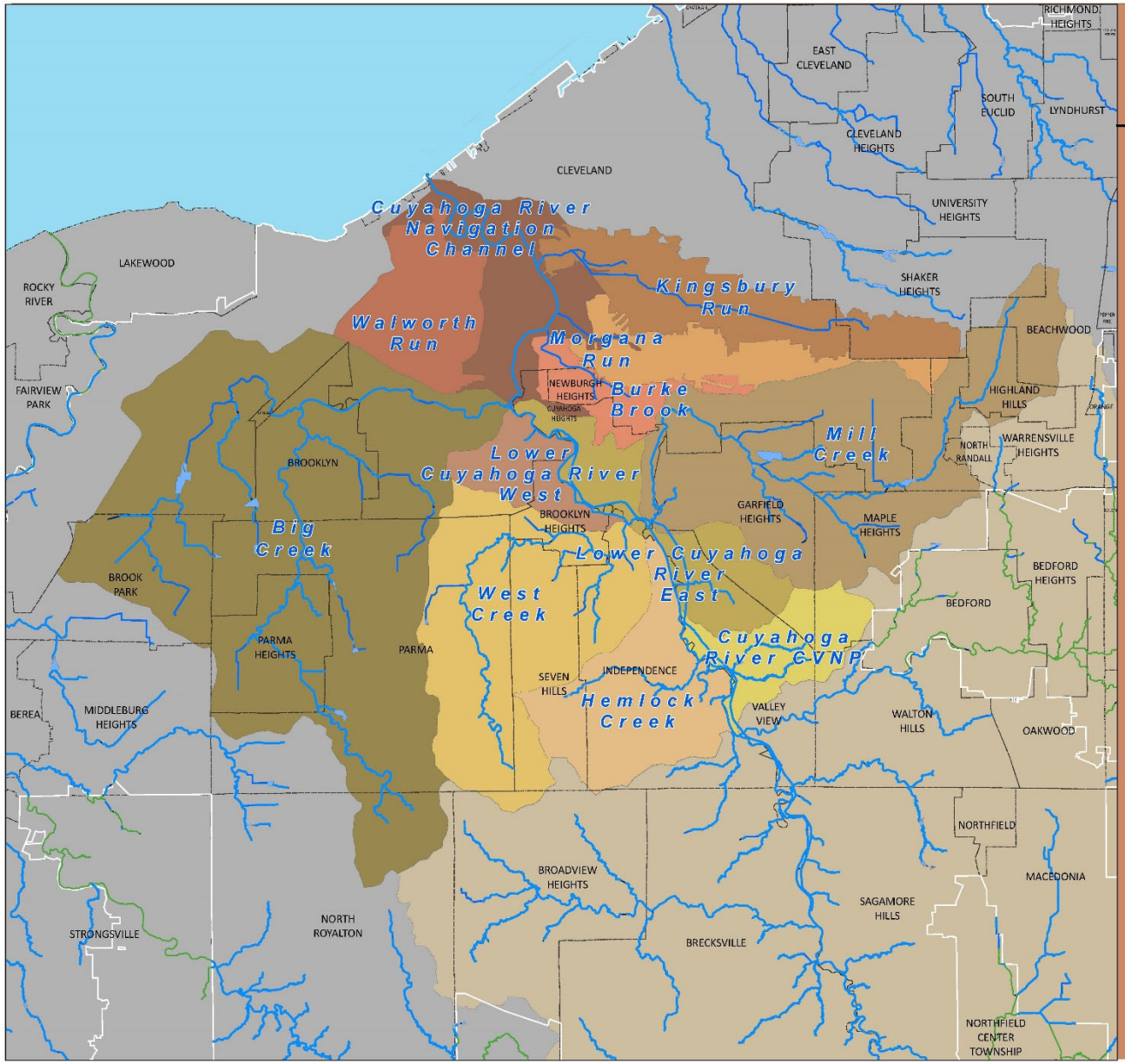

Cuyahoga River - North

Regional Stormwater System in NEORSD Service Area

Regional Stormwater System not in NEORSD Service Area

Service Area

Community

Northeast Ohio Regional Sewer District

Coordinate System : Ohio State Plane North
Datum: NAD 1983 , NAVD 1988
Projection: Lambert Conformal Conic
Sources: NEORSD GIS

Map Created: October 2017 **1:50,524**

Watershed Advisory Committee
Cuyahoga River - North
October 2018

Northeast Ohio
Regional Sewer District

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Agenda

- Sewer District Updates
  - Community Cost-Share
  - Local Sewer System Evaluation Studies
- Stormwater Master Plan
- Stormwater Inspection and Maintenance
  - Urgent Response Process
  - Problems to Projects
  - Community Meetings on Crossings and Culverts
- Stormwater Construction Plan
  - 2018 Project Updates
  - 2019 Annual SW Construction Plan Review
  - Construction Project Oversight

Community Cost-Share: 2018

- CCS Funds Balance (8/31/2018) $ 22,039,931
- 67 projects w/ executed agreement $ 9,150,615
- 17 approved allocation agreements $ 7,539,502
- CCS Funds available to Member Comm. $ 5,349,814

30 of 55 Member Communities currently participating

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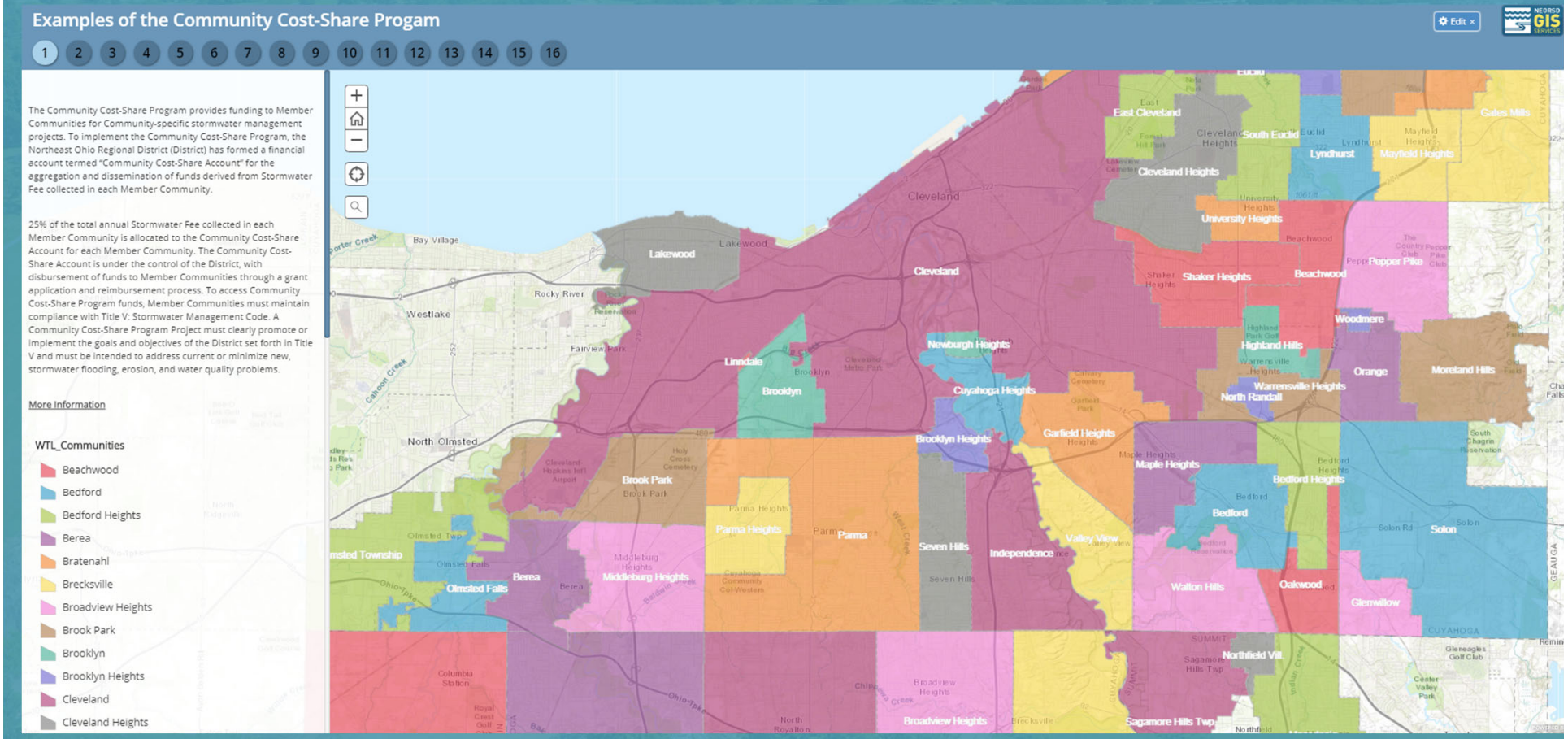
Community Cost-Share
Project Ideas



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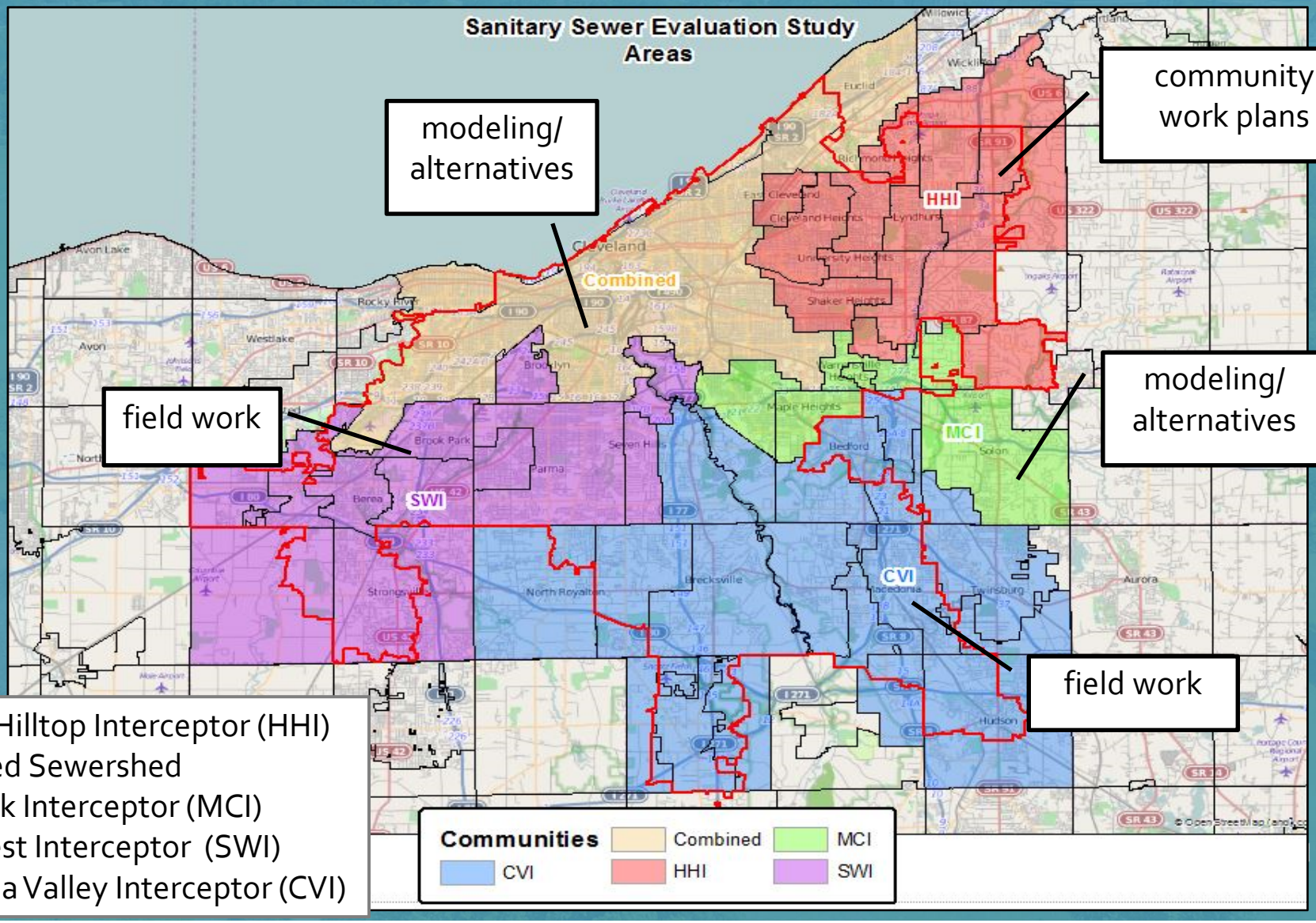
Local Sewer System Evaluation Studies

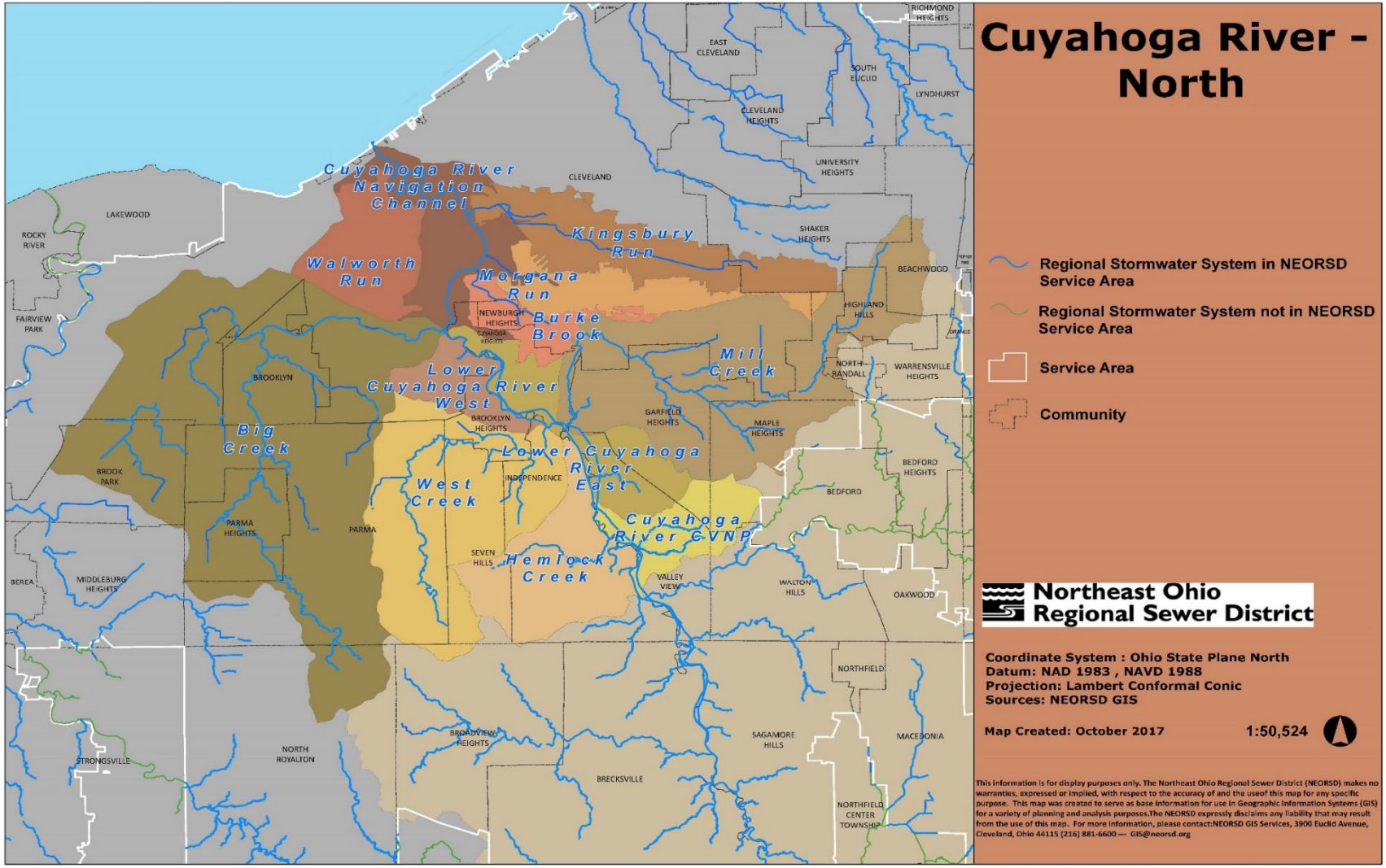


Heights Hilltop Interceptor (HHI)
Combined Sewershed
Mill Creek Interceptor (MCI)
Southwest Interceptor (SWI)
Cuyahoga Valley Interceptor (CVI)

