

Residential Stormwater Management: Landscaping Your Way to a Drier Basement



**Northeast Ohio
Regional Sewer District**

Jeff Jowett

Watershed Team leader

Agenda

- Who we are
- Project Clean Lake
- Regional Stormwater Program
- Stormwater Credits



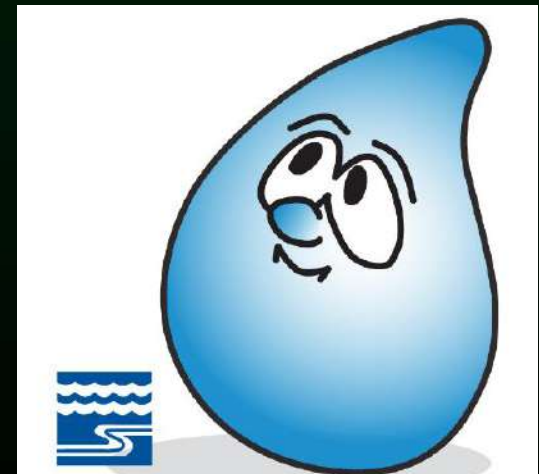
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Who We Are...

- Created in 1972 by Court Order
 - Political subdivision of Ohio (6119)
 - Code of Regulations
 - Governed by seven Trustees



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What We Do

- Serve 1+ million customers
 - Wastewater Treatment Plants
 - 90+ Billion gallons of wastewater treated annually
 - Interceptor Sewer Operation and Maintenance
 - Combined Sewer Overflow Control
 - Regional Stormwater Management
- *no drinking water responsibilities



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355
square miles



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 District Service Area

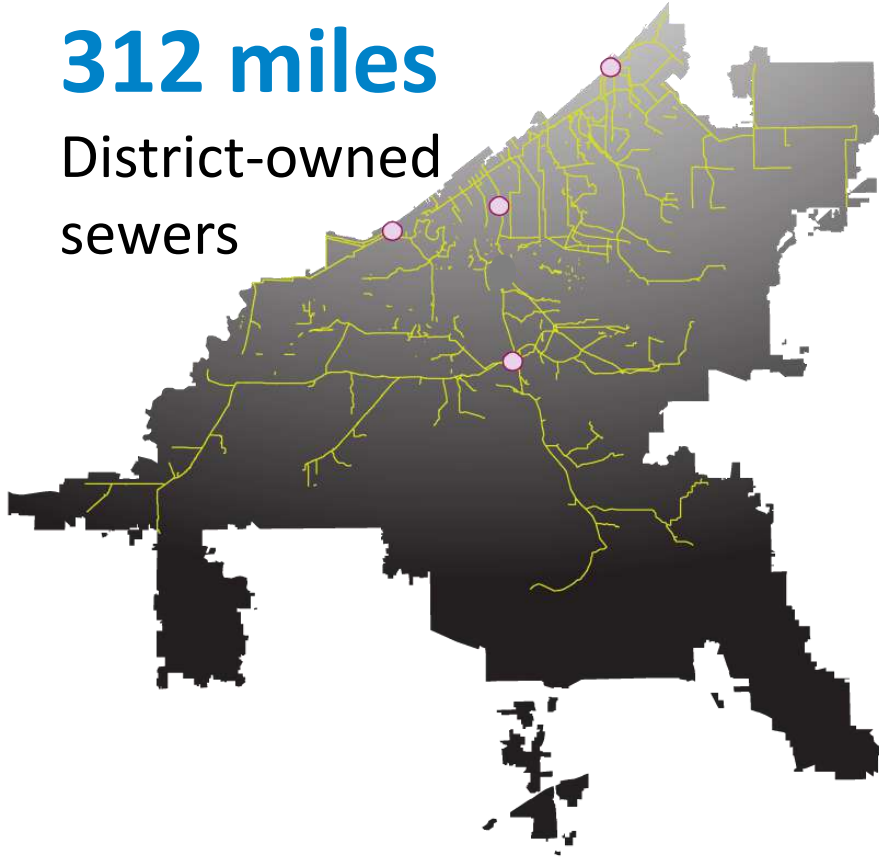
 Interstate

 County Boundary

Sewer Responsibility

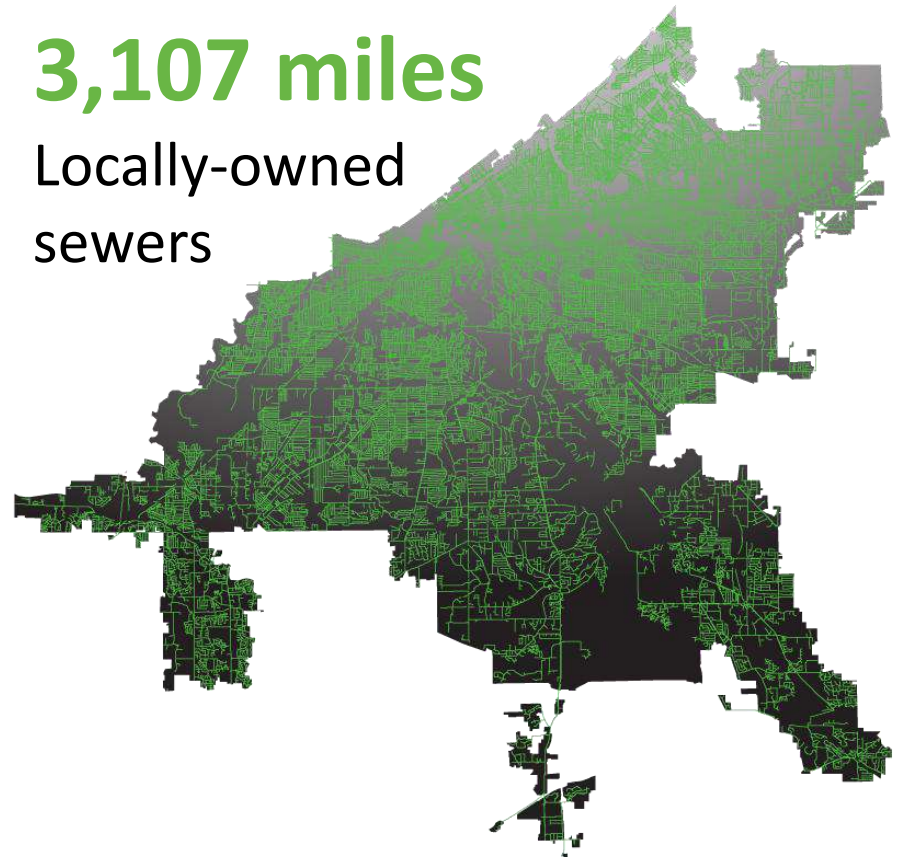
312 miles

District-owned
sewers



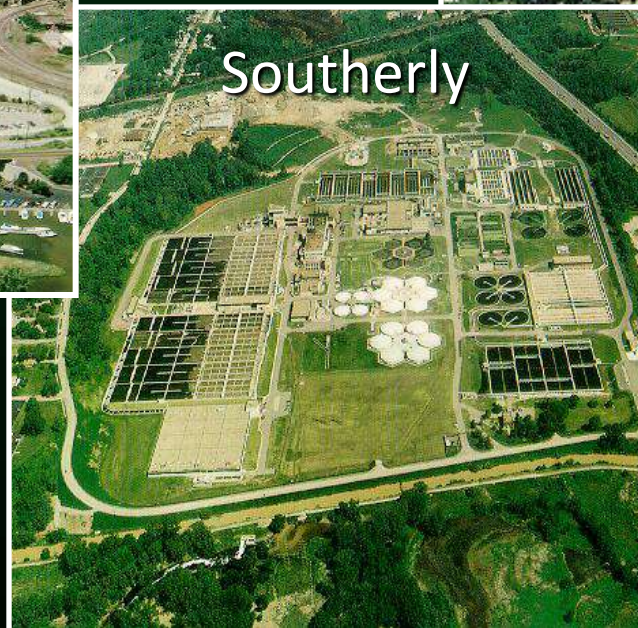
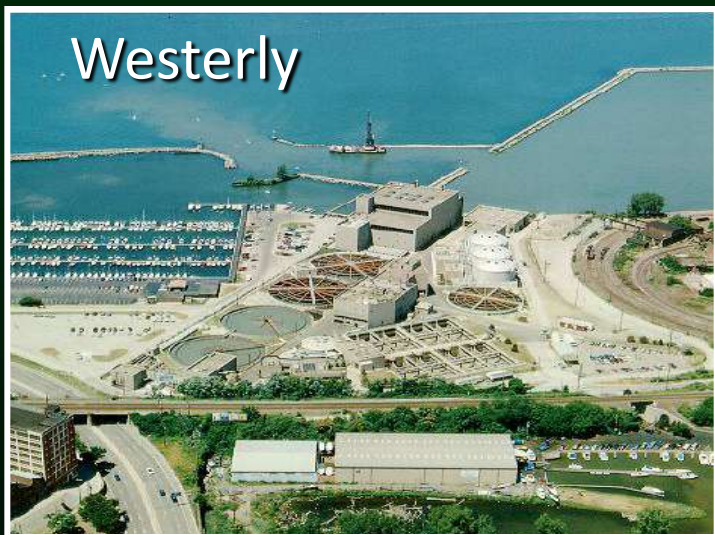
3,107 miles

Locally-owned
sewers



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We Own and Operate 3 Wastewater Treatment Plants



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Northeast Ohio Regional Sewer District Responsibility



- \$3 billion in 25 years
- Combined Sewer Overflow (CSO) control
- Sewer fees
- Regional flooding and erosion issues
- Impervious surface fee



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Why is it important to manage stormwater?



