Residential Stormwater Management: Landscaping Your Way to a Drier Basement

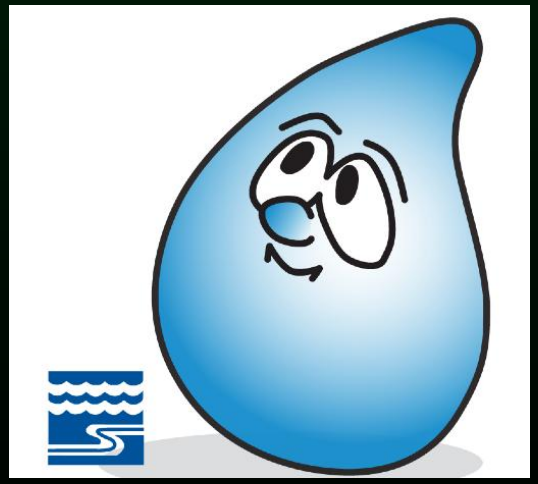
Northeast Ohio Regional Sewer District
Jeff Jowett
Watershed Team leader

Agenda

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

Who We Are…

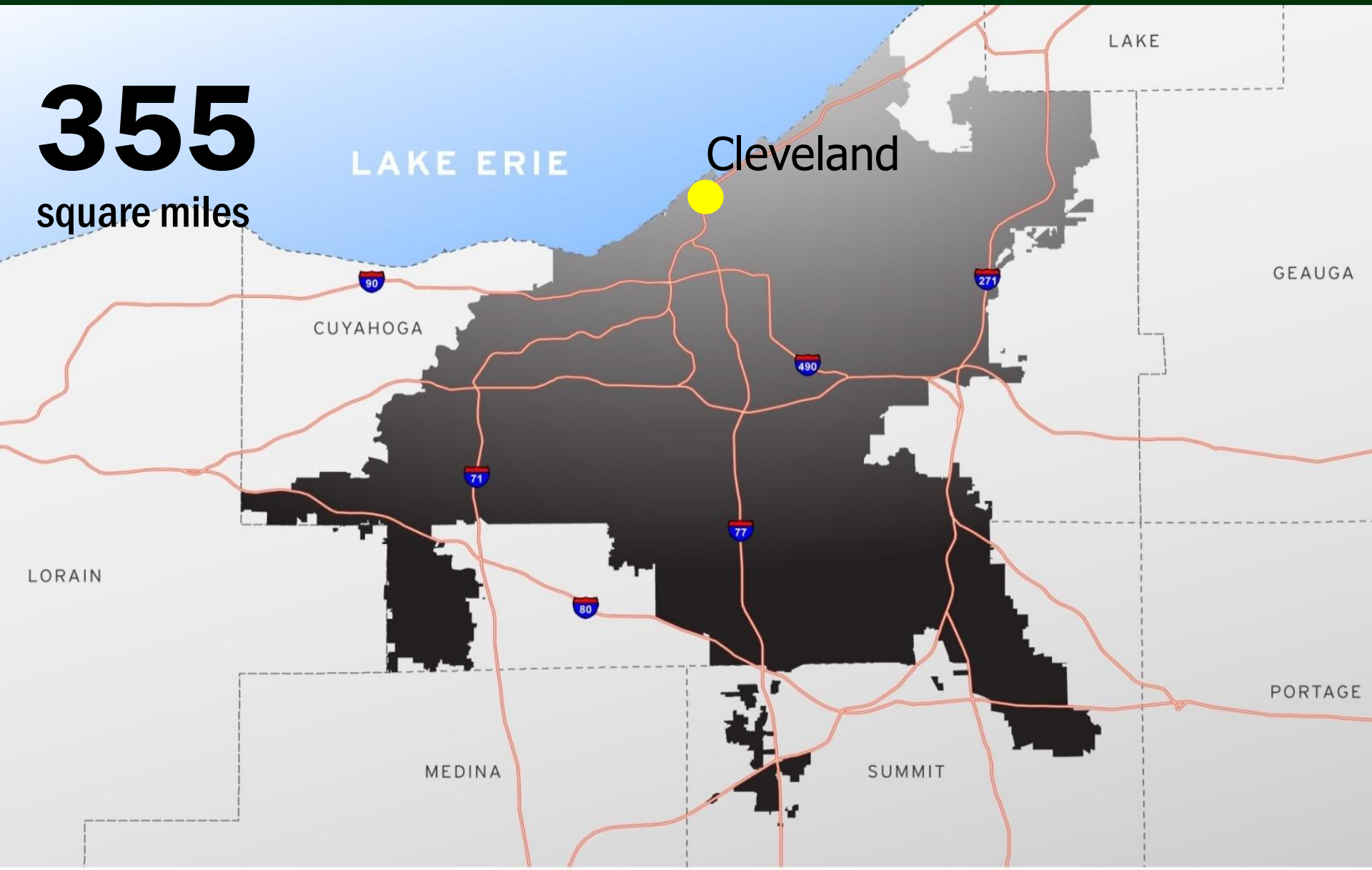
- Created in 1972 by Court Order
  - Political subdivision of Ohio (6119)
  - Code of Regulations
  - Governed by seven Trustees



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

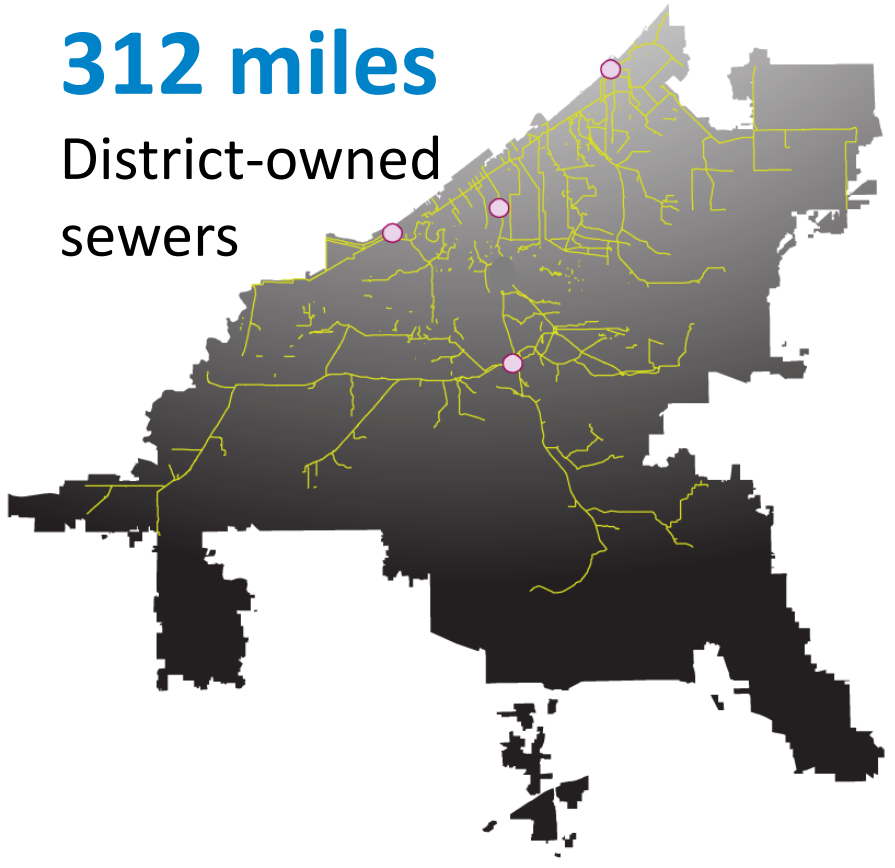
*no drinking water responsibilities


355
square miles
LAKE ERIE
Cleveland
LAKE
GEAUGA
CUYAHOGA
LORAIN
MEDINA
SUMMIT
PORTAGE
90
271
490
71
77
80
Your Sewer District
Keeping our Great Lake great.
District Service Area
Interstate
County Boundary