Questions

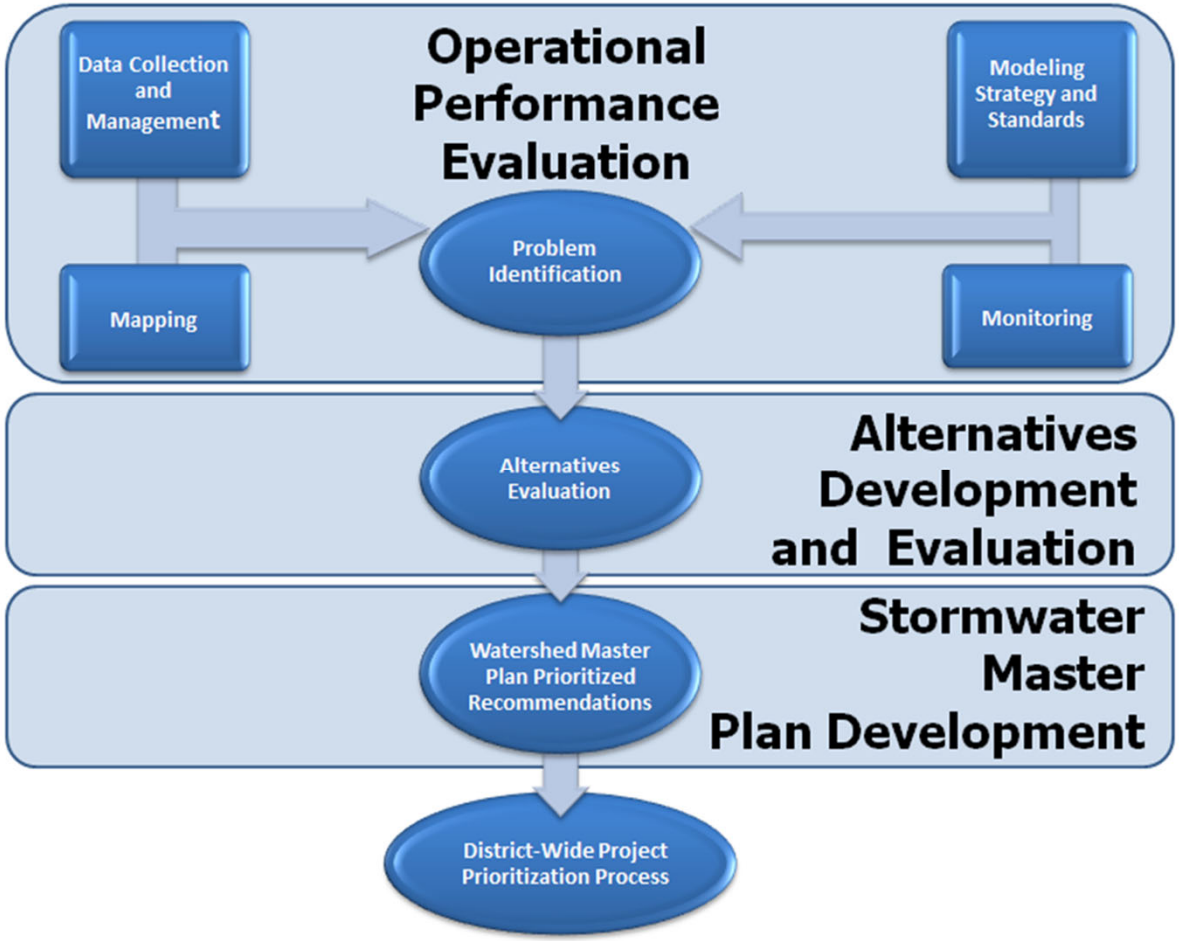
South Euclid Community Cost Share – Equipment Purchase

Stormwater Master Plan



Stormwater Master Plan

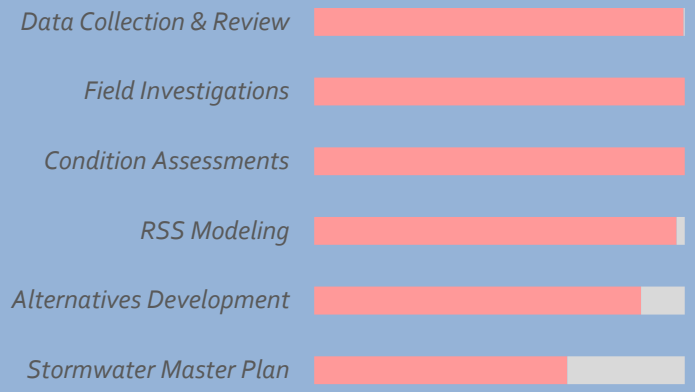
Study Process



Stormwater Master Planning
(status through 9/30)

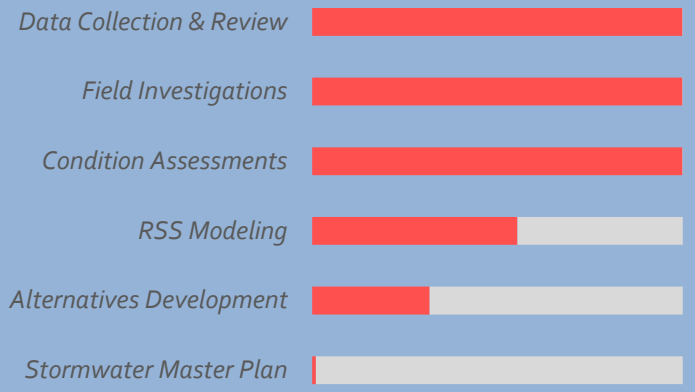
Cuyahoga River South

Completion Date: December 2018



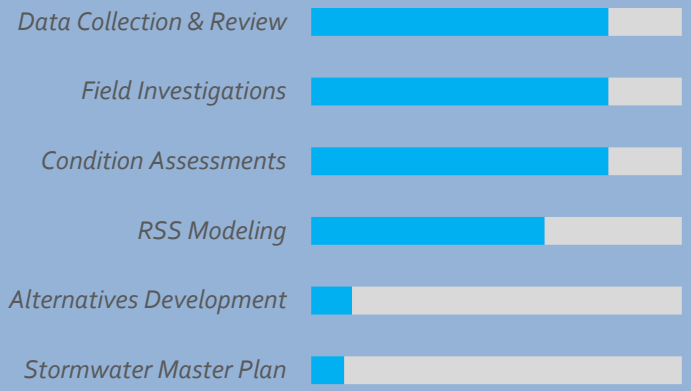
Cuyahoga River North

Completion Date: 4th Quarter 2019



Rocky River

Completion Date: 4th Quarter 2019



Chagrin/Lake Erie

Completion Date: 4th Quarter 2020

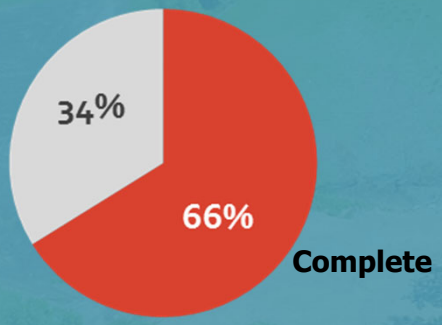
Stormwater Master Plan

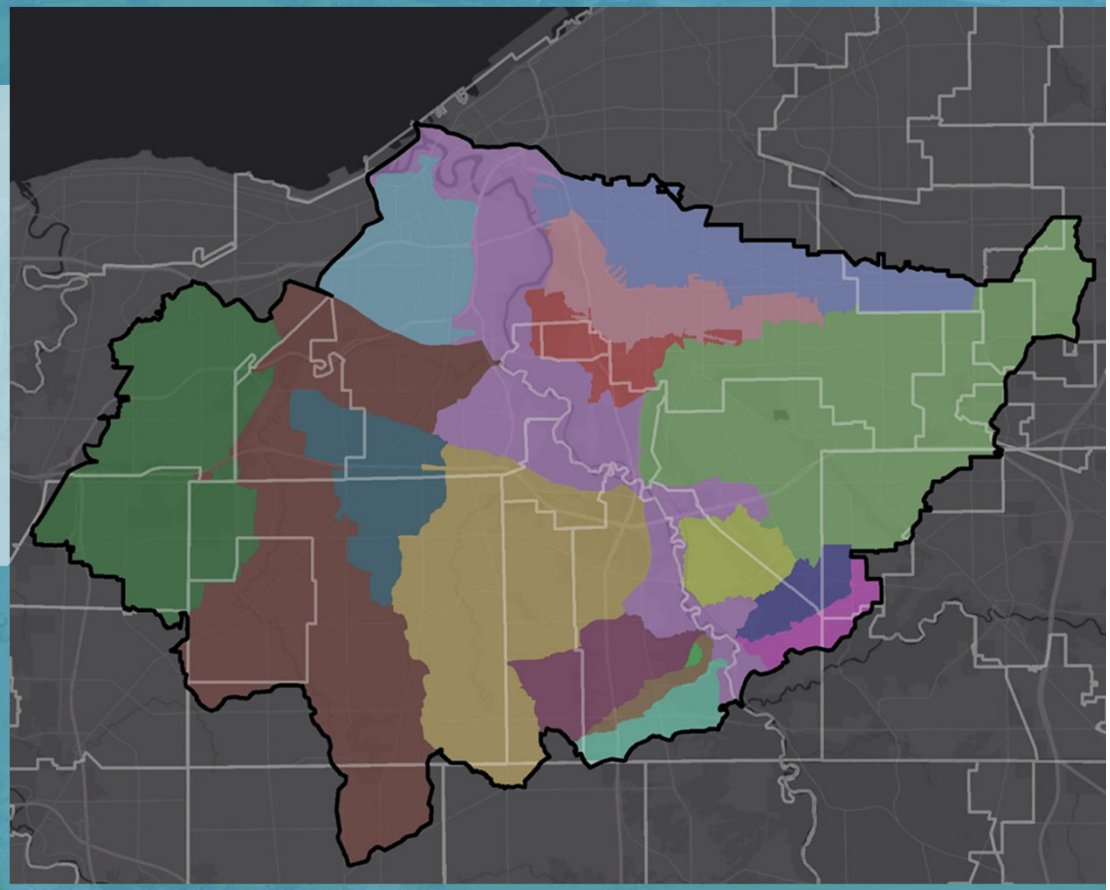
Study Area

Total Study Area

- 99,000 acres (all within SWSA)
- 11 Subwatersheds in the SWSA
- 23 WAC Member Communities

Budget: $8.02 Million





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Stormwater Master Plan

Field Work Project Status

Task Item Status – 100% Complete

- Survey work
- Culverted Stream Inspection (25 miles)
- Open Channel Streams
- Crossings
- Major Structures
- Basins (15 total)
- High Water Mark Monitoring

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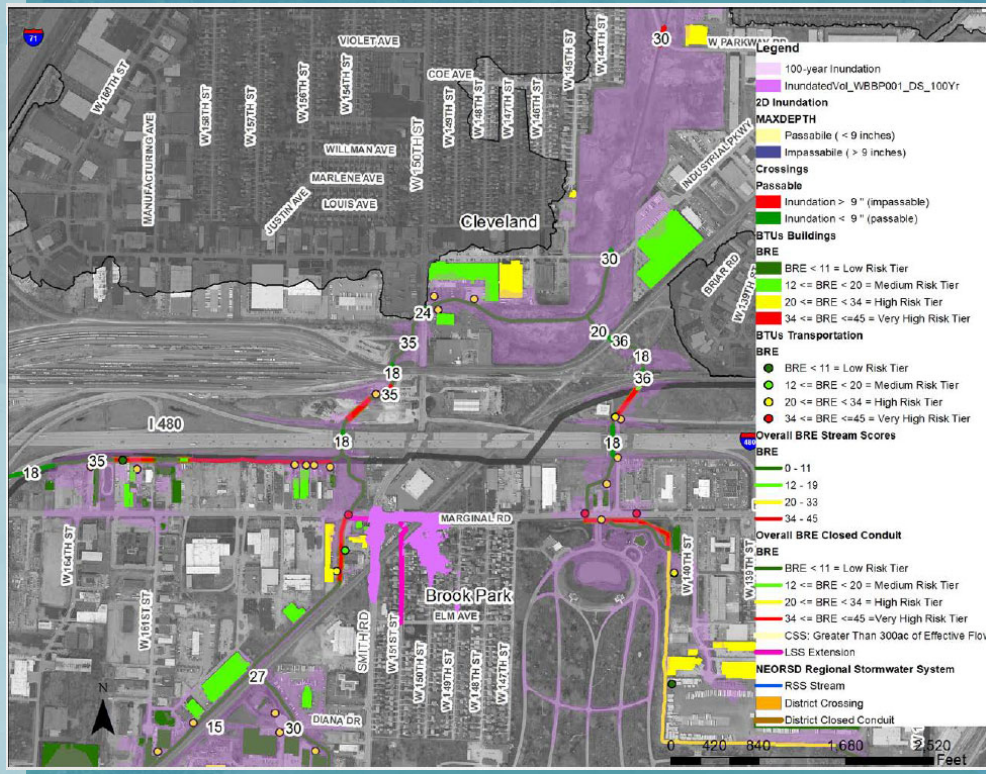
Stormwater Master Plan

Modeling & Problem Identification Project Status

Task Item Status: 55% Complete

- Stickney Creek - Model & Problem ID Complete
- B.C. Main Branch - Model & Problem ID Complete
- B. C. West Branch - Model & Problem ID Complete
- West Creek - Model Complete - Problem ID Begin
- Hemlock – Model Complete
- Small Tributaries – In Progress
- Mill Creek – In Progress
- RSS Terminus Changes: 12 approved – Additional 4.3 miles



