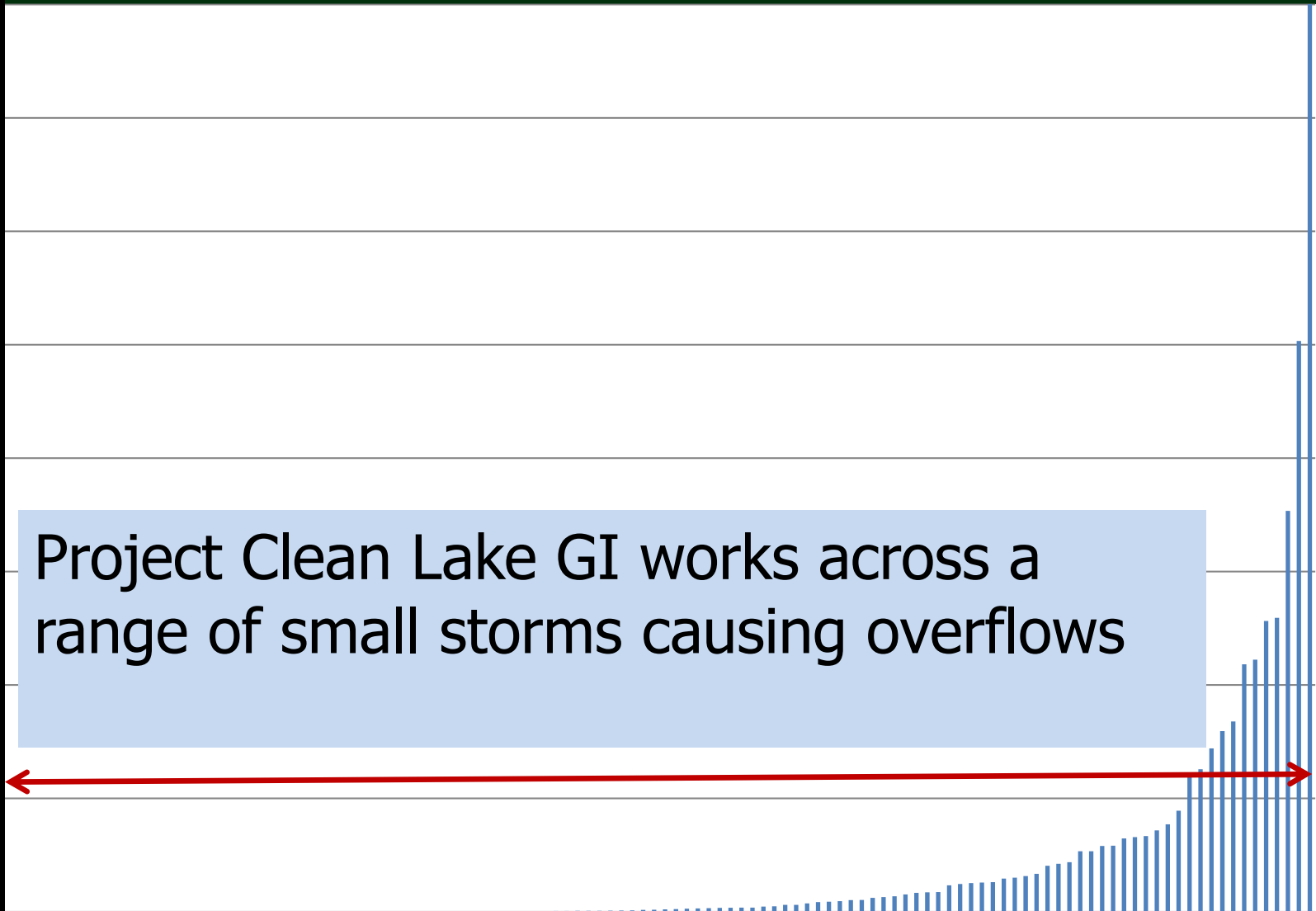


The Facts on UAIZ Green Infrastructure for Appendix 3 CSO Control

- Project Cost: \$7.2M
- Stormwater Volume: 7.0 MG/yr
- CSO volume (Baseline): 7.0 MG/yr
- CSO Volume (Appendix 3): 1.2 MG/yr

Typical Year Baseline CSO Volume (MG)