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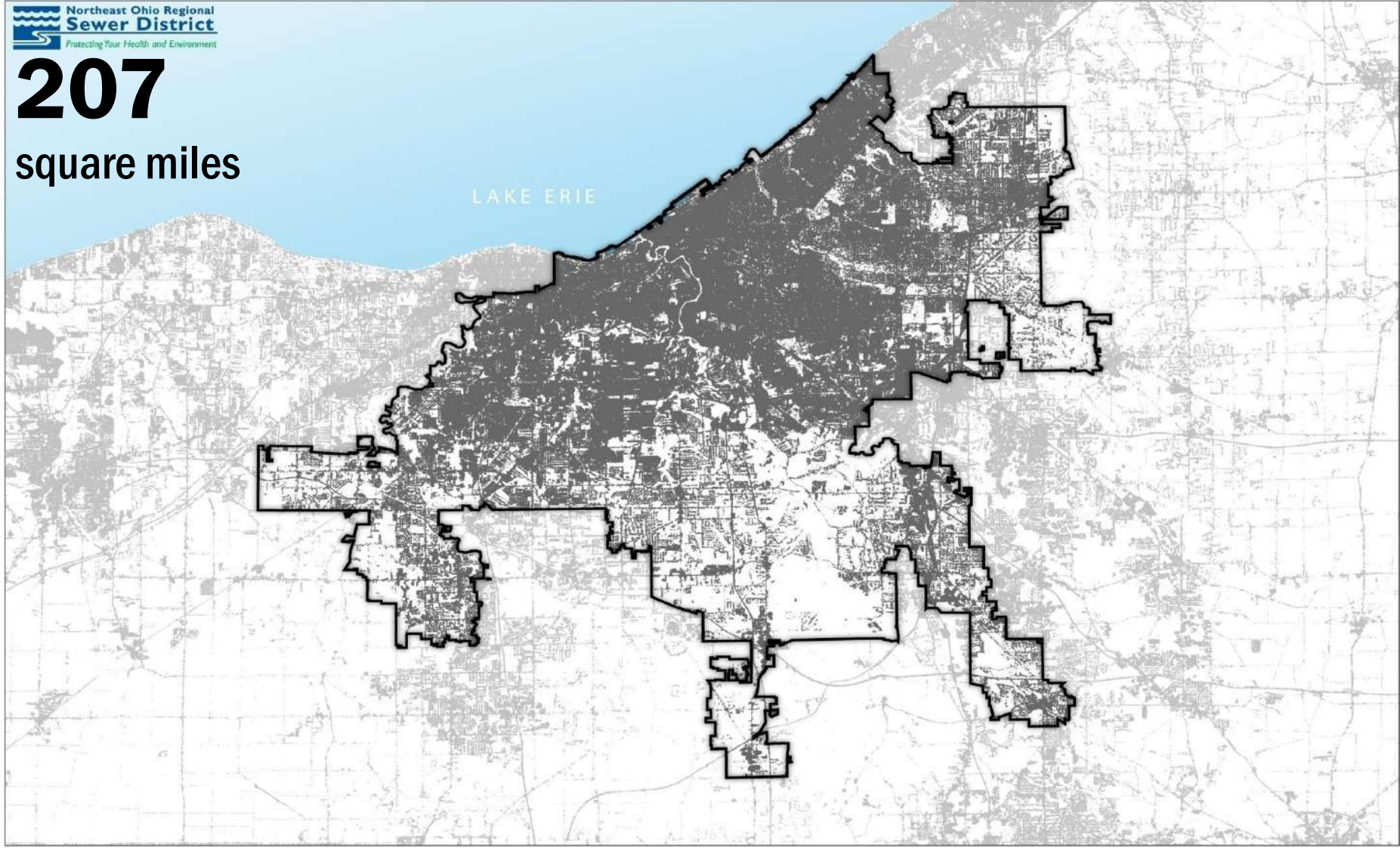


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On-Going Impacts: Impervious Surfaces



207
square miles

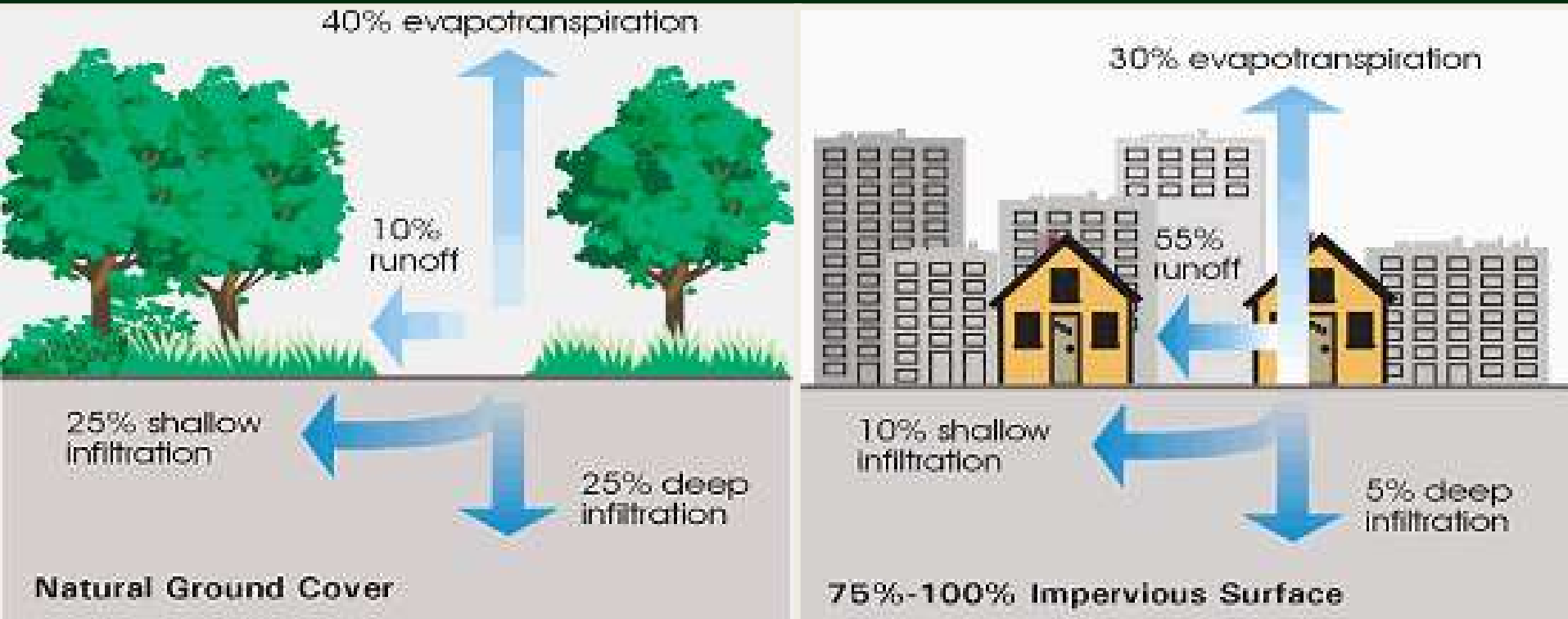


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Impervious Surface Impact



Impervious Surface = Stormwater Runoff
Stormwater Runoff = Flooding & Erosion



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The Sewer District: COMBINED SEWER OVERFLOW CONTROL

