Thank you for joining us.

WE WILL BEGIN SHORTLY.

Watershed Advisory Committee

CHAGRIN RIVER/LAKE ERIE DIRECT TRIBUTARIES | OCTOBER 19, 2021

Northeast Ohio Regional Sewer District

REGIONAL STORMWATER MANAGEMENT

Agenda

- Welcome, Introduction & Updates
- Plum Creek Fish Relocation - Feature
- Strategic Support Update
- Master Planning Update
- Inspection and Maintenance Update
- Design & Construction Update
- Looking Ahead

Program Highlights

Matt Scharver, Deputy Director of Watershed Programs

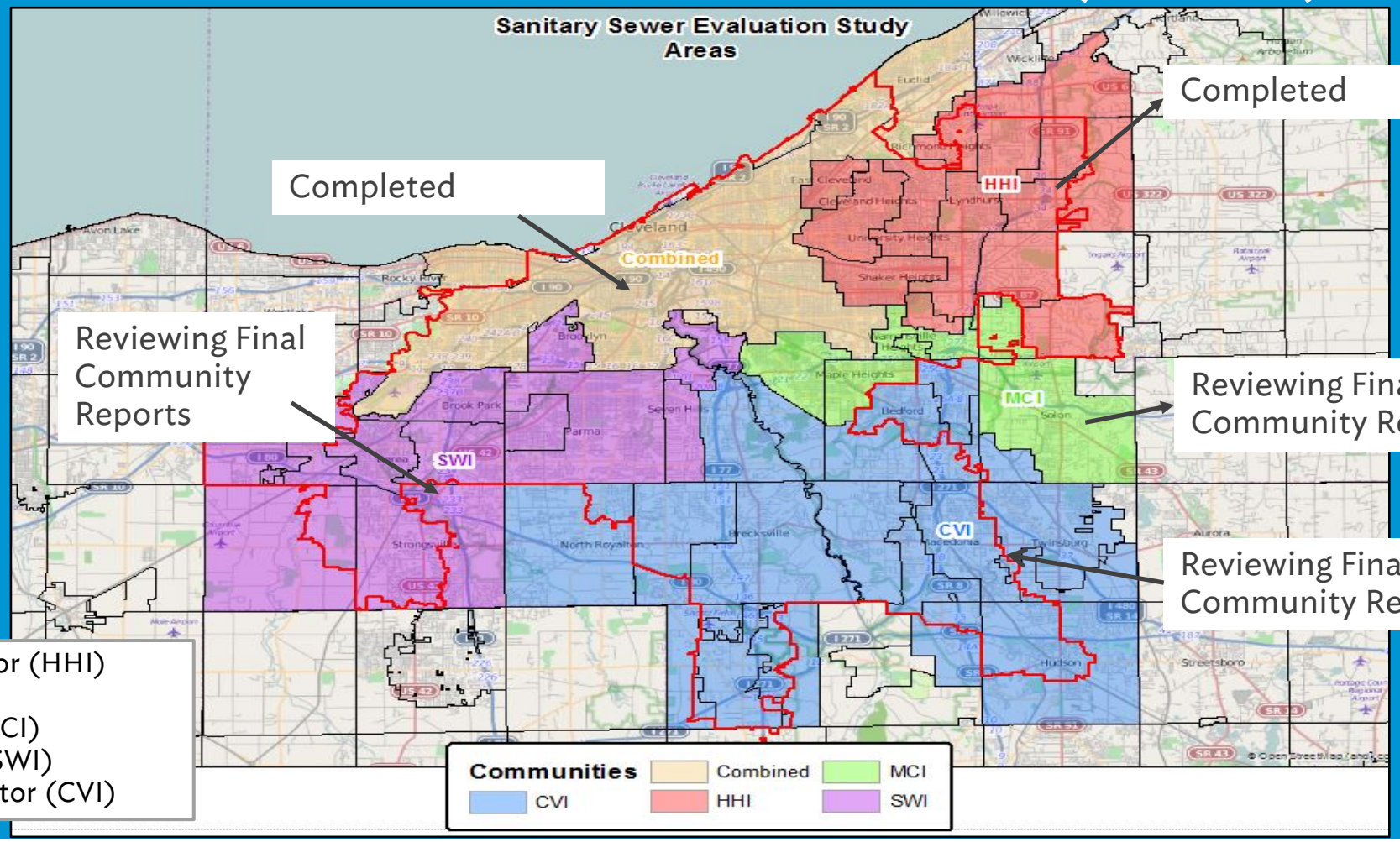
Community Cost-Share: 2021

CCS fund balance (8/31/21) $32,489,369

CCS funds available $22,478,882

Year	CCS Spent
2016	$72,190
2017	$2,626,418
2018	$4,218,308
2019	$9,178,445
2020	$6,940,369
2021 (9/30/21)	$7,937,863
Total	**$30,973,593**

Local Sewer System Evaluation Studies (LSSES)



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

Northeast Ohio Regional Sewer District

REGIONAL STORMWATER MANAGEMENT

Stormwater Fee Credit Policy Manual

Draft updates affecting commercial, industrial and HOA properties

1. Quantity – Peak Flow credits can be applied to impervious areas that cannot physically be conveyed to an SCM, provided that SCM accounts for these areas via over-detention.

Stormwater Fee Credit Policy Manual

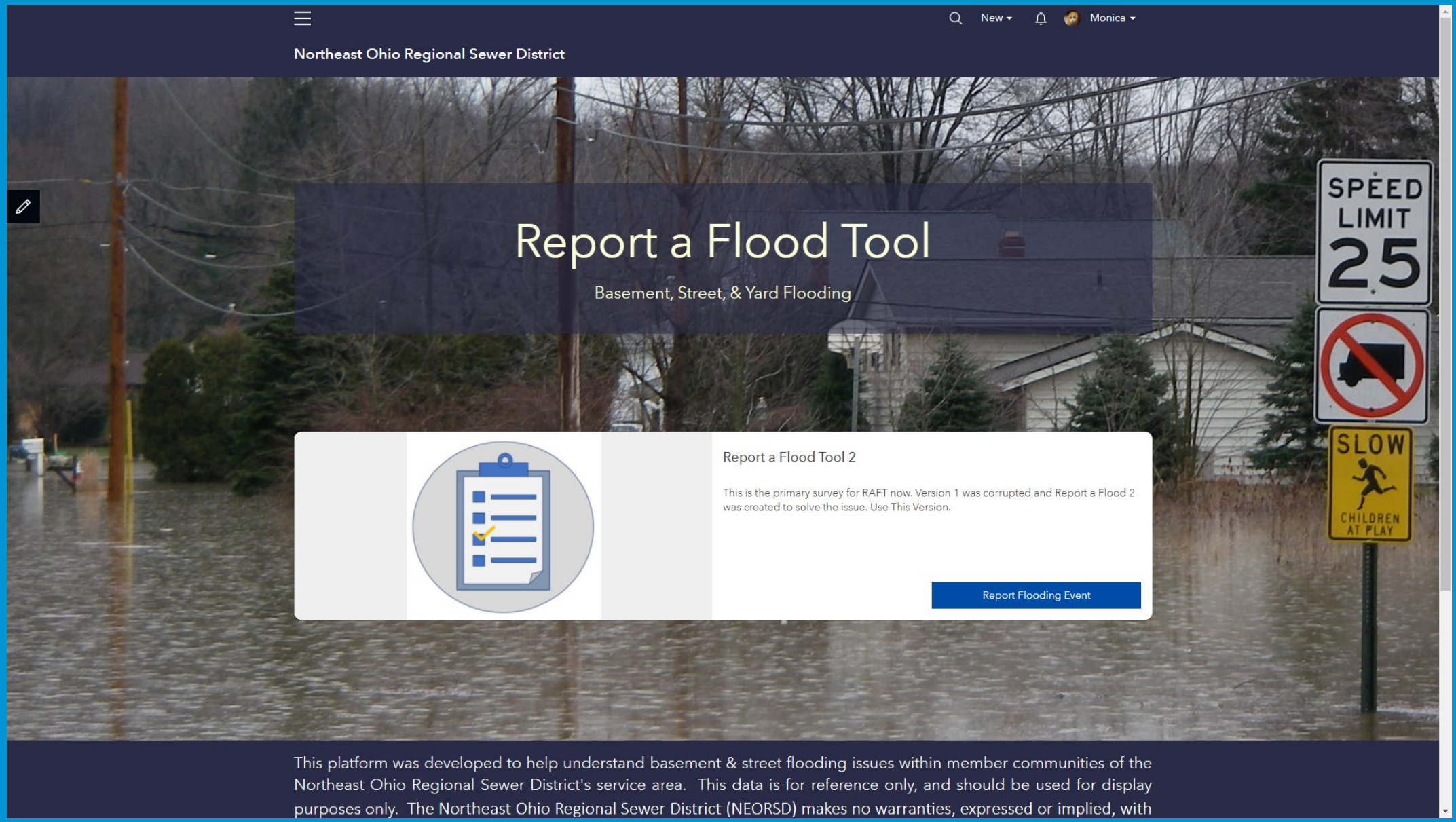
Draft updates affecting commercial, industrial and HOA properties

2. Facilities identified within an MS4's current Stormwater Management Program, as part of a valid MS4 NPDES permit, may be eligible to receive a Stormwater Quality Credit of 25% (Example: parking lot adjacent to City Macedonia's rec center).

Stormwater Fee Credit Policy Manual

Draft updates affecting commercial, industrial and HOA properties

3. Credit eligibility will require an applicant to at least have partial/shared maintenance responsibilities for an SCM.
4. An expedited credit application process for SCMs funded via the District's GIG Program
5. Credit renewal dates limited to May 1st thru December 31st to ensure required SCM inspections can be completed during favorable weather conditions.
   - Example: A new Quantity or Quality credit approved on February 17, 2022, will have an initial annual renewal date of May 1, 2023 (and every month of May thereafter).
6. Various administrative updates to provide additional clarification.



Northeast Ohio Regional Sewer District

REGIONAL STORMWATER MANAGEMENT

New mark, same message.

PLEASE NOTE OUR UPDATED LOGO FOR YOUR PROJECTS.

Northeast Ohio
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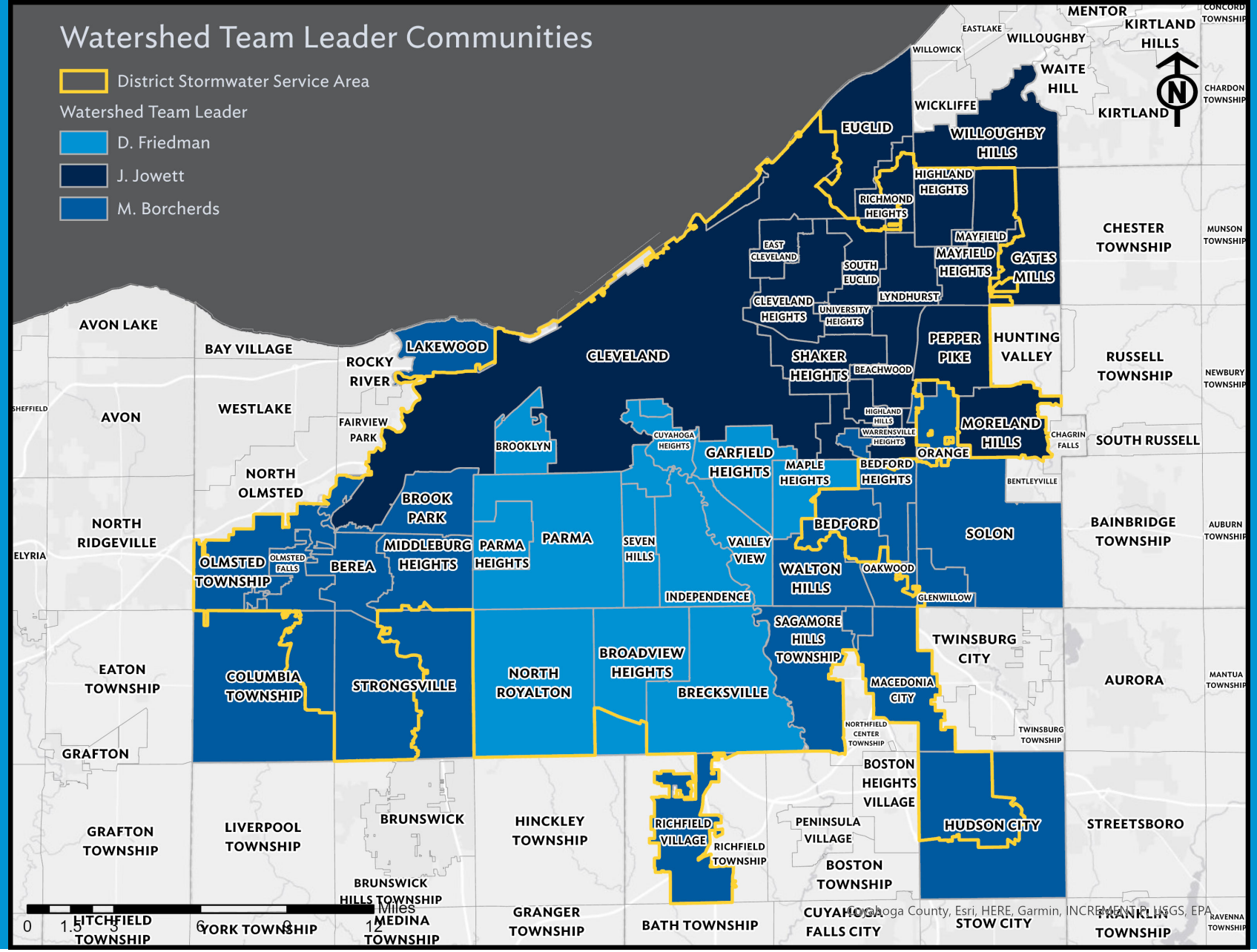
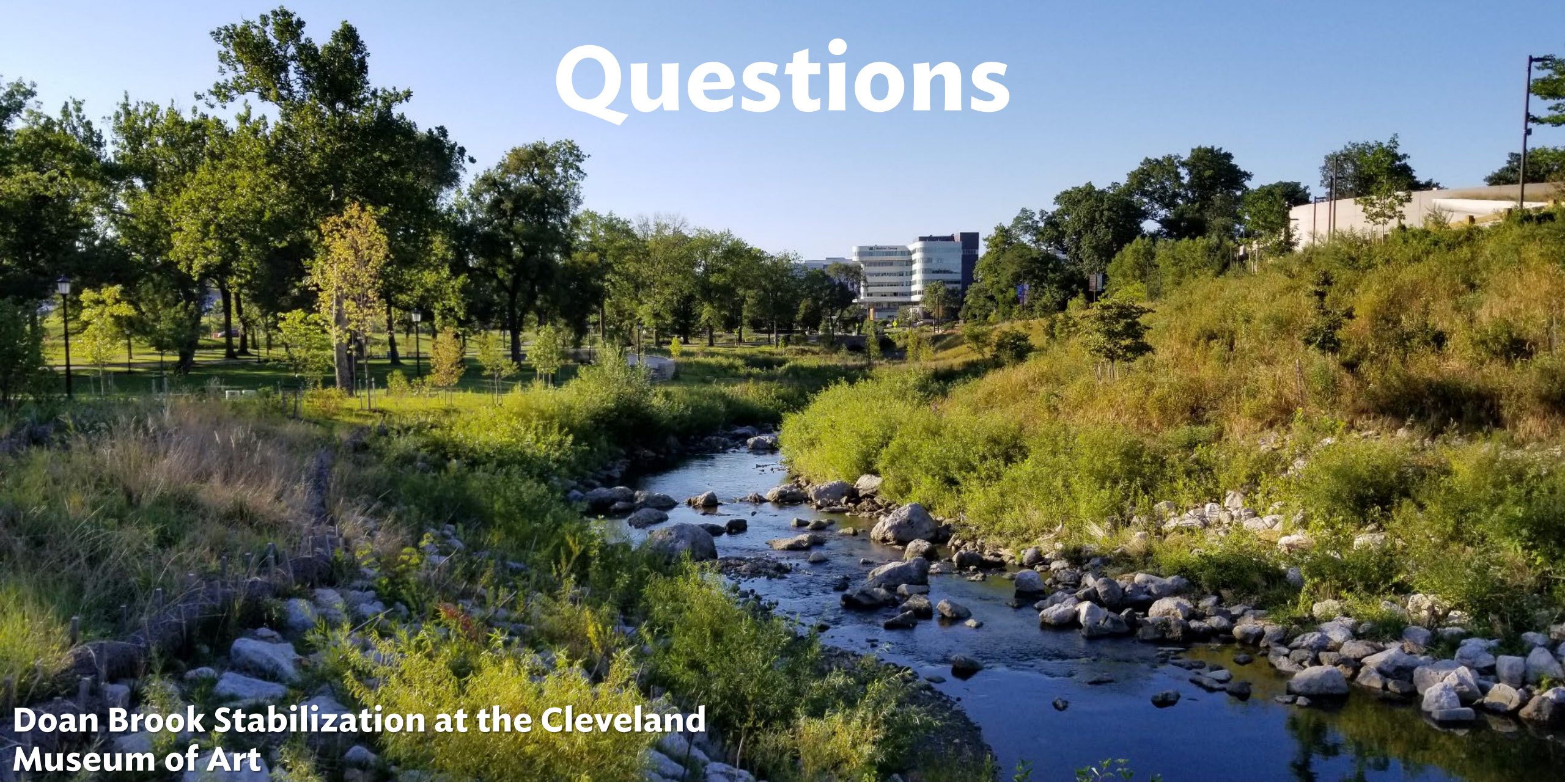