Project Clean Lake GI works across a range of small storms causing overflows

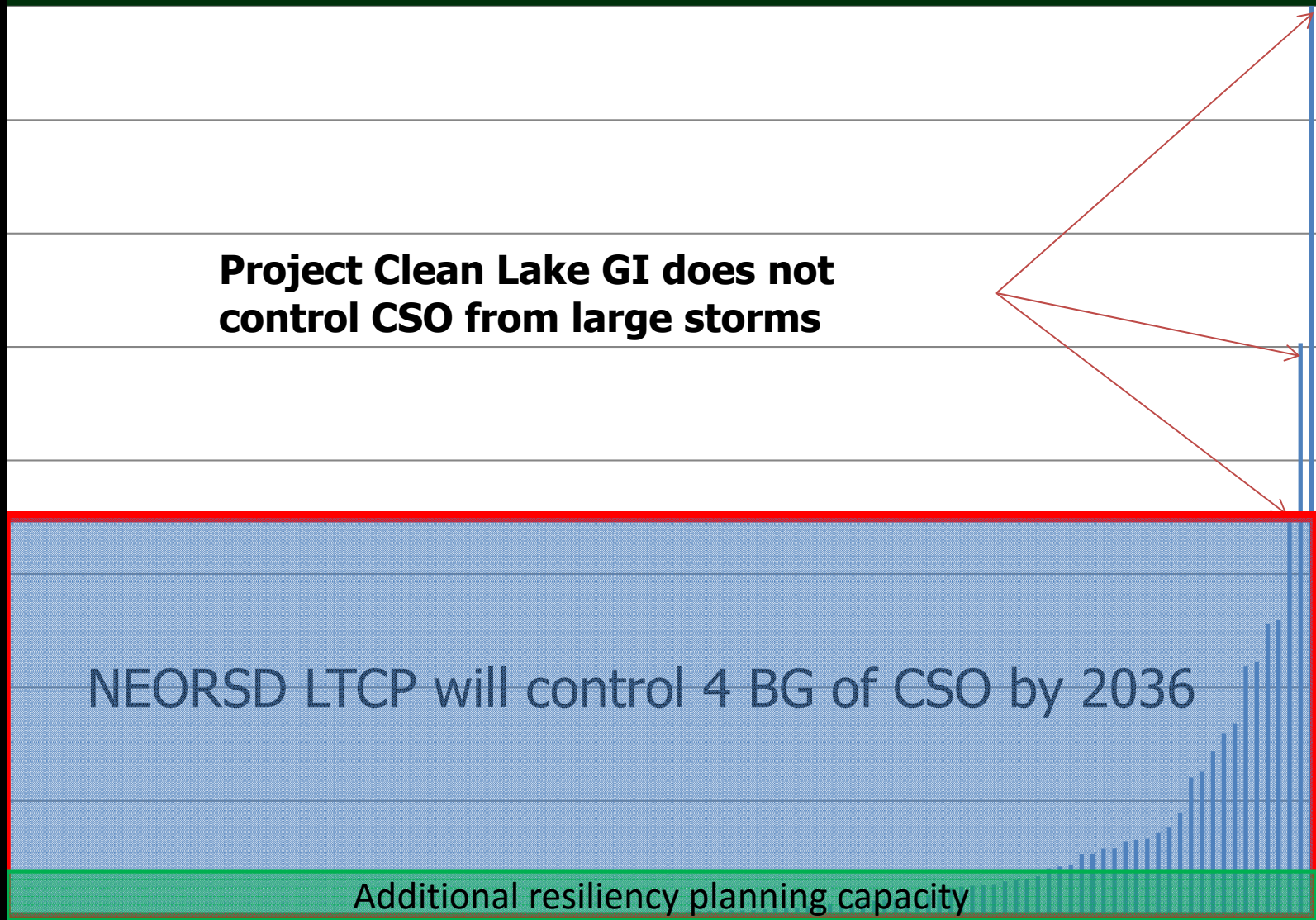


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Typical Year Baseline CSO Volume (MG)

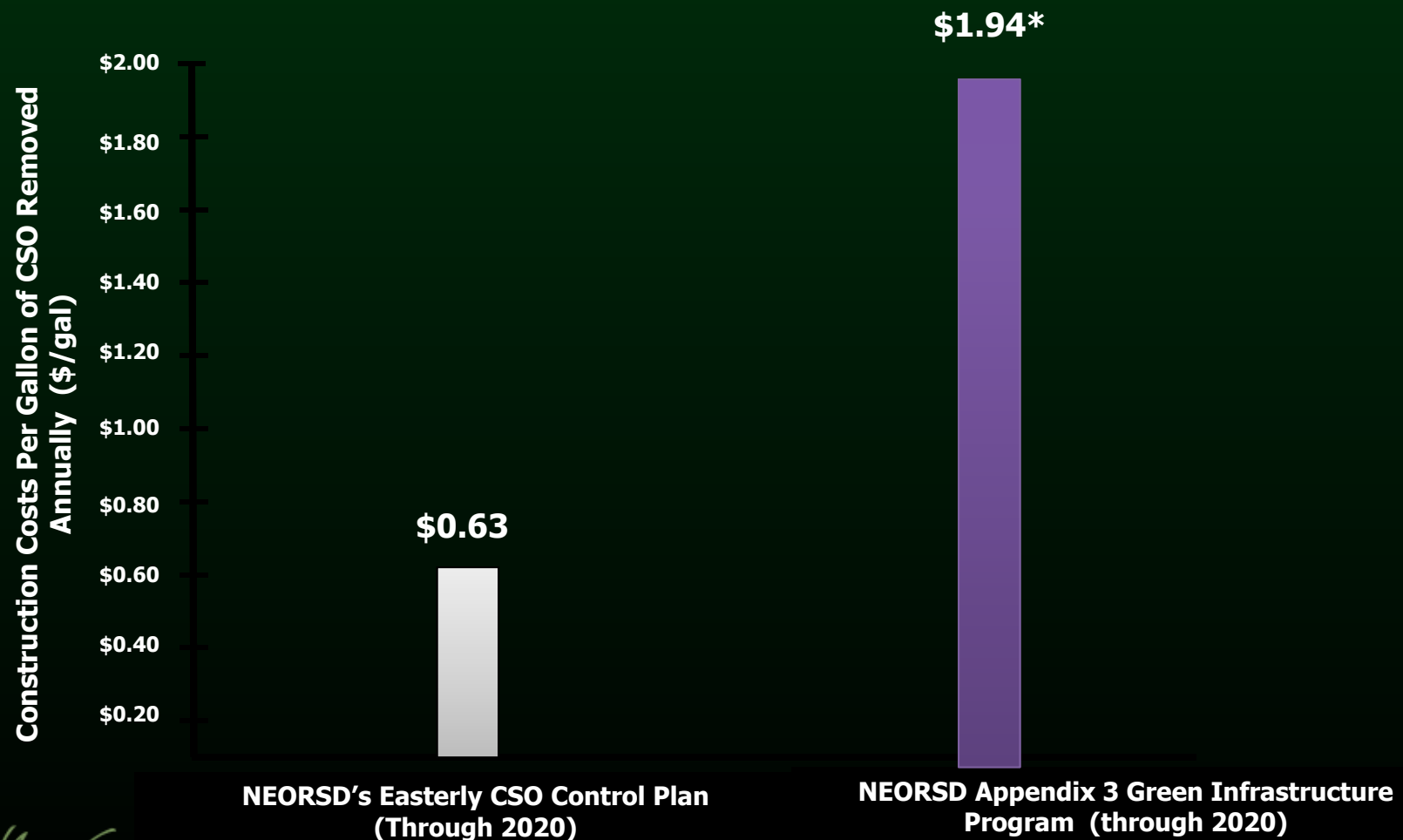


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Construction Cost Comparison for CSO Control



Your Sea

* Appendix 3 CSO Control is the last volume to be captured, in a post-implementation scenario.