Project Clean Lake

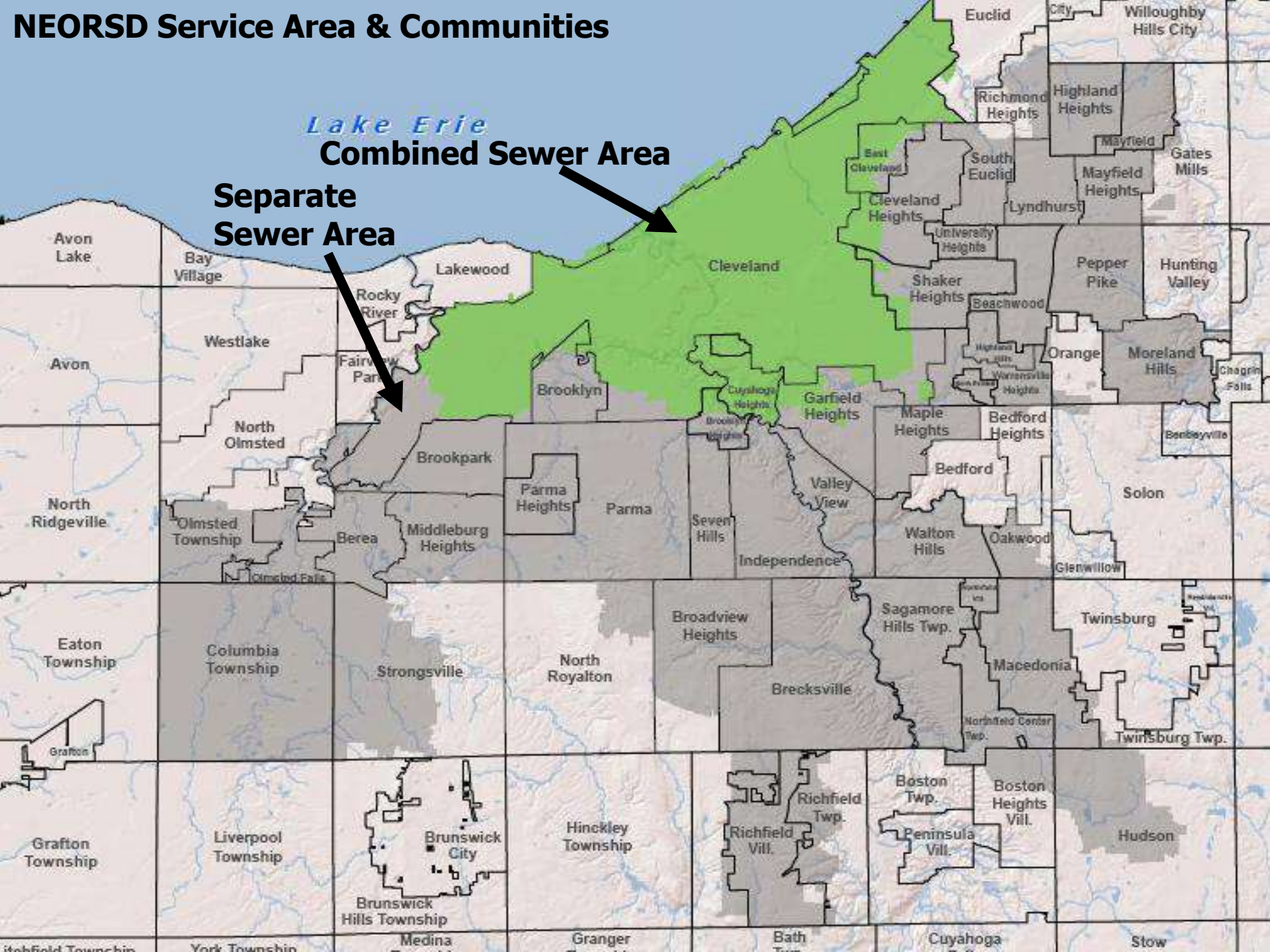


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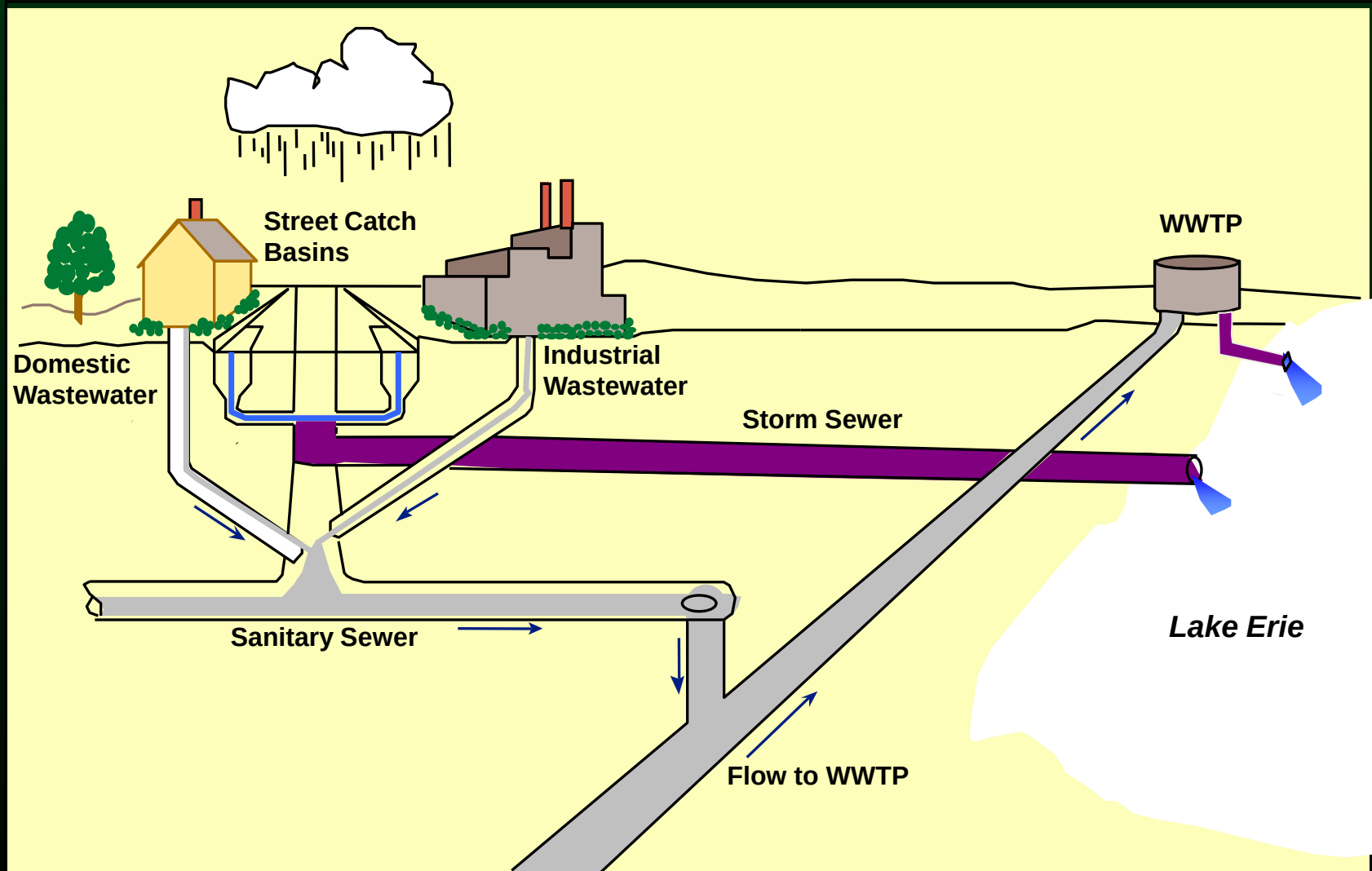


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NEORSD Service Area & Communities



Separate Sewer System

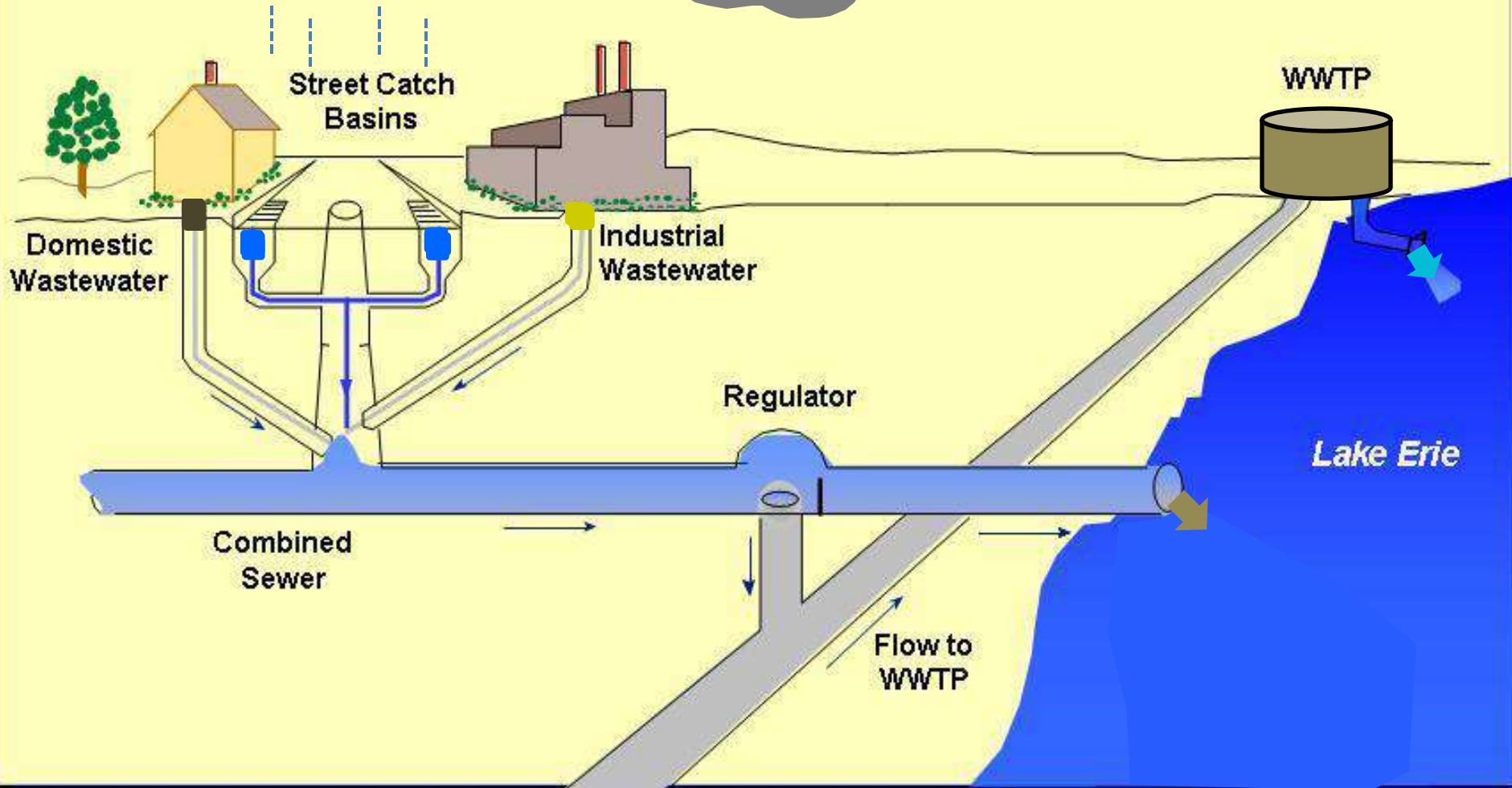


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How does a combined sewer system work?