Northeast Ohio Regional Sewer District

REGIONAL STORMWATER MANAGEMENT

Questions



Doan Brook Stabilization at the Cleveland Museum of Art

Northeast Ohio Regional Sewer District

REGIONAL STORMWATER MANAGEMENT

FEATURE PRESENTATION

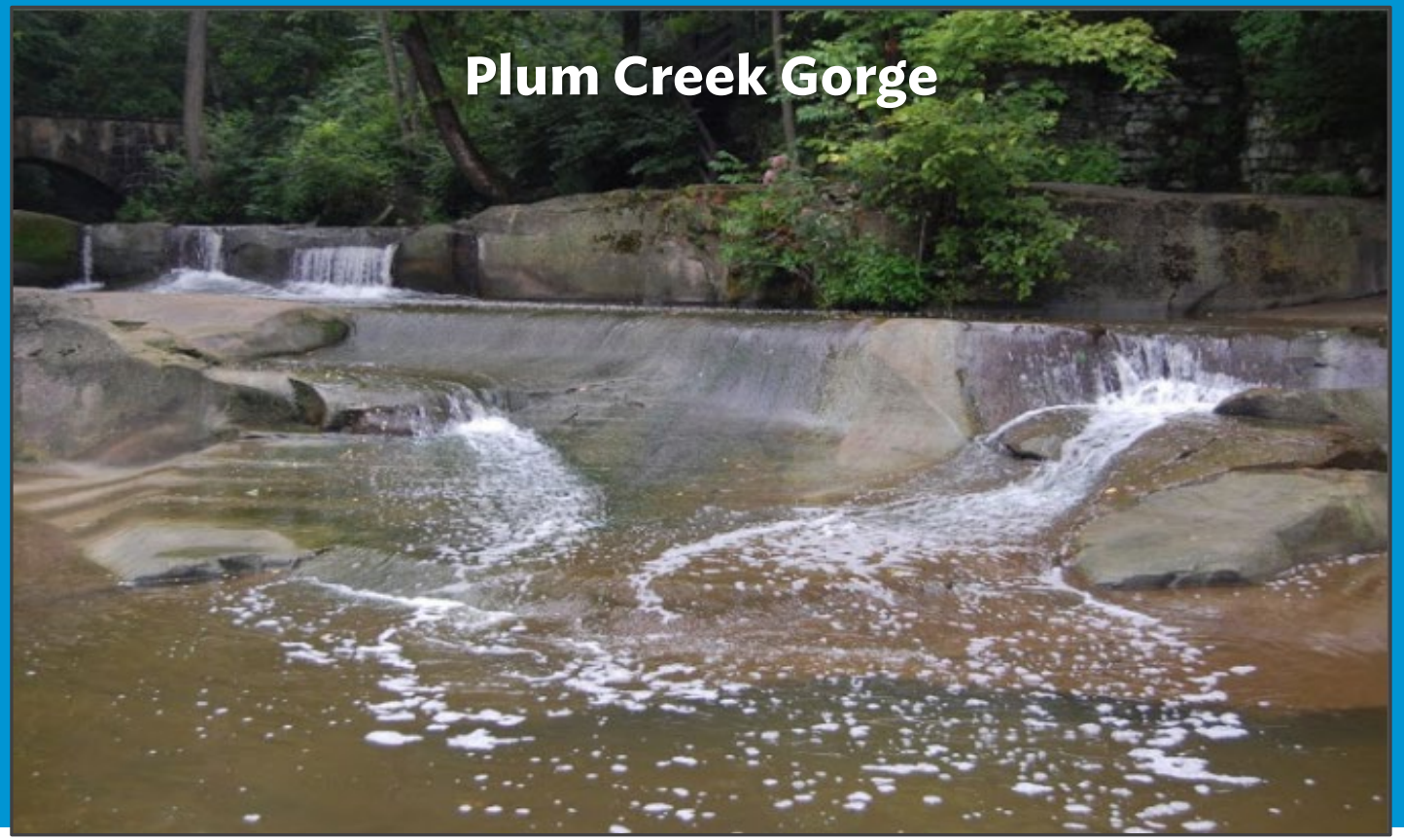
Justin Telep

Northeast Ohio
Regional Sewer District

Plum Creek fish translocation to support biological attainment

Justin Telep
WQIS Environmental Compliance Inspector

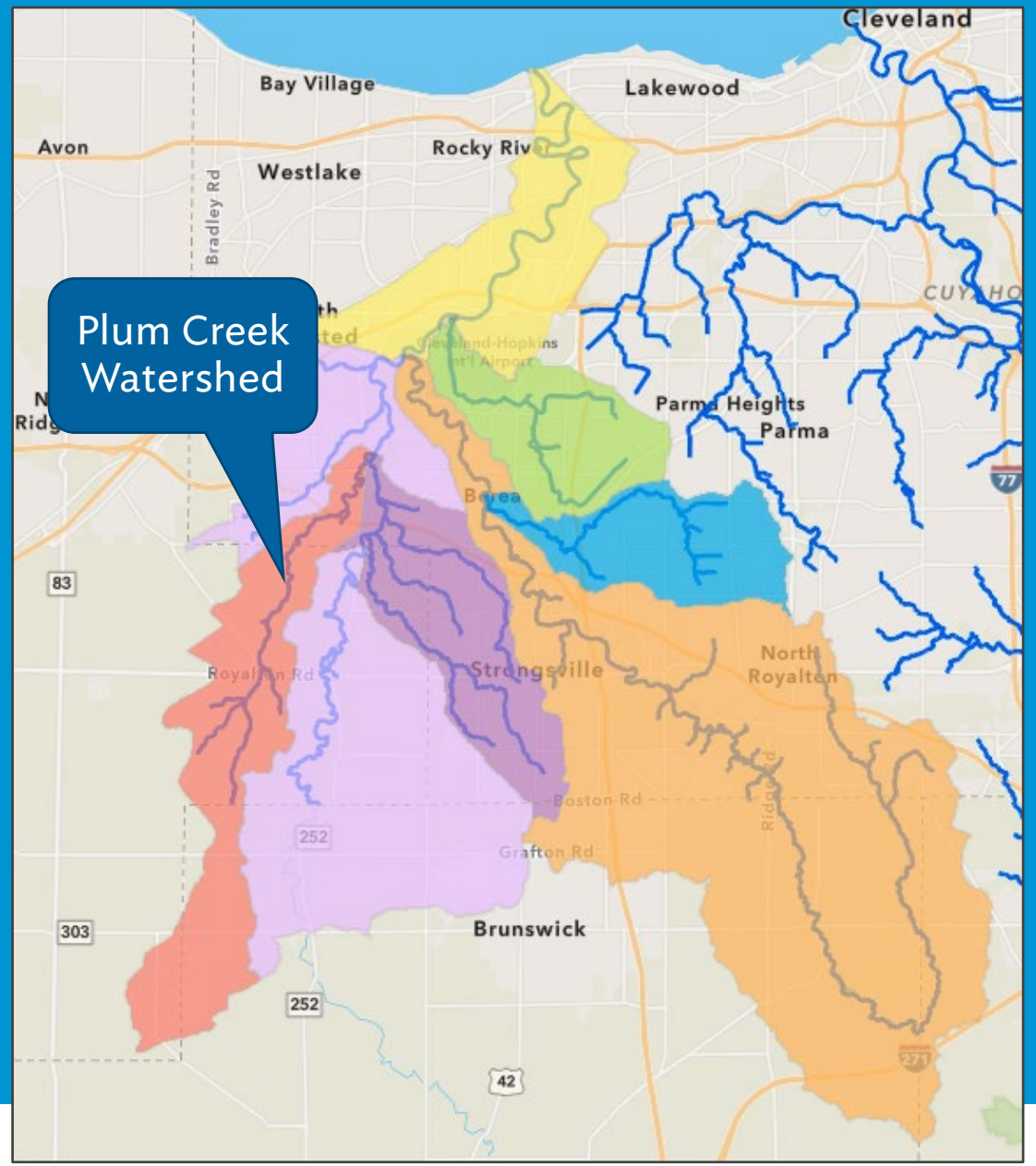
Sand shiners tagged and ready for release



Northeast Ohio Regional Sewer District
REGIONAL STORMWATER MANAGEMENT

Background

- Headwater stream tributary to the W. Branch of the Rocky River in Olmsted Falls and Columbia Township.
  - 3.6 miles long within NEORSD service area
- Watershed characteristics:
  - Drainage Area ~ 18 sq. mi.
  - 26.8% forested
  - 20.3% urban/developed land
  - 4.0% impervious surface



Source: StreamStats & National Land Cover Dataset, 2011

Background

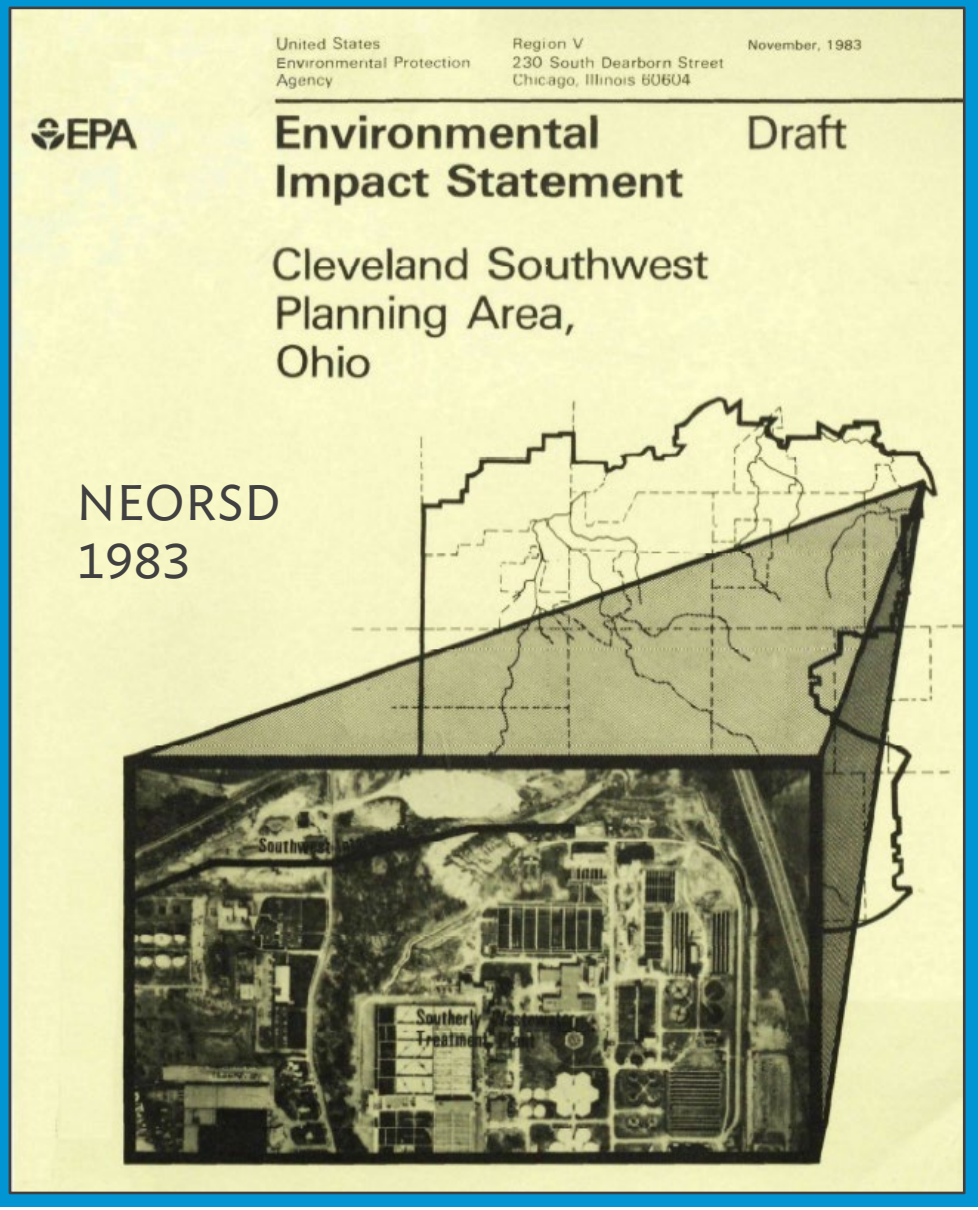
- Ohio EPA Biocriteria framework:
  - Biological: Fish (IBI) and Macroinvertebrate (ICI)
    - Physical: QHEI
    - Chemical: Aquatic life use WQS
- Impaired since its first Ohio EPA bioassessment in 1981
  - Gross organic enrichment and poor chemical water quality (prior to 1990s)
  - Nutrient enrichment (early 2000s)
  - Natural sources (current)