Sewer Responsibility

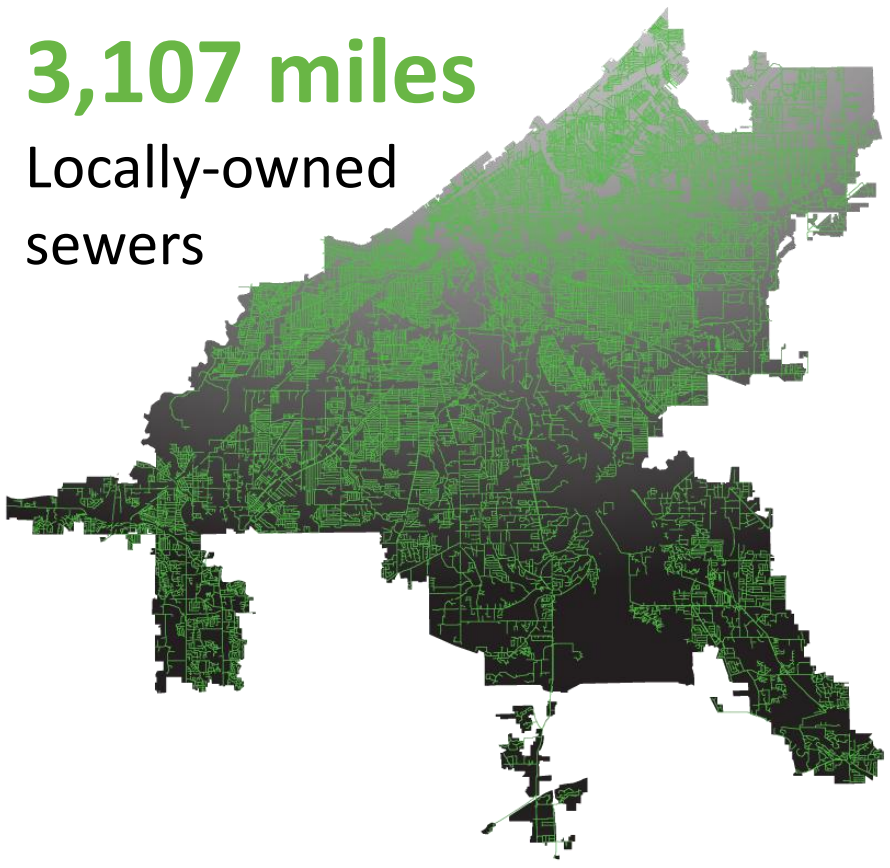
312 miles

District-owned sewers

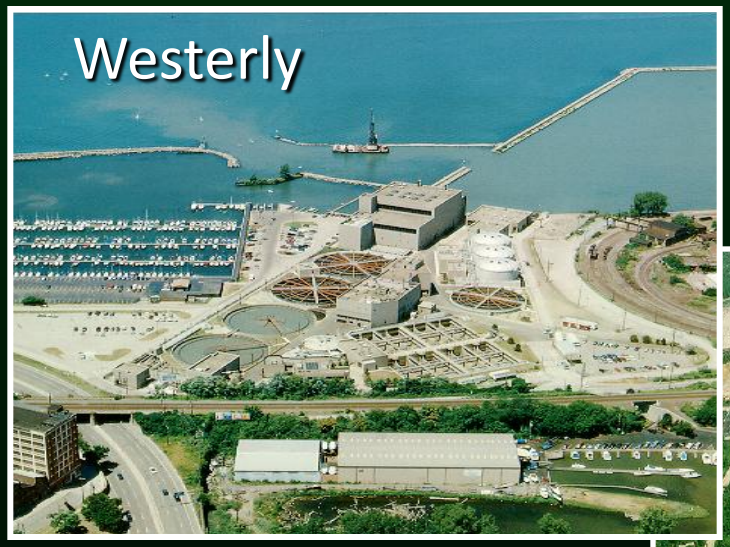


3,107 miles

Locally-owned sewers



We Own and Operate 3 Wastewater Treatment Plants



Northeast Ohio Regional Sewer District

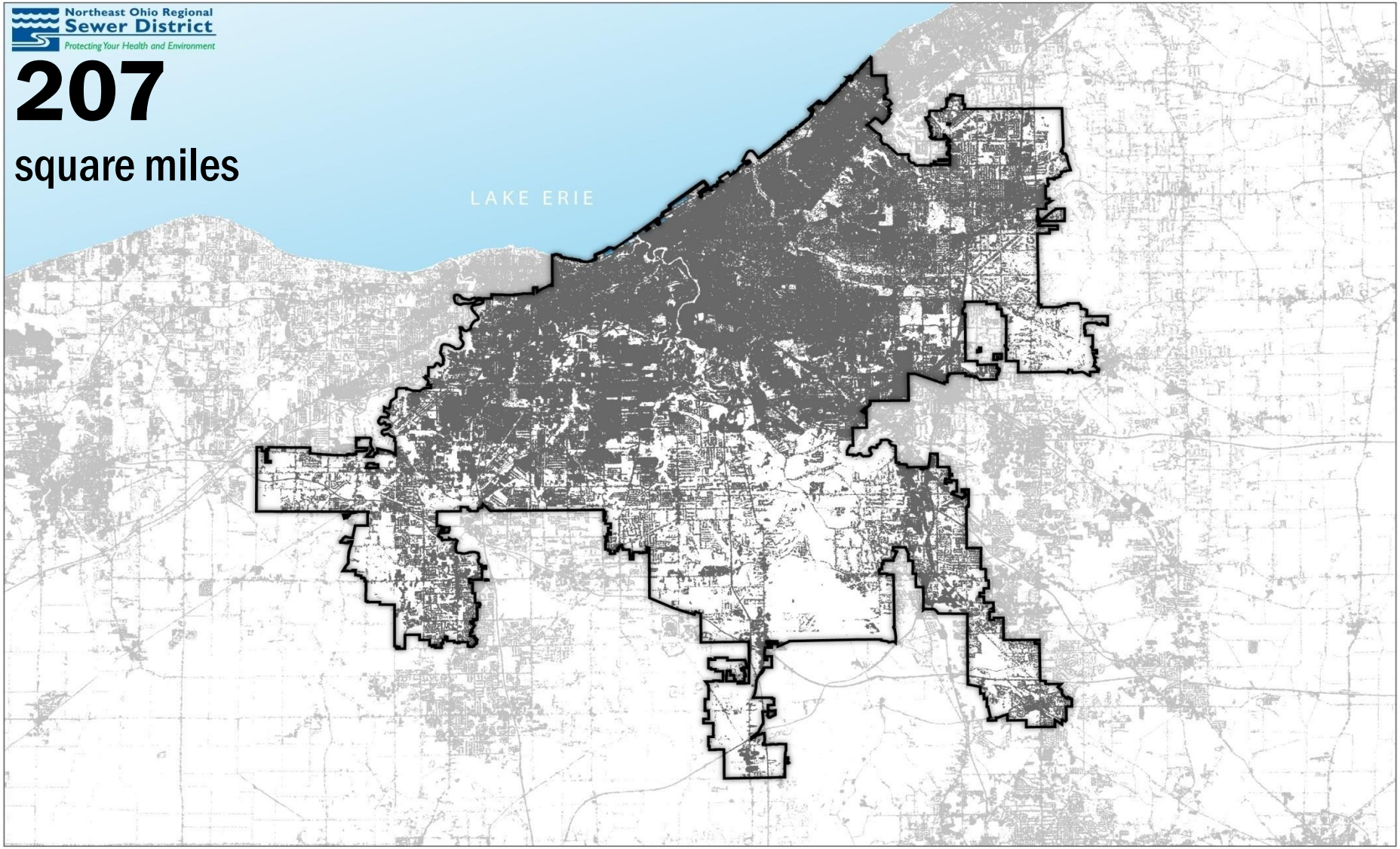
Responsibility

- $3 billion in 25 years
- Combined Sewer Overflow (CSO) control
- Sewer fees

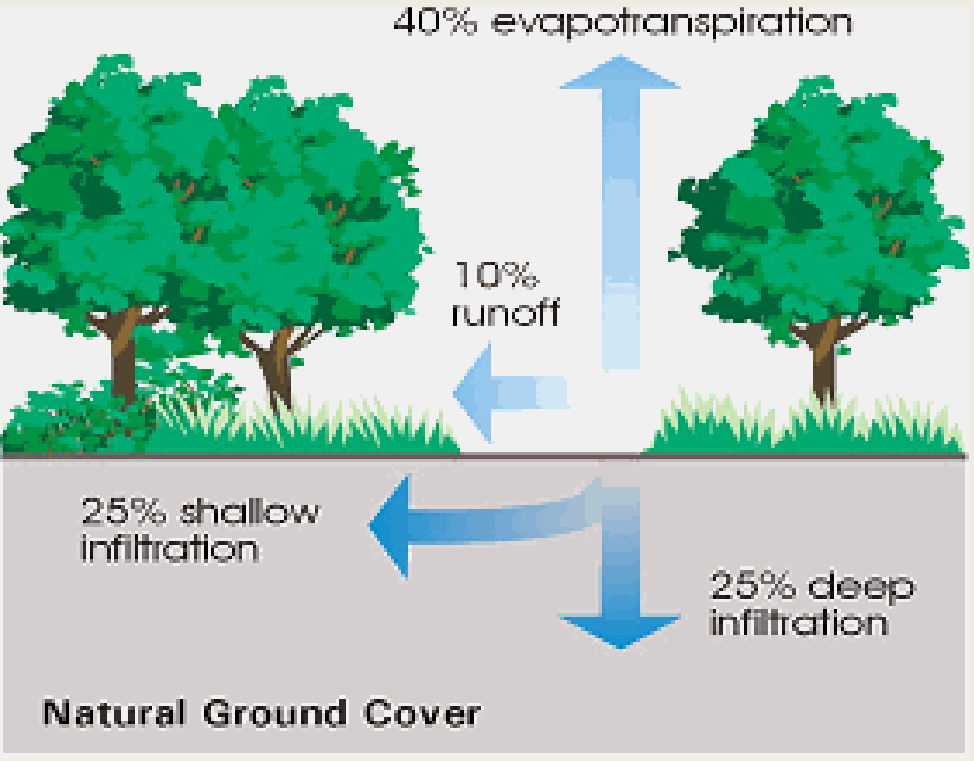
- Regional flooding and erosion issues
- Impervious surface fee

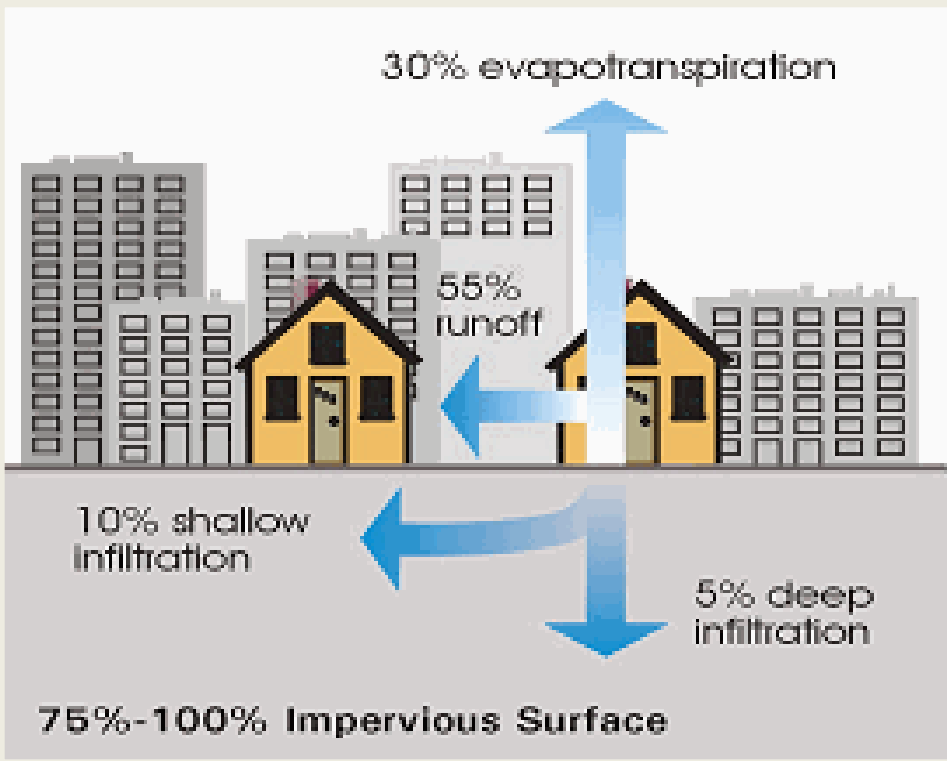
Why is it important to manage stormwater?