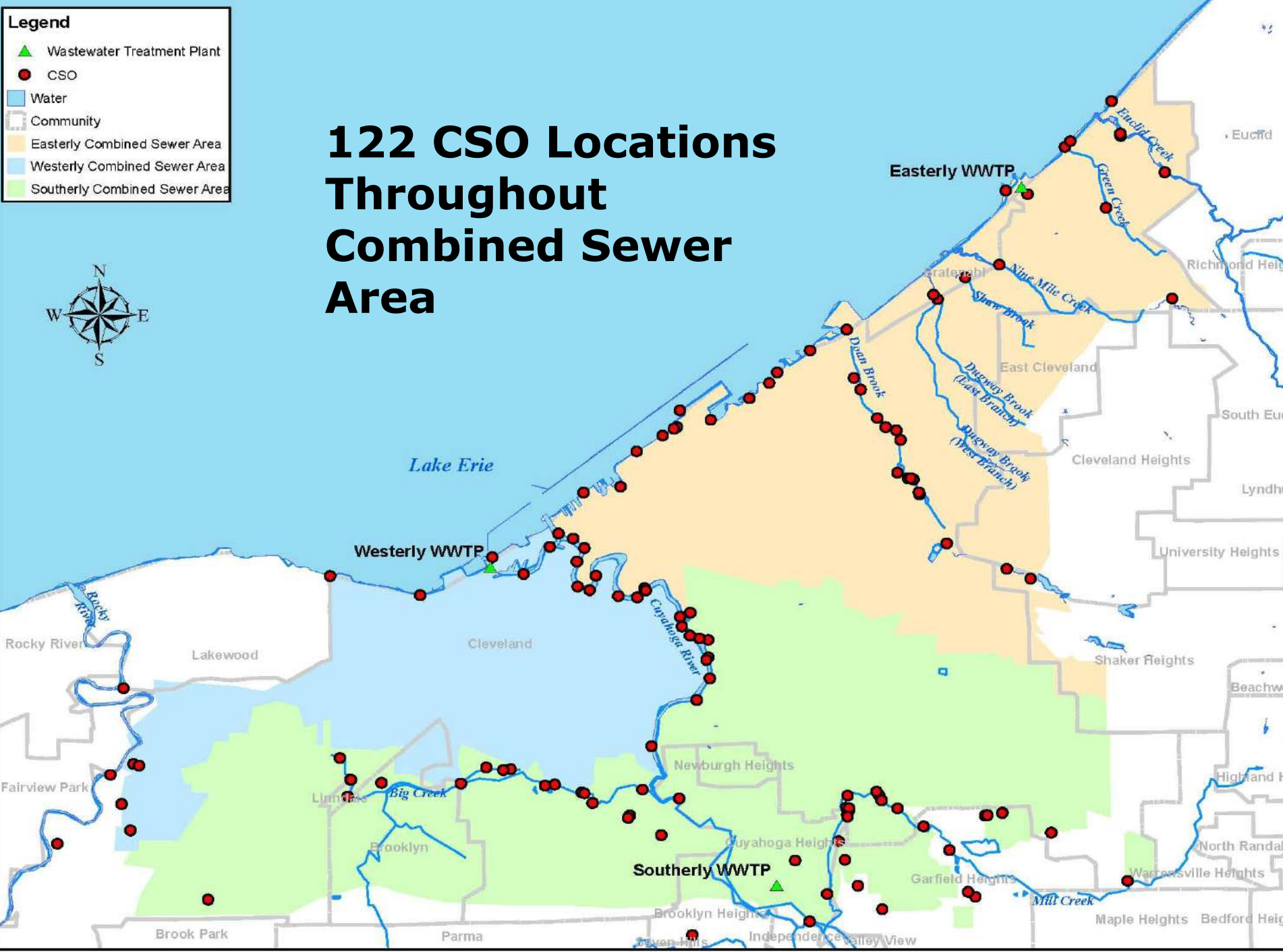
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Legend

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

122 CSO Locations Throughout Combined Sewer Area





**Water quality impacts of 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.NEORSD.org

FOR MORE INFORMATION ABOUT
WATER-RELATED HEALTH CONCERNS:

CLEVELAND DEPARTMENT
OF PUBLIC HEALTH
(216) 664-4292

OHIO DEPARTMENT
OF HEALTH
(614) 466-1290

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.

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Reducing combined sewer overflows

Past and future



- Since 1970s
 - 9 billion gallons of CSO annually in 1970s
 - Invested \$950 million to cut volume in half (4.5 billion gallons)
- Moving forward
 - **Project Clean Lake**
 - 25 years, \$3 billion
 - To cut volume by another 4 billion gallons
 - Gray and smart green



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Project Clean Lake: THE GRAY