Year assessed/ agency	River Mile	IBI	ICI[a]	QHEI	Status	Causes	Sources	ALU WQS Exceedances
2020 (NEORSD)	2.84	24*	28	69.25	NON			
2020 (NEORSD)	2.84	26*						
2019 (NEORSD)	2.84	30*	26*/F*	70.0	NON	Natural (fish passage) Flow regime alterations	HS Urban runoff Physical barrier (Plum Creek Gorge)	*E. coli*
2019 (NEORSD)	2.84	26*						
2014 (EPA)	8.50	22*	MG[ns]	51.5	NON	Low DO Habitat alterations	Natural sources (rheopalustrine) channelization	Dissolved oxygen Iron
2014 (EPA)	4.92	24*	MG[ns]	65.0	NON	Low DO Habitat alterations	Natural sources (rheopalustrine) Channelization	Dissolved oxygen Iron
2014 (EPA)	2.50	20*	MG[ns]	69.75	NON	Natural (fish passage) Other flow regime alterations	Natural sources (Plum Cr. Gorge) Urban runoff/storm sewers	No water chemistry sampled
2014 (EPA)	0.25	20*	MG[ns]	69.50	NON	Natural (fish passage) Other flow regime alterations	Natural sources (Plum Cr. Gorge) Urban runoff/ storm sewers	*E. coli* Lead
2012 (NEORSD)	2.90	22*	24*	70.75	NON	Low DO Natural (fish passage) Other flow regime alterations	HSTS Urban runoff Physical barrier (Plum Creek Gorge)	*E. coli* Dissolved oxygen
2012 (NEORSD)	0.30	16*	18*	64.25	NON	Natural (fish passage) Other flow regime alterations	HSTS Urban runoff Physical barrier (Plum Creek Gorge)	*E. coli*
2001 (EPA)	2.8	22*		71.5	NON			
2001 (EPA)	0.01	18*		72	NON			
1997 (EPA)	2.8	18*	MG[ns]	71.5	NON	Nutrient enrichment Organic enrichment	N/A	Fecal coliform
1997 (EPA)	0.1/0.2	18*	F*	70.5	NON	Nutrient enrichment Organic enrichment	Small POTWs Unsewered areas, construction runoff, polluted stormwater	Fecal coliform Lead (OMZA)
1992 (EPA)	0.3	18*	F*	43.5	NON	Organic enrichment Oxygen depletion Habitat limitations	Small POTWs (Brentwood WWTP and Western Utility WWTP)	Dissolved Oxygen (chronic), Fecal coliform
1981 (EPA)	8.5	22*	--	50	NON			
1981 (EPA)	0.25	18*	--	55.5	NON			

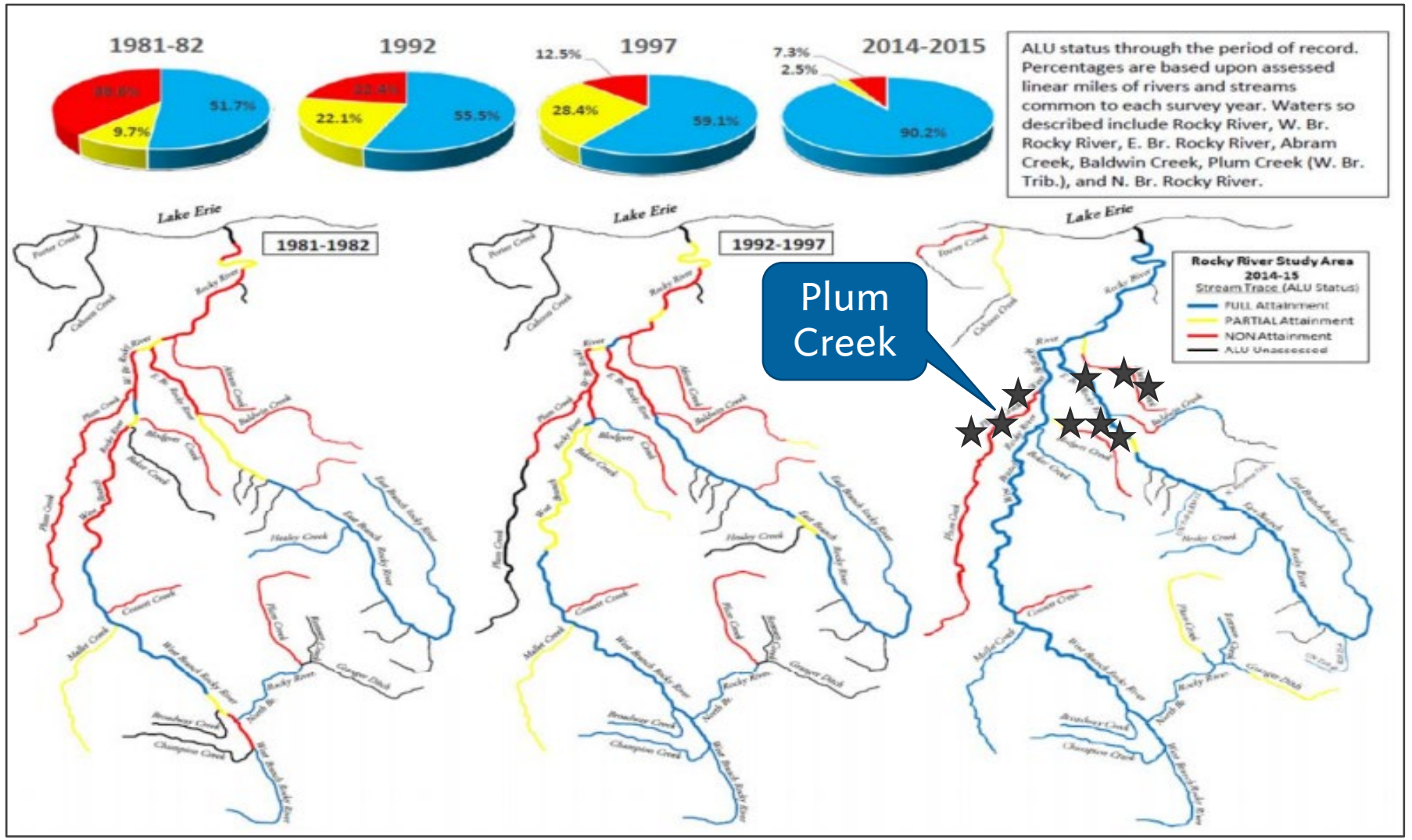
* - significant departure from biocriteria; poor and very poor results are underlined
ns – nonsignificant departure from biocriteria for WWH (4 IBI or ICI units)
a – Narrative evaluation used in lieu of ICI where quantitative sampling was not done or where artificial substrates were affected by slow current velocity (E=Exceptional; G=Good; MG=Marginally good; F=Fair; P=Poor; VP=Very poor)

Plum Creek Water Quality Improvements

- Organic Enrichment
  - Brentwood, Western Ohio Utility, and ODOT Park 3-39 WWTPs abandoned in 1997 with flows redirected to NEORSD SWI.
    - Eliminated 0.55+ MGD
  - One remaining: Plum Creek WWTP average design flow 0.04 MGD
- Nutrient Enrichment
  - Nutrient based TMDL developed in 2001 for Plum Creek
  - 2019 & 2020 NEORSD monitoring demonstrates Plum Creek is meeting all nutrient TMDL target criteria



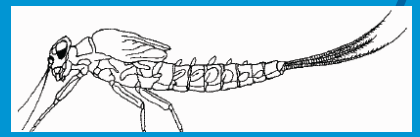
Watershed Water Quality Improvements

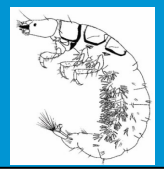


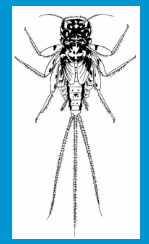
★ **9 decommissioned WWTPs now tributary to NEORSD SWI**

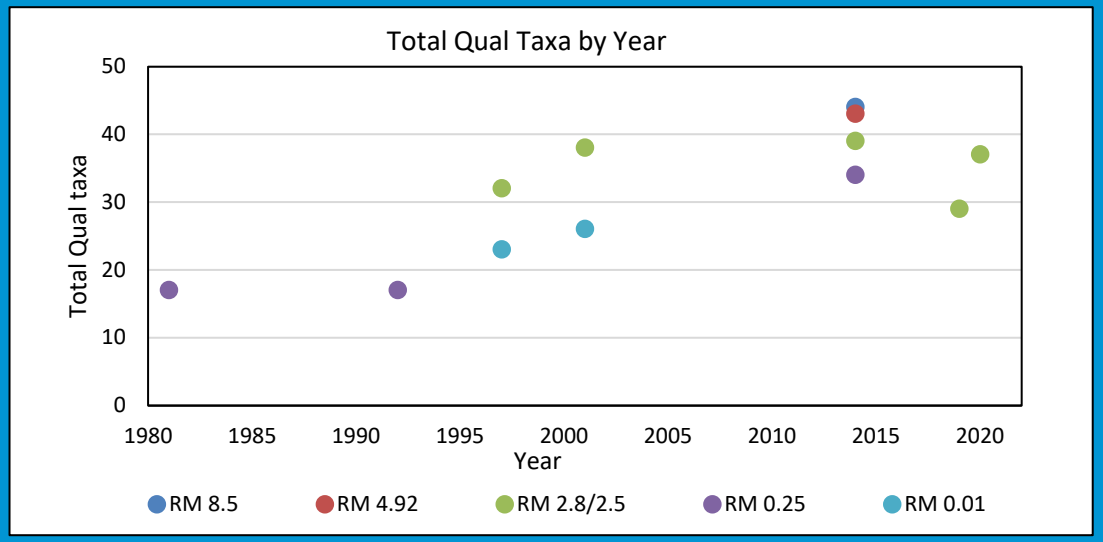
Source: Ohio EPA, 2020. *Biological and Water Quality Study of the Rocky River and Selected Tributaries Sapling Years 2014-2015*

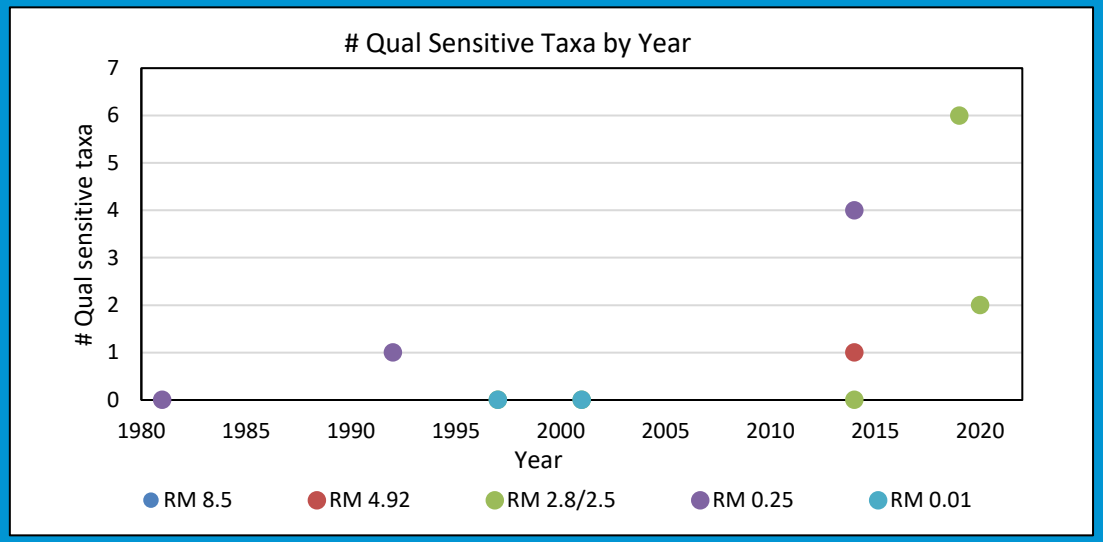
Plum Creek Macroinvertebrate Community Trends

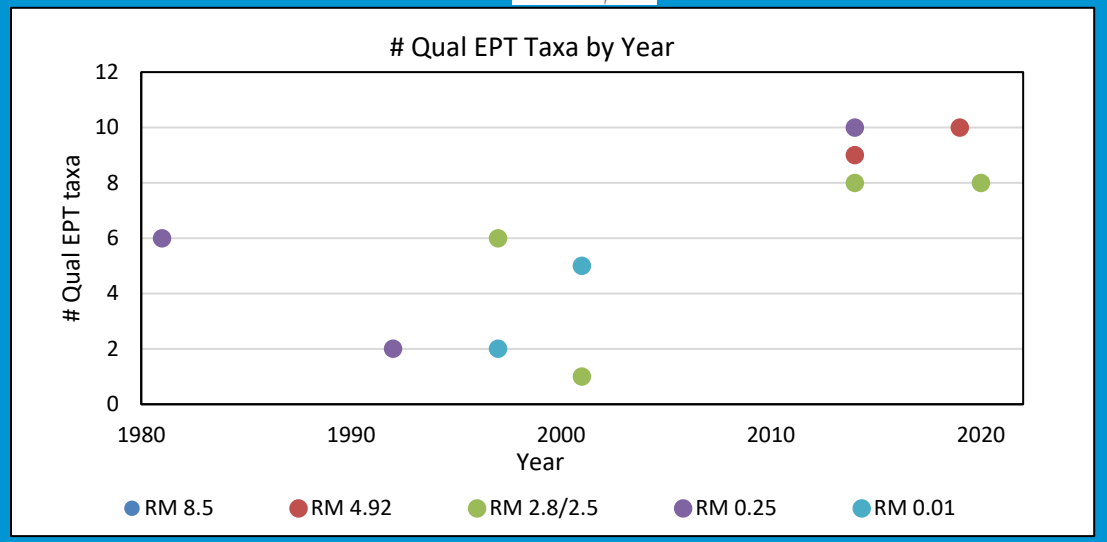












Macroinvertebrate community **in attainment**
5 of last 6 assessments dating back to 2014.