On-Going Impacts: Impervious Surfaces



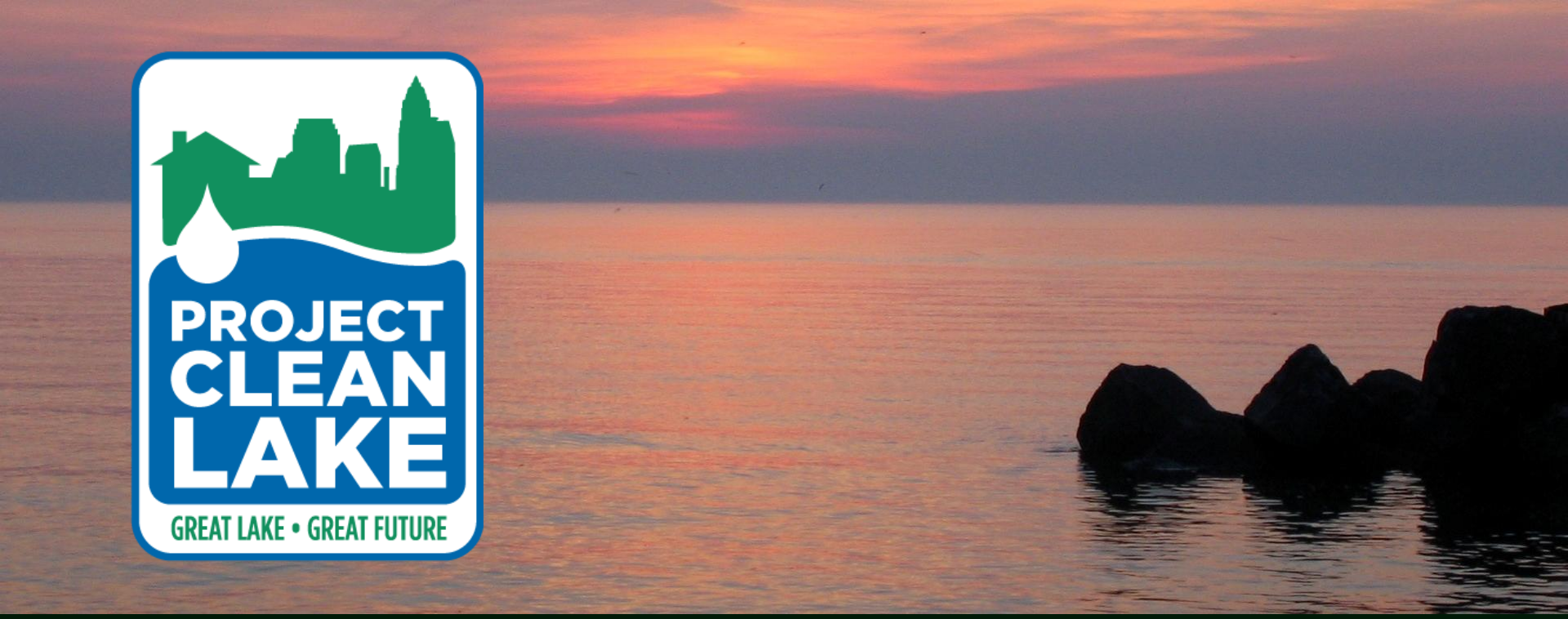
Impervious Surface Impact





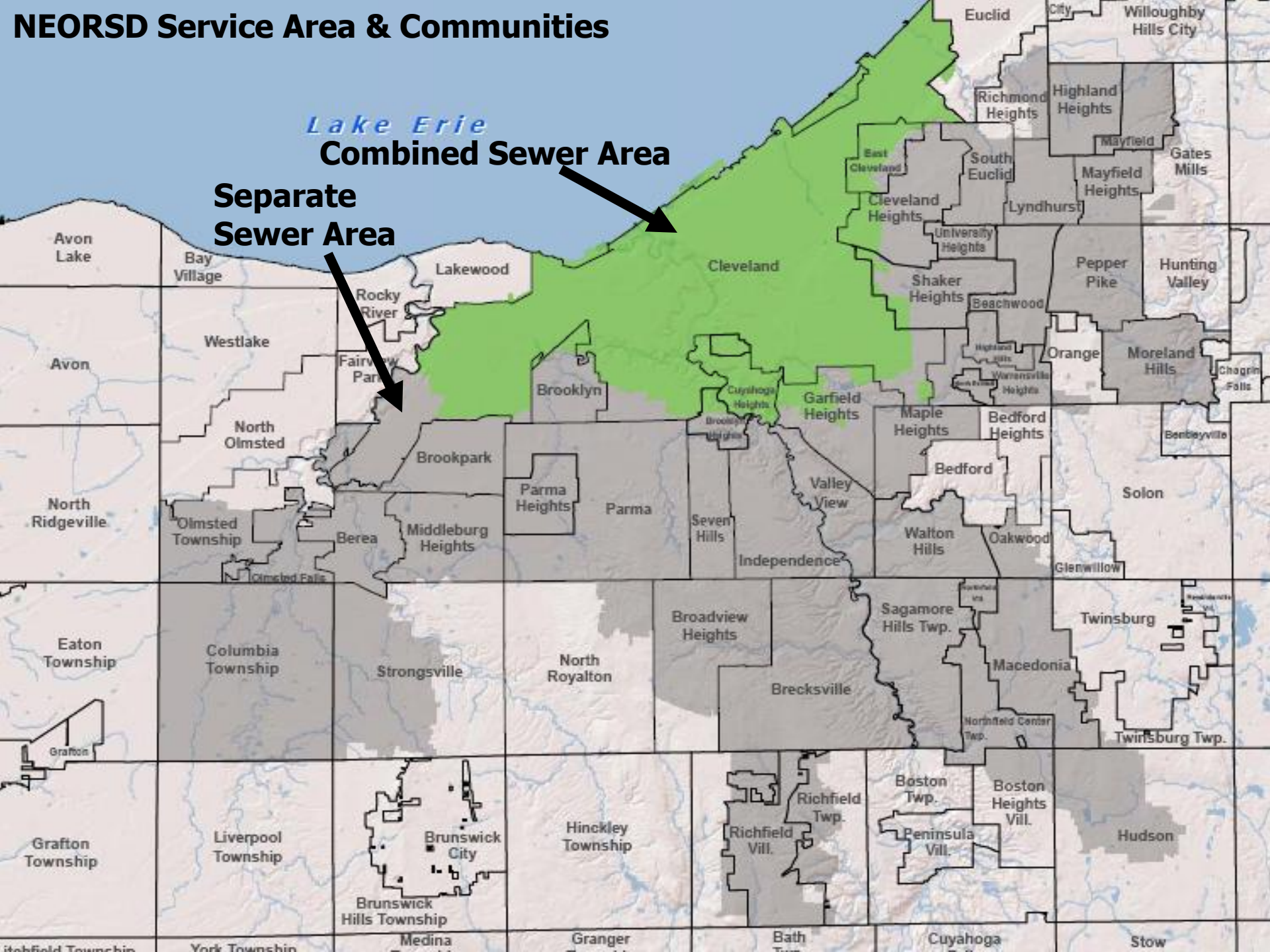
Impervious Surface = Stormwater Runoff

Stormwater Runoff = Flooding & Erosion

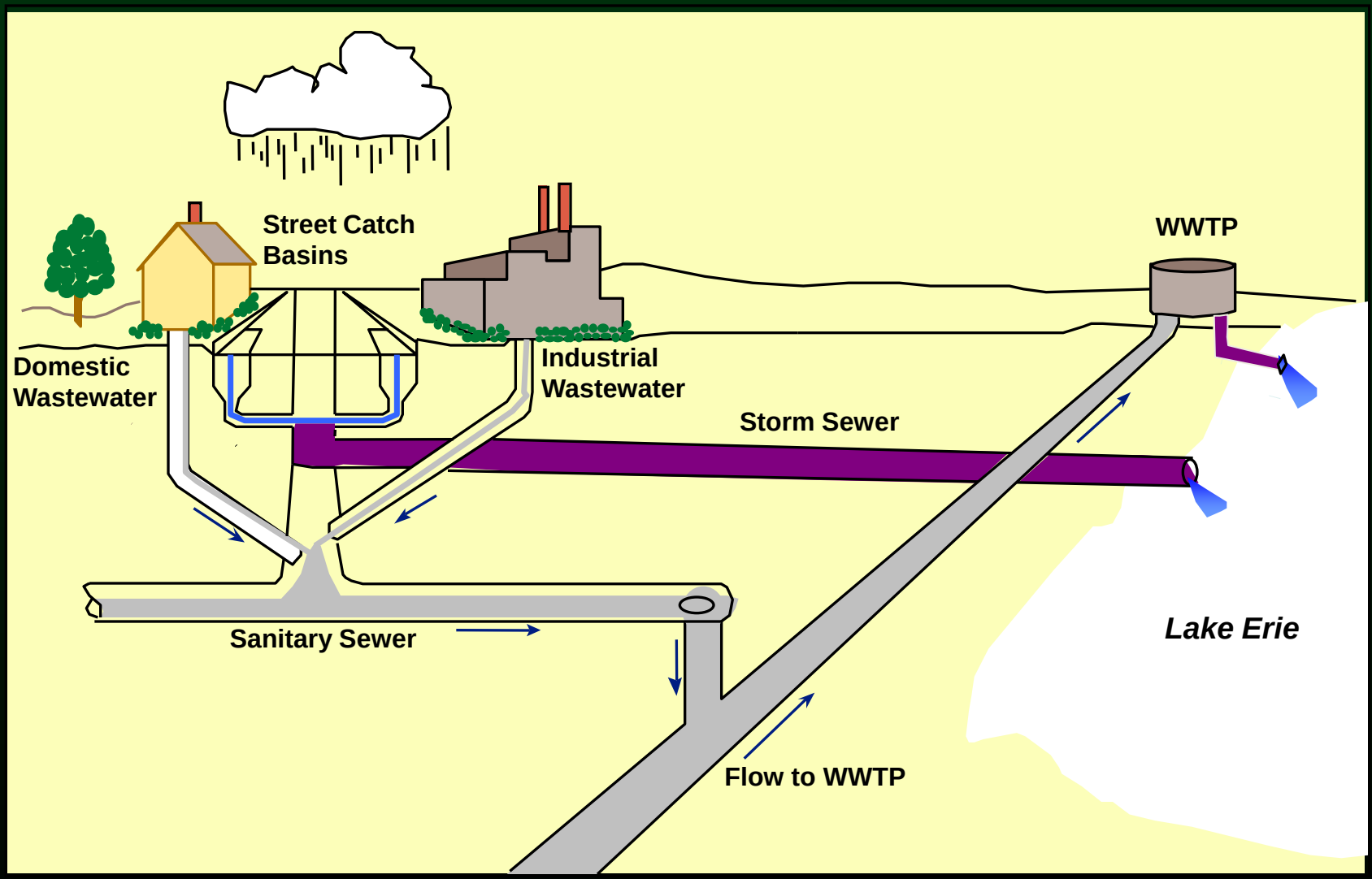


The Sewer District: COMBINED SEWER OVERFLOW CONTROL

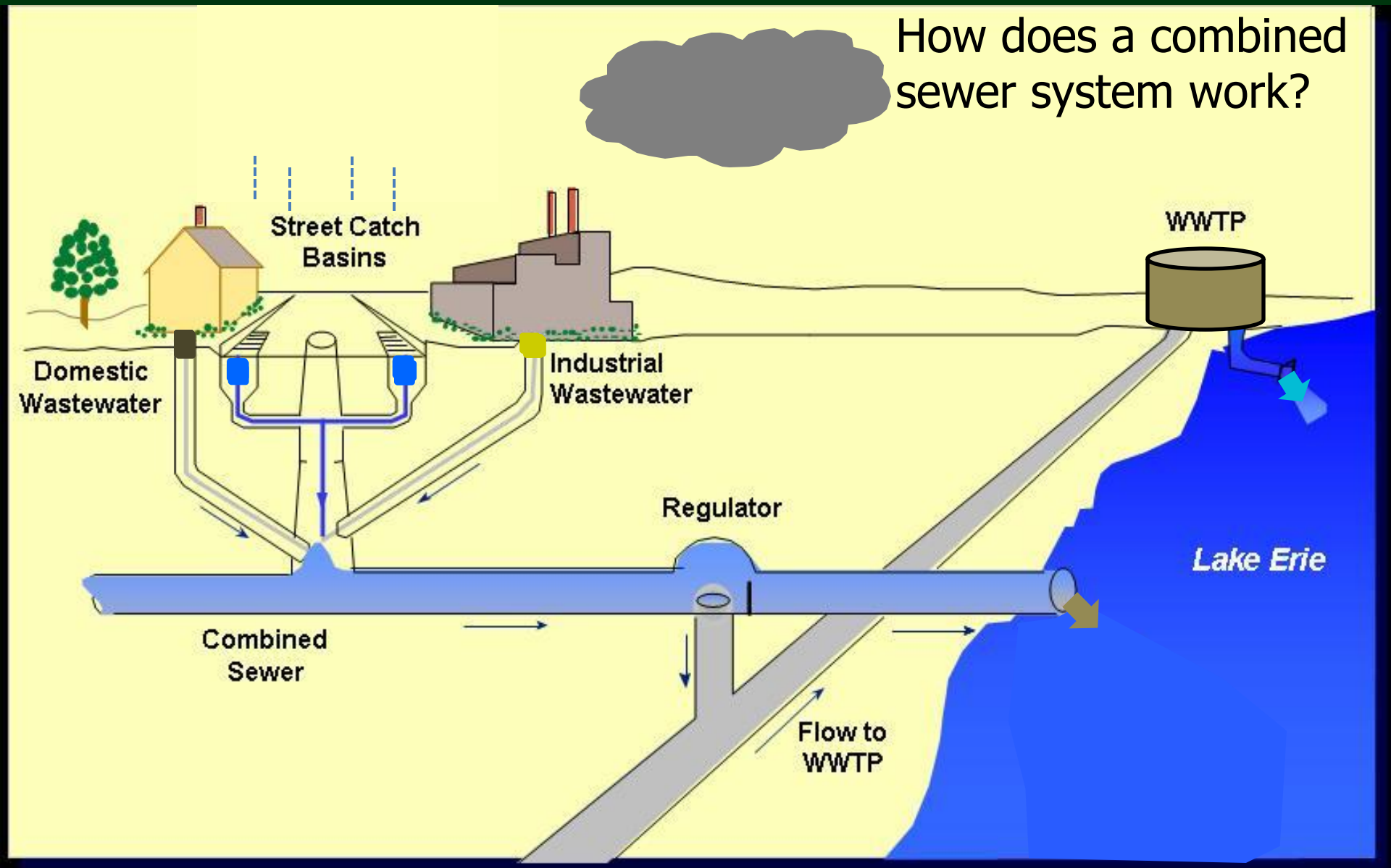
Project Clean Lake

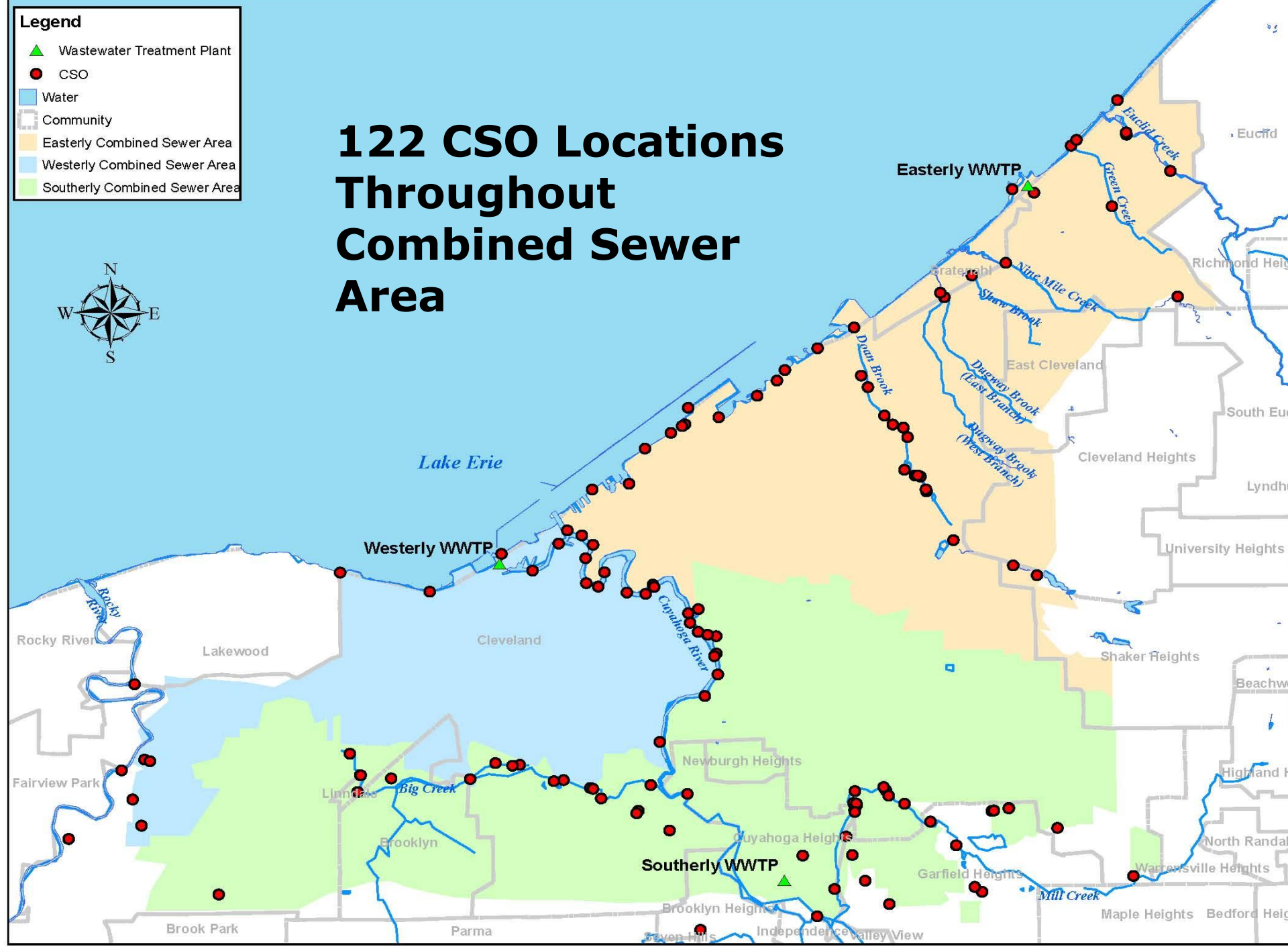

NEORSD Service Area & Communities
Lake Erie
Combined Sewer Area
Separate Sewer Area
Euclid
Willoughby Hills City
Richmond Heights
Highland Heights
Mayfield
Gates Mills
East Cleveland
South Euclid
Mayfield Heights
Cleveland Heights
Lyndhurst
University Heights
Avon Lake
Bay Village
Lakewood
Cleveland
Pepper Pike
Hunting Valley
Rocky River
Shaker Heights
Beachwood
Westlake
Avon
Fairview Park
Orange
Moreland Hills
Chagrin Falls
Brooklyn
Cuyahoga Heights
Garfield Heights
Maple Heights
Bedford Heights
Bentleyville
North Olmsted
Brookpark
Bedford
Parma Heights
Parma
Valley View
Solon
North Ridgeville
Olmsted Township
Berea
Middleburg Heights
Seven Hills
Walton Hills
Oakwood
Olmsted Falls
Independence
Glenwillow
Eaton Township
Columbia Township
Strongsville