25 years of tunnel construction

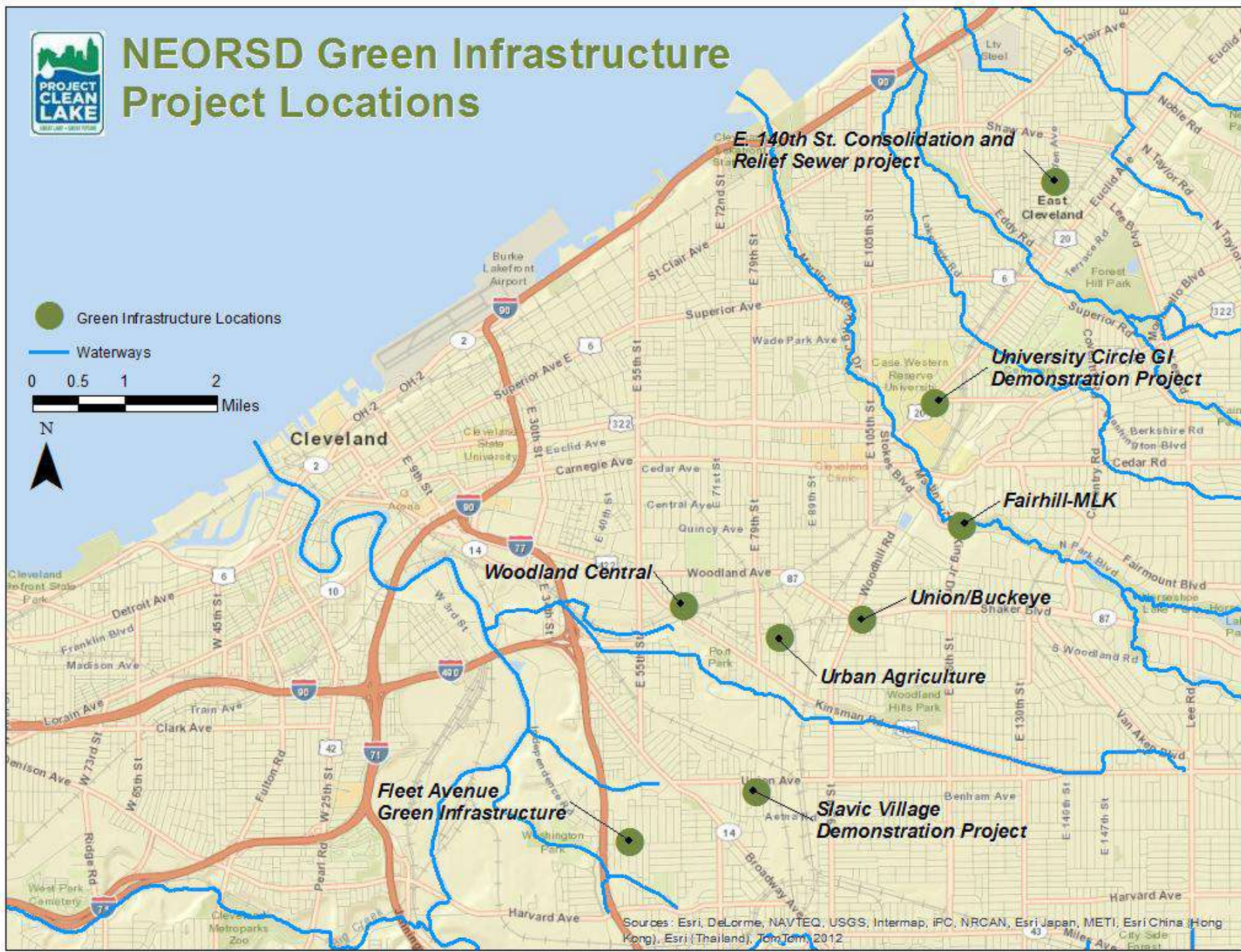


7 tunnel systems

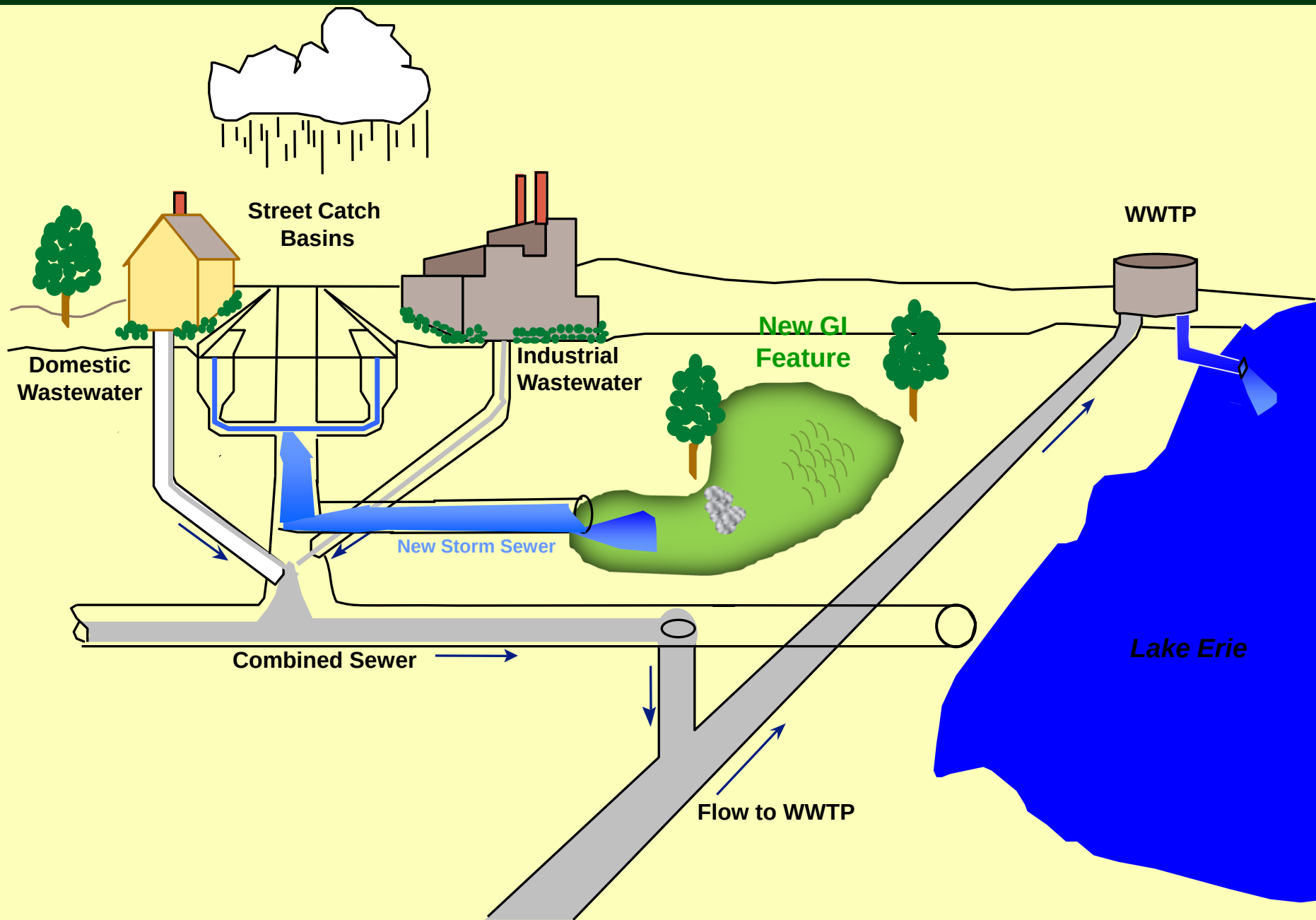
- 21 miles
- 17' to 24' diameter
- 100' to 200' deep
- Three deep tunnel pump stations
- Drop structures
- Near-surface sewers , structures



NEORSD Green Infrastructure Project Locations



Sources: Esri, DeLorme, NAVTEQ, USGS, Intermap, IFC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2012



NORTHEAST OHIO REGIONAL SEWER DISTRICT



REGIONAL
STORMWATER
MANAGEMENT
PROGRAM

REGIONAL STORMWATER MANAGEMENT PROGRAM

Addressing flooding, erosion, and water quality



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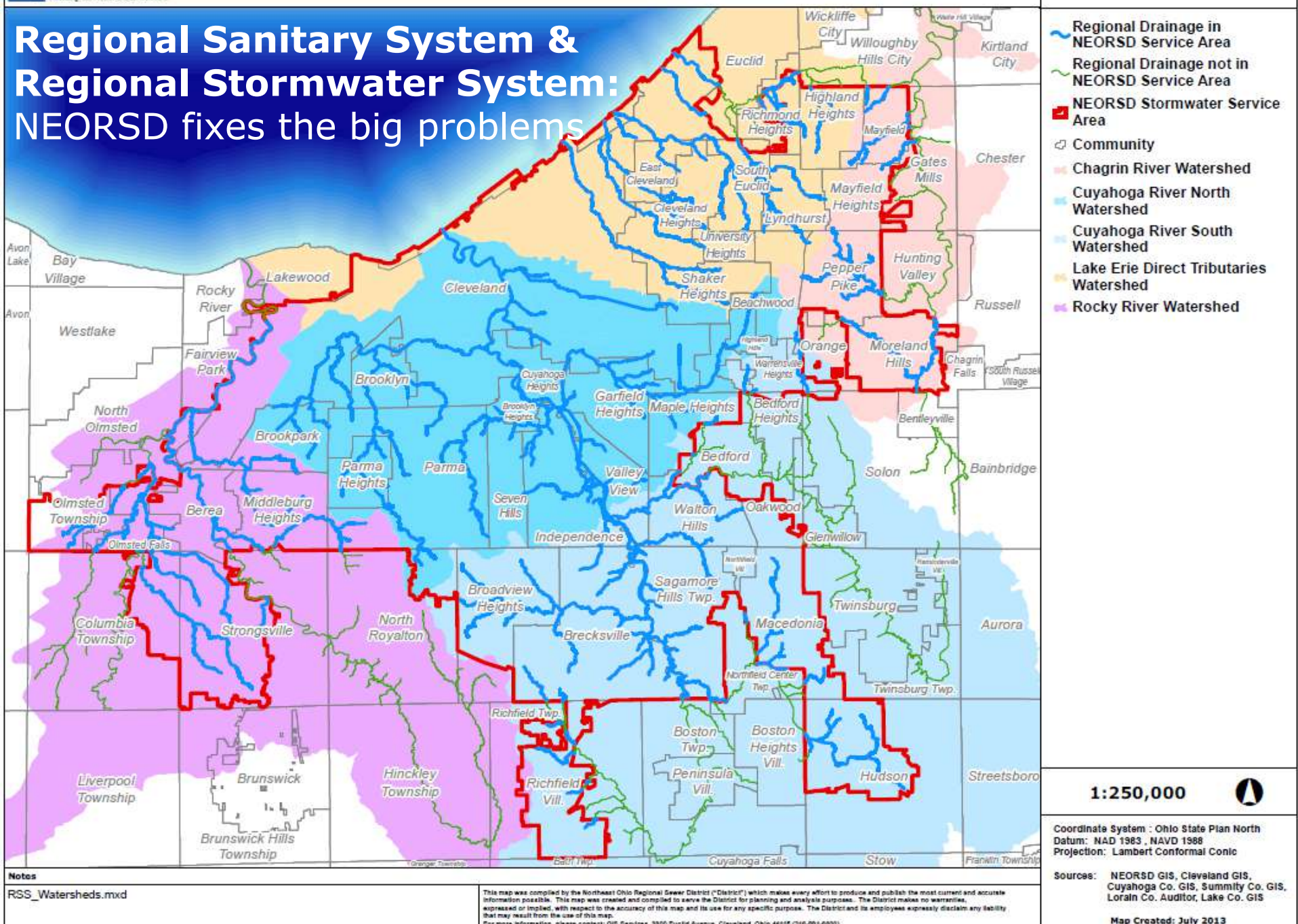
Regional Stormwater Management Program

- Ohio Supreme Court opinion issued September 15, 2015
- Request for reconsideration denied: December 2, 2015; opinion final

District has authority to implement program and collect impervious surface fee



Regional Sanitary System & Regional Stormwater System: NEORSD fixes the big problems



Stormwater: Quantity Problems



Middleburg Heights/Brook Park,
Ohio along Abrams Creek



Streambank erosion on Mill Creek
threatens Warner Road
in Garfield Heights, Ohio

Problems cannot be solved by property owners alone.



Stream bank erosion along
Stickney Creek



Streambank erosion
Baldwin Creek, August 2011



Debris along Dugway Brook,
Cleveland Heights, Ohio

Regional Stormwater Management Program Components...