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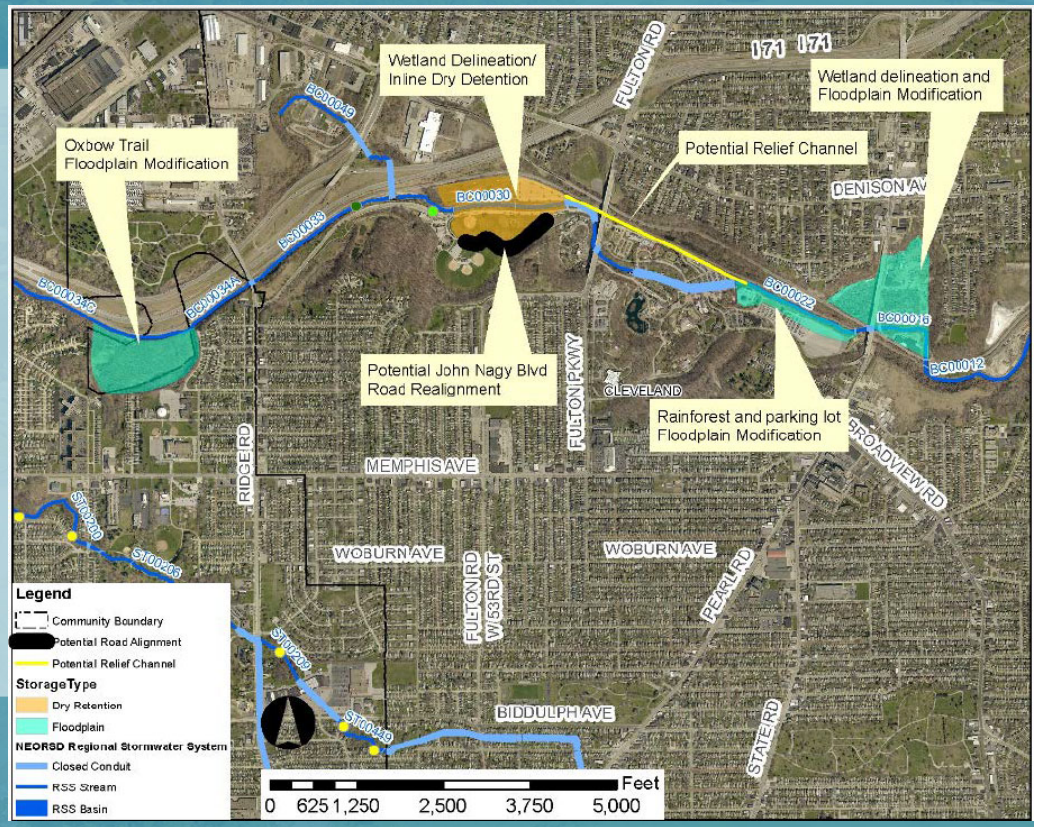
Stormwater Master Plan

Alternative Evaluation Project Status

Task Item Status: 32% Complete

- Stickney Creek – Complete
- B.C. Main Branch – Alternatives Review Complete
- B. C. West Branch – Alternatives for Brook Park & Cleveland Area
- Basin Evaluations – In Progress



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Stormwater Master Plan

Level of Service Evaluation

Sam's Club – Brooklyn, Ohio – Big Creek Subwatershed

Problem:

- Stormwater inundation and impacts to Sam's Club, Brookpark Road & surrounding areas including fueling station
- Brookpark Road overtops around a 1-yr. storm
- Sam's Club parking lot begins to flood between the 2- and 5- yr storms
- Water enters the Sam's Club Building around the 10-yr storm

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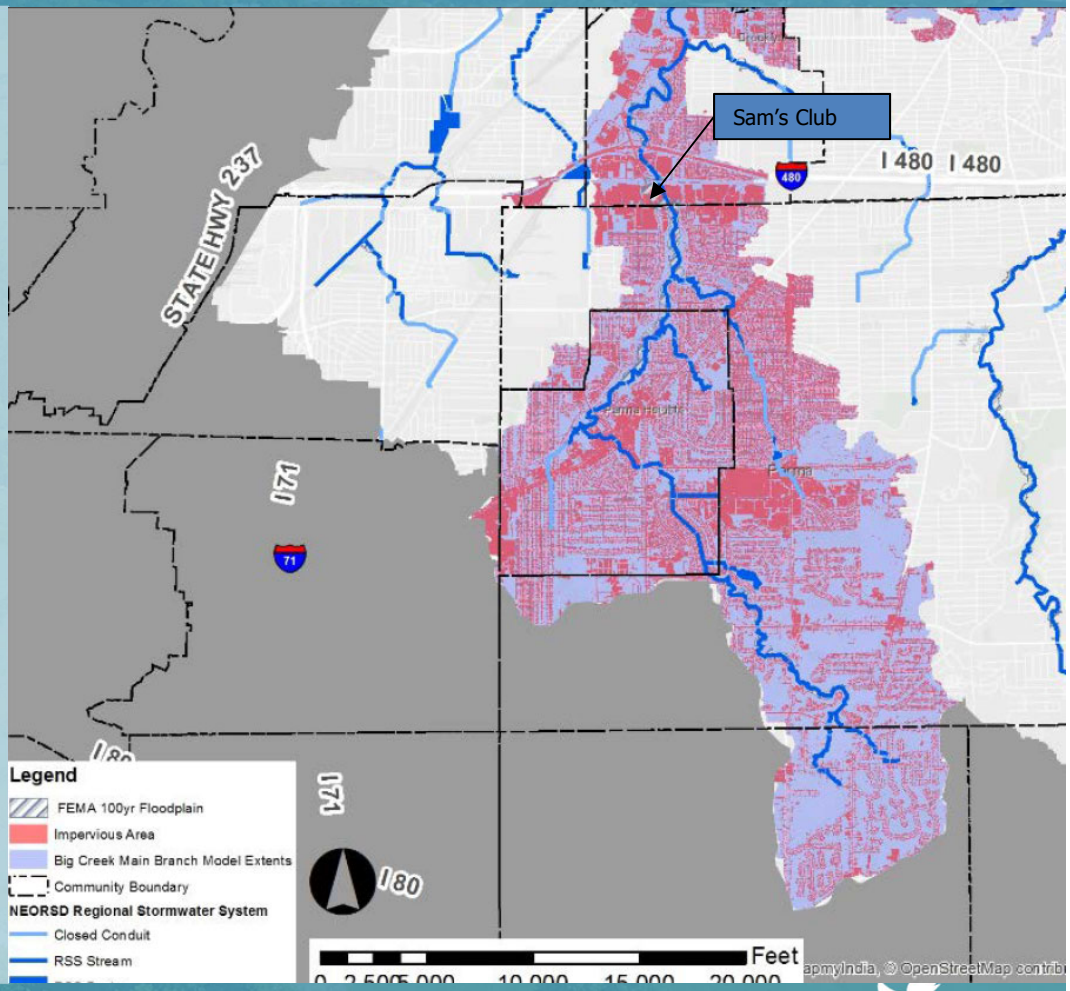
Stormwater Master Plan
Level of Service Evaluation

Problem Overview

- Total Drainage Area 8781 acres
- Percent Impervious 38% acres
- Problem Area Specific - Target volume to manage for 100-year LOS 1,800 acre-feet or ≈1,361 football fields
- Watershed-wide: Target volume to manage for 100-yr LOS 3,300 acre-feet or 2,496 football fields
- Sam's Club building & parcel site within both the 100-year FEMA & CRN SWMP model floodplains



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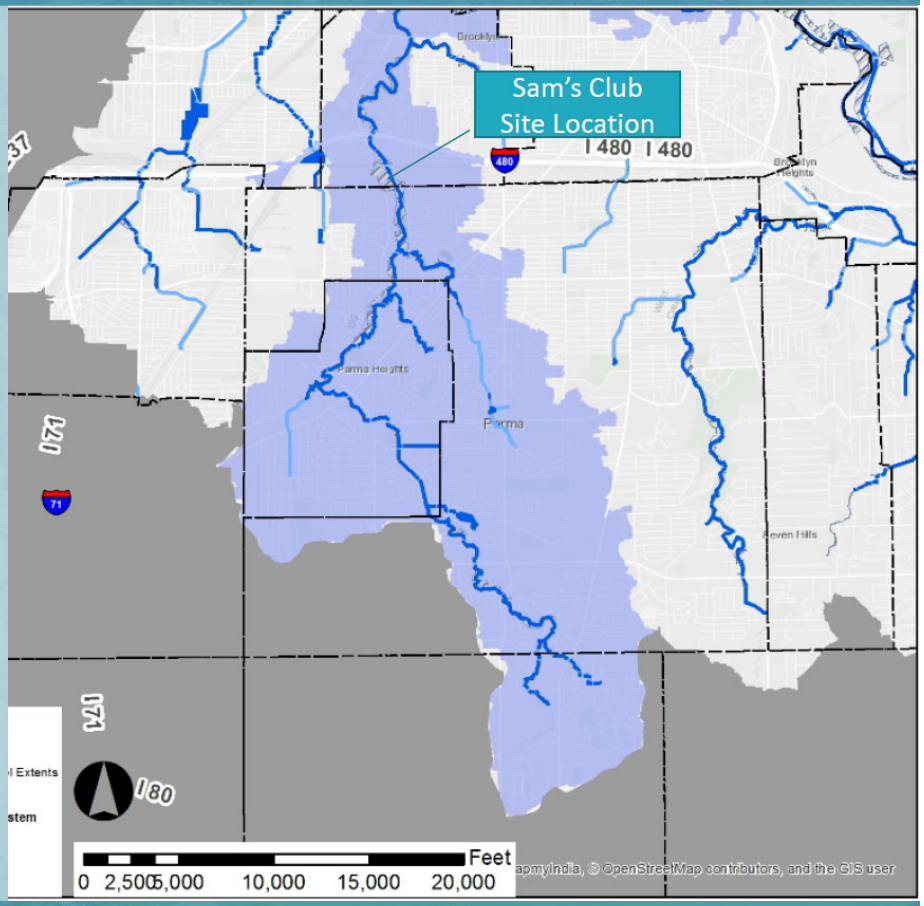
Stormwater Master Plan
Level of Service Evaluation

No upstream development at all

- All impervious area (development) removed
- Review 100-yr design storm (CRN SWMP parameter)
- Review depth at Sam's Club entrance 767.3

Results

- Inundation depth 1 ft above Sam's Club entrance elevation



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Stormwater Master Plan

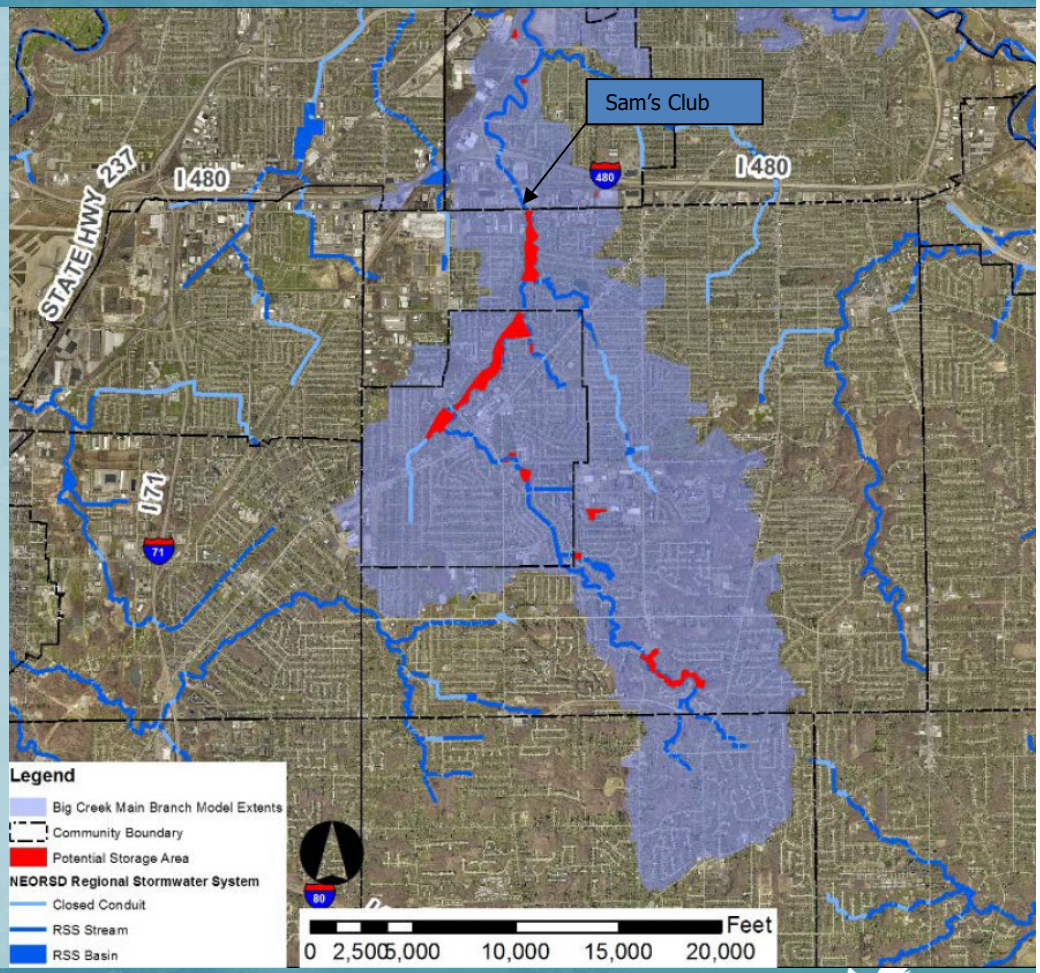
Level of Service Evaluation

Use open land areas –regardless of current ownership

- Review 100-yr design storm (CRN SWMP parameter)
- Review depth at Sam's Club entrance 767.3

Results

- Potential open area is about 440 acres
- Needed storage of 1,500 acre-ft exceeds potential
- Current watershed does not have enough open areas to address levels of flooding
- Available open areas at Walmart locations for storage opportunities can not remedy issues



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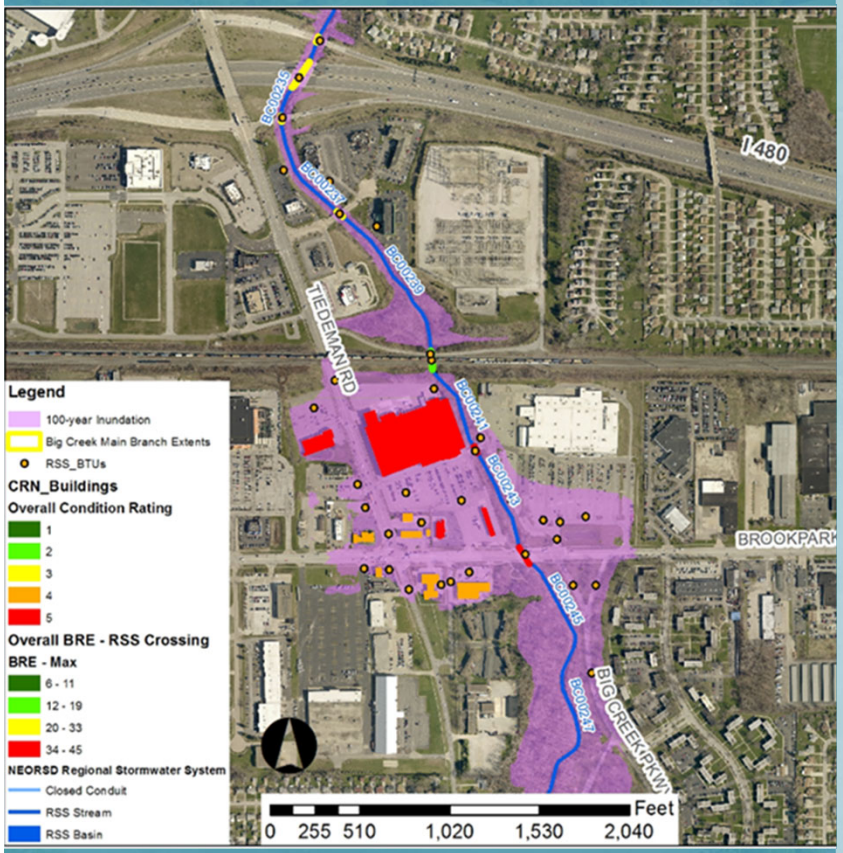
Stormwater Master Plan

Level of Service Evaluation – Mitigation Options



- **<2-year Scenarios**
  - Current conditions (Do Nothing)
  - Raise Brookpark Road
  - Channel re-alignment south of Brookpark Rd
  - Sam's Club/Walmart bridge removal
- **<5-year Scenario (New)**
  - CSX crossing modification
- **<10-year Scenario**
  - Channel widening into Walmart parking lot
- **<25-year Scenario (New)**
  - Channel widening into Walmart parking, CSX crossing upsizing & width increase at Brookpark Rd
- **Results:**
  - Increased floodplain storage from <2-yr to <25-yr LOS (up to <10-yr with channel widening only)
  - Inundation depths reduced by about 1 inch at 100-yr
  - Downstream problem areas show increase inundation depths