Green Infrastructure Policy

**Actively Pursue Implementation
and Maintenance of Green
Infrastructure Across Programs**



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#ProjectCleanLake

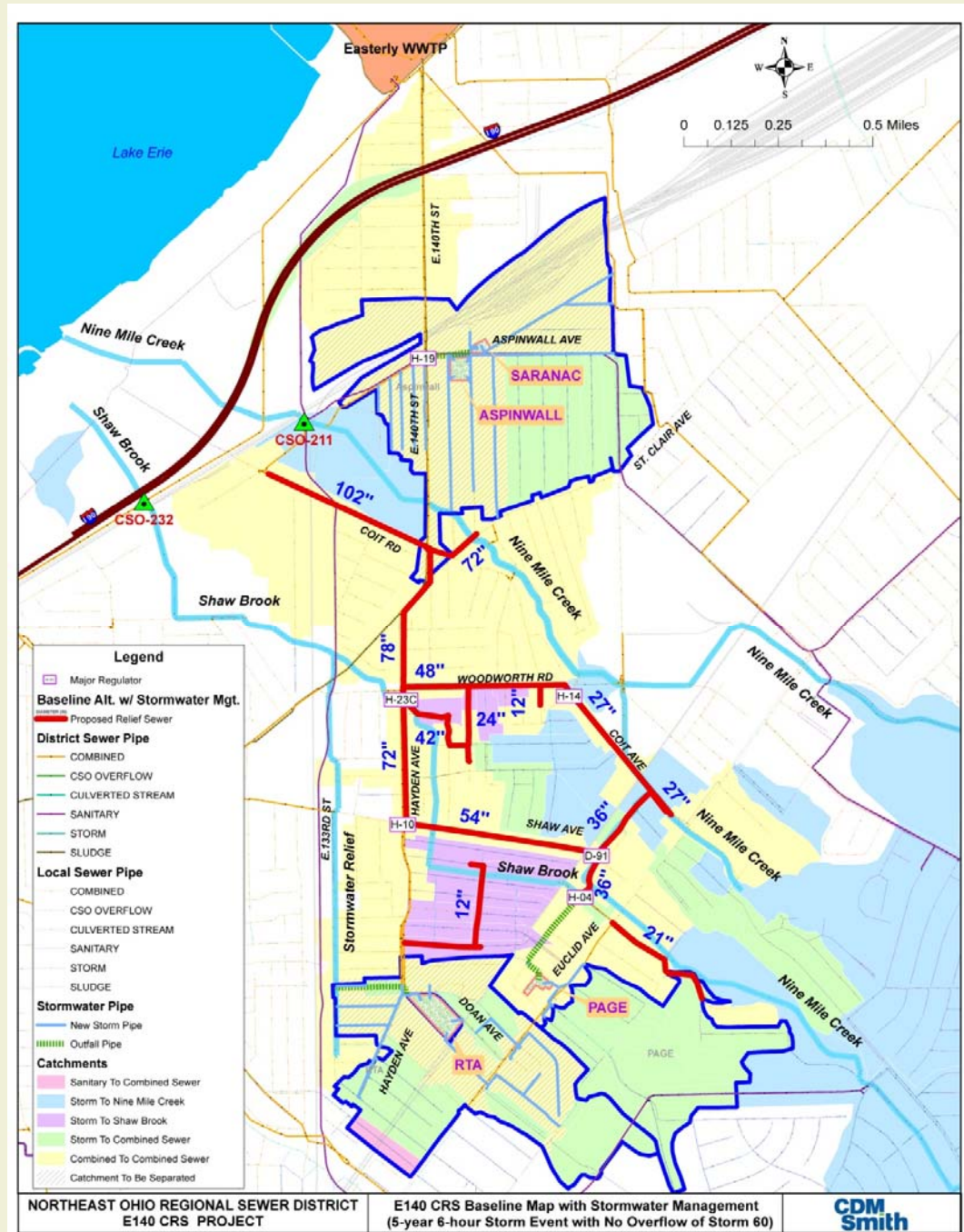
Implementing GI Policy through CIP: E. 140th Relief & Consolidation Sewer Project - Base Design