Stormwater
Master
Plans



Inspect &
Maintain



Construct
Projects



Encourage
Good
Practices

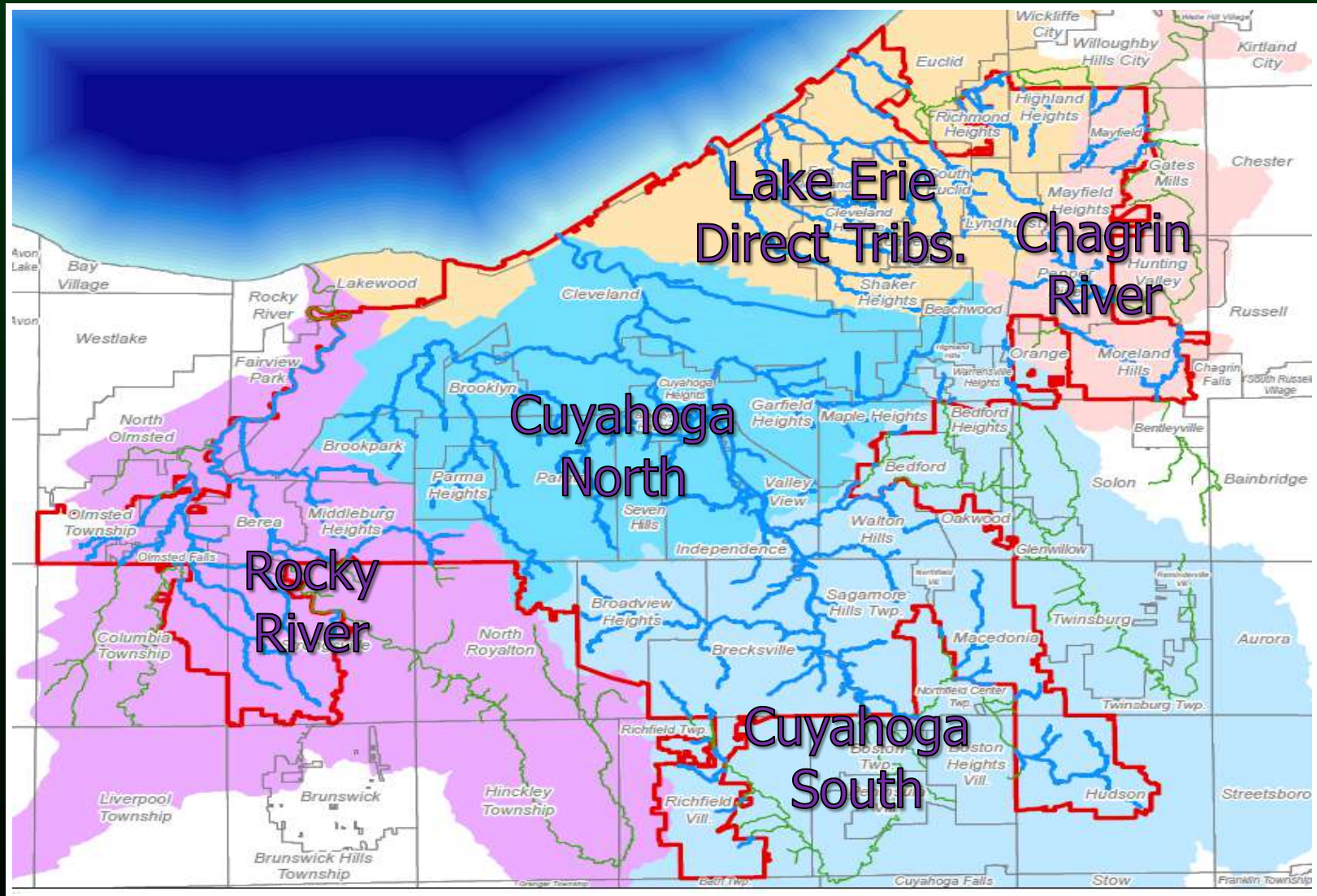


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Stormwater Master Plans



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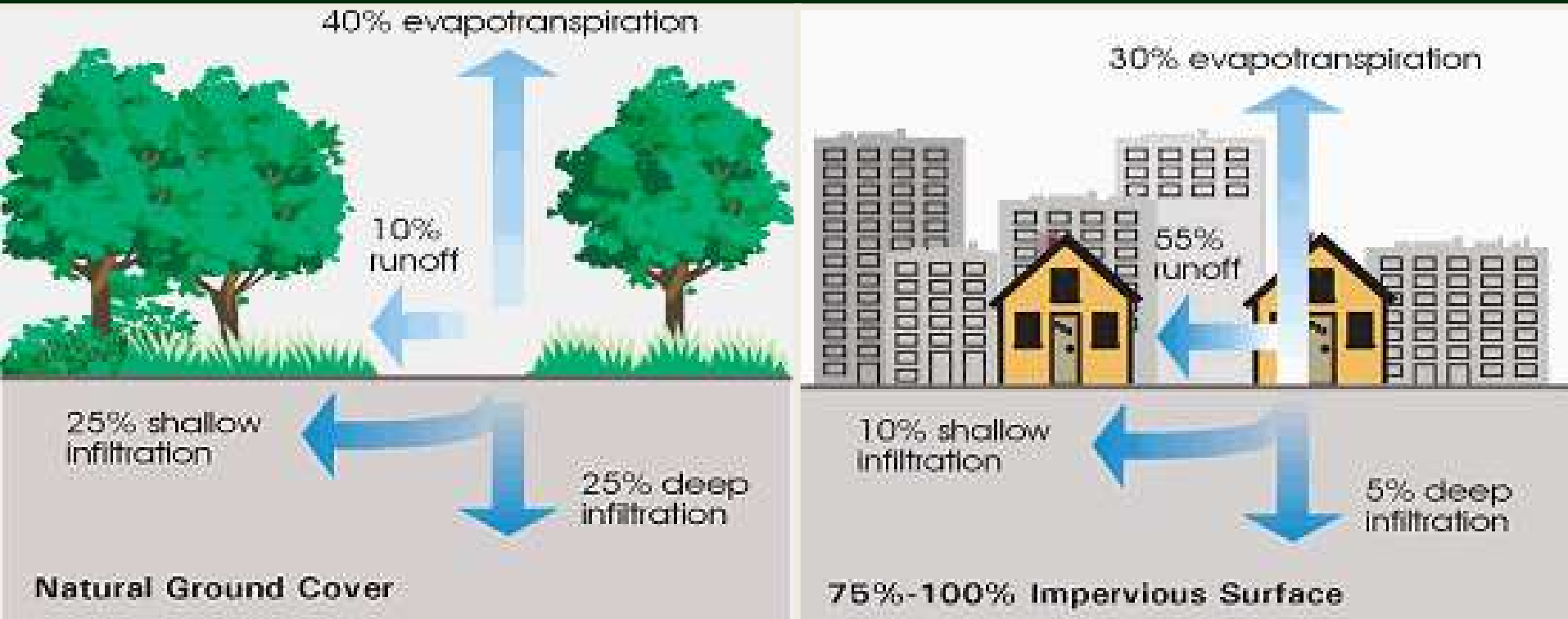
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Regional Stormwater Management Program

- Estimated revenue of \$41M/year from impervious surface fee
 - Inspection and Maintenance
 - Planning
 - Construction
 - Partner support



Impervious Surface Impact



Impervious Surface = Stormwater Runoff
Stormwater Runoff = Flooding & Erosion



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Stormwater Fee

**2016 Base Rate =
\$5.15 per ERU per month
Billing to begin second half 2016**

- Impervious Area (IA)
 - Billing Unit = Equivalent Residential Unit (ERU)
 - ERU = 3,000 square feet of IA

Stormwater Fee

**2016 Base Rate =
\$5.15 per ERU per month
Billing to begin second half 2016**

- Property Classification
 - SFR: Single Family Residential
 - NSFR: Non-Single Family Residential

Stormwater Fee

**2016 Base Rate =
\$5.15 per ERU per month
Billing to begin second half 2016**



SFR Property



NSFR Property

Stormwater Fee – Single Family

- Tier 1 (Small) < 2,000 ft²
– **\$3.09** per month
- Tier 2 (Medium)
– **\$5.15** per month
- Tier 3 (Large) > 4,000 ft²
– **\$9.27** per month



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Stormwater Fee Example

- Downtown Cleveland
- 99,000 sq.ft of total impervious area
- 33 ERUs across multiple parcels
- \$509.85/quarter
- \$2039.40/year



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While the Sewer District Does Large Projects, You Can Also Manage Your Runoff