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Stormwater Master Plan

Community Communication

- Member Community Work Plans
- Meet with communities
  - Problem Area Review
- Recommendations and Community Report

Your Watershed Team Leader serves as the point of contact between the communities and the District

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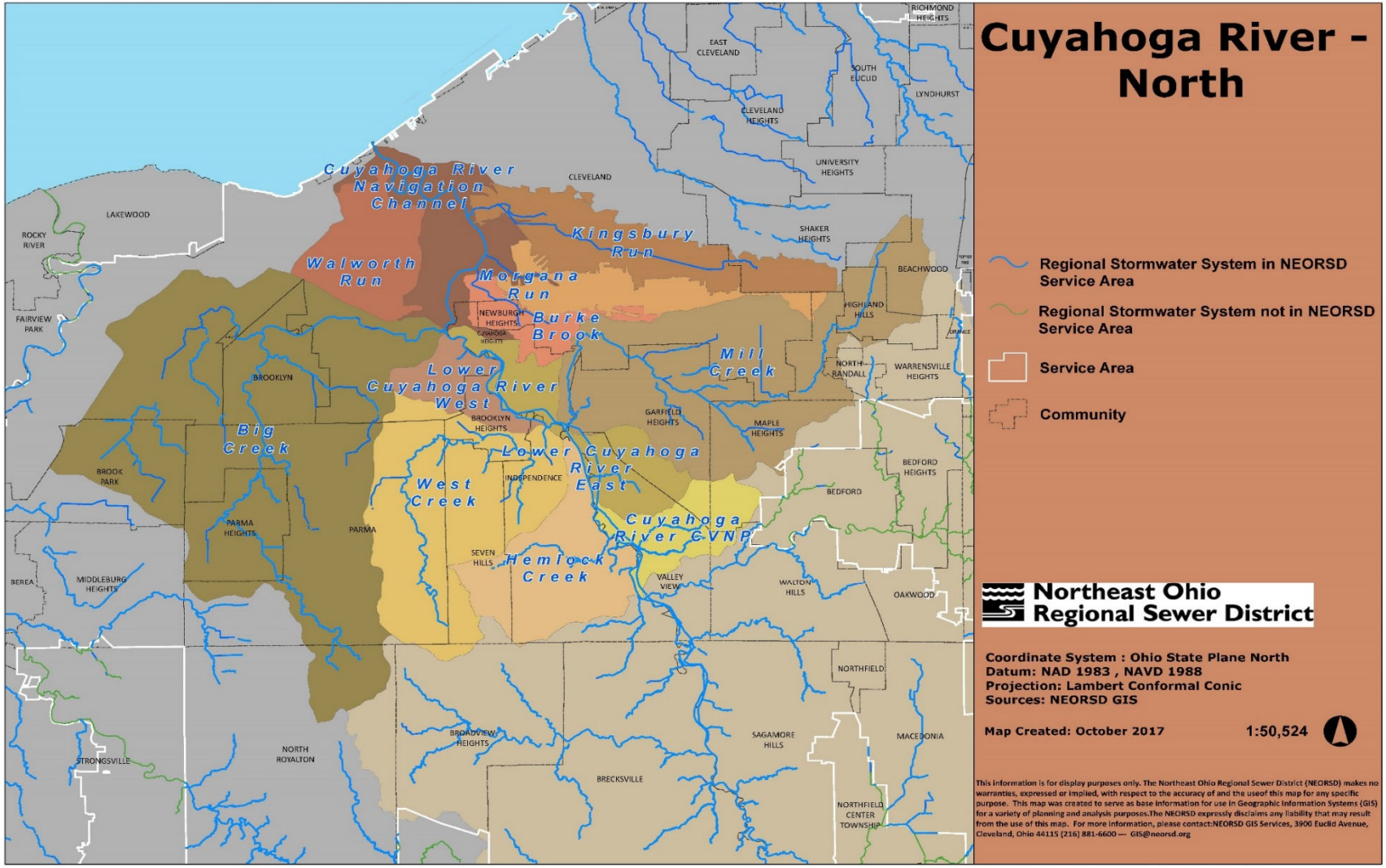
Questions


Cuyahoga River - North
Regional Stormwater System in NEORSD Service Area
Regional Stormwater System not in NEORSD Service Area
Service Area
Community
Cuyahoga River Navigation Channel
Walworth Run
Kingsbury Run
Morgana Run
Burke Brook
Lower Cuyahoga River West
Mill Creek
Big Creek
West Creek
Lower Cuyahoga River East
Cuyahoga River CVNP
Hemlock Creek
CLEVELAND
LAKEWOOD
ROCKY RIVER
FAIRVIEW PARK
BROOKLYN
BROOK PARK
PARMA
PARMA HEIGHTS
BEREA
MIDDLEBURG HEIGHTS
STRONGSVILLE
NORTH ROYALTON
BROADVIEW HEIGHTS
BRECKSVILLE
SEVEN HILLS
INDEPENDENCE
BROOKLYN HEIGHTS
NEWBURGH HEIGHTS
CUYAHOGA HEIGHTS
GARFIELD HEIGHTS
MAPLE HEIGHTS
BEDFORD
BEDFORD HEIGHTS
VALLEY VIEW
WALTON HILLS
OAKWOOD
NORTHFIELD
SAGAMORE HILLS
MACEDONIA
NORTHFIELD CENTER TOWNSHIP
EAST CLEVELAND
SOUTH EUCLID
LYNDHURST
CLEVELAND HEIGHTS
UNIVERSITY HEIGHTS
SHAKER HEIGHTS
RICHMOND HEIGHTS
BEACHWOOD
HIGHLAND HILLS
NORTH RANDALL
WARRENSVILLE HEIGHTS
Northeast Ohio Regional Sewer District
Coordinate System : Ohio State Plane North
Datum: NAD 1983 , NAVD 1988
Projection: Lambert Conformal Conic
Sources: NEORSD GIS
Map Created: October 2017
1:50,524
This information is for display purposes only. The Northeast Ohio Regional Sewer District (NEORSD) makes no warranties, expressed or implied, with respect to the accuracy of and the useof this map for any specific purpose. This map was created to serve as base information for use in Geographic Information Systems (GIS) for a variety of planning and analysis purposes.The NEORSD expressly disclaims any liability that may result from the use of this map. For more information, please contact:NEORSD GIS Services, 3900 Euclid Avenue, Cleveland, Ohio 44115 (216) 881-6600 — GIS@neorsd.org

Stormwater Inspection and Maintenance (*SWIM)*

SWIM Agenda

- Introduce SWIM Team Members
- Urgent Storm Event Response Process
- Small Scale Maintenance Projects
- Upcoming Community Meetings on Crossings

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Westside SWIM Team

- **Mark Link**
  Supervisor
- **Christina Silea**
  Inspector
- **Nikki Velez**
  Inspector
- **Claire Posius**
  Project Coordinator
- **Martina Jozanovic**
  Data Maintenance Administrator

Eastside SWIM Team

- **Keith McClintock**
  Supervisor
- **Jon Brauer**
  Inspector
- **Anne Roberto**
  Inspector
- **Mark Hornyak**
  Project Coordinator
- **Eric Baker**
  Data Maintenance Administrator

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SWIM Agenda

- Introduce SWIM Team Members
- Urgent Storm Event Response Process
- Small Scale Maintenance Projects
- Upcoming Community Meetings on Crossings

SWIM Progress Status

Urgent Storm Response Case Study

April 15, 2018 Storm Event

Northeast Ohio Regional Sewer District

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SWIM Urgent Storm Event Response Process

- Review Advanced Warning Notifications
  - e.g., National Weather Service
- Field Check and Clean Known Problem Assets Prior to Storm
- Track Rainfall for Size of Storm (e.g., 10-yr, 24-hr) & Monitor Live Field Data for Evidence of Flooding
- Analyze Media, Customer & Member Community reported flooding

SWIM Urgent Storm Event Response Process

- Immediately Field Inspect Problem Assets Upon Receded Flooding
- Mobilize Contractors for Post-Storm Event Response Maintenance

Urgent Storm Event Response Case Study

April 15-16, 2018

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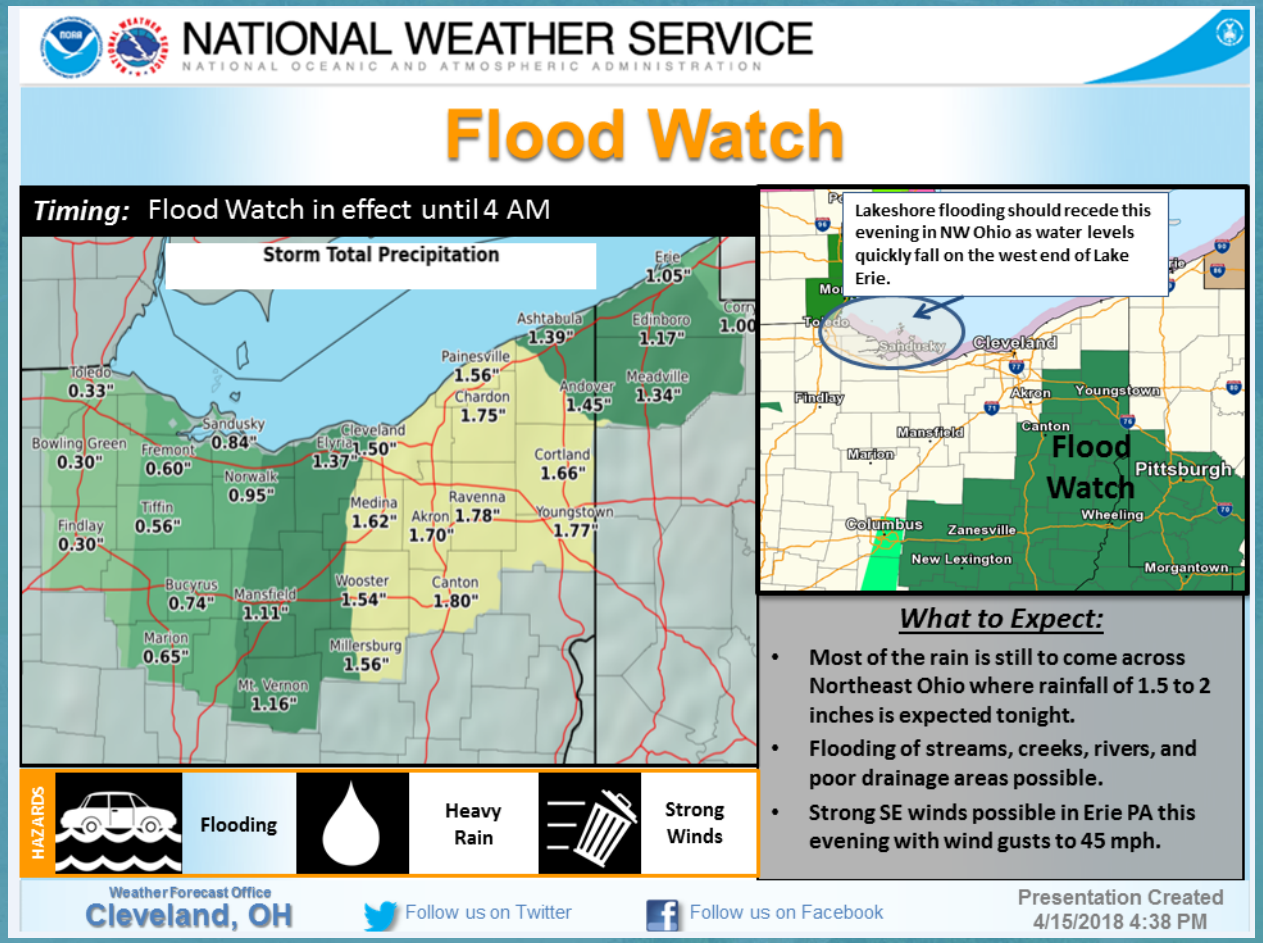
Review of Advanced Warning Notifications



4/15/18 NWS Notifications received at 5:02 PM (Sunday) immediately prior to the storm

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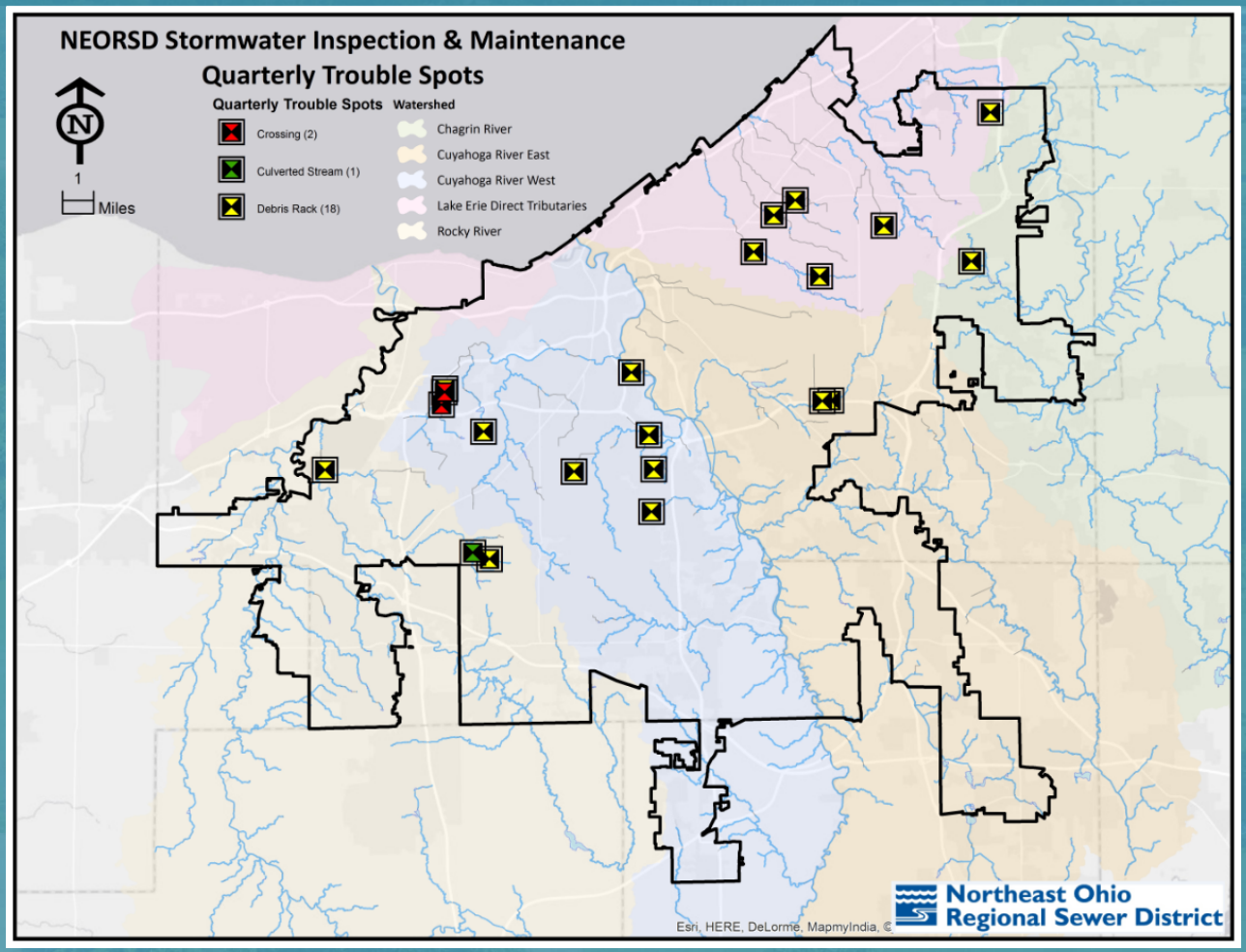
Sites SWIM Routinely Checks for Debris and Prior to Large Storms with Advanced Warning