North Royalton
Broadview Heights
Sagamore Hills Twp.
Twinsburg
Macedonia
Brecksville
Northfield Center Twp.
Twinsburg Twp.
Grafton
Grafton Township
Liverpool Township
Brunswick City
Brunswick Hills Township
Hinckley Township
Richfield Vill.
Richfield Twp.
Boston Twp.
Boston Heights Vill.
Peninsula Vill.
Hudson
York Township
Medina
Granger
Bath
Cuyahoga
Stow

Separate Sewer System



How does a combined sewer system work?




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
N
W
E
S
Easterly WWTP
Westerly WWTP
Southerly WWTP
Lake Erie
Euclid Creek
Green Creek
Nine Mile Creek
Shaw Brook
Dugway Brook (East Branch)
Dugway Brook (West Branch)
Dam Brook
Cuyahoga River
Big Creek
Rocky River
Mill Creek
Eucrid
Richmond Heig
East Cleveland
South Eu
Cleveland Heights
Lyndh
University Heights
Shaker Heights
Beachw
Highland H
North Randal
Warrensville Heights
Maple Heights
Bedford Heig
Garfield Heights
Cuyahoga Heights
Newburgh Heights
Brooklyn Heights
Independence
Valley View
Seven Hills
Parma
Brook Park
Brooklyn
Linndale
Fairview Park
Lakewood
Rocky River
Cleveland

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) 466-1390
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.