**Stormwater
Management Begins at
Home**

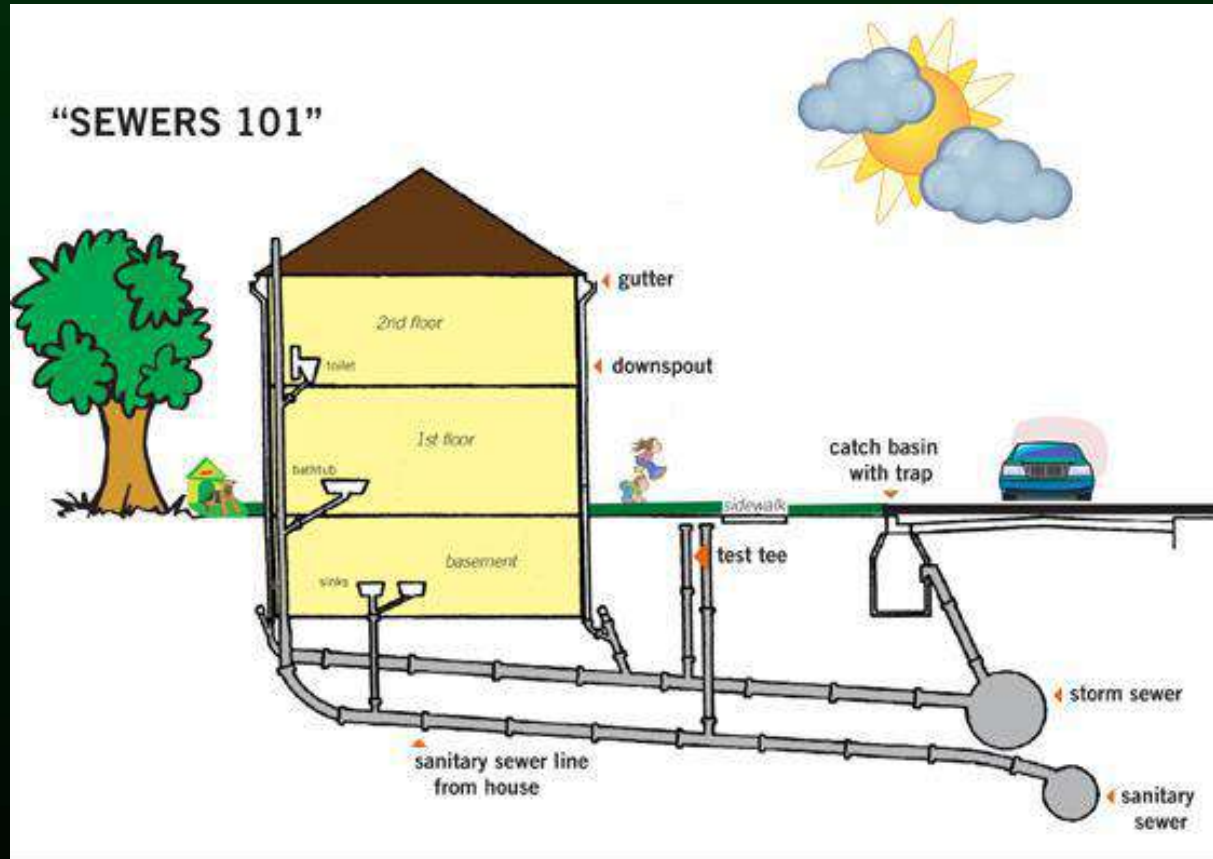


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Are YOUR pipes clear?



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Local Community Investigation results:

- 55% of laterals required light cleaning



- 27% of laterals required heavy cleaning
 - Roots, mud, sludge, or other foreign material



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Stormwater Fee Credits



Raingarden



PerVIOUS Pavement



Cistern



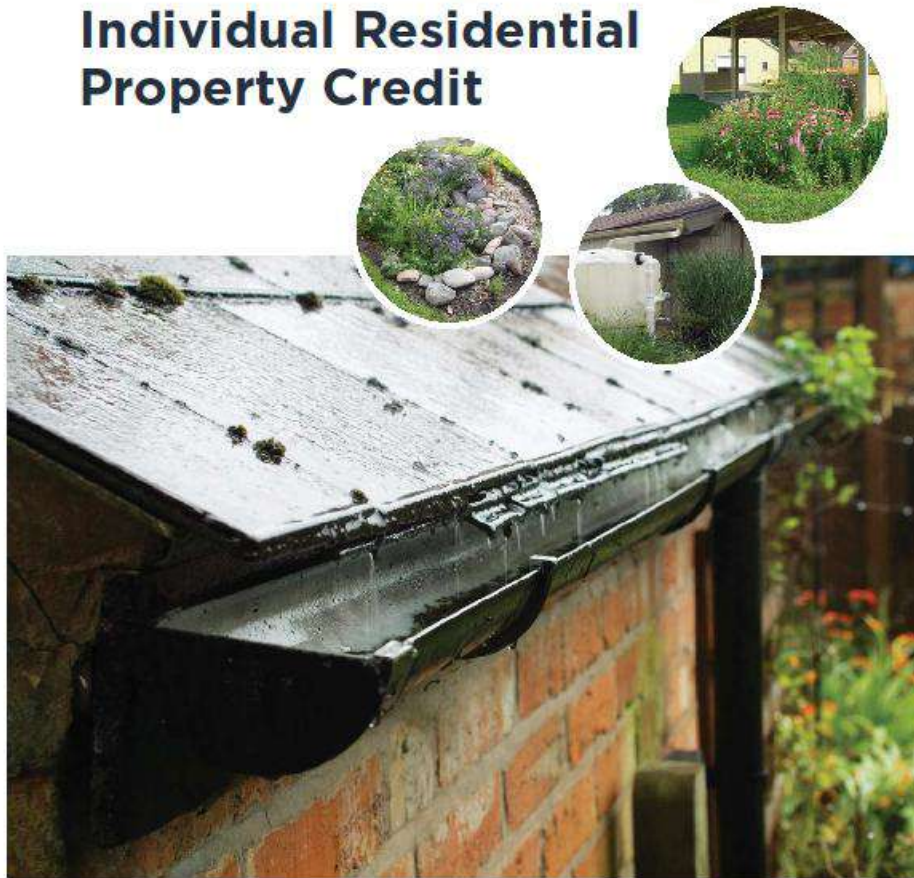
Detention Basin

**Good Stormwater
Management =
Disconnection and
Distribution**

Retention Pond

NORTHEAST OHIO REGIONAL SEWER DISTRICT
Stormwater Management Program

**Individual Residential
Property Credit**



Revised 12/04/12



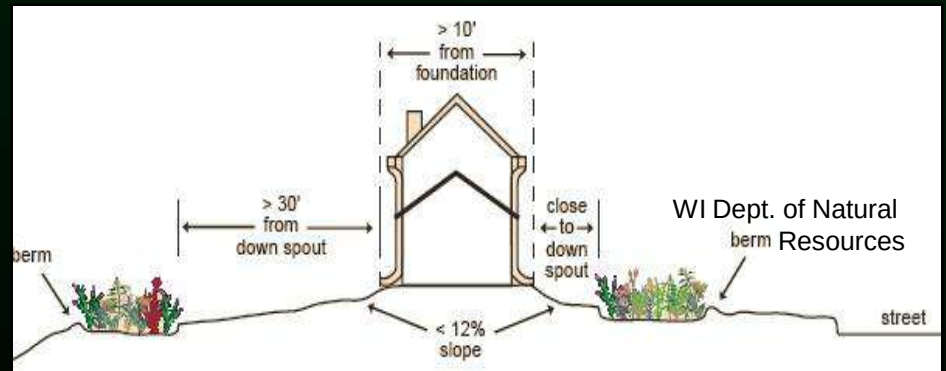
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Site Considerations

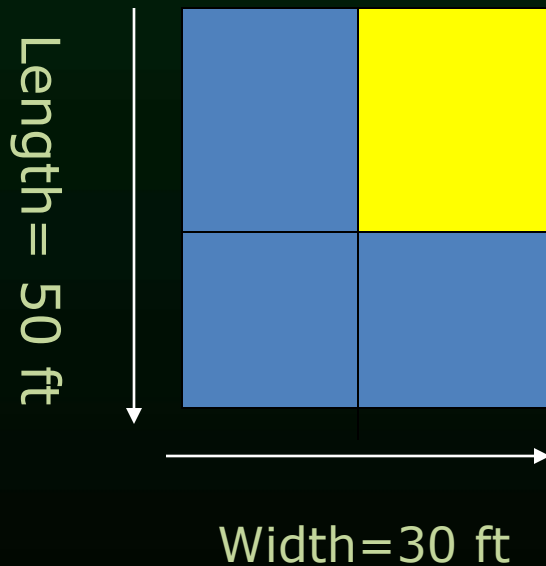
- Close enough that downspouts can be used to direct rainwater into your rain garden
- Investigate natural drainage of yard so overflow (during a heavy rain) flows away from the house and into the rest of your yard
- Identify the location of underground utilities



Sizing your Rain Garden

Calculate area draining to rain garden

Area of roof going
to down spout



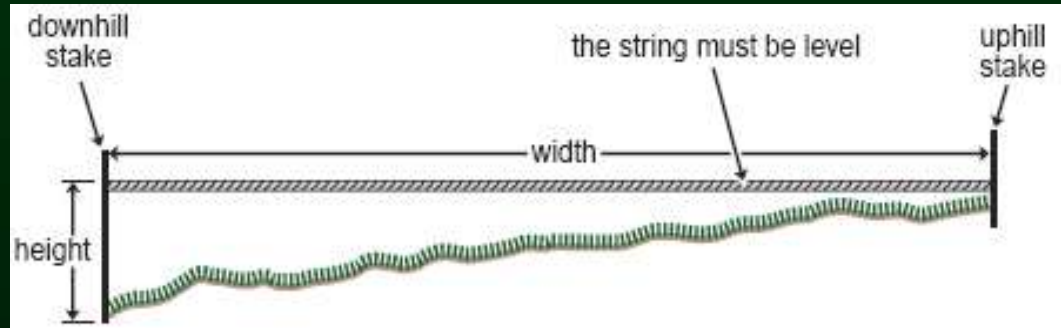
Area of rooftop = Length x Width

Area = 50' x 30' = 1500 square feet

Only 25% of total property roof area is
draining to rain garden via downspout,
so **1500/4 = 375 square feet**



Sizing the depth of your Rain Garden



$$\text{Slope} = \text{Height} / \text{Width} \times 100$$



Slope	Depth
≤4%	3 to 5 inches
5% to 7%	6 to 7 inches
8% to 12%	8 inches (maximum)



Making the connection

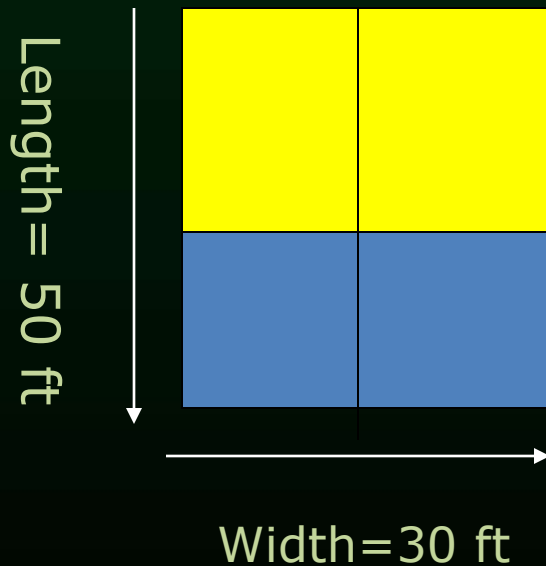
- Create flow path from disconnected downspout to rain garden



How many Rain Barrels do I need?