SWIM routinely visits 21 sites for debris maintenance



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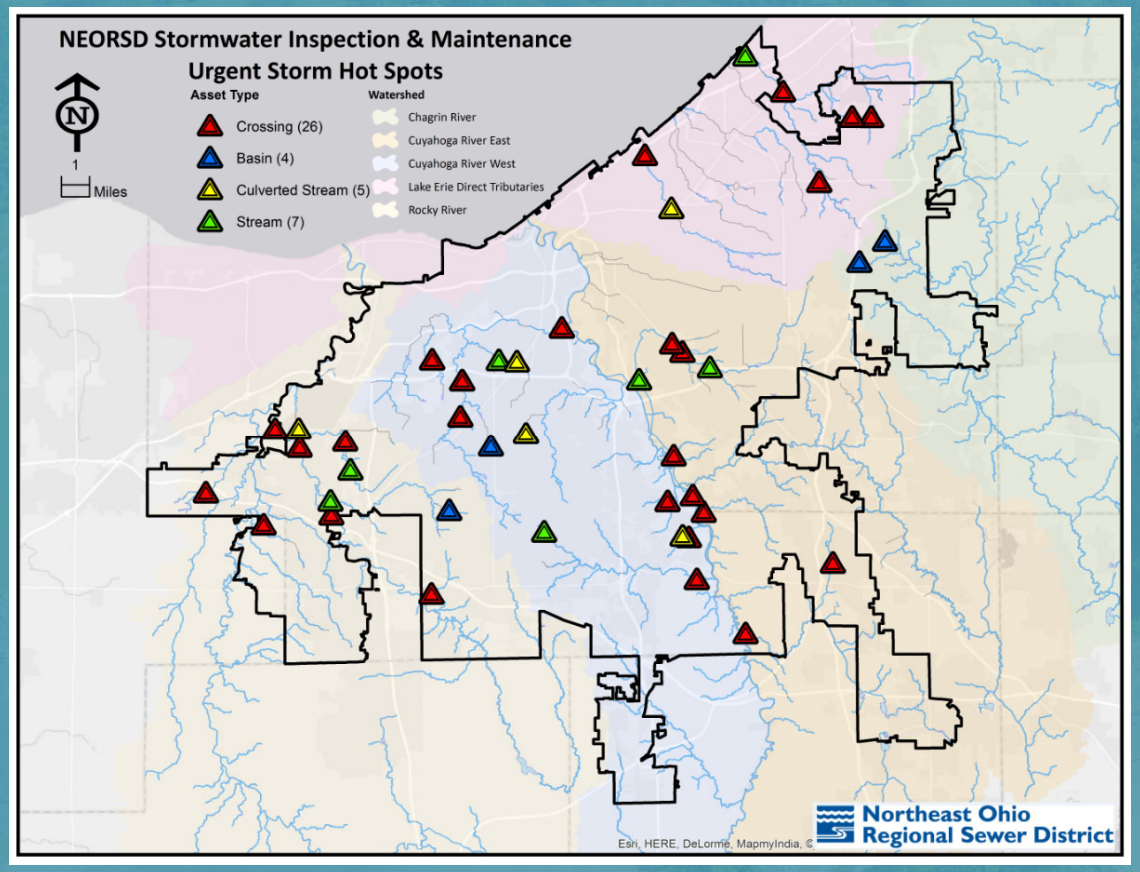
April 14, 2018: Debris Rack is clear before the storm event

April 16, 2018: Peak storm and debris accumulated on rack

Immediately Field Inspected Problem Assets Upon Receded Flooding



SWIM has a list of 42 known sites that are prone to flooding

Field inspected when reported heavy rainfall, high streams, or media reports of flooding in the area

Additional sites are added per media reports or field observations

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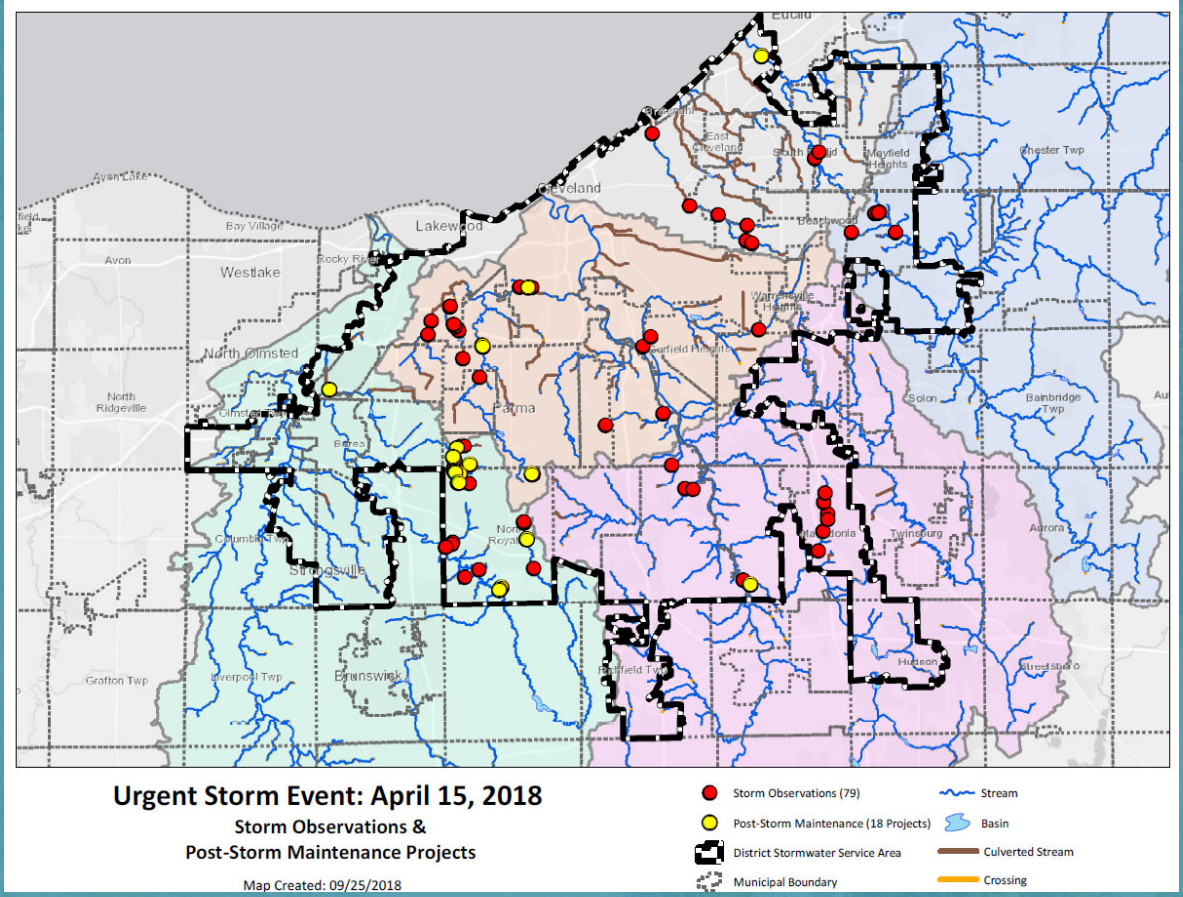
Mobilized Contractors to Perform Post-Storm Response Maintenance



79 site inspections

18 debris removal projects (many the same day as inspection)

Average yardage of debris was low compared to previous removals due to preventative maintenance

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Rocky River: Rocky River East Branch
Member Community: North Royalton
Asset ID: RY00434
Maintenance Project: Debris Removal (10 CY)

Debris was removed the same day it was inspected

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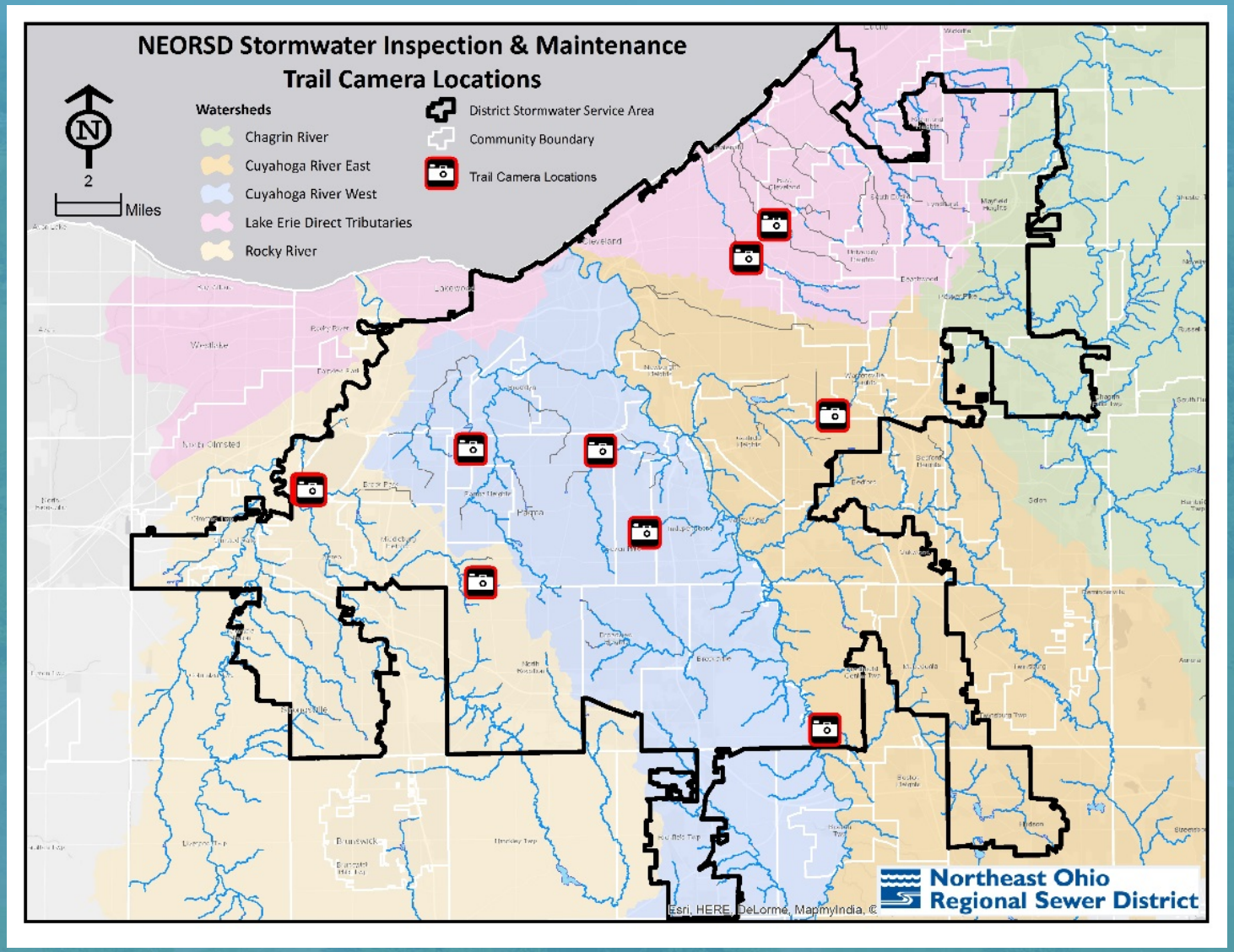
Using Trail Cameras to Support the RSMP



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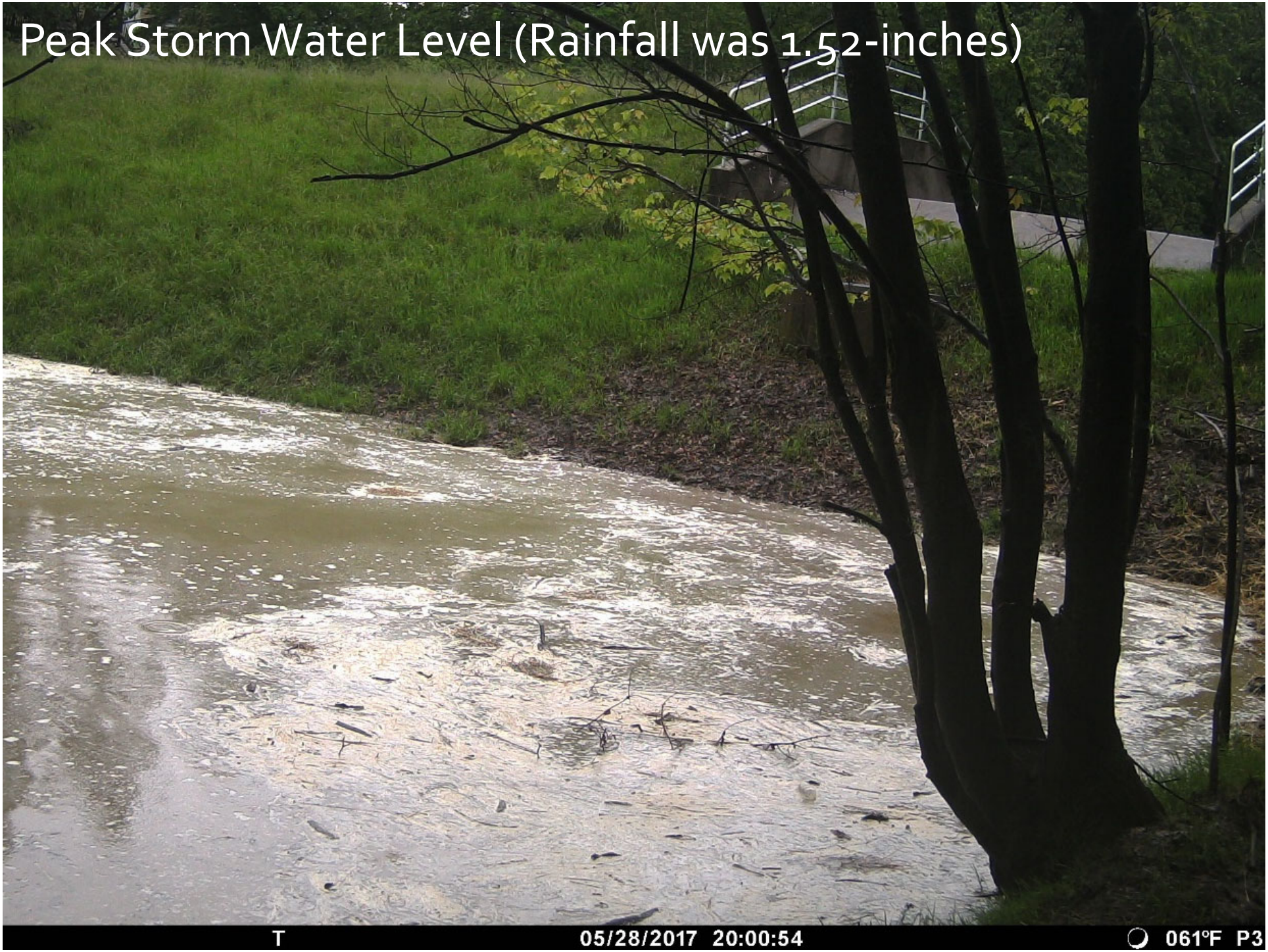
Forest Overlook Basin
Hemlock Creek (Seven Hills)
Prior to Storm

Peak Storm Water Level (Rainfall was 1.62-inches)


Post Storm (80 Cubic Yards of Sediment & Debris)