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

Project Clean Lake: THE GRAY

25 years of tunnel construction

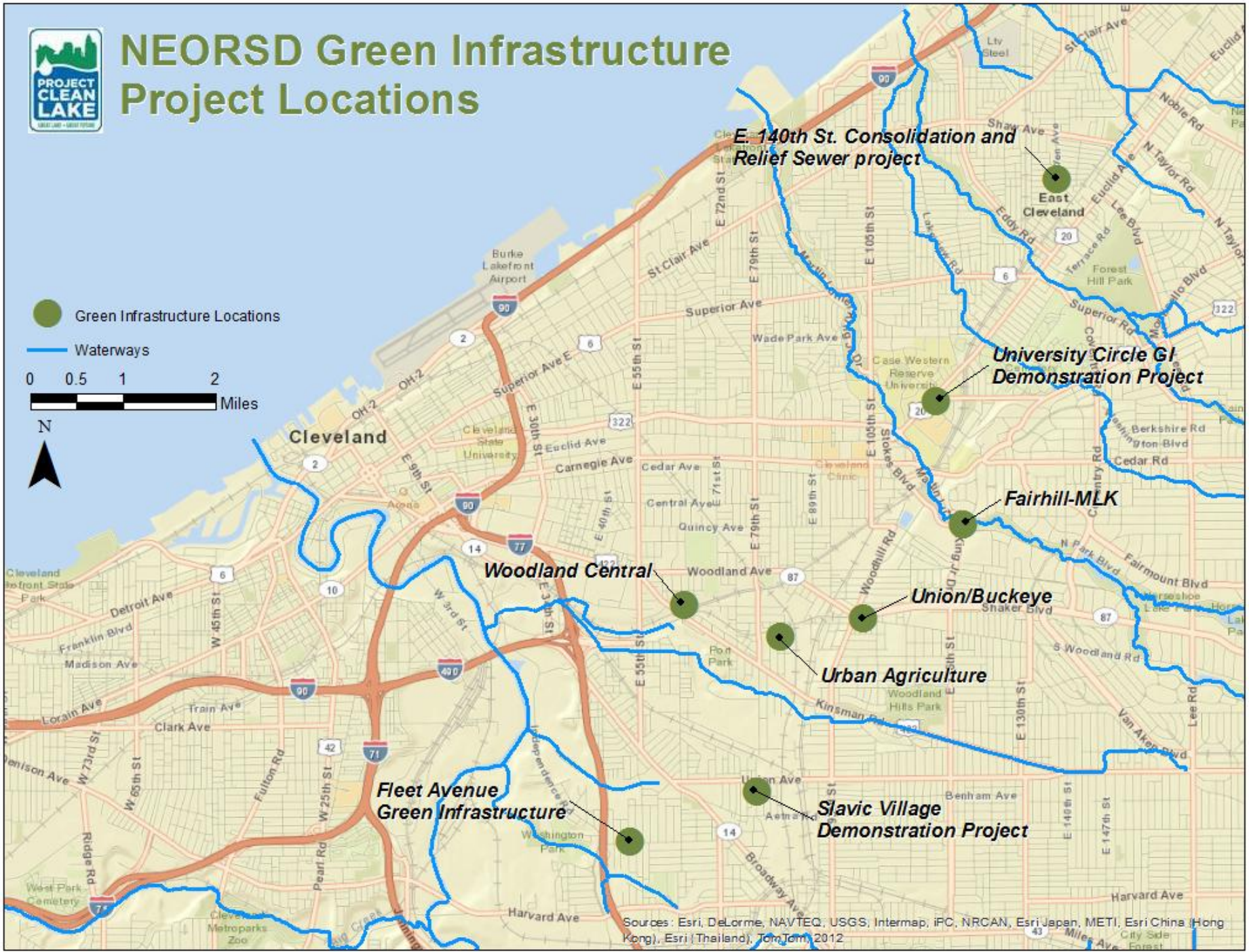
Combined Sewer Overflow Long-Term Control Plan

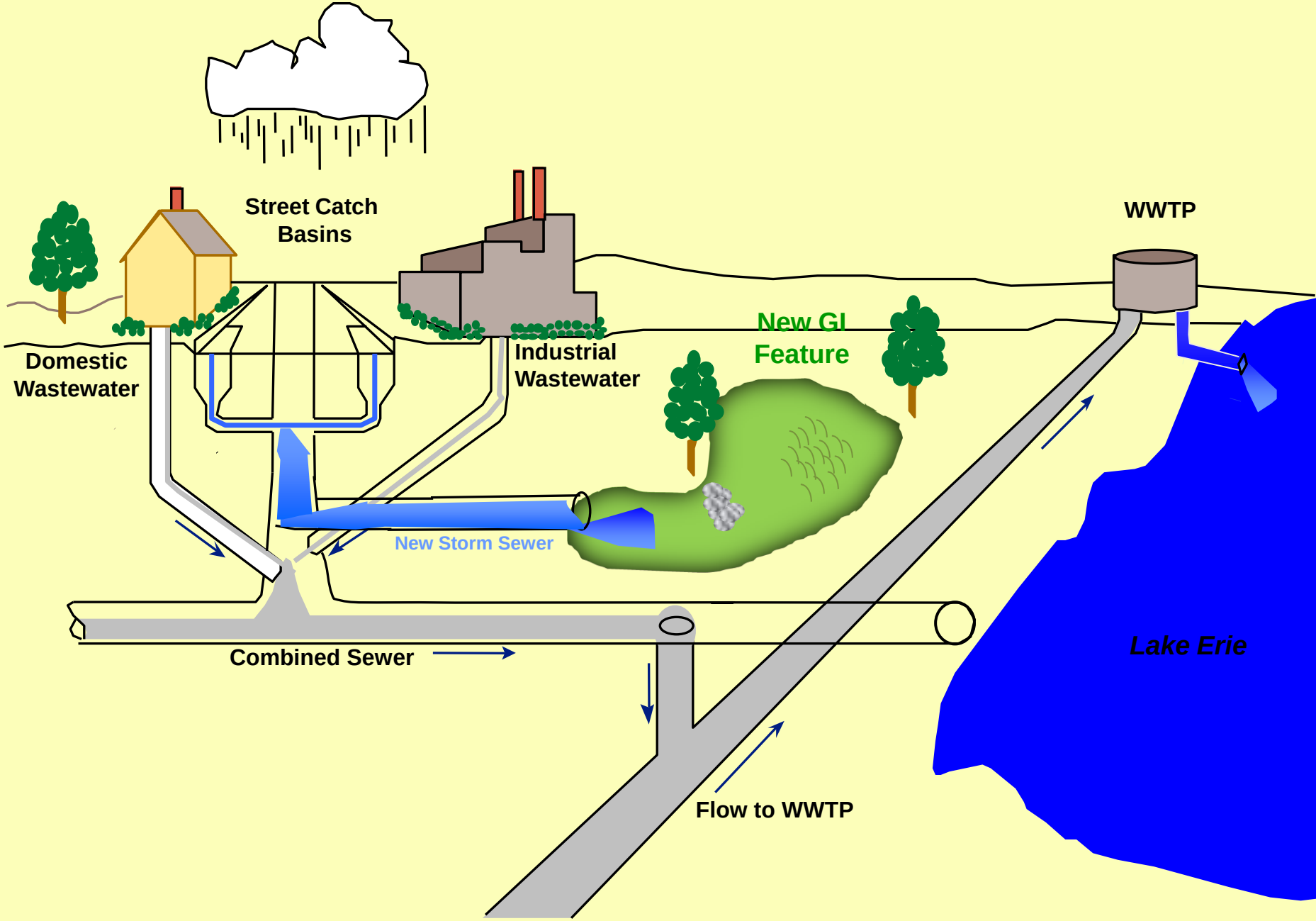
Some of these projects are detailed in our 2010-2014 Capital Improvement Plan available at **neorsd.org/cip**

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




Street Catch Basins
WWTP
Domestic Wastewater
Industrial Wastewater
New GI Feature
New Storm Sewer
Combined Sewer
Lake Erie
Flow to WWTP

REGIONAL STORMWATER MANAGEMENT PROGRAM

Addressing flooding, erosion, and water quality

Regional Stormwater Management Program

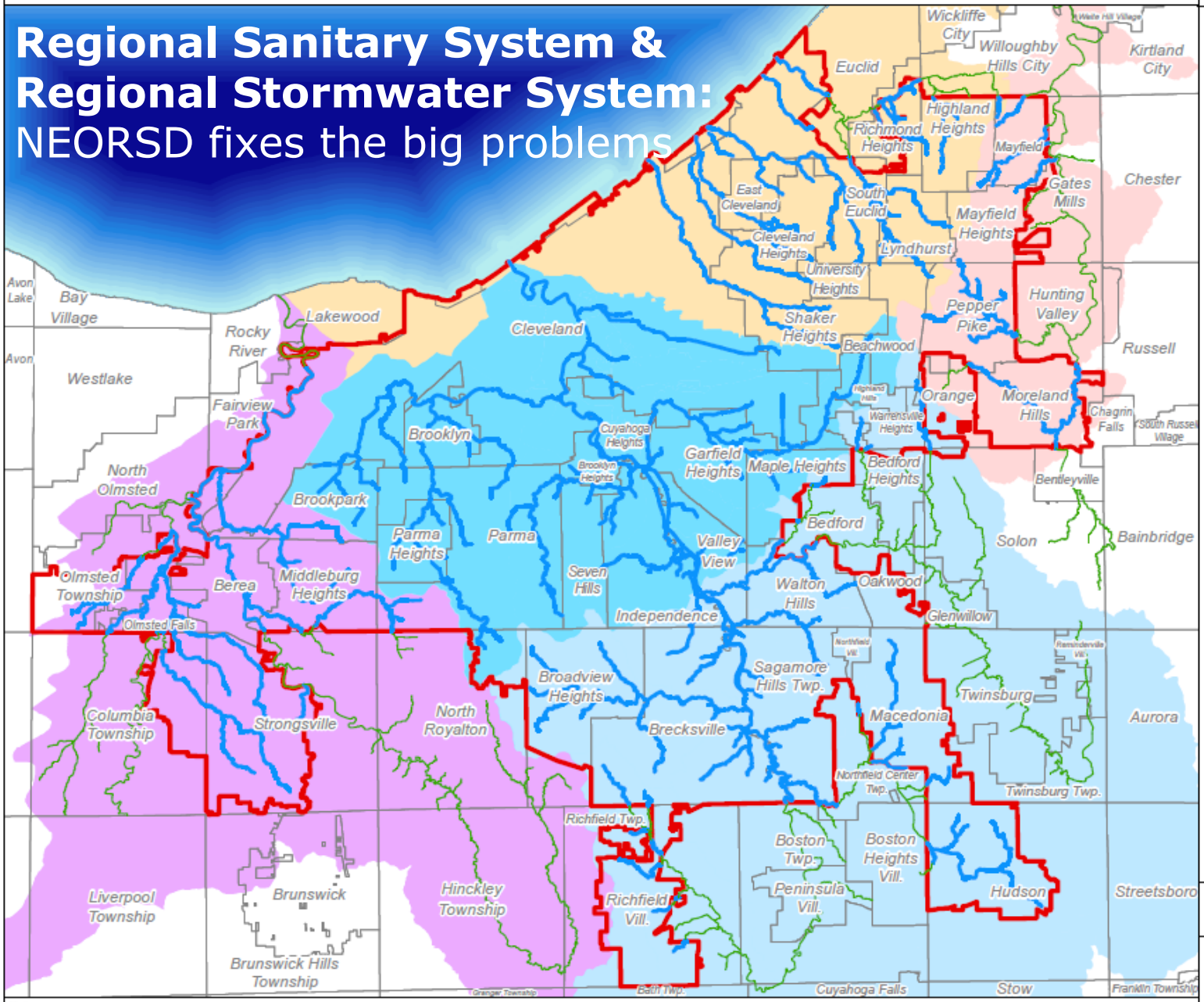
- Ohio Supreme Court opinion issued September 15, 2015
- Request for reconsideration denied: December 2, 2015; opinion final