- Aerial dispersion in adult life form

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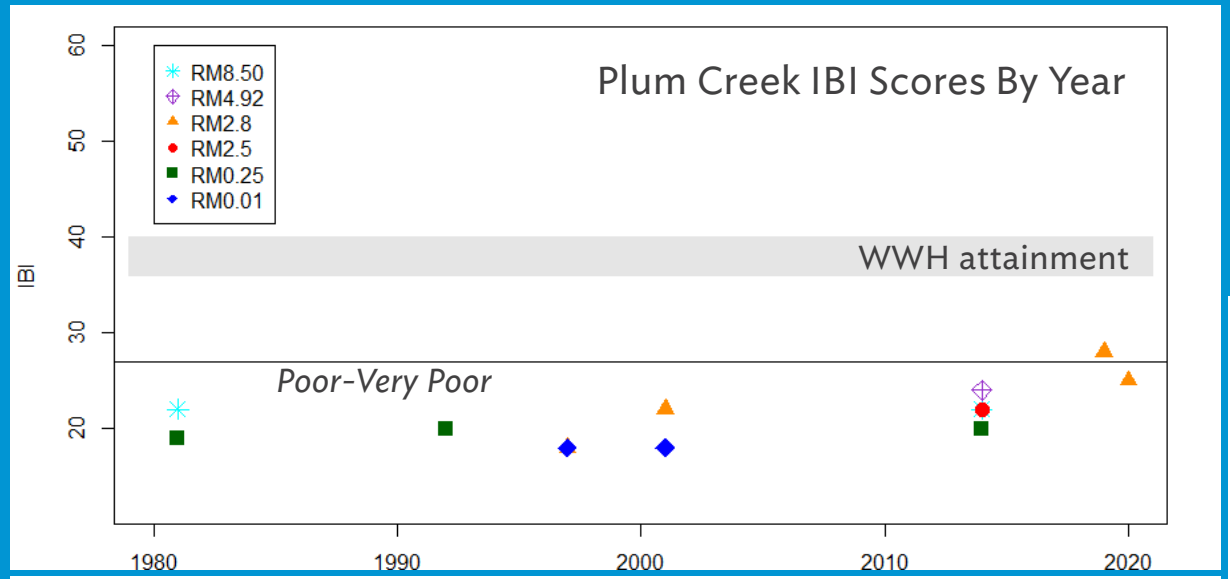
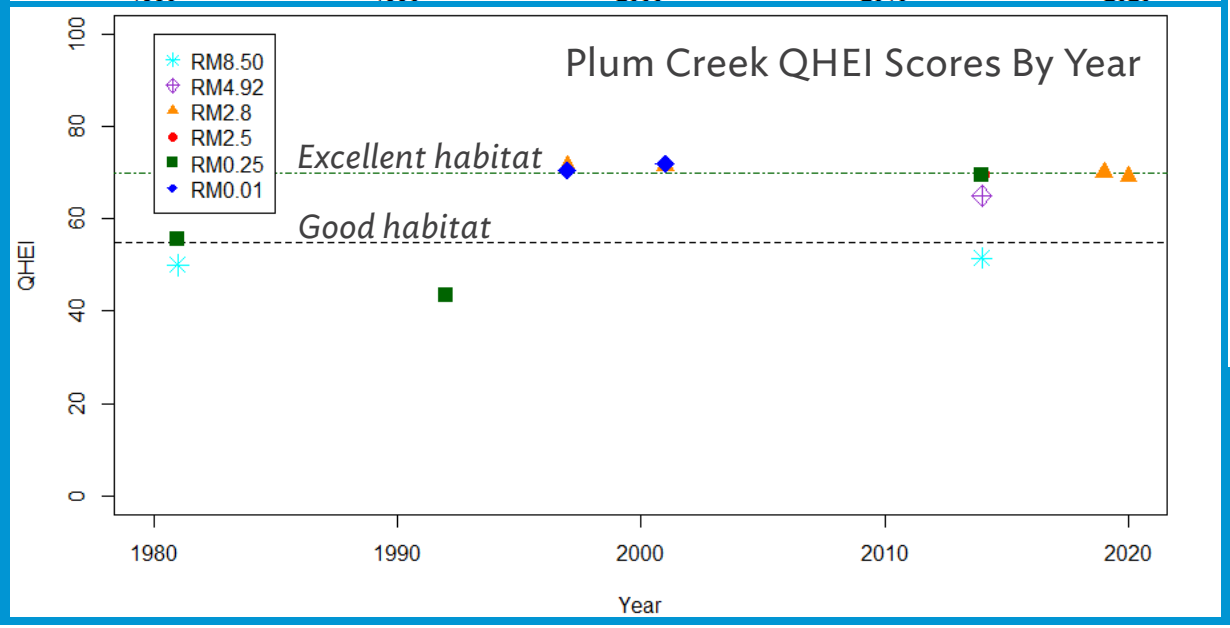
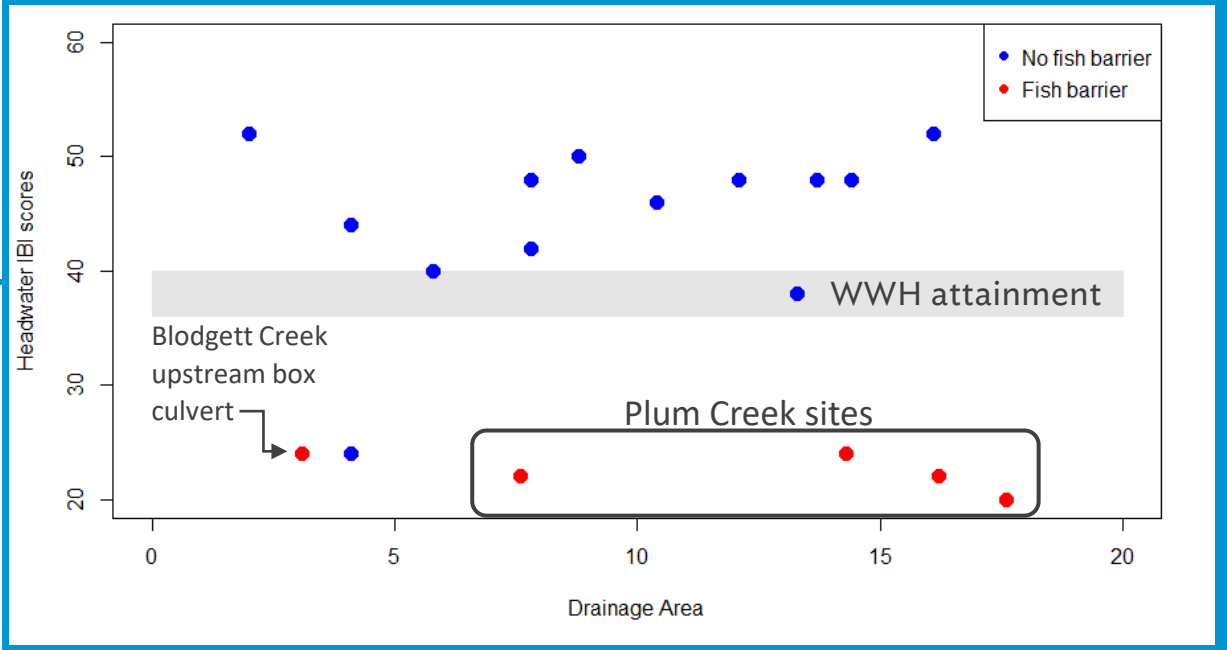
REGIONAL STORMWATER MANAGEMENT

Plum Creek Fish Community Trends







- 5 of the 6 impaired sites are upstream of fish barriers

Plum Creek Gorge

- The natural barriers at the Plum Creek Gorge prevent fish migration upstream
- “Potentially eligible for an aquatic life use redesignation to a lower water quality goal” (Ohio EPA 2020 Rocky River Water Quality Report).
  - Lower water quality protection for Plum Creek
    - Dissolve oxygen standards
    - Habitat goals

Proposed Project

- EPA proposed in their 2020 report:
  - "A seeding of upper Plum Creek with a representative collection of headwater fish species from adjacent waters within the basin should be considered. If successful, this will contribute to ALU restoration and eliminate the need to lower its water quality goal."
- This project aligns with the Water Quality and Resource Management focus area in the NEORSD Strategic Plan: Identify opportunities to drive water quality protection and enhancement.

- We have already helped solve numerous water quality issues
  - Free fish migration is hindering its potential to achieve full biological attainment

Species Selection

- After a full literature review, a list of 9 candidate species were selected based on:
  - Never been collected in Plum Creek
  - Found in abundance in adjacent waters to Plum Creek
    - Fish that would have likely migrated into Plum Creek
  - Ability to increase IBI score
  - Spawning and habitat preferences are available in Plum Creek
  - Are typical species found in other W. Branch headwater streams

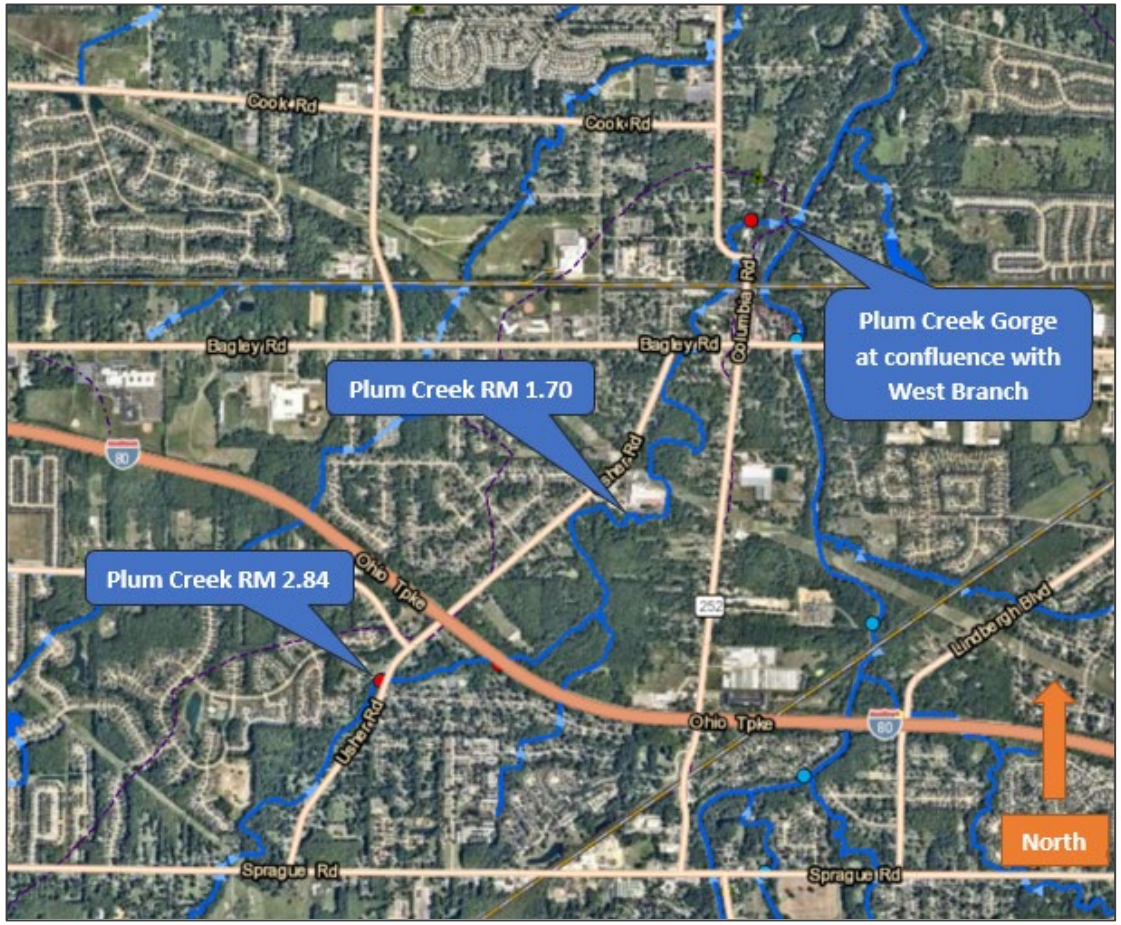
Table 2. IBI Metrics and effect of species introduction

	IBI metric	Northern hogsucker	Blacknose dace	Striped shiner	Silverjaw minnow	Sand shiner	Rainbow darter	Greenside darter	Blackside darter	Fantail darter
Number of	Total sp.	+	+	+	+	+	+	+	+	+
	Minnow sp.		+	+	+	+				
	Headwater sp.		+							+
	Sensitive sp.	+				+	+	+		
	Darter sp.						+	+	+	+
	Simple lithophil sp.	+	+	+			+	+	+	
Percent of	Tolerants	+	-	+	+	+	+	+	+	+
	Omnivores	+	+	+	+	+	+	+	+	+
	Pioneering sp.	+	+	+	+	+	+	+	+	+
	Insectivores	+	-	+	+	+	+	+	+	+
	DELTs									
Rel. No.**		+	-	+	+	+	+	+	+	+

Positive effect on IBI metric (+)
Negative effect on IBI metric (-)
*Based on historical scores, drainage area, habitat, reproductive needs, and Best Professional Judgement
**per 0.30 km, minus tolerant and hybrid species

Sampling Plan

- All source locations within the Rocky River watershed
- Goal: minimum of 200 fish/species/year into Plum Creek at two seed locations
- Minimum of 3 consecutive years of translocation
  - Reduces environmental variability of a bad spawning/weather year
  - Increases genetic diversity
  - Increases number of fish introduced and chance of success
- Translocate in the spring before fish spawn
- Tag every fish with a visual implant elastomer
- Perform a fall sampling to determine survivability



Plum Creek seed/translocation locations

Northeast Ohio Regional Sewer District

REGIONAL STORMWATER MANAGEMENT

Visual Implant Elastomer

- Tagging fish benefits:
  - Color coded by year
    - Determine long-term or multi-year survivability success
  - Determine recruitment (successful spawn) immediately upon fall sampling of Plum Creek
  - Document movement throughout the stream

Year one progress

- Started sampling this spring in March, when darters prepare to spawn
- Partner agencies:
  - Brian Zimmerman, OSU Museum of Biological Diversity and Co-Author *"A Naturalist's Guide to the Fishes of Ohio"*
  - Ohio State University Stream & River Ecology Lab Students
  - Approval and support from:
    - Ohio EPA Ecological Assessment Section
    - ODNR Division of Wildlife
    - Cleveland Metroparks

Brian Zimmerman and OSU students assisting in seine netting; Rocky River West Branch at SR 82

Year one progress

Species	#
Northern hogsucker	4
Blacknose dace	500
Striped shiner	263
Silverjaw minnow	56
Sand shiner	1,170
Rainbow darter	929
Greenside darter	256
Blackside darter	3
Fantail darter	186

As of 5/13/2021, we have tagged and translocated 3,367 fish into Plum Creek

Post sampling and overall goals

- Goal: to achieve full biological attainment of Plum Creek
  - Eliminate the need for an aquatic life use redesignation to a lower water quality goal
- Enhance water quality and drive protection of Plum Creek

Site	Year assessed/ agency	River Mile	IBI	ICI	QHEI	Status	Causes	Sources	ALU WQS Exceedances
Plum Creek	2026	2.84	**46**	34	69.25	**FULL**	N/A	N/A	*E. coli*

Table 7. IBI Metrics and effect of species introduction

IBI metric		9/4/2020 Bioassessment	Simulated Bioassessment with new species	Approximate metric criteria for increased score	Achievable rank 1-12 (1=best)*
Number of	Total sp.	8(1)	17(5)	17 sp. for a 5	3
	Minnow sp.	1(1)	7(5)	7 sp. for a 5	6
	Headwater sp.	0(1)	2(3)	2 sp. for a 3	1
	Sensitive sp.	0(1)	4(3)	4 sp. for a 3	7
	Darter sp.	1(1)	5(5)	3 sp. for a 3	4
	Simple lithophil sp.	1(1)	7(5)	4 sp. for a 3	5
Percent of	Tolerant sp.	59.8(1)	53.1(3)	<33% for 5 <56% for 3	2
	Omnivores	17.7(5)	15.5(5)	<16% for 5	--
	Pioneering sp.	69.2(1)	61.1(1)	<30% for 5 <55% for 3	9
	Insectivores	15.3(3)	25.1(3)	>22% for 3 >44% for 5	8
	DELTs	0.5(3)	0.4(3)	≤0.1 for 5 ≤0.30 for 3	10
Rel. No.**		876(5)	1168(5)	>750 for 5	--
IBI score (*narrative*)		**22 (*Poor*)**	**46 (*Very Good*)**		