Post Storm Event Response

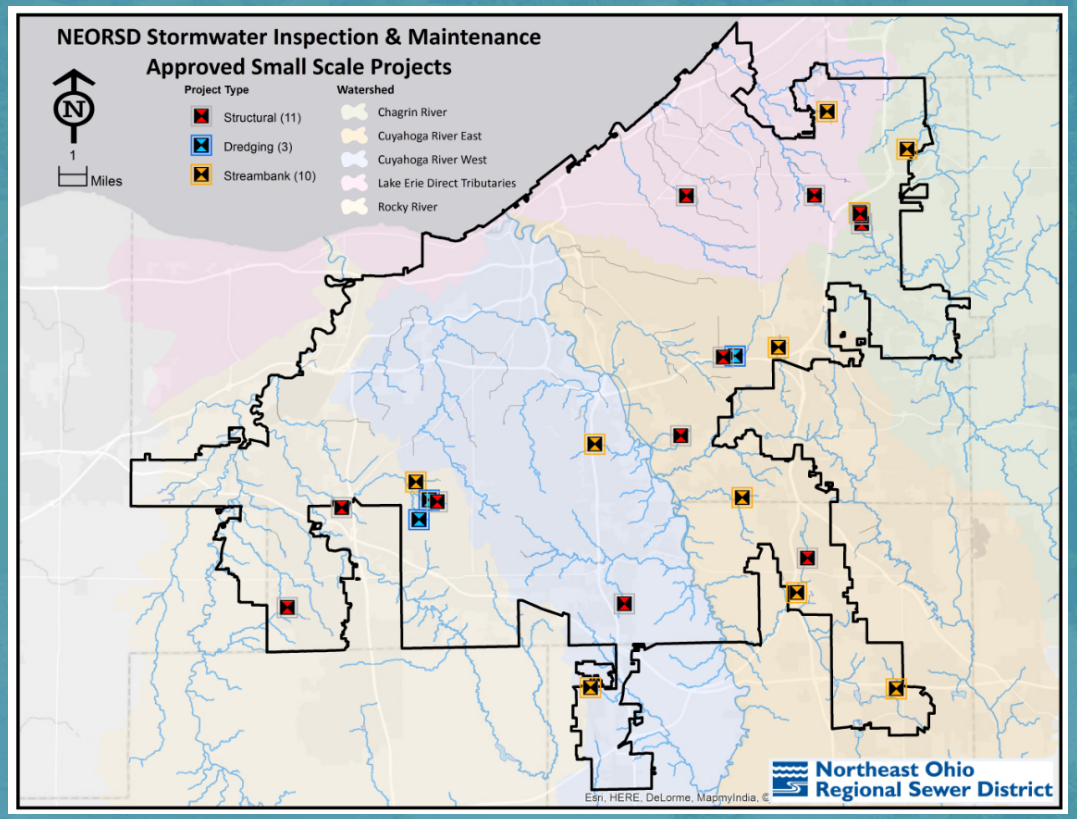

Peak Storm Water Level (Rainfall was 1.52-inches)
T
05/28/2017 20:00:54
061°F P3


Post Storm
T
05/29/2017 06:00:03

SWIM Agenda

- Introduce SWIM Team Members
- Urgent Storm Event Response Process
- Small Scale Maintenance Projects
- Upcoming Community Meetings on Crossings

Small Scale Maintenance Projects



21 small scale maintenance projects are underway as a pilot preventative maintenance program

- 11 Structural Maintenance projects
- 10 Streambank Stabilization projects

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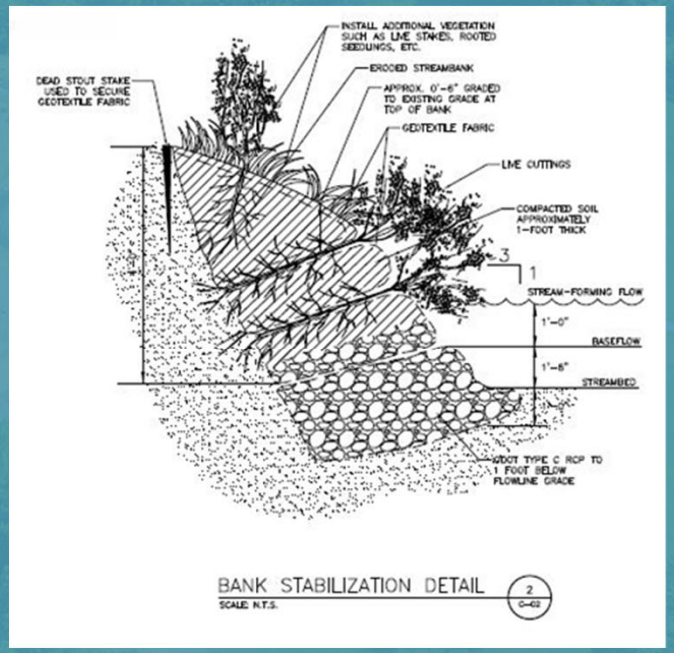
Small Scale Maint Project: Streambank Stabilization
Cuyahoga River: Hemlock Creek

Small Scale Maint Project: Streambank Stabilization
Cuyahoga River: Hemlock Creek

- Remove Failing Gabions
- Lay banks to a stable slope
- Install live branch layering and rock toe protection



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SWIM Agenda

- Introduce SWIM Team Members
- Urgent Storm Event Response Process
- Small Scale Maintenance Projects
- Upcoming Community Meetings on Crossings

Upcoming Community Meetings to Discuss State of RSS Crossings

District Stormwater Service Area

2018 SWSA Structural Integrity Report Card	SWSA Subwatersheds
A	12
B	38
C	5
D	1
F	0
Total	56

The District continues to inspect RSS assets (55%)

Almost all RSS crossings have been inspected

Meetings will review SWIM findings and next steps for implementation and financing

- 327 SWSA RSS assets with Condition Rating = 4 or 5
- 63 SWSA RSS Crossing assets Condition Rating = 4 or 5

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Upcoming Community Meetings to Discuss State of RSS Crossings

2018 Cuyahoga River North WAC Structural Integrity Report Card

RSS SUBTOTAL	1,070	451	△	42%	B	△	2.26	✓ 12.00

ASSET CLASS TYPE	RSS COUNT	COND SCORE COUNT	Percent Inspected	Report Card Grade (per structural integrity condition)	Average Structural Integrity Condition	AVG BRE
BASIN	20	15	✓ 75%	B+	△ 1.9	✓ 11.1
CROSSING	325	199	△ 61%	B	△ 2.1	△ 14.9
CULVERTED_STREAM	83	40	△ 48%	C+	◆ 2.6	✗ 20.6
Major Structure	6	1	✗ 17%	D	✗ 4.0	✗ 36.0
STREAM	636	196	✗ 31%	B-	△ 2.4	✓ 7.2

- 101 CRN RSS assets with Condition Rating = 4 or 5
- 13 CRN RSS Crossing assets with Condition Rating = 4 or 5

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Questions

Stormwater Design and Construction Program

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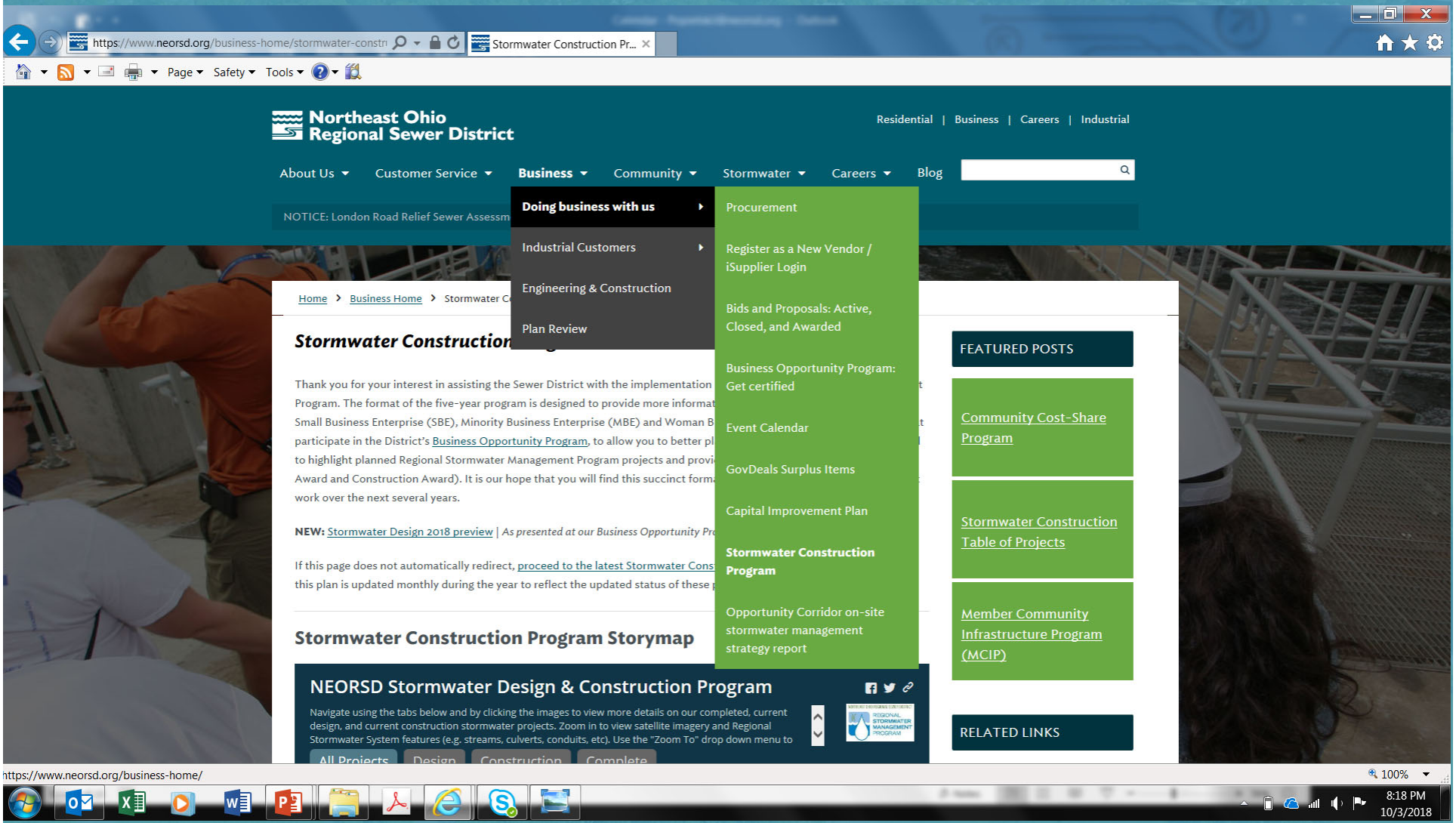
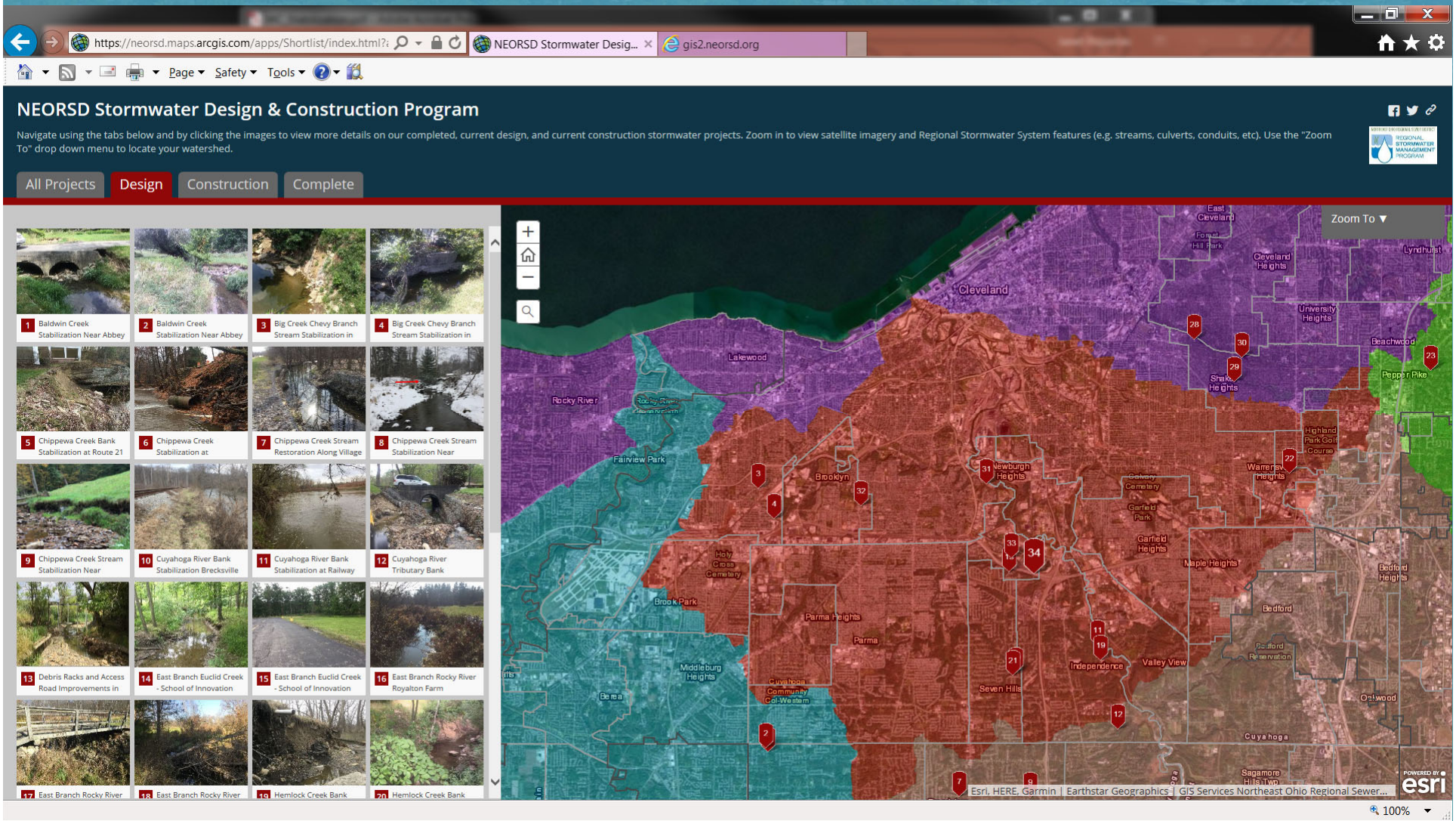
Cuyahoga River North Watershed Design



Cuyahoga River North Watershed Design



https://neorsd.maps.arcgis.com/apps/Shortlist/index.html?

NEORSD Sto

Page Safety Tools

NEORSD Stormwater Design & Construction Program

Navigate using the tabs below and by clicking the images to view more details on our completed, current design, and c
To" drop down menu to locate your watershed.

All Projects | Design | Construction | Complete

32 Stickney Creek Restoration and Utility Repair at Ridge Road in Brooklyn

Project Name: Stickney Creek Restoration and Utility Repair at Ridge Road in Brooklyn

Community: Brooklyn

Watershed Team Leader: D. Friedman

Watershed: Cuyahoga River North

Subwatershed: Stickney Creek

Summary: This project will reestablish floodplain storage, slow stream velocities and create more in-stream and floodplain habitat by restoring up to 1000-feet of urban stream within the City of Brooklyn. The stream has been eroding toward the 66-inch Ridge Road Relief Sewer, exposing it and also allowing for inflow into the sanitary sewer which eventually receives treatment at NEORSD's Southerly Wastewater Treatment Plant. The 66-inch sewer, which is currently undersized will be moved and upsized prior to the stream restoration project to prevent the inflow of stormwater and also to avoid the need to disturb the area in the future.

Asset Number: ST00209

Contract Type: Design/Build

Construction Cost: $500,000

Estimated Construction NTP: 4th QTR 2018

Summary Sheet: Click here

Northeast Ohio Regional Sewer District

STICKNEY CREEK RESTORATION & UTILITY REPAIR AT RIDGE ROAD

BROOKLYN, OHIO

CUYAHOGA RIVER NORTH

•

STICKNEY CREEK SUBWATERSHED

SUMMARY

This project will reestablish floodplain storage, slow stream velocities, and create more in-stream and floodplain habitat by restoring up to 1000-feet of urban stream within the City of Brooklyn.