District has authority to implement program and collect impervious surface fee

Northeast Ohio Regional Sewer District
Protecting Your Health and Environment

Regional Stormwater System

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



Legend

- Regional Drainage in NEORSD Service Area
- Regional Drainage not in NEORSD Service Area
- NEORSD Stormwater Service Area
- Community
- Chagrin River Watershed
- Cuyahoga River North Watershed
- Cuyahoga River South Watershed
- Lake Erie Direct Tributaries Watershed
- Rocky River Watershed

1:250,000

Coordinate System : Ohio State Plan North
Datum: NAD 1983 , NAVD 1988
Projection: Lambert Conformal Conic

Sources: NEORSD GIS, Cleveland GIS, Cuyahoga Co. GIS, Summity Co. GIS, Lorain Co. Auditor, Lake Co. GIS

Map Created: July 2013

Notes

RSS_Watersheds.mxd

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…

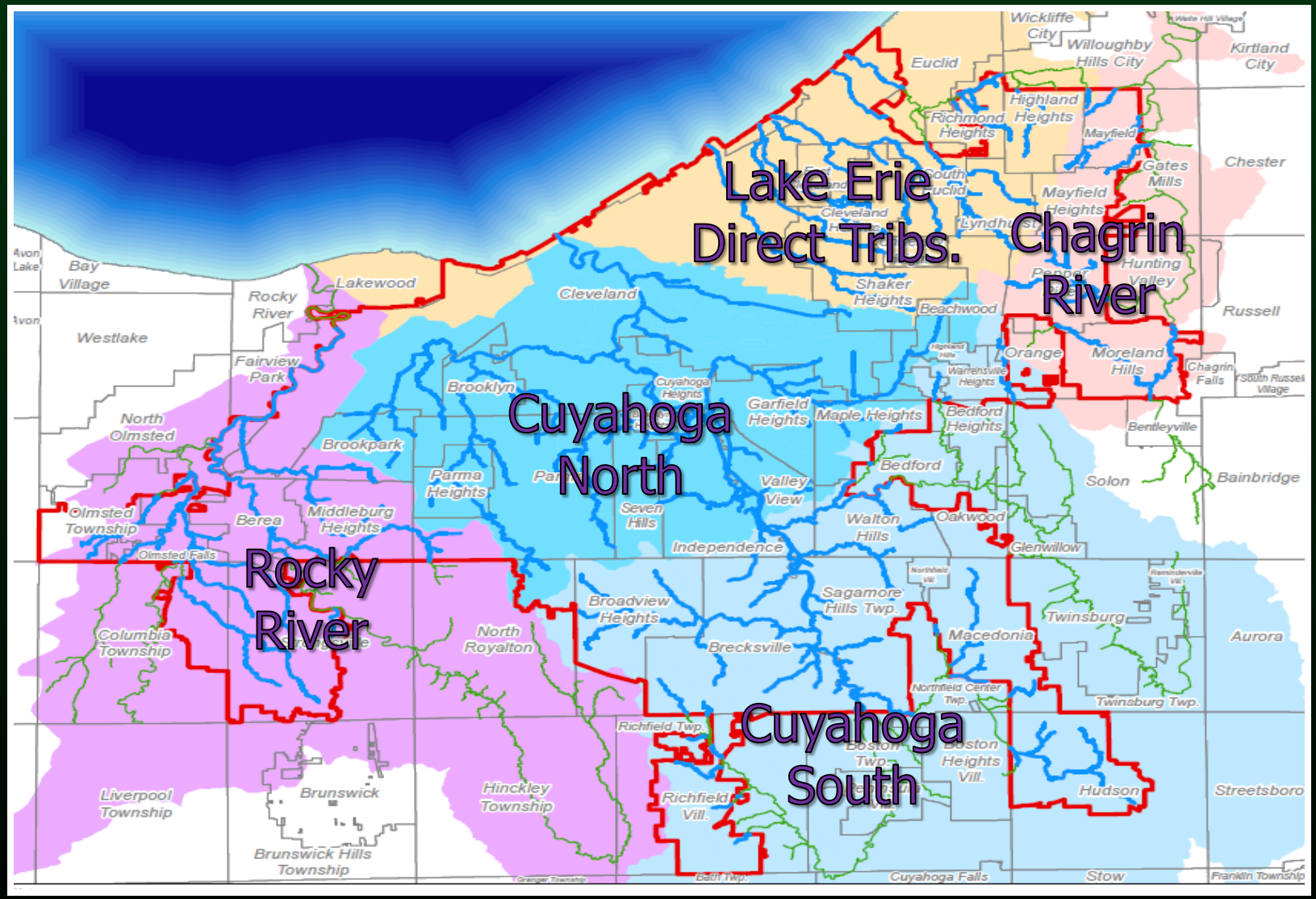
Stormwater Master Plans

Inspect & Maintain

Construct Projects

Encourage Good Practices

Stormwater Master Plans

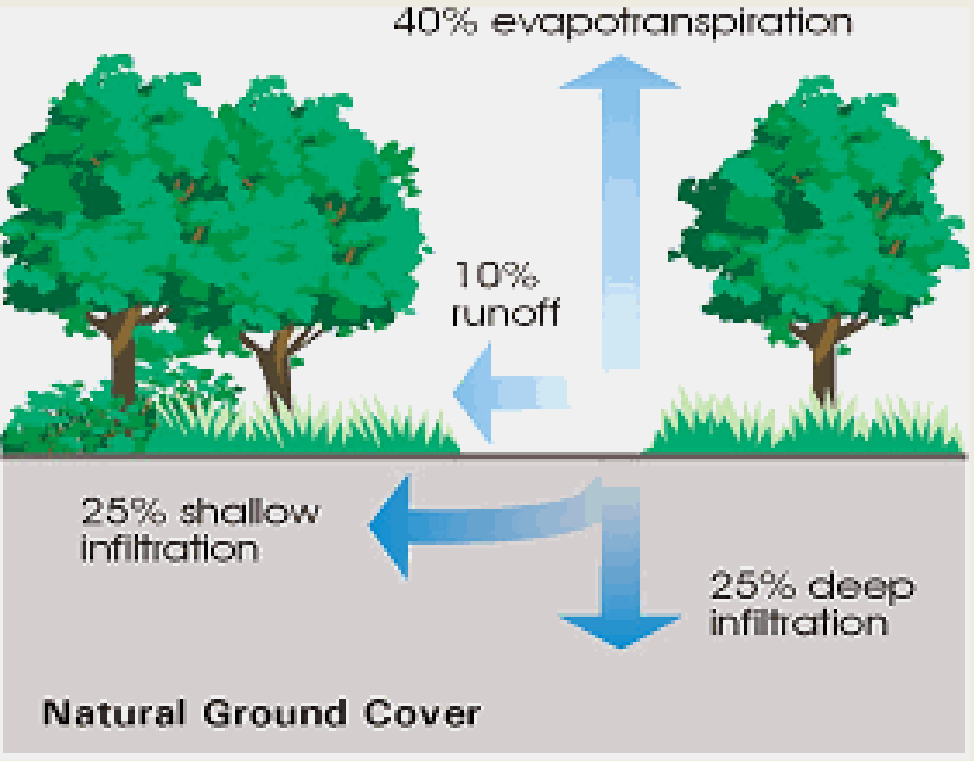


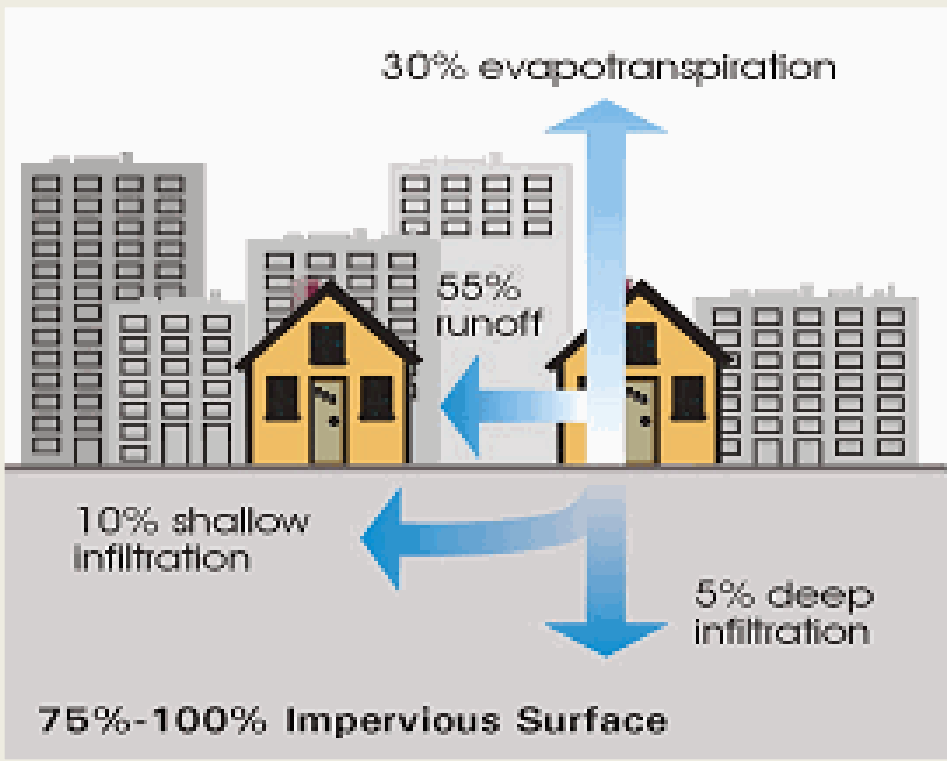
Regional Stormwater Management Program

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

#neorsdGREEN

Impervious Surface Impact





Impervious Surface = Stormwater Runoff

Stormwater Runoff = Flooding & Erosion

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 ft^2
  - ***$3.09*** *per month*
- Tier 2 (Medium)
  - ***$5.15*** *per month*
- Tier 3 (Large) > 4,000 ft^2
  - ***$9.27*** *per month*