Calculate 50% of your TOTAL roof area

Area of roof going to down spouts



Area of rooftop = Length x Width

Area = 50' x 30' = 1500 square feet

50% of total property roof area is draining to rain garden via downspout, so $1500/2 = 750$ square feet



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On-Site Storage

- Rain Barrels
 - 50% of the property's roof area connected to rain barrels
 - Provide at least 40 gallons of storage per downspout
- Storage devices (cistern)
 - Sized to hold the runoff from 50% of the property's roof during a 1-inch rain storm
- Must be covered to prevent mosquitoes.
- Drain in less than 24 hours and no more than 4 days.
- Overflows from storage must be directed to appropriate outlets or areas.



Pervious Pavement

- Pavement must be installed with at least 10" stone reservoir underneath, and must meet local building and zoning codes for driveways.



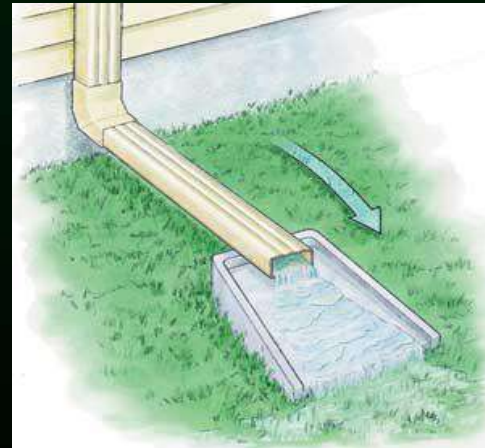
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Vegetated Filter Strip

- Fully vegetated – grass, shrubs, trees, flowers, etc.
- Filter strip must be at least 50 feet long, depending on slope of yard.



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Consider the flow path

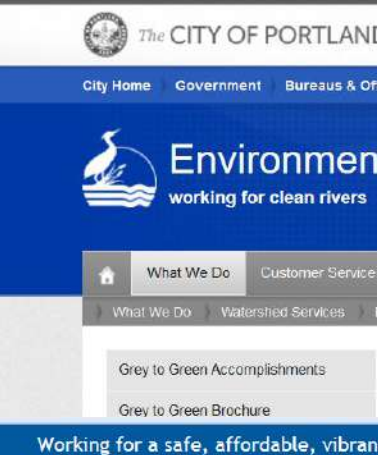
- Minimum of 50 linear feet of flow path for treatment of runoff



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INFRASTRUCTURE

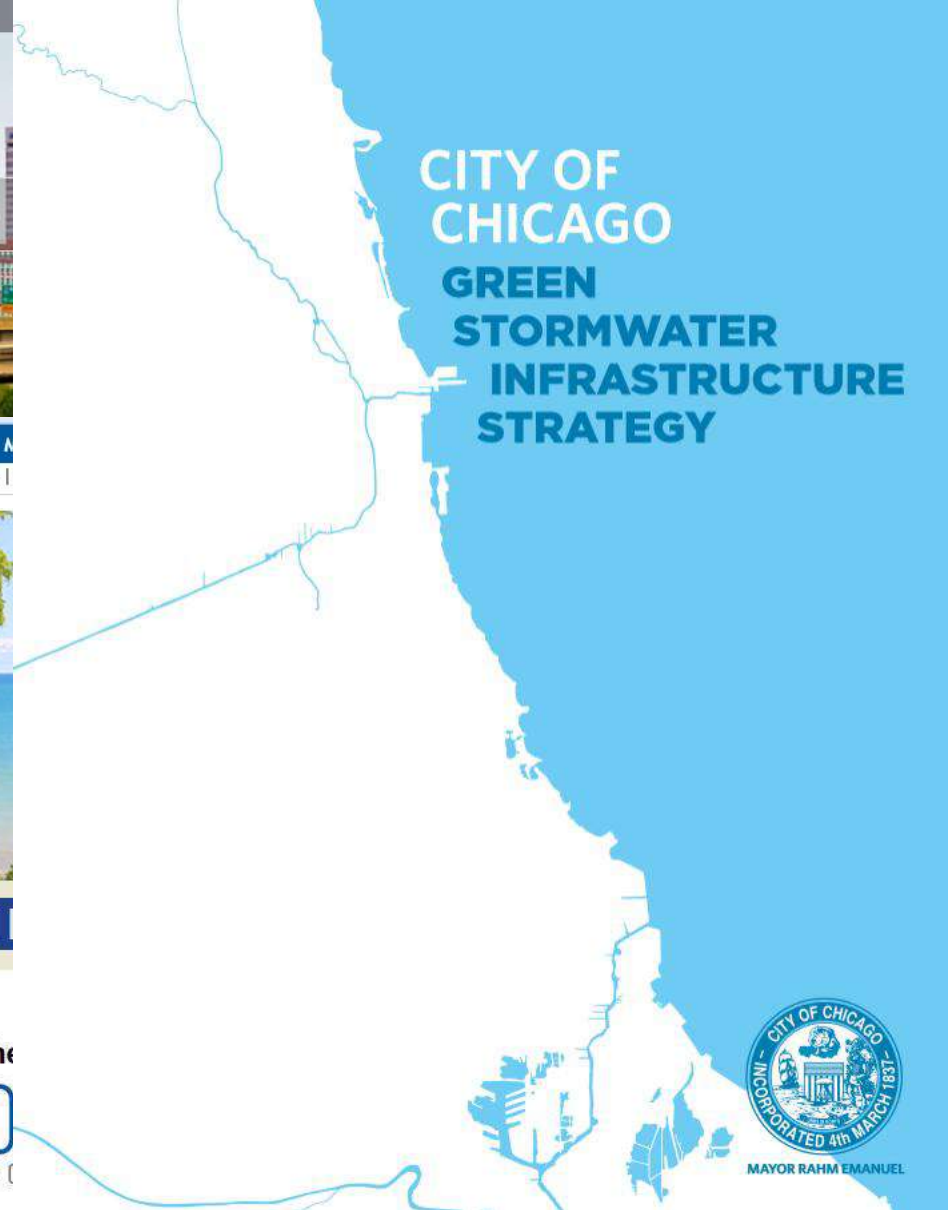
Managing Water Where

FRESH COAT
MILWAUKEE, WISCONSIN

We have an aggressive goal and we need your help!

It's to create, by the year 2035, enough green infrastructure in our region to capture **740 million gallons** of water every time it rains. Why? To reduce water pollution and improve our rivers and Lake Michigan.

Yes, 740 million gallons is huge, but consider this:





Native Gardens • Raingardens • Shoreline Stabilization

[Home](#) • [About](#) • [Why](#) • [Calendar](#) • [Partner Map](#) • [Find Help](#) • [Plant Selector](#) • [Grants](#) • [News](#)



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HOME

About us +

Programs +

Customer Service +

Business with us +

Project Clean Lake
and CSO consent
decree +

Stormwater and
Watersheds

Community Discharge
Permit Program
(CDPP): Plan Review

Stormwater
Management Program

Title V: Stormwater
Management Code

Careers



Community rain garden project in West Creek neighborhood

Small drops. Big problems. A regional solution.

Regional Stormwater Management Program

The Sewer District's Regional Stormwater Management Program addresses problems related to stormwater runoff from hard surfaces. Runoff contributes to regional stream flooding, erosion, and water-quality issues, and the program improves our ability to further address stormwater problems that cross community boundaries.

Fee credit manual available for public comment
Now through May 6, 2016

The Regional Stormwater Management Program credit manual is available for download and review during the public-comment period. You can view the manual in its current form, or view the mark-up version which contains revisions proposed during the current public comment period, which runs until May 6, 2016.

KNOW YOUR FEE FACTS!



ABOUT FEES AND CREDITS

- Understand your fee
- **FEE CREDITS**
 - Residential credit manual to apply for a stormwater credit
 - Full credit manual (includes credits for non-residential properties)

Regional Stormwater Management Program info:

- <http://neorsd.org/stormwaterprogram.php>



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VISIT CLEVELAND.

NO, THIS DOESN'T HAPPEN ANYMORE.

Jeff Jowett, GISP

Watershed Team leader

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jowettj@neorsd.org

I ♥ CLE @neorsd