The stream has been eroding toward the Ridge Road Relief Sewer, exposing it and allowing for flow into the sanitary sewer.

This 66-inch sewer will be moved and upsized prior to stream restoration to prevent the inflow of stormwater and to avoid the need to disturb the area in the future.

Project Details

Asset Number:
ST00209

Contract Type:
Design/Build

Construction Cost:
$500,000

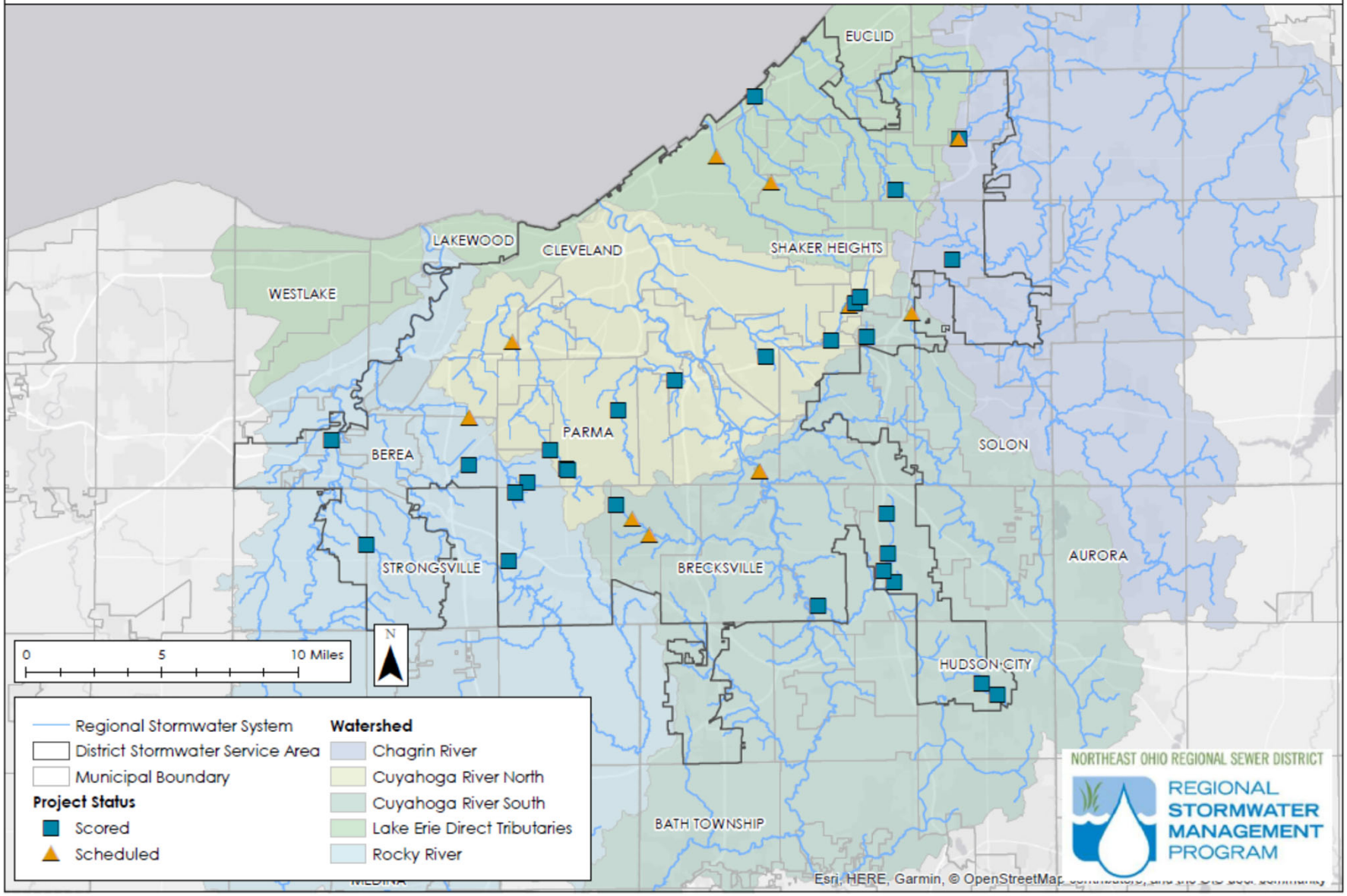
Estimated Construction NTP:
4th QTR 2018

Watershed Team Leader:
FriedmanD@neorsd.org

NORTHEAST OHIO REGIONAL SEWER DISTRICT
REGIONAL STORMWATER MANAGEMENT PROGRAM

Northeast Ohio Regional Sewer District

Stormwater Design & Construction Program

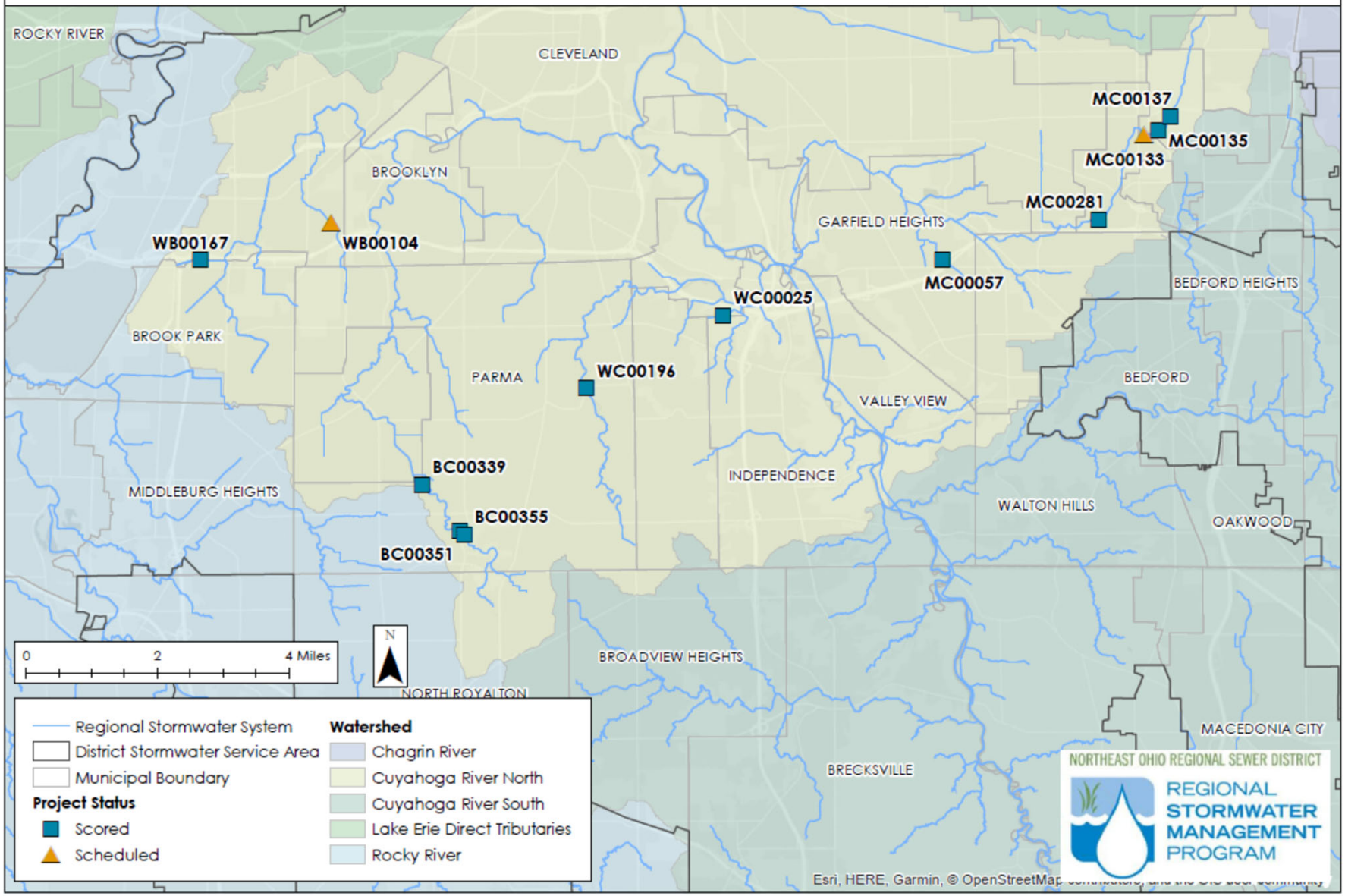


New Design and Construction Projects
Cuyahoga River North

	Proposed Project Name	RSS Asset ID(s)	WAC Watershed	Subwatershed	Project Community	Total BRE
1	West Branch Big Creek Stream Culvert in Brook Park	WB00167_P1_C01	Cuyahoga River North	Big Creek West Branch	Brook Park	72
2	Mill Creek_Restoration and Stabilization UPS Kerruish Basin MC00115 and MC00281	MC00115 and MC00281	Cuyahoga River North	Mill Creek	Cleveland	59
3	West Creek Streambank and Culvert Stabilization downstream from Ridgewood Road in Parma	WC00196	Cuyahoga River North	West Creek	Parma	52
4	Big Creek Stream Stabilization Downstream from Ridge Road in Parma	BC00351	Cuyahoga River North	Big Creek	Parma	31
5	Mill Creek Stream Stabilization in Garfield Heights	MC00057	Cuyahoga River North	Mill Creek	Highland Hills	29
6	Upper Mill Creek Stabilization and Restoration Phase II in Highland Hills	MC00135	Cuyahoga River North	Mill Creek	Highland Hills	27
7	Big Creek_Erosion and Flooding at Local Sanitary Manholes East of Ridge Road	BC00355	Cuyahoga River North	Big Creek	Parma	23
8	West Creek Tributary Headcut Stabilization in Independence and Brooklyn Heights	WC00025	Cuyahoga River North	West Creek	Independence	19
9	Mill Creek Stream and Floodplain Restoration Phase 1 in Highland Hills	MC00221, MC00136, MC00137, MC00139	Cuyahoga River North	Mill Creek	Highland Hills	7

NEORSD Stormwater Design & Construction Program

Cuyahoga River North Watershed



Project Delivery Methods

- GES- Bid-Build
- Design-Bid-Build
- Design-Build
- Small Scale Projects
  - Under $50K
  - $50K-$250K

West Creek Bank Stabilization at Parma Care

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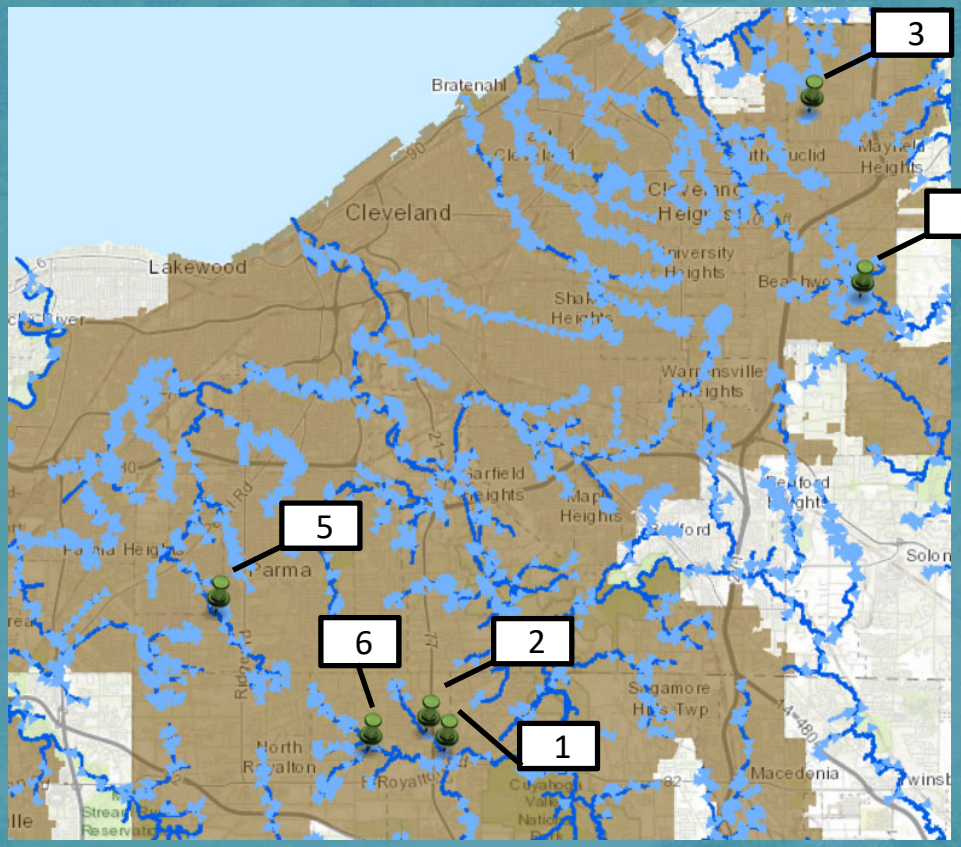
Multi-Site Streambank Stabilization



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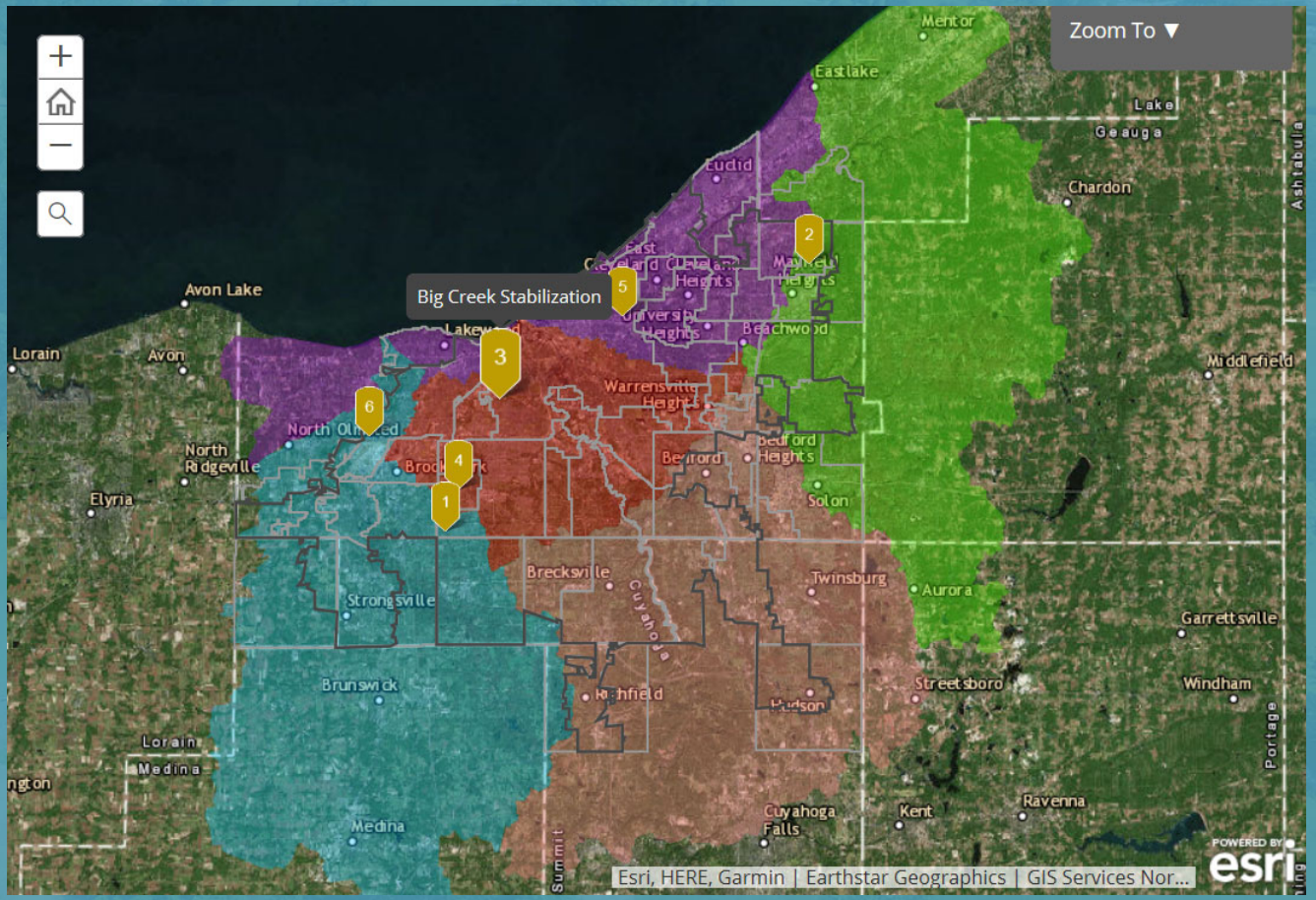
Metrics of Success

- **9,336 LF** of Stream Restored/Stabilized
- **23,725 Tons** of Sediment Removed
- **6.6 Acres** of Floodplain Reconnected
- **575 LF** of Culverts Repaired/Replaced

- Property Interests Obtained
  - **2** Fee Simple Acquisitions (18 acres)
  - **17** Permanent Easements Acquired

Cuyahoga River North Watershed Construction

- 6 Active Construction Projects
- 2 in CRN



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BIG CREEK STABILIZATION

CLEVELAND, OHIO

CUYAHOGA RIVER NORTH

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BIG CREEK SUBWATERSHED

SUMMARY

The Big Creek Stabilization project will repair streambanks with riprap and construction of a rock cascade on top of the existing spillway structure to rehabilitate the existing channel.