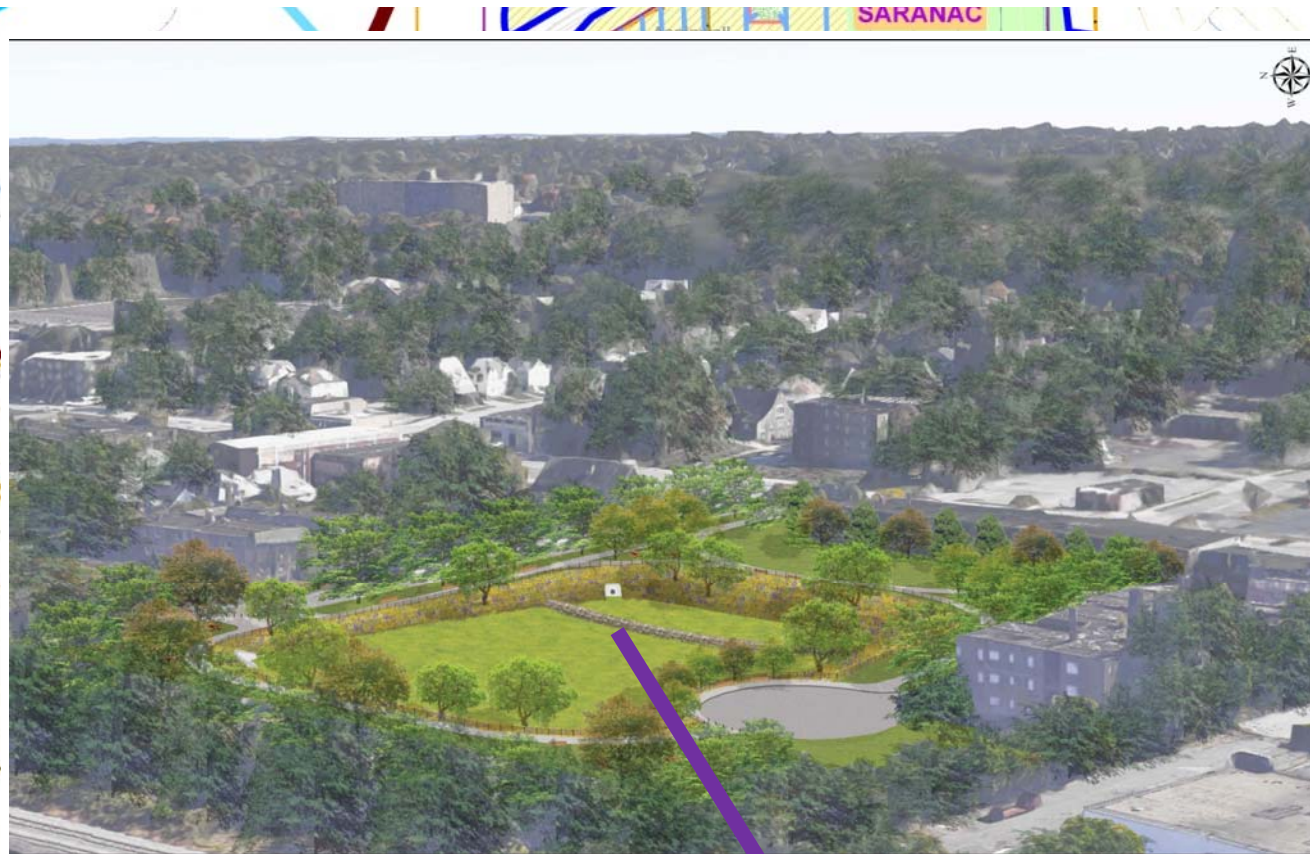
1. Field research and flow monitoring
2. Remaining CSO volume
3. Pockets of separated storm sewer systems going to combined
4. Two culverted streams



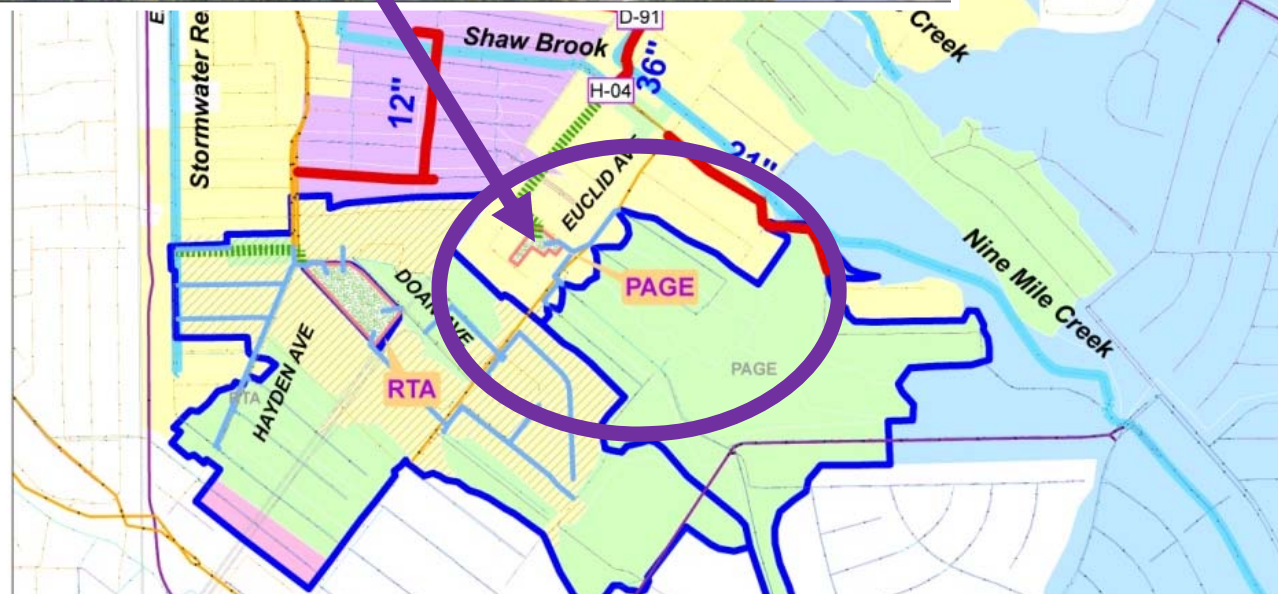
Implementing GI Policy through CIP: E. 140th Relief & Consolidation Sewer Project- Optimized Design

1. Use storm sewer systems
2. Reduce gray components (size and length)
3. Eliminate sections of sewer that impact major streets
4. Reduce cost by 15% and include GI features





- SLUDGE
- Local Sewer Pipe**
 - COMBINED
 - CSO OVERFLOW
 - CULVERTED STREAM
 - SANITARY
 - STORM
 - SLUDGE
- Stormwater Pipe**
 - New Storm Pipe
 - Outfall Pipe
- Catchments**
 - Sanitary To Combined Sewer
 - Storm To Nine Mile Creek
 - Storm To Shaw Brook
 - Storm To Combined Sewer
 - Combined To Combined Sewer
 - Catchment To Be Separated