Metric total (metric score 1, 3, or 5)

*Based on historical scores, drainage area, habitat, reproductive needs, and best professional judgement

**Relative number per 0.30 km, minus tolerant and hybrid species

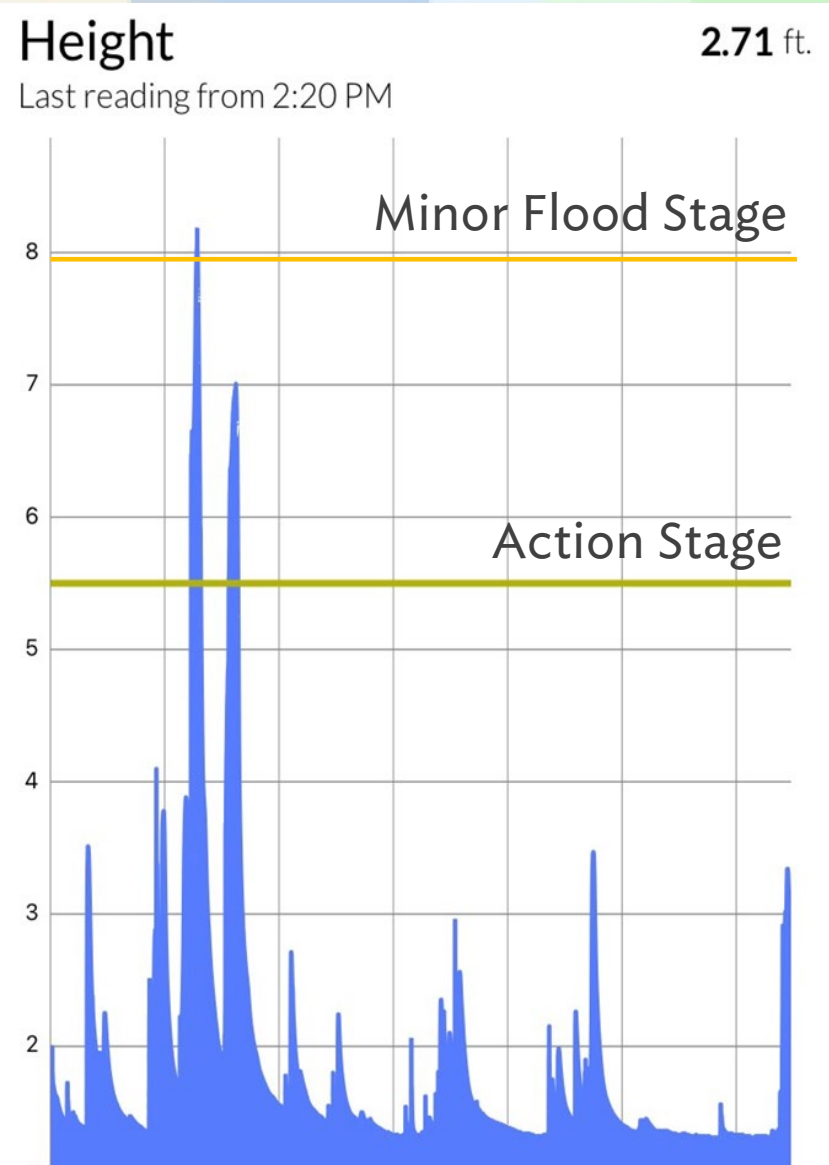
Other impaired streams affected by fish barriers:

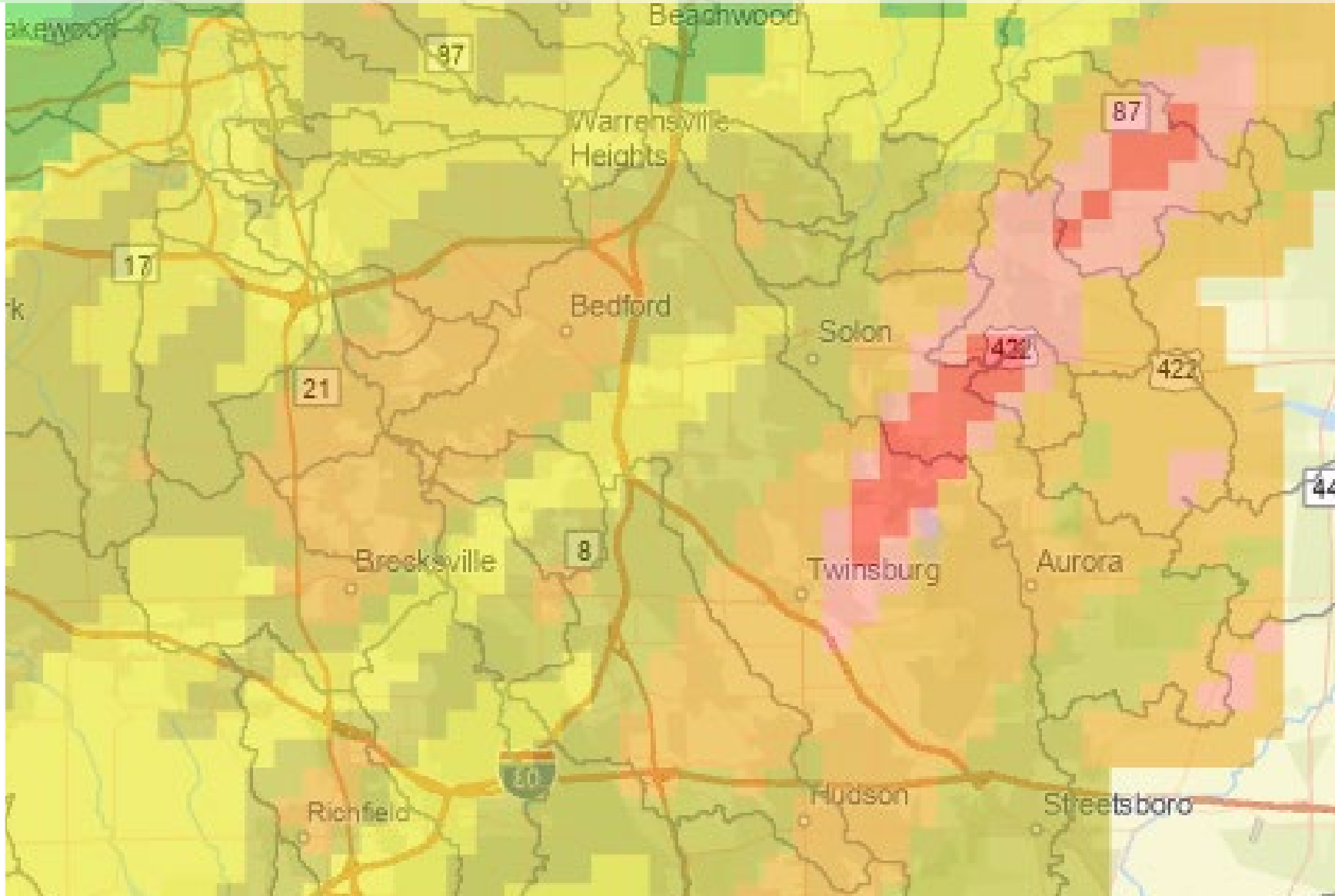
- Abram Creek: low head dam and Cleveland Hopkins Airport enclosure and drop structure
- Beechers Brook: Dam at Mayfield Village bank stabilization project upstream of Som Center Road
- Big Creek: John Nagy cascade
- **Blodgett Creek**: Box culvert under Ohio Turnpike
- Brandywine Creek: Brandywine Falls at RM 1.95
- Mill Creek upstream of Mill Creek Falls

Questions/ comments?

Justin Telep
Telepj@neorsd.org
Environmental Compliance Inspector
WQIS

Stormwater Strategic Support





Using Rainfall and Monitoring Data to Support Urgent Storm Event Field Response and Post-Storm Event Data Analysis

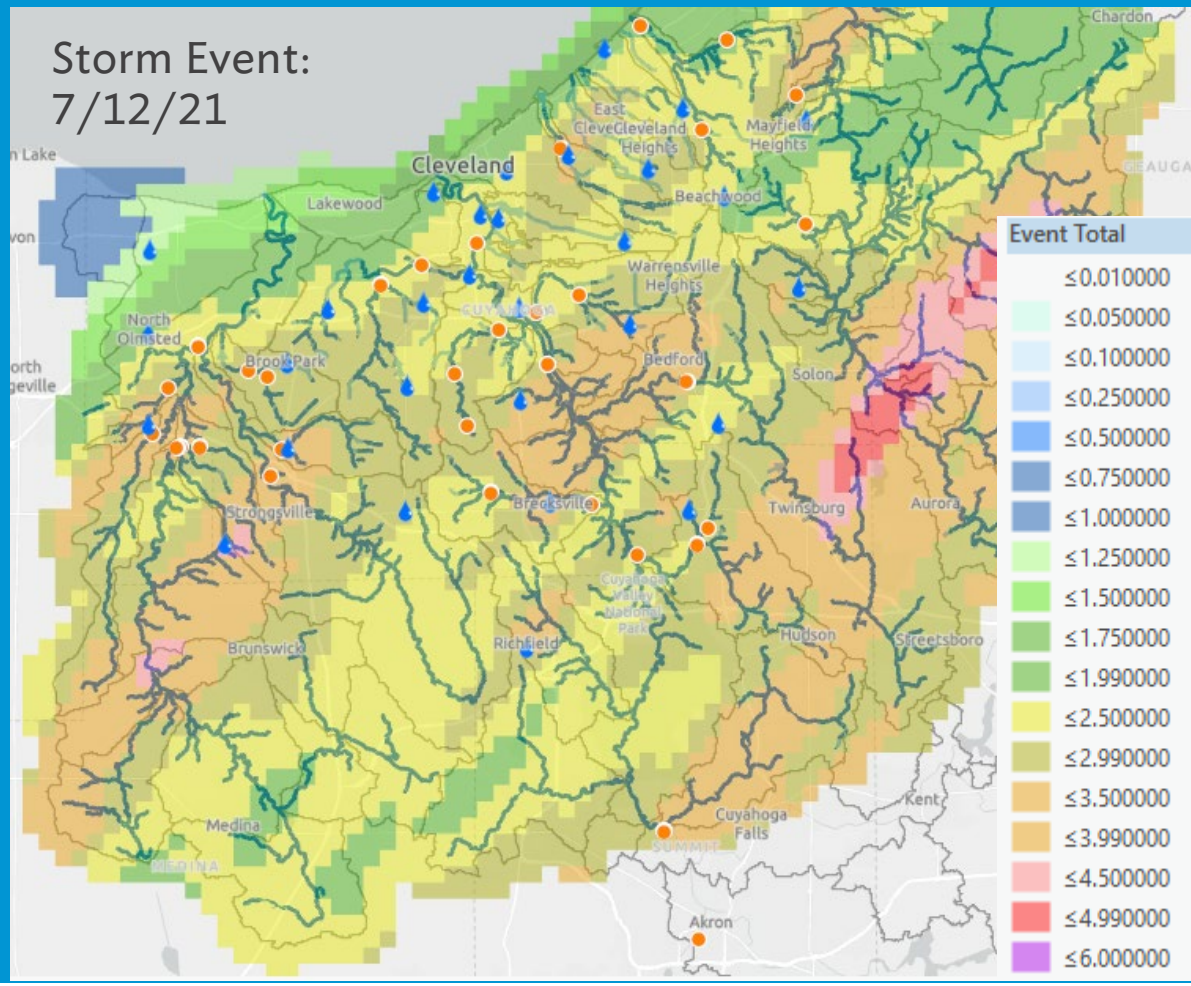
The District has been developing and refining an Urgent Storm Response Program.

Rainfall and monitoring data are collected and analyzed to help identify and prioritize potential flooding/debris problems for field response.

Rainfall:
- Rain Gauges, Gauge Adjusted Radar Rainfall (GARR)

Flood Stages:
- Level Sensors and Flow Monitors

Flooding/Debris/Erosion:
- Trail Cams

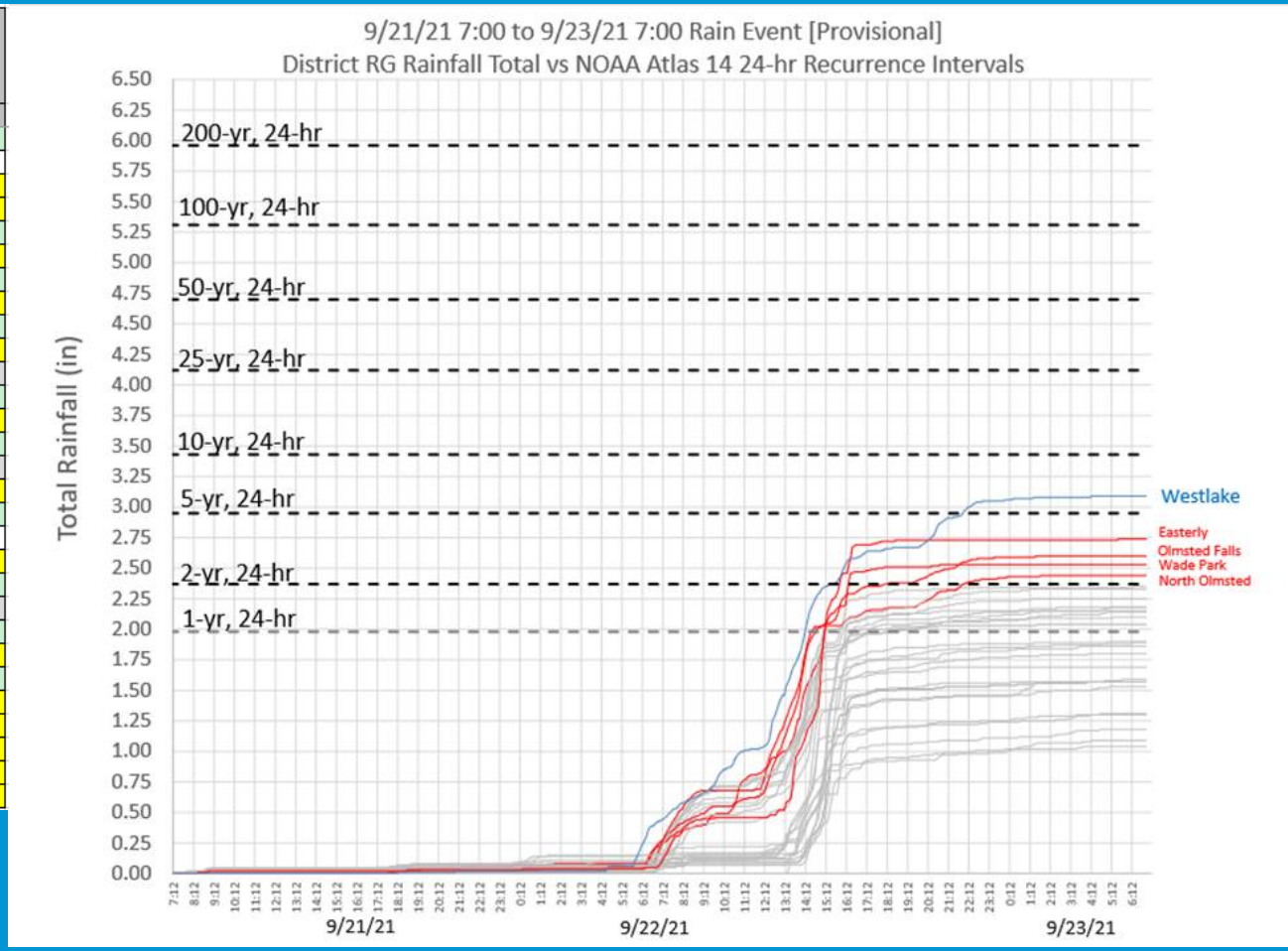


Northeast Ohio Regional Sewer District

REGIONAL STORMWATER MANAGEMENT

District RG Data is Evaluated to Determine Locations Recording High Intensity or Heavy Rainfall