Stormwater Fee Example

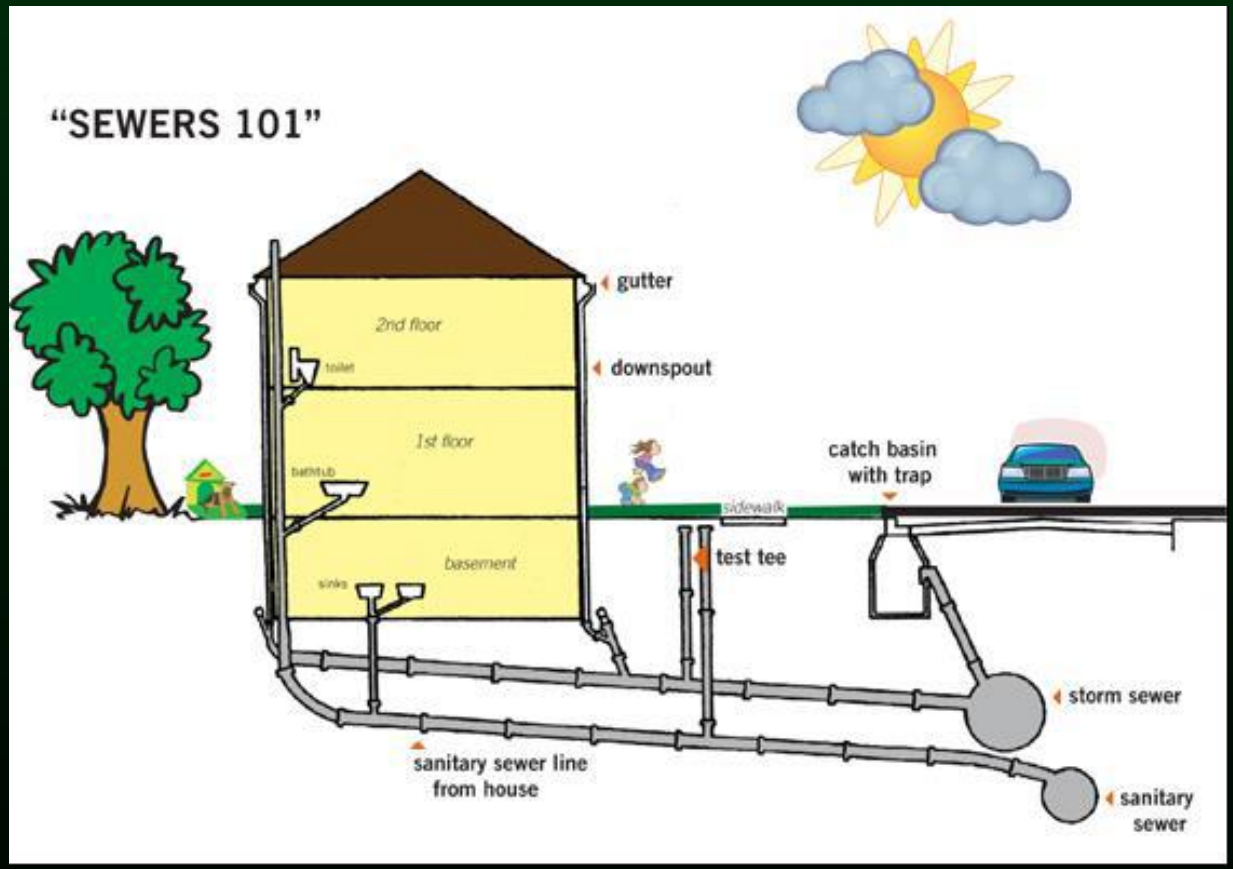
- Downtown Cleveland
- 99,000 sq.ft of total impervious area
- 33 ERUs across multiple parcels
- $509.85/quarter
- $2039.40/year

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

Stormwater Management Begins at Home

PROJECT CLEAN LAKE
GREAT LAKE • GREAT FUTURE

Are YOUR pipes clear?



Local Community Investigation results:

- 55% of laterals required light cleaning

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

Stormwater Fee Credits

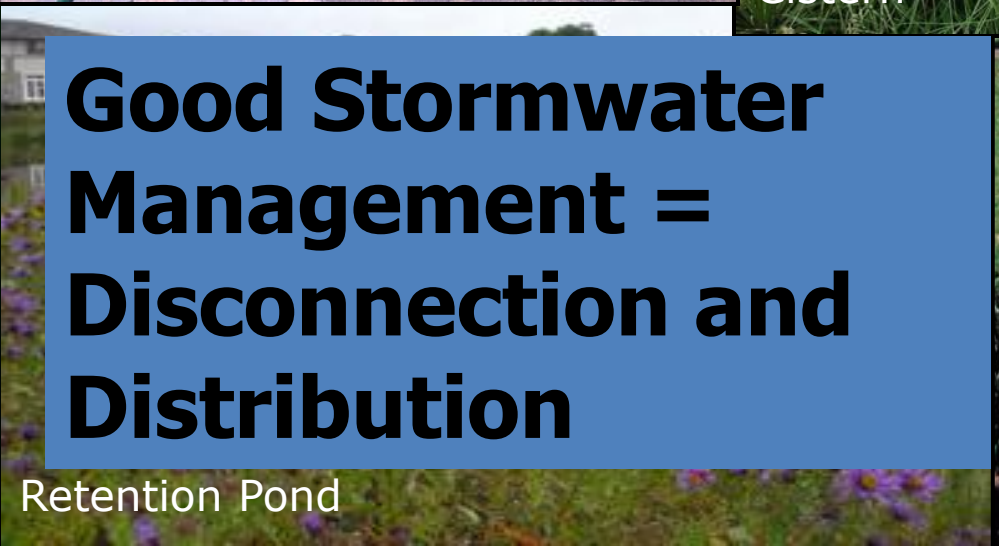

Raingarden


Pervious Pavement


Cistern


Detention Basin

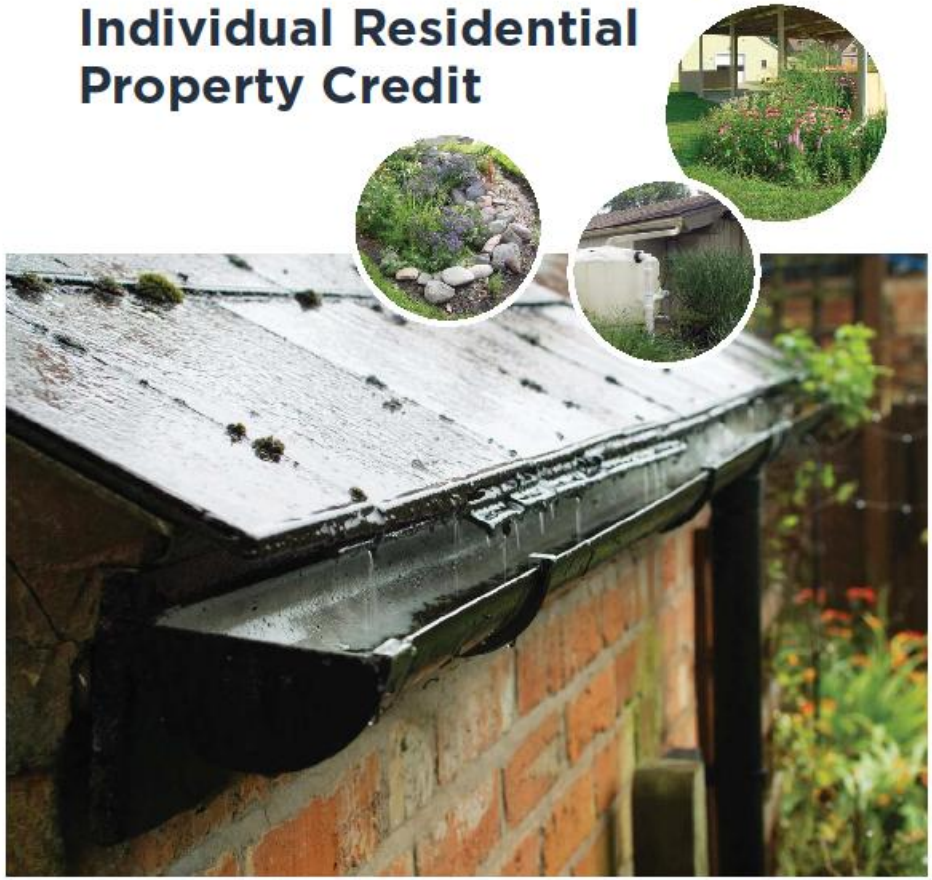
Good Stormwater Management = Disconnection and Distribution