Existing Site: Page at Elwood



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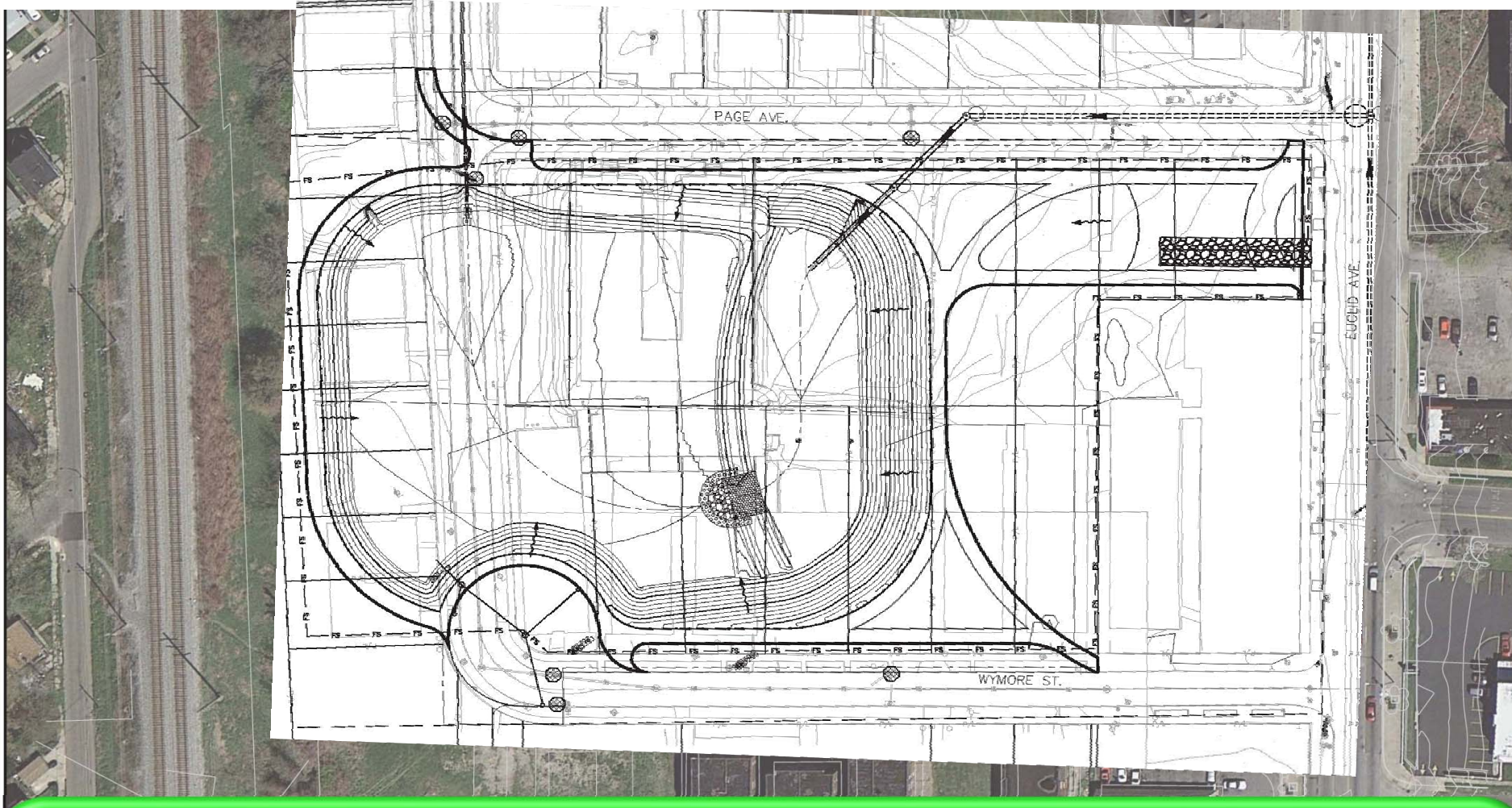
Existing Site: Page Ave



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The Facts on E. 140th Green Infrastructure for Appendix 3 CSO Control

- Project Cost: \$18.4 M
- Stormwater Volume: 48.3 MG/yr
- CSO volume (Baseline): 25.3 MG/yr
- CSO Volume (Appendix 3): 5.8 MG/yr

Green Infrastructure Grants

Facilitating GI with Partnerships

- Available to communities and non-profits
 - For profits can apply in partnership with eligible applicant
- \$2 million available in 2016
- 2015 Green Infrastructure Grants
 - \$1.7 million
 - 6 MG annual stormwater removal
 - \$0.28/gallon stormwater
- Agreements/inspection for maintenance



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Why We Grant.....

- Grant programs compliment District efforts to address wet weather and water quality problems.
- Grant programs facilitate:
 - Dedicated local partners
 - Member Community involvement
 - Cost-sharing opportunities
 - Community visibility
 - Long-term maintenance



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NEORSD Grant Programs

What is Important?