Rain Gage	Peak 5min in	Peak 10min in	Peak 15min in	Peak 30min in	Peak 1-hr in	Peak 2-hr in	Peak 3-hr in	Peak 6-hr in	Peak 12-hr in	Peak 24-hr in	Peak 48-hr in
Beachwood .Tips (in)	2-mo	2-mo	2-mo	4-mo	9-mo	1-yr	1-yr	9-mo	6-mo	4-mo	4-mo
Brecksville.Tips (in)	<2-mo	<2-mo	<2-mo	<2-mo	<2-mo	<2-mo	3-mo	3-mo	2-mo	2-mo	2-mo
Brook Park.Tips (in)	<2-mo	<2-mo	<2-mo	2-mo	3-mo	4-mo	6-mo	6-mo	2-yr	1-yr	9-mo
Dille Ave PS.Tips (in)	4-mo	4-mo	6-mo	4-mo	4-mo	1-yr	1-yr	1-yr	2-yr	1-yr	9-mo
Division Ave PS.Tips (in)	<2-mo	<2-mo	<2-mo	2-mo	2-mo	6-mo	6-mo	6-mo	1-yr	1-yr	6-mo
Easterly WWTP.Tips (in)	<2-mo	<2-mo	2-mo	2-mo	3-mo	1-yr	2-yr	2-yr	5-yr	2-yr	2-yr
Independence.Tips (in)	2-mo	<2-mo	<2-mo	2-mo	3-mo	4-mo	6-mo	6-mo	6-mo	4-mo	4-mo
Cleveland Industrial Pkwy.Tips (in)	<2-mo	<2-mo	<2-mo	<2-mo	2-mo	3-mo	4-mo	6-mo	1-yr	1-yr	9-mo
James Rhodes HS.Tips (in)	<2-mo	<2-mo	<2-mo	2-mo	3-mo	4-mo	4-mo	6-mo	1-yr	9-mo	6-mo
Jennings PS.Tips (in)	3-mo	3-mo	4-mo	4-mo	4-mo	1-yr	1-yr	1-yr	2-yr	1-yr	1-yr
Macedonia.Tips (in)	<2-mo	<2-mo	<2-mo	<2-mo	2-mo	2-mo	3-mo	2-mo	<2-mo	<2-mo	<2-mo
Maple Heights .Tips (in)	<2-mo	<2-mo	2-mo	3-mo	3-mo	6-mo	1-yr	6-mo	4-mo	4-mo	3-mo
Mary Street PS	4-mo	3-mo	4-mo	3-mo	4-mo	9-mo	1-yr	1-yr	2-yr	1-yr	9-mo
Mayfield Heights.Tips (in)	9-mo	9-mo	9-mo	1-yr	2-yr	2-yr	2-yr	1-yr	1-yr	6-mo	6-mo
Moreland Hills.Tips (in)	<2-mo	<2-mo	<2-mo	<2-mo	<2-mo	2-mo	2-mo	<2-mo	<2-mo	<2-mo	<2-mo
North Olmsted.Tips (in)	<2-mo	<2-mo	<2-mo	<2-mo	2-mo	6-mo	6-mo	1-yr	2-yr	2-yr	1-yr
North Royalton.Tips (in)	4-mo	3-mo	4-mo	6-mo	9-mo	9-mo	1-yr	1-yr	6-mo	6-mo	6-mo
Oakwood.Tips (in)	<2-mo	<2-mo	<2-mo	3-mo	4-mo	4-mo	4-mo	4-mo	2-mo	2-mo	2-mo
Olmsted Falls.Tips (in)	<2-mo	<2-mo	<2-mo	2-mo	4-mo	9-mo	1-yr	1-yr	2-yr	2-yr	1-yr
Parma.Tips (in)	2-mo	<2-mo	<2-mo	3-mo	3-mo	4-mo	6-mo	6-mo	1-yr	6-mo	6-mo
Richfield.Tips (in)	<2-mo	<2-mo	<2-mo	<2-mo	<2-mo	<2-mo	<2-mo	<2-mo	<2-mo	<2-mo	<2-mo
Shaker Heights.Tips (in)	4-mo	3-mo	3-mo	2-mo	2-mo	6-mo	1-yr	9-mo	6-mo	4-mo	4-mo
South Euclid.Tips (in)	3-mo	3-mo	4-mo	6-mo	1-yr	2-yr	2-yr	2-yr	1-yr	1-yr	9-mo
Southerly WWTC.Tips (in)	4-mo	4-mo	6-mo	6-mo	4-mo	9-mo	1-yr	1-yr	6-mo	6-mo	4-mo
Strongsville C WWTP.Tips (in)	<2-mo	<2-mo	<2-mo	3-mo	4-mo	6-mo	6-mo	6-mo	2-yr	1-yr	1-yr
Strongsville Foltz.Tips (in)	<2-mo	<2-mo	<2-mo	2-mo	3-mo	6-mo	6-mo	9-mo	1-yr	1-yr	9-mo
University Hts	1-yr	9-mo	9-mo	9-mo	1-yr	2-yr	2-yr	2-yr	1-yr	1-yr	9-mo
Wade Park.Tips (in)	6-mo	9-mo	9-mo	9-mo	9-mo	2-yr	2-yr	2-yr	2-yr	2-yr	1-yr
Westlake.Tips (in)	<2-mo	<2-mo	<2-mo	<2-mo	2-mo	6-mo	1-yr	1-yr	5-yr	5-yr	2-yr



Northeast Ohio Regional Sewer District

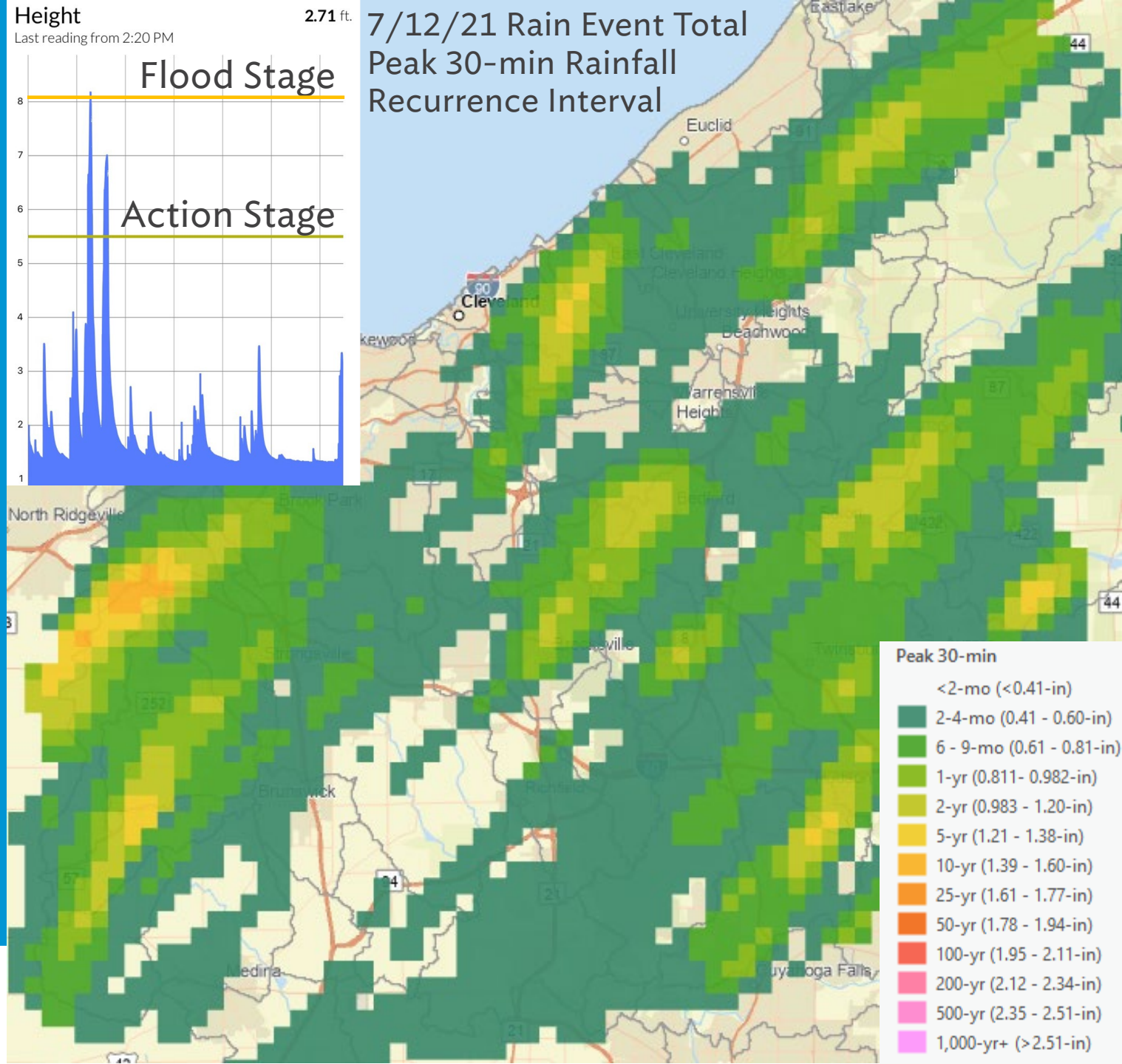
REGIONAL STORMWATER MANAGEMENT

GARR Data is Evaluated to Support Additional Rainfall Spatial Analysis

The District reviews GARR Data for a range of rainfall durations to identify recurrence intervals.

Pockets of High Intensity or Heavy Rainfall are evaluated further using other data sources.

For larger storms, the District collects Radar Rainfall videos to better understand the overall storm event (formation, direction, speed, intensity, coverage).



Northeast Ohio Regional Sewer District

REGIONAL STORMWATER MANAGEMENT

Stream Monitors are Reviewed for Evidence of Potential Flooding to Support Field Response

- The District is working to assign the four NWS-equivalent Flood Stages to any District or USGS monitor within the SWSA:
  - Action
  - Minor Flooding
  - Moderate Flooding
  - Major Flooding

	7/12/21 Data								
	Stream Monitor	Current Stage	Current NWS Flood Status	Peak Stage	Peak NWS Flood Status	Action Stage	Minor Flood	Moderate Flood	Major Flood
Type		FT	FT	FT	FT	FT	FT	FT	FT
USGS	Big Creek at Cleveland	3.5	Below Action	7.6	Below Action	9	11	12	13
USGS	Brandywine Creek near Macedonia	3.6	Below Action	6.7	Below Action	12	13	14	15
USGS	Chagrin River at Willoughby	5.6	Below Action	7.1	Below Action	9	12	14	16
USGS	Cuyahoga River at Hiram Rapids	2.9	Below Action	2.9	Below Action	5	7	8	12
USGS	Cuyahoga River at Independence	7.6	Below Action	13.0	Below Action	14	17	18.5	21
USGS	Cuyahoga River at Jaite	5.6	Below Action	9.7	Below Action	11	n/a	n/a	n/a
USGS	Cuayhoga River at Old Portage	5.0	Below Action	8.6	Below Action	9	10.5	13	18
USGS	Indian Creek near Macedonia	1.7	Below Action	6.3	Below Action	8.5	9.5	10	12
USGS	Mill Creek at Garfield Pkwy at Garfield Heights	1.7	Below Action	5.1	Below Action	7	7.5	10	12
USGS	Plum Creek near Olmsted Falls	7.8	Action	7.9	Action	5.5	8	11	14
USGS	Rocky River near Berea	9.3	Below Action	10.8	Below Action	11.5	18	20	22
USGS	Tinkers Creek at Bedford	3.7	Below Action	5.9	Below Action	7	9.5	12	n/a
USGS	West Branch Rocky River at West View	13.3	Action	14.3	Action	13	17.5	21	25
USGS	West Creek at Ridgewood Road at Parma	5.0	Below Action	7.7	Below Action	8	10	14	16

Trail Cams are Reviewed to Identify Potential Stormwater Issues for Field Response

Airport Debris Rack

Lakeview Dam

Northeast Ohio Regional Sewer District

REGIONAL STORMWATER MANAGEMENT

Post-Storm Event Analysis:

Objective: Use Collected Data to Better Understand What Happened and Why to Support Planned Projects and Future Urgent Storm Responses

Data Sources:

- District Rain Gauge Data
- GARR Rainfall Data
- Monitoring Data
- Sediment/Debris Accumulation
- Field Observations
- Customer/Media Reports

Data Analysis:

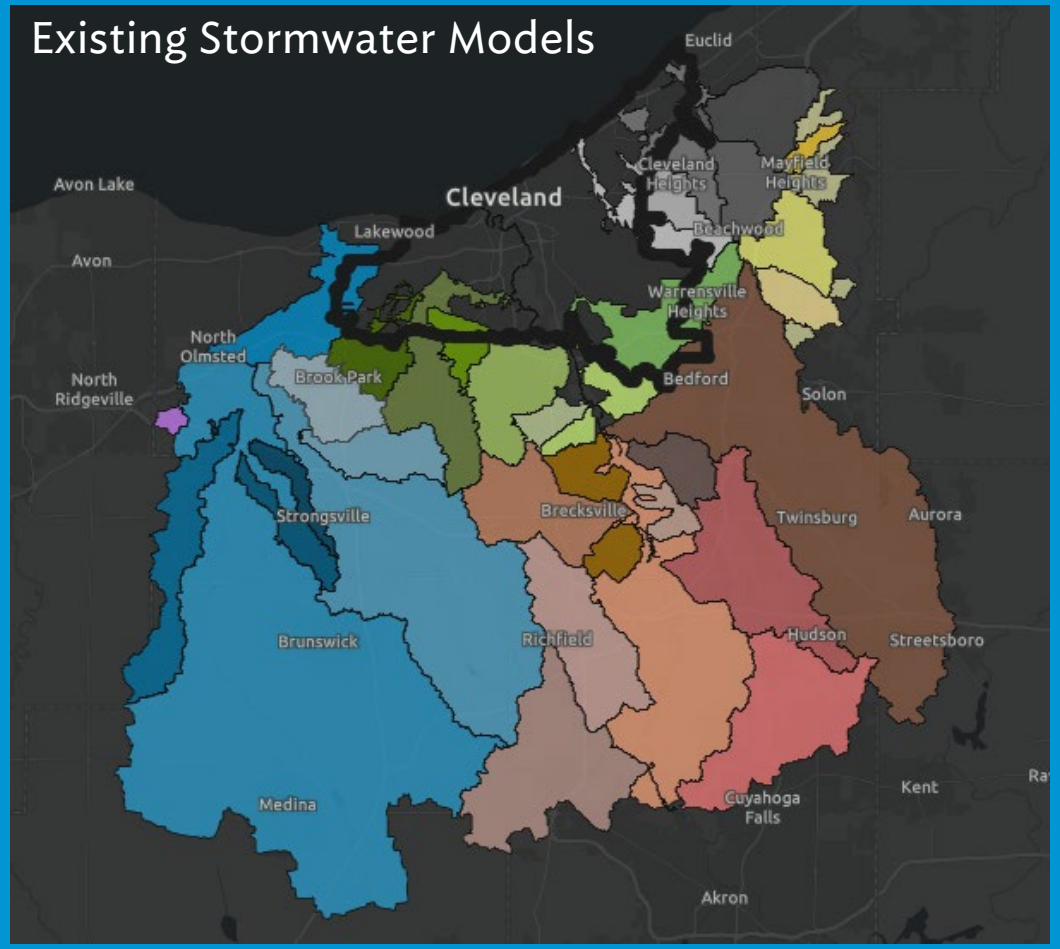
- Rainfall Statistics (e.g., 10-year 2-hr)
- Comparing H/H Model-Predicted Flooding to Actual Flooding
- Comparing Historical Storms for Potential Correlations (Flooding, Debris Accumulation)

Extending the RSMP Stormwater Models to Support Resolving Local Flooding Issues

The District currently manages over 40 stormwater hydrologic & hydraulic models across the SWSA to reflect existing conditions and recommended alternatives.