The current concrete liner will be removed and reused as fill material, and the rock cascade will replace the existing 30-ft drop with a gently sloping cascade to provide energy dissipation.

A low flow channel will be constructed within the rock cascade and a 96-inch outfall will be extended to outlet at the end of the rock cascade.

Project Details

Asset Number:

BC00032

Contract Type:

GES/Bid/Build

Construction Cost:

$6,505,860

Anticipated Substantial Completion:

4th QTR 2019

Watershed Team Leader:
JowettJ@neorsd.org

NORTHEAST OHIO REGIONAL SEWER DISTRICT

REGIONAL STORMWATER MANAGEMENT PROGRAM

COLOMBO PARK STREAM RESTORATION

PARMA HEIGHTS, OHIO

CUYAHOGA RIVER NORTH

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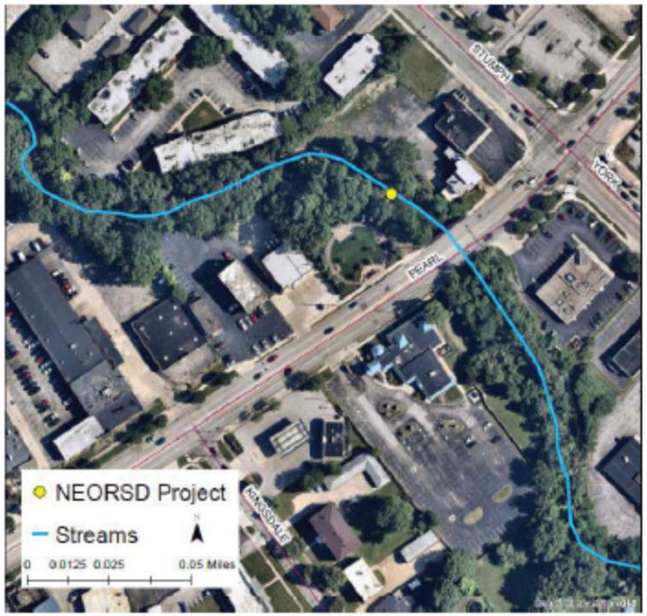
BIG CREEK SUBWATERSHED



SUMMARY

This project will improve stream function and halt erosion, which is threatening public sanitary sewer infrastructure along Big Creek in Parma Heights adjacent to Colombo Park.

Approximately 400-feet of stream will be realigned, widened, and stabilized to establish new floodplain areas, reduce in-channel velocities and reduce streambank and streambed erosion.

Project Details

Asset Number:
BC00299

Contract Type:
GES/Bid/Build

Construction Cost:
$1,544,819

Estimated Construction NTP:
4th QTR 2018

Watershed Team Leader:
FriedmanD@neorsd.org

NORTHEAST OHIO REGIONAL SEWER DISTRICT
REGIONAL STORMWATER MANAGEMENT PROGRAM

Beecher's Brook Bank Stabilization

Stream Focused Solutions

- Flooding
- Erosion
- Water Quality

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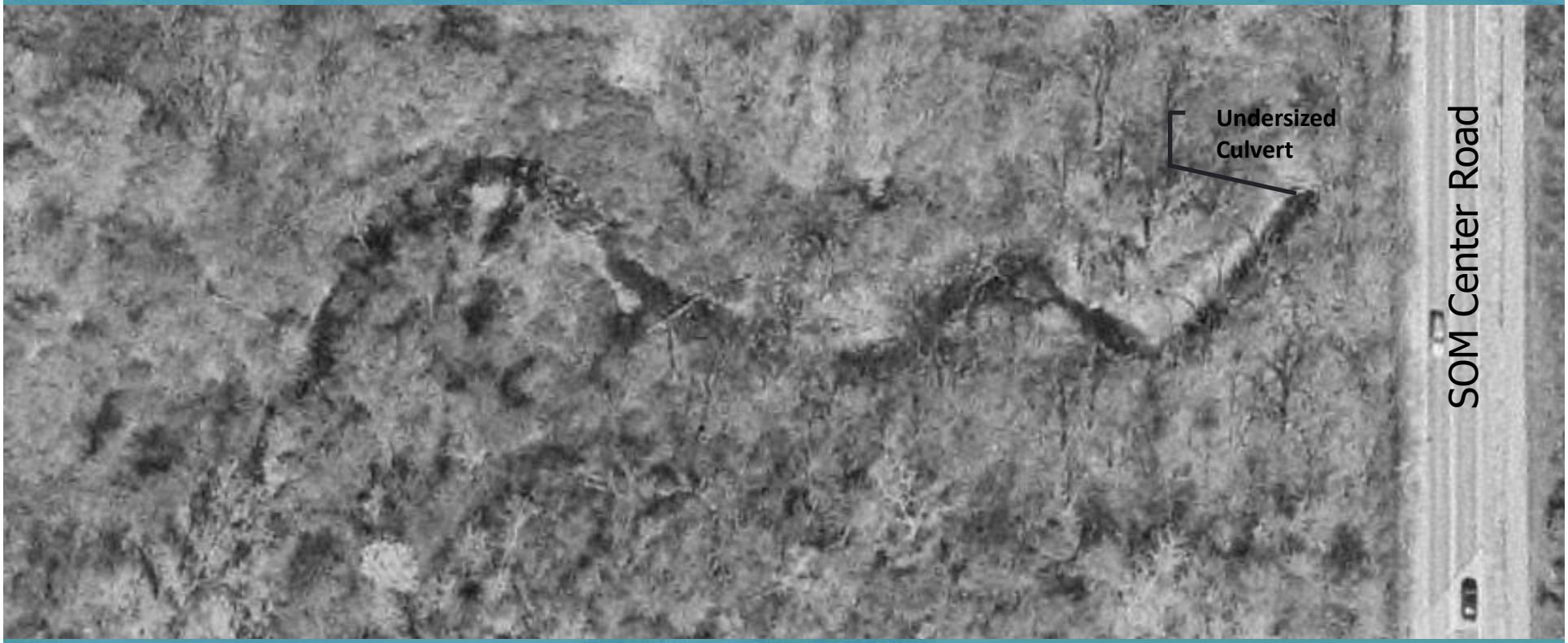
Beecher's Brook Culvert 2002



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Beecher's Brook Culvert 2002

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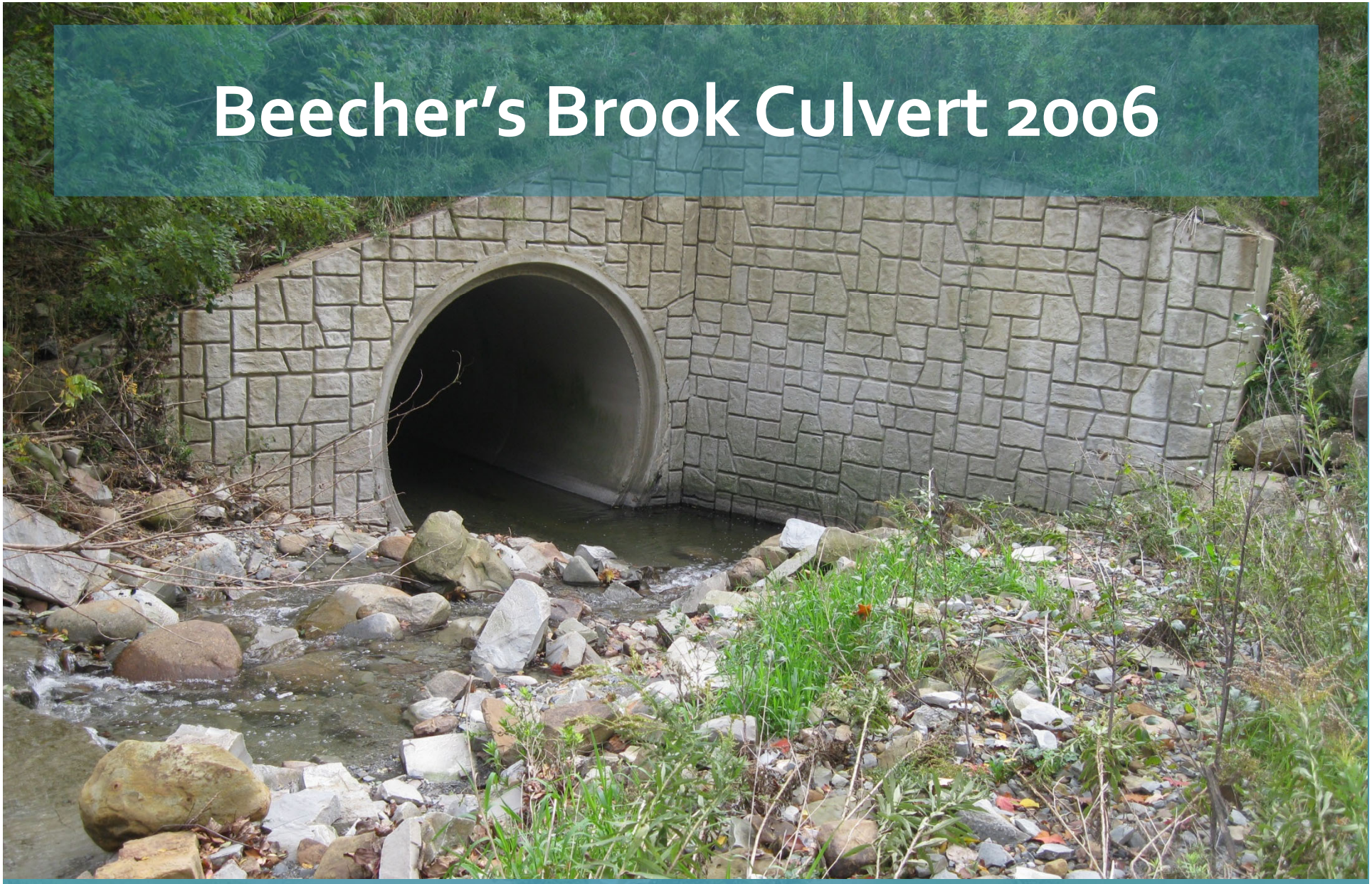
Beecher's Brook Culvert 2006



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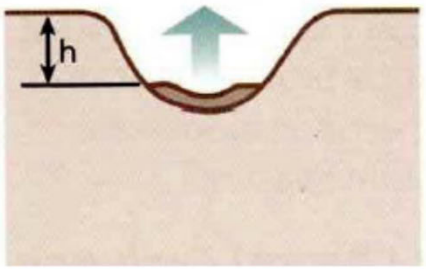
CHANNEL EVOLUTION MODEL (SIX STAGES)
Simon and Hupp, 1986

Class I. Sinuous, Premodified
$h<h_c$



Class II. Channelized*
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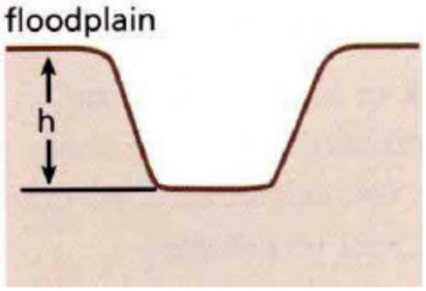
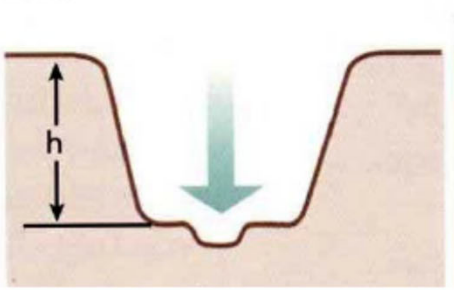
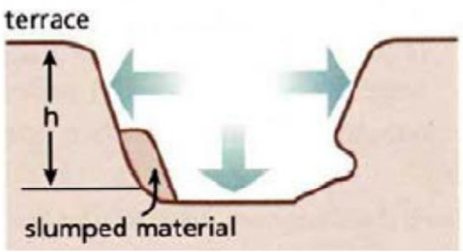


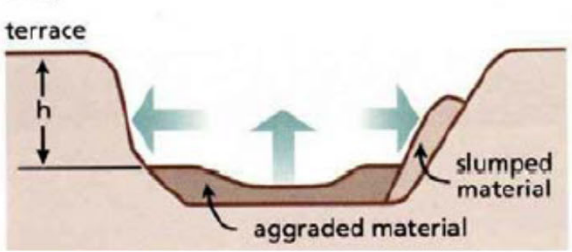
Class III. Degradation
$h<h_c$



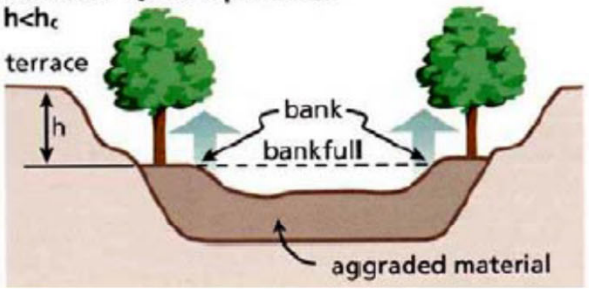
Class IV. Degradation and Widening
$h>h_c$



Class V. Aggradation and Widening
$h>h_c$



Class VI. Quasi Equilibrium
$h<h_c$



*Anthropogenic

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Beecher's Brook Culvert 2017

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Questions

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What's Next

- District Stream Restoration Site Visit
  - October 25 (Thursday) from 2 to 3 pm
  - Meet at 6700 Beta Drive, Mayfield OH, 44143
- Annual WAC Representative Designation – January 2019
- Next WAC Meeting – March 2019

WTL Contacts

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jowettj@neorsd.org

NORTHEAST OHIO REGIONAL SEWER DISTRICT
REGIONAL STORMWATER MANAGEMENT PROGRAM

Stormwater Program: Community Resources

http://www.neorsd.org/communitystormwaterresources.php

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