- Rigorous application review
- Required community support
- Control over project design
- Inspection during construction
- Correction of improper installations
- On-going operation and maintenance

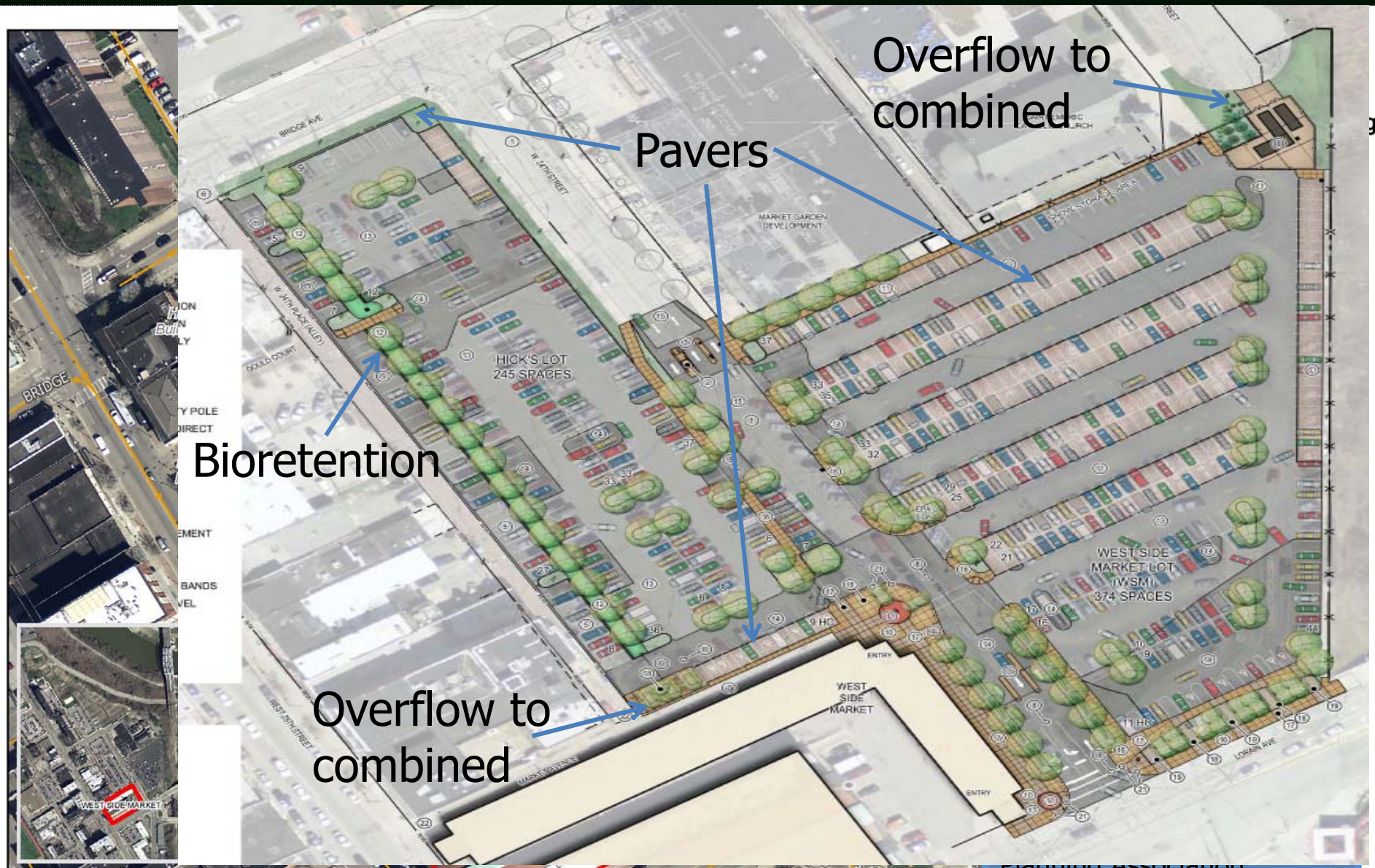


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Green Infrastructure Funding: \$500,000 to West Side Market Parking Lot Renovation, 2.6 MG of stormwater controlled annually.

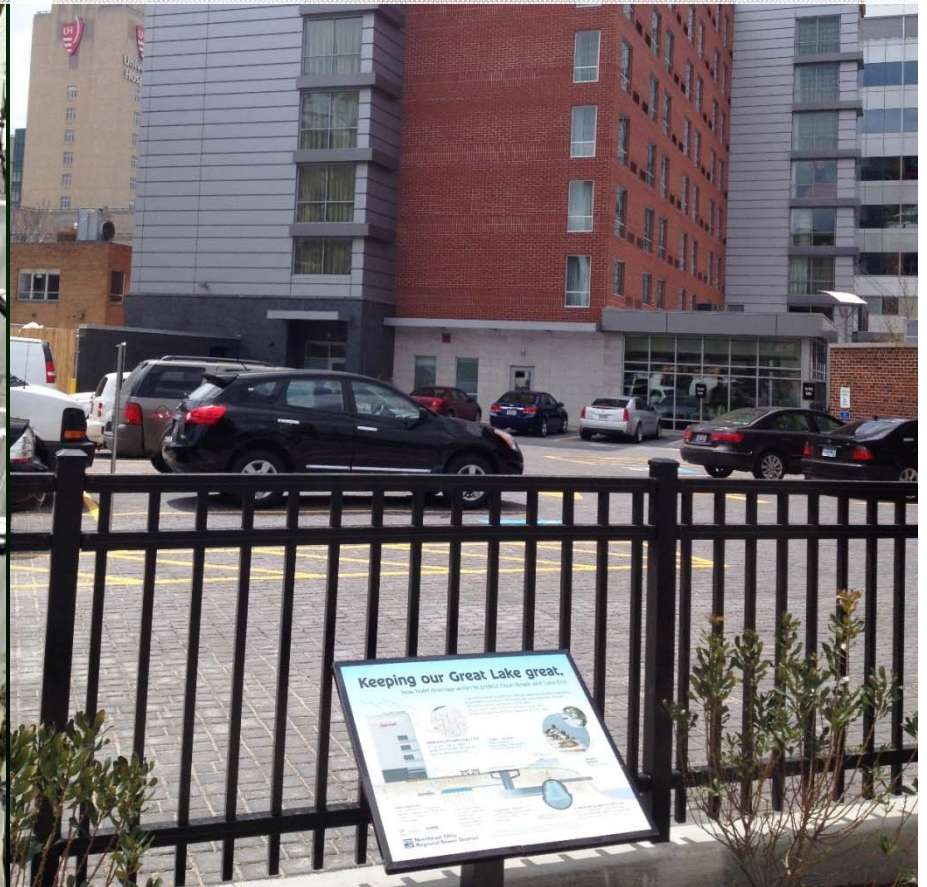


Source: OGRIP, City of Cleveland, NEORS, C

Planning Association

Green Infrastructure Funding: \$268,813 to Courtyard by Marriot, Redevelopment + Sand = GI Opportunity