Upon request, the District stormwater models can be provided to support local stormwater evaluations.

At times, the District assists with evaluating local flooding issues that may provide benefit along the RSS.



Northeast Ohio Regional Sewer District

REGIONAL STORMWATER MANAGEMENT

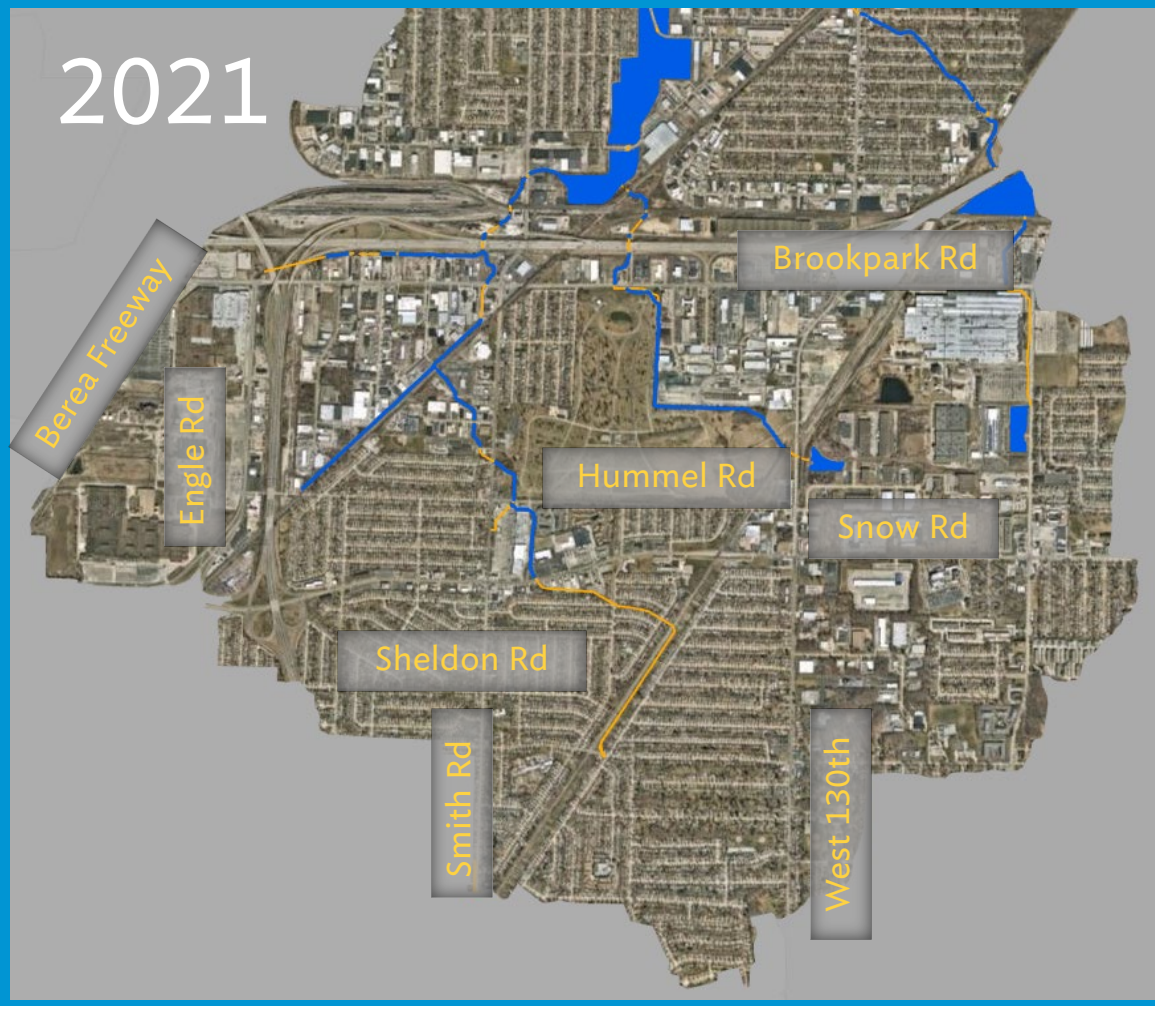
Brook Park: Kolleda “Ditch” Tributary Flooding

The City of Brook Park requested District assistance to mitigate local flooding along Kolleda Ditch.

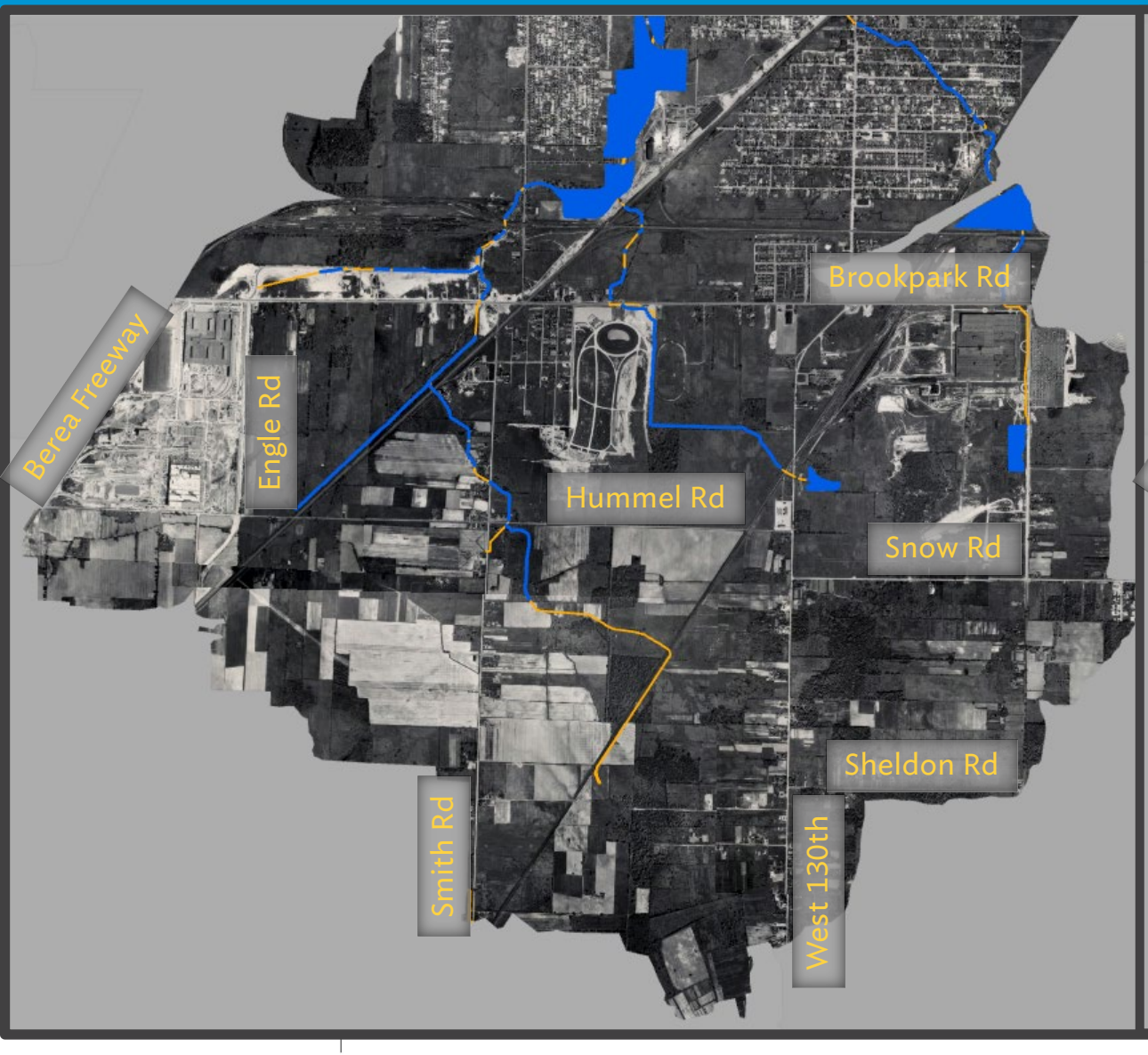
The City of Brook Park was heavily developed during the post World War II era (1950s and 60s). The Kolleda “Ditch” drainage area is approximately 4 square miles and includes over 2-miles of impervious area (53% impervious).

Very few stormwater control measures (SCMs) exist to manage stormwater runoff. Most of the streams have been culverted.

Existing storm sewers are primarily from their original construction (1950s & 60s), are common trench (MH separated), undersized compared to today’s standards, and near the end of their useful life.

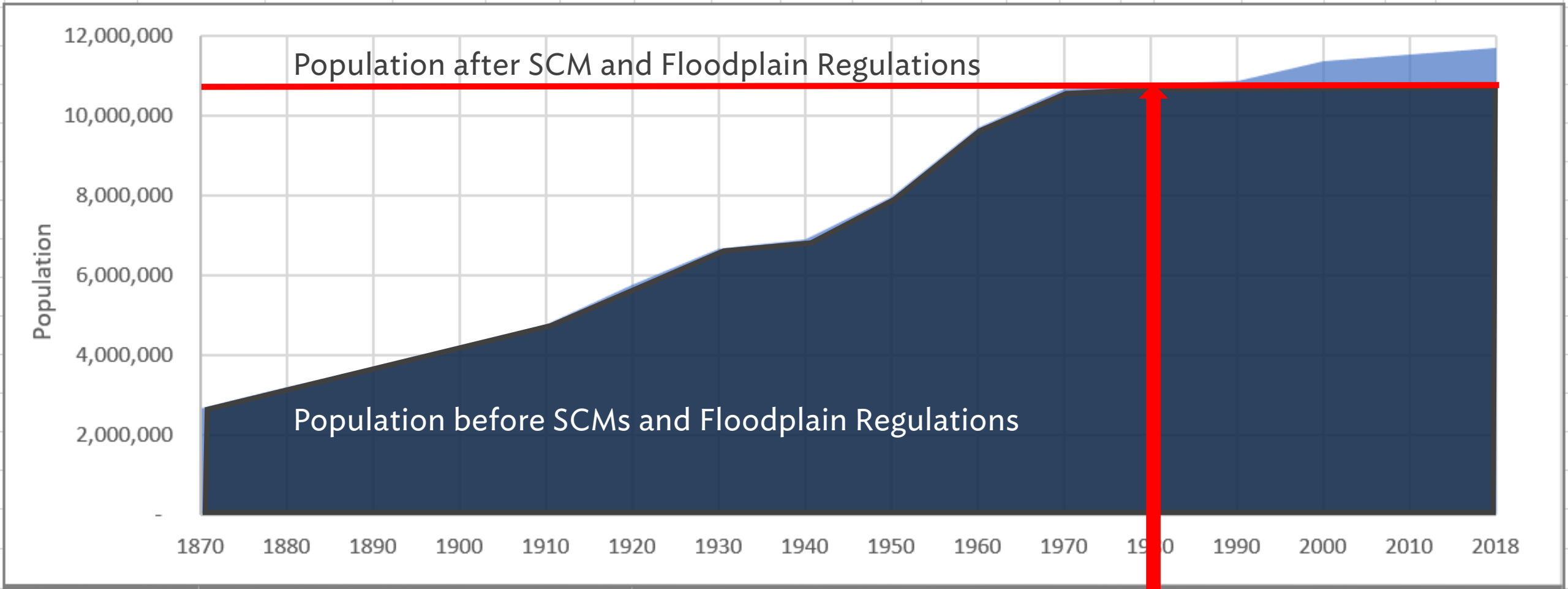


Brook Park: 1951



Brook Park: 1979

Ohio's Population and Stormwater Management Regulations by Decade



Pipe Capacity	< 2-yr Capacity		2-yr to 5-yr Capacity	5-yr to 10-yr Capacity
Floodplain Regulations	No Regulations			FEMA 100-yr / Stream Setback
SCMs	No Regulations			Flood Control / WQV