Retention Pond

NORTHEAST OHIO REGIONAL SEWER DISTRICT

Stormwater Management Program

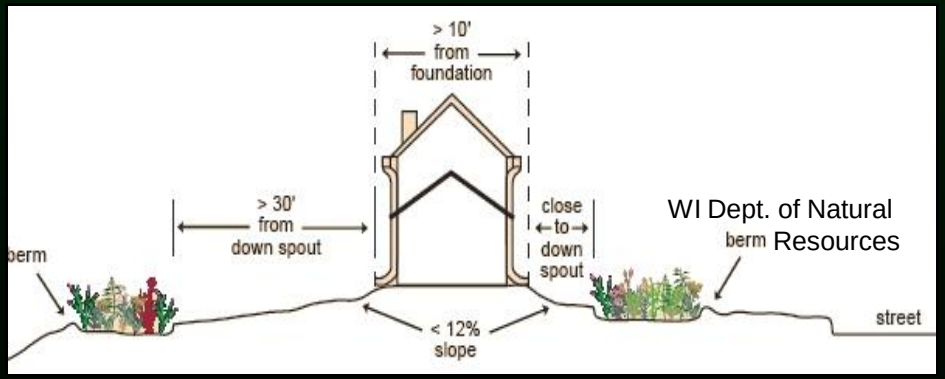
Individual Residential Property Credit



Revised 12/04/12

Site Considerations

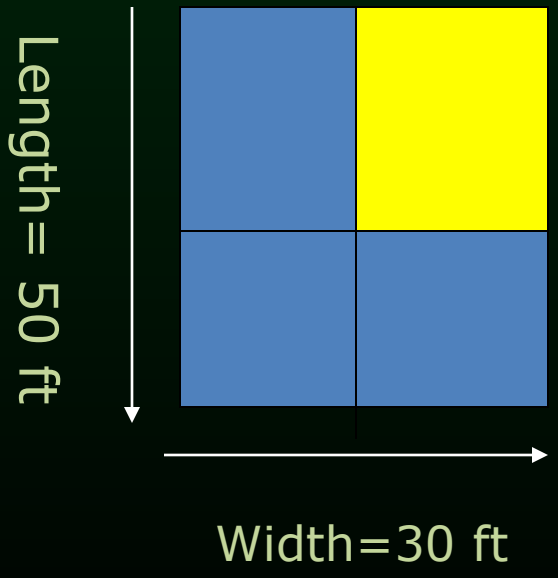
- Close enough that downspouts can be used to direct rainwater into your rain garden
- Investigate natural drainage of yard so overflow (during a heavy rain) flows away from the house and into the rest of your yard
- Identify the location of underground utilities



Sizing your Rain Garden

Calculate area draining to rain garden

Area of roof going to down spout

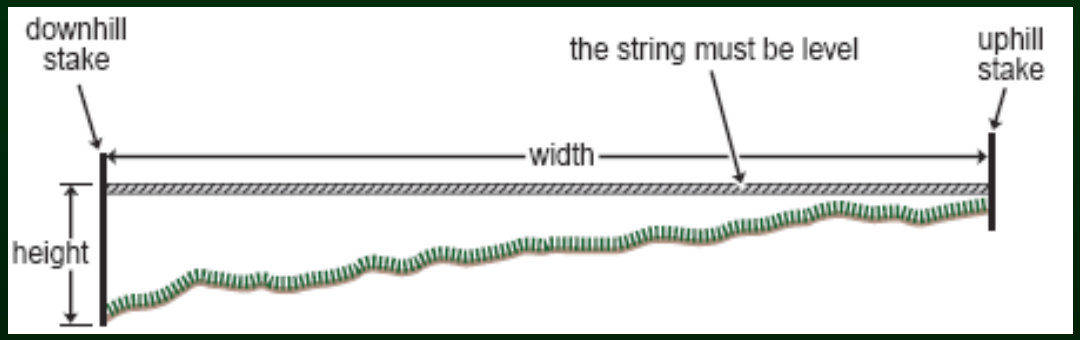


Area of rooftop= Length x Width

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

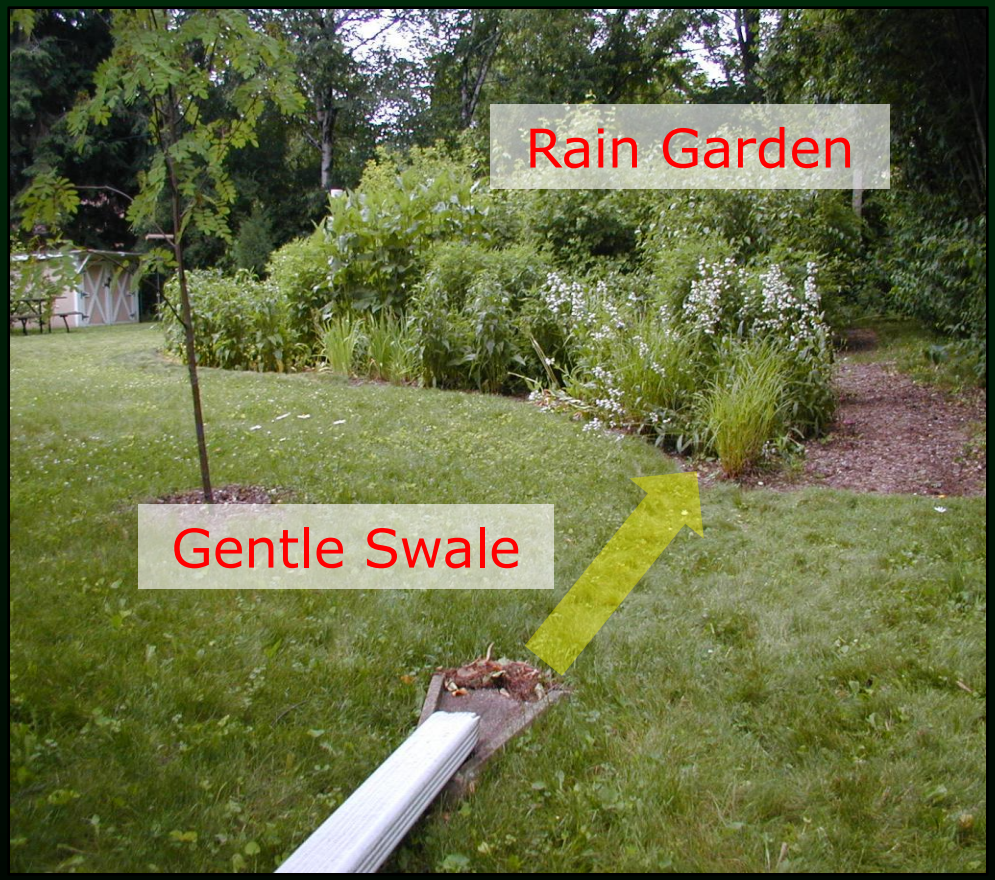


Slope= Height / Width x 100

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

Making the connection

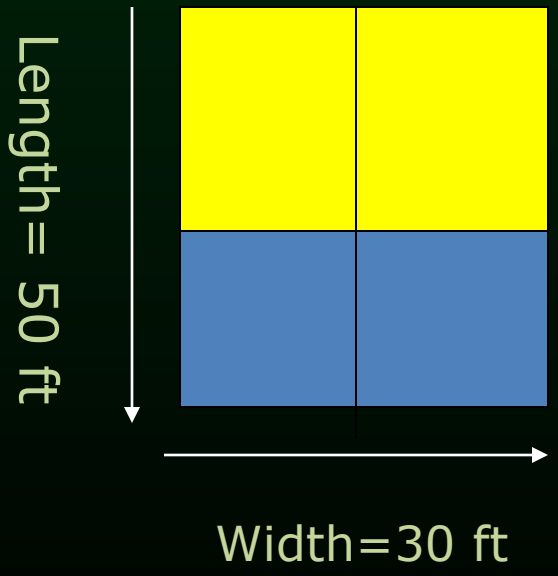
- Create flow path from disconnected downspout to rain garden



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

On-Site Storage

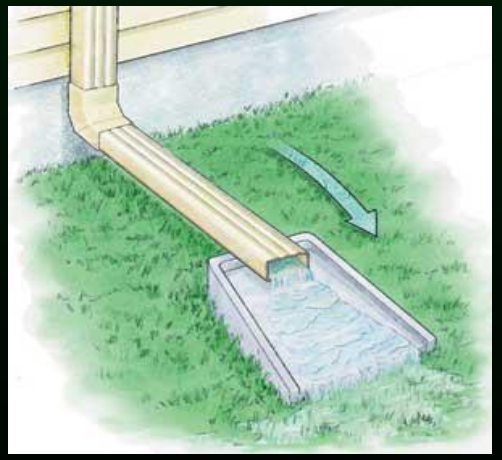
- Rain Barrels
  - 50% of the property's roof area connected to rain barrels
  - Provide at least 40 gallons of storage per downspout
- Storage devices (cistern)
  - Sized to hold the runoff from 50% of the property's roof during a 1-inch rain storm
- Must be covered to prevent mosquitoes.
- Drain in 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.

Vegetated Filter Strip

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



Consider the flow path

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

The CITY OF PORTLAND

City Home | Government | Bureaus & Of

Environmen
working for clean rivers

What We Do | Customer Service

What We Do | Watershed Services

Grey to Green Accomplishments

Grey to Green Brochure

Working for a safe, affordable, vibrant, innovative, and interconnected city. Learn More

Departments | Services |

seattle.gov

SEATTLE PUBLIC UTILITIES

Home | Services | Environment & Conservation | Engineering | For Bus

Recycling | My Home | Our City | Our Watersheds | Projects

- Green Stormwater
- Stormwater Code
- Current GSI Projects
- Completed GSI Projects
- RainWise Program
- Low Impact Development
- Incentives & Opportunities

Environment & Conservation > Projects > Green Stormwat

Green Stormwater Infrastructu

We provide guidance for modest to grand
that welcome the rain – storing, draining, a

In 2013, the City Council and the Mayor di
managing 700 million gallons of stormwate

700milliongallons.org
Learn about GSI within the City of Seattle

GSI for Stormwater Code Compliance
Details how stormwater flow and water qua
Infrastructure.

Current GSI Projects
Information about current projects to prote

Completed GSI Projects
Data and details from completed projects

RainWise Program
Seattle residents can use this web-based t
See what others are doing, find a contracto

Contact Information

INFRAST

CITY OF CHICAGO
GREEN STORMWATER INFRASTRUCTURE STRATEGY

CITY OF CHICAGO INCORPORATED 4th MARCH 1837

MAYOR RAHM EMANUEL

Managing Water Whe

FRESHCO

MILWAUKEE, WISC

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:

Blue Thumb

PLANTING FOR CLEAN WATER®

Native Gardens • Raingardens • Shoreline Stabilization

Home • About • Why • Calendar • Partner Map • Find Help • Plant Selector • Grants • News

Your Sewer District **Keeping our Great Lake great.**

#neorsdGREEN

Regional Stormwater Management Program info:

- **http://neorsd.org/stormwaterprogram.php**

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Watershed Team leader
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jowettj@neorsd.org