No stormwater runoff from this site through 100-yr storm



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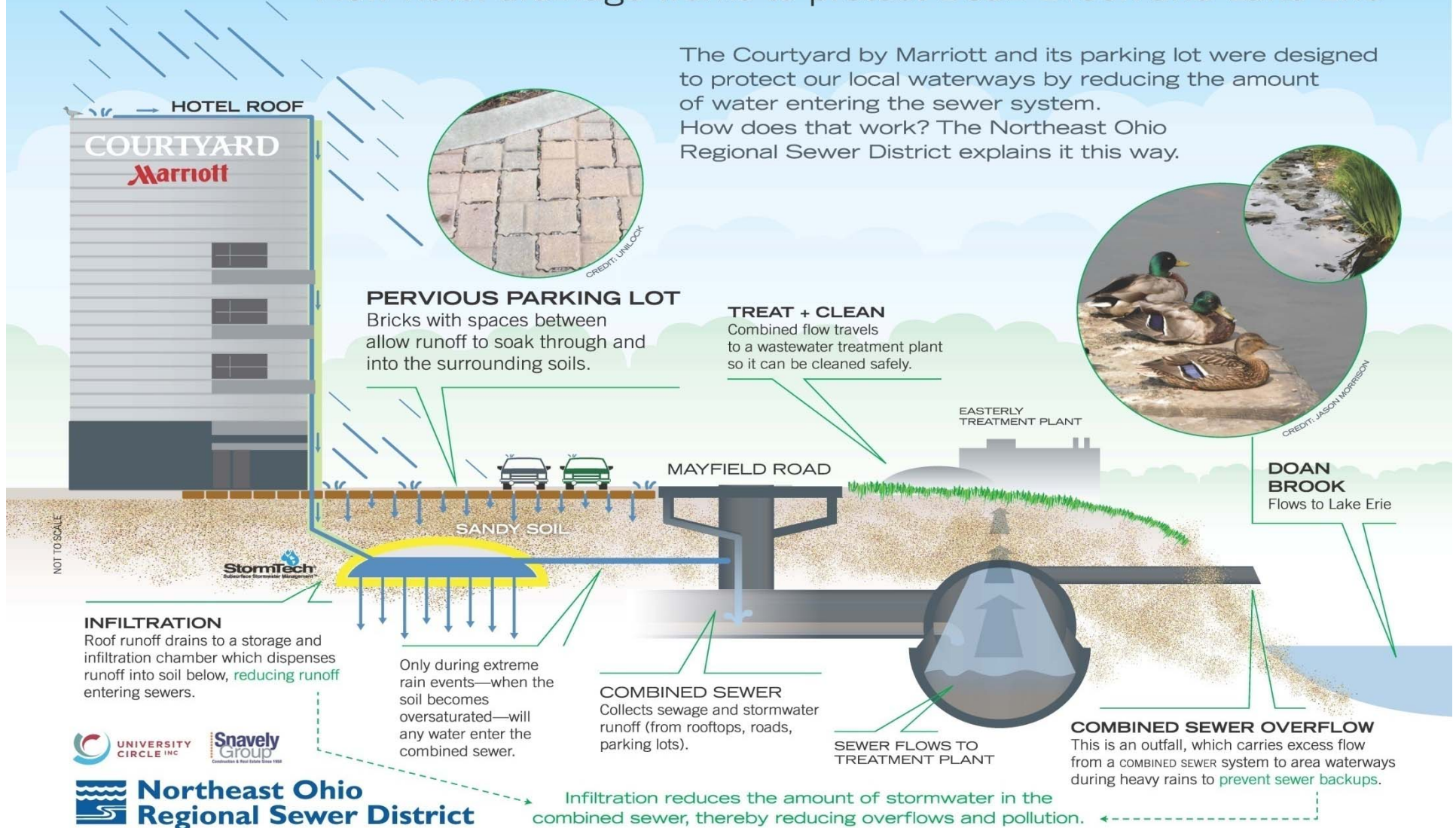


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Keeping our Great Lake great.

How hotel drainage works to protect Doan Brook and Lake Erie

The Courtyard by Marriott and its parking lot were designed to protect our local waterways by reducing the amount of water entering the sewer system. How does that work? The Northeast Ohio Regional Sewer District explains it this way.