Stormwater Model Updates to Support Local Flooding Evaluation

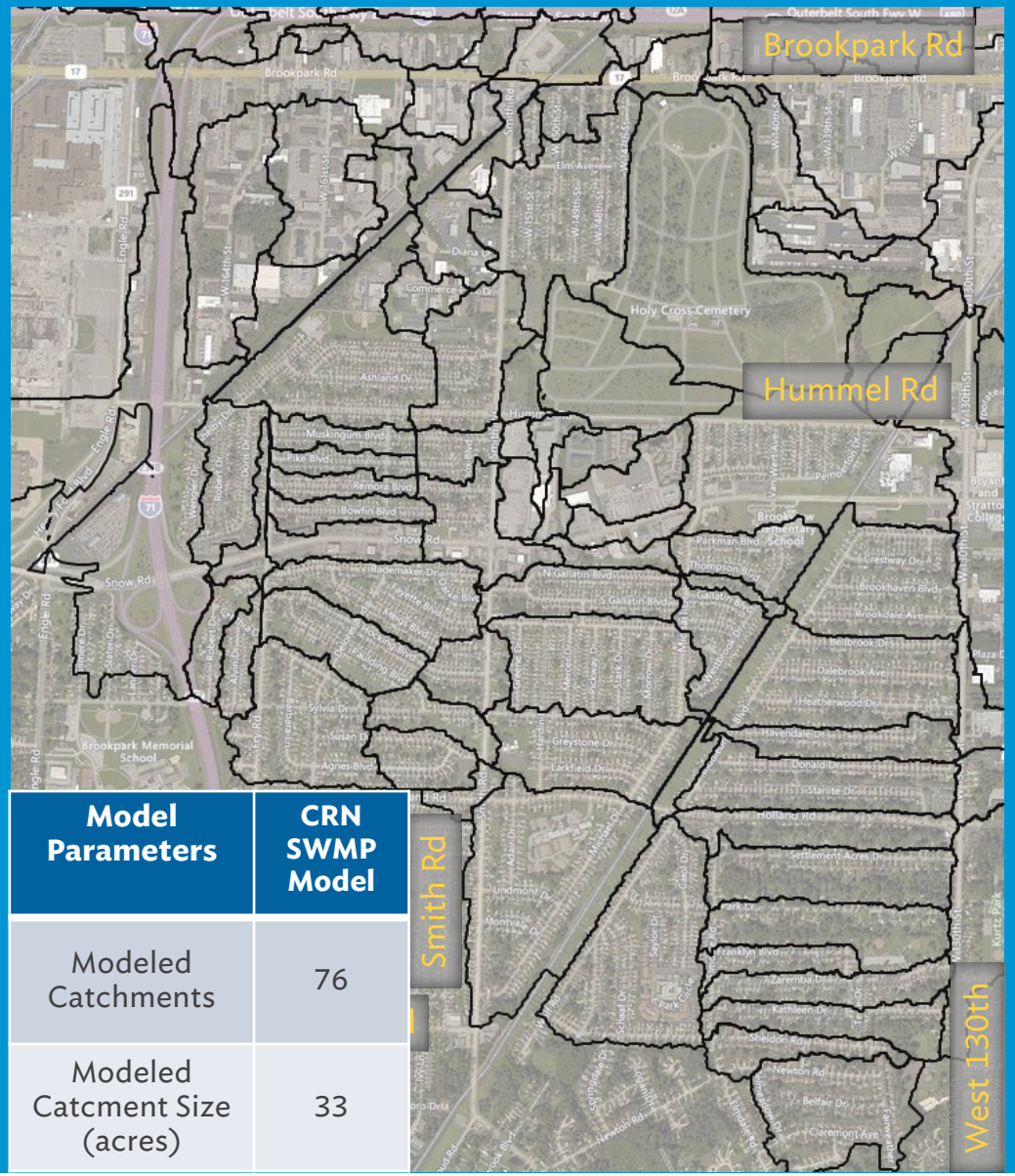
The CRN SWMP model was extended from the RSS into the Local Storm Sewer System (LSS). Hydrologic catchments were also refined as part of the model extension.

The model extension allows for:

- Better understanding of the LSS flooding problems
- Potential RSS influence on LSS flooding problems
- Identifying potential opportunities to mitigate flooding at the local level
- Identifying potential RSS benefit from local solutions.

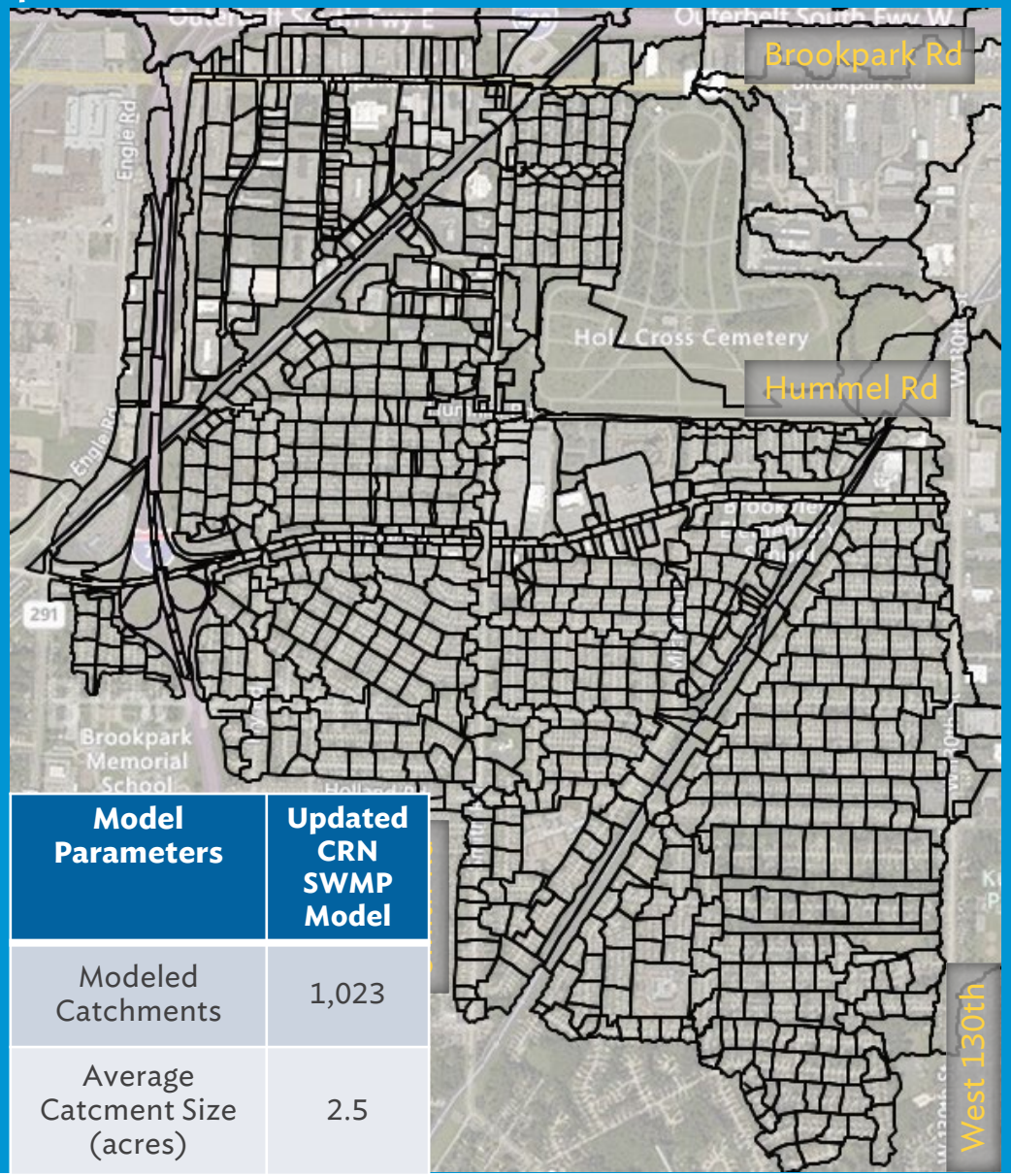
Model Parameters	CRN SWMP Model	Updated CRN SWMP Model (LSS Extensions)
Modeled Catchments	76	1,023
Average Catcment Size (acres)	33	2.5
Modeled Conduits	222	1,119
Total Conduit Length (feet)	53,367	249,522

CRN SWMP Model: Catchments



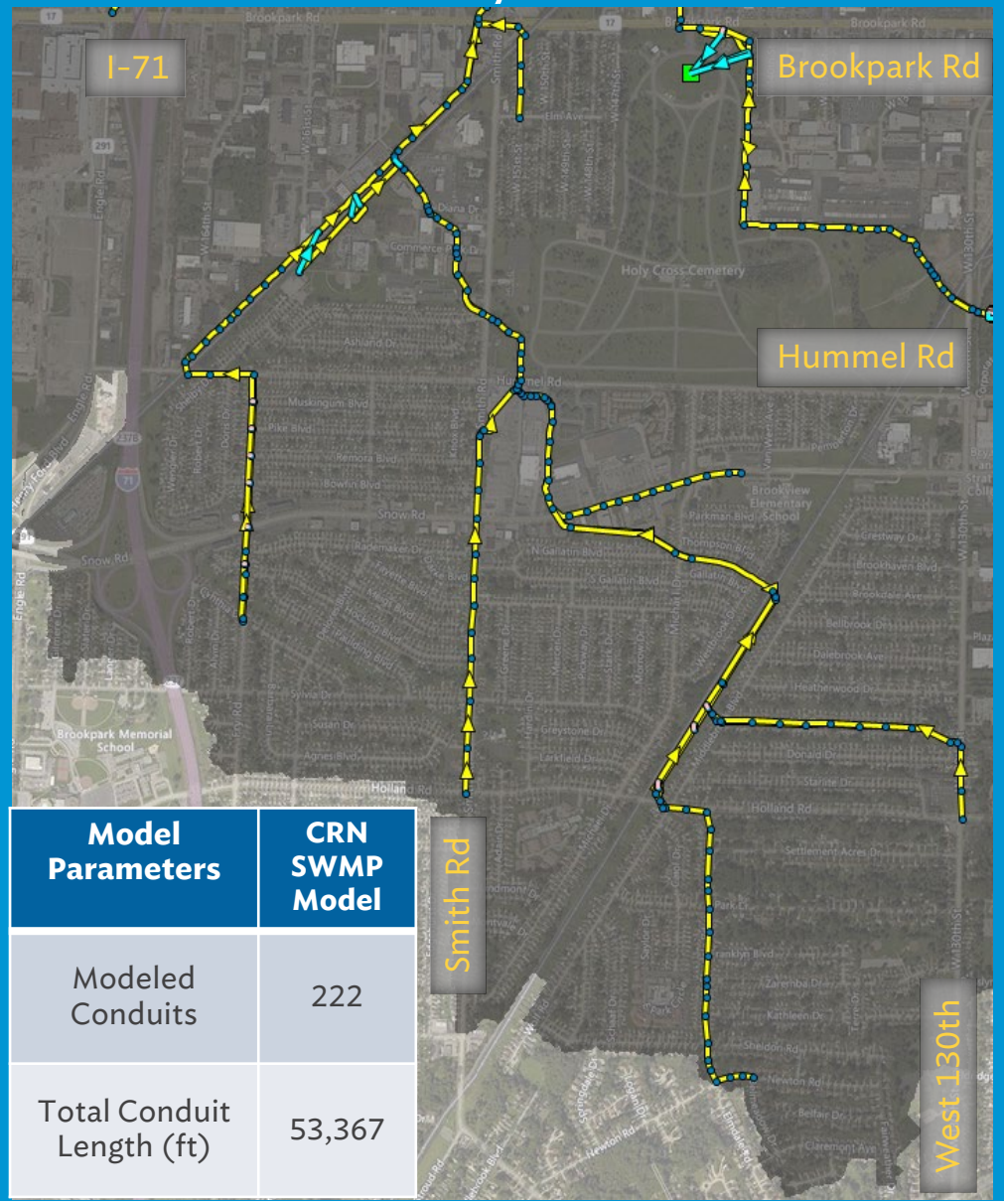
Model Parameters	CRN SWMP Model
Modeled Catchments	76
Modeled Catcment Size (acres)	33

Updated CRN SWMP Model: Catchments



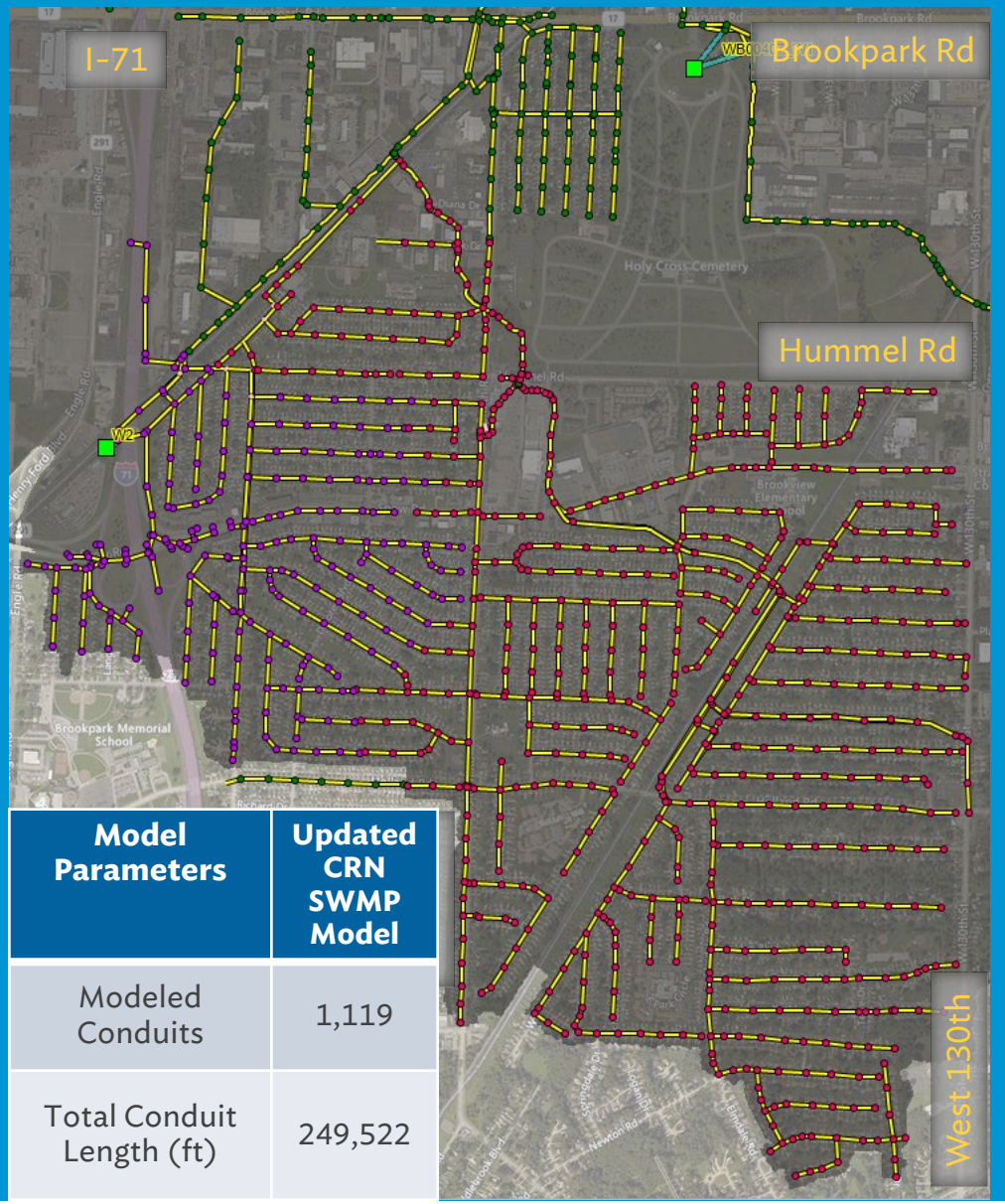
Model Parameters	Updated CRN SWMP Model
Modeled Catchments	1,023
Average Catcment Size (acres)	2.5

CRN SWMP Hydraulic Model



Model Parameters	CRN SWMP Model
Modeled Conduits	222
Total Conduit Length (ft)	53,367

Updated Hydraulic Model with LSS Extensions



Model Parameters	Updated CRN SWMP Model
Modeled Conduits	1,119
Total Conduit Length (ft)	249,522

Northeast Ohio Regional Sewer District

REGIONAL STORMWATER MANAGEMENT