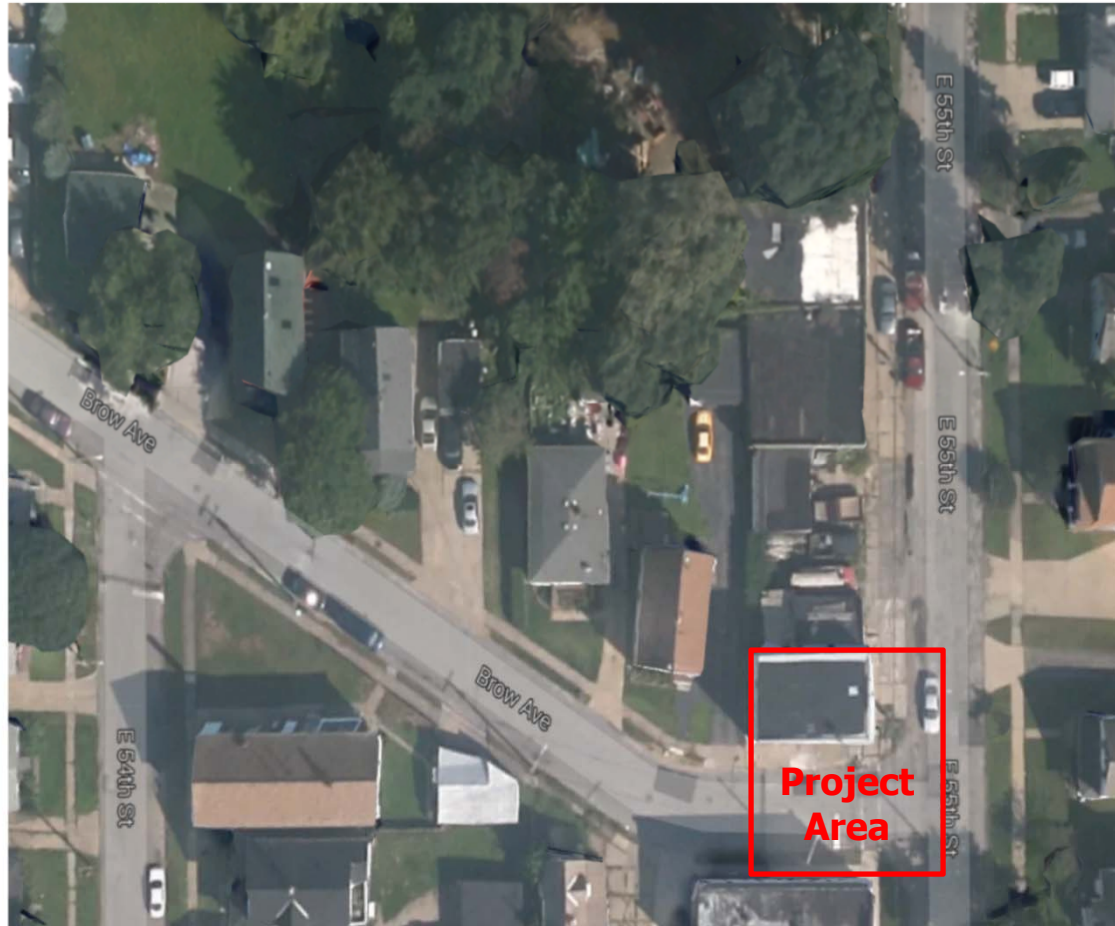
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Brow Avenue GI Project

Village of Newburgh Heights



Location: 3952 Brow Ave

Applicant: Village of Newburgh Heights

Site Acres: 0.50

Impervious Acres Draining to Green Infrastructure: 0.41

Stormwater Runoff Reduction gal/yr*:
247,178

Green Infrastructure:
Reduce Impervious Area
Bioretention

Green Infrastructure Grant:
\$181,000



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Brow Avenue GI Project Village of Newburgh Heights



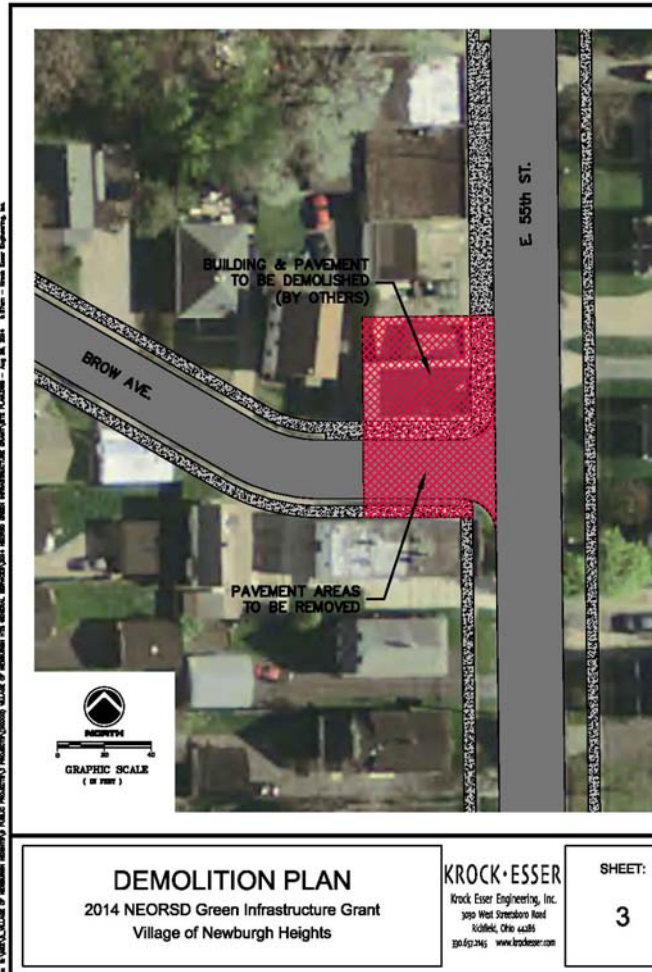
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Brow Avenue GI Project

Village of Newburgh Heights



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Brow Avenue GI Project Village of Newburgh Heights



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Brow Avenue GI Project Village of Newburgh Heights



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Project Clean Lake

GI Lessons Learned

- Know your system
 - Volumes/peak flows causing overflow
- Flexibility essential
 - Partnerships necessary for GI
- Customers like green infrastructure
 - Multiple benefits
 - Innovative approaches



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Project Clean Lake

GI Lessons Learned – Con't

- GI works well when you have...
 - Partners
 - Separate sewers & off load points
 - Available land
- GI good for....
 - Controlling small storms
 - Eliminating tanks & relief sewers
 - Removing drainage area from combined system



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- 
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Dreyfuss-wellsk@neorsd.org

FOR MORE INFORMATION

- **216-881-6600**
- **neorsd.org**
- **facebook.com/yoursewerdistrict**
- **twitter.com/neorsd**

www.BIGskyline.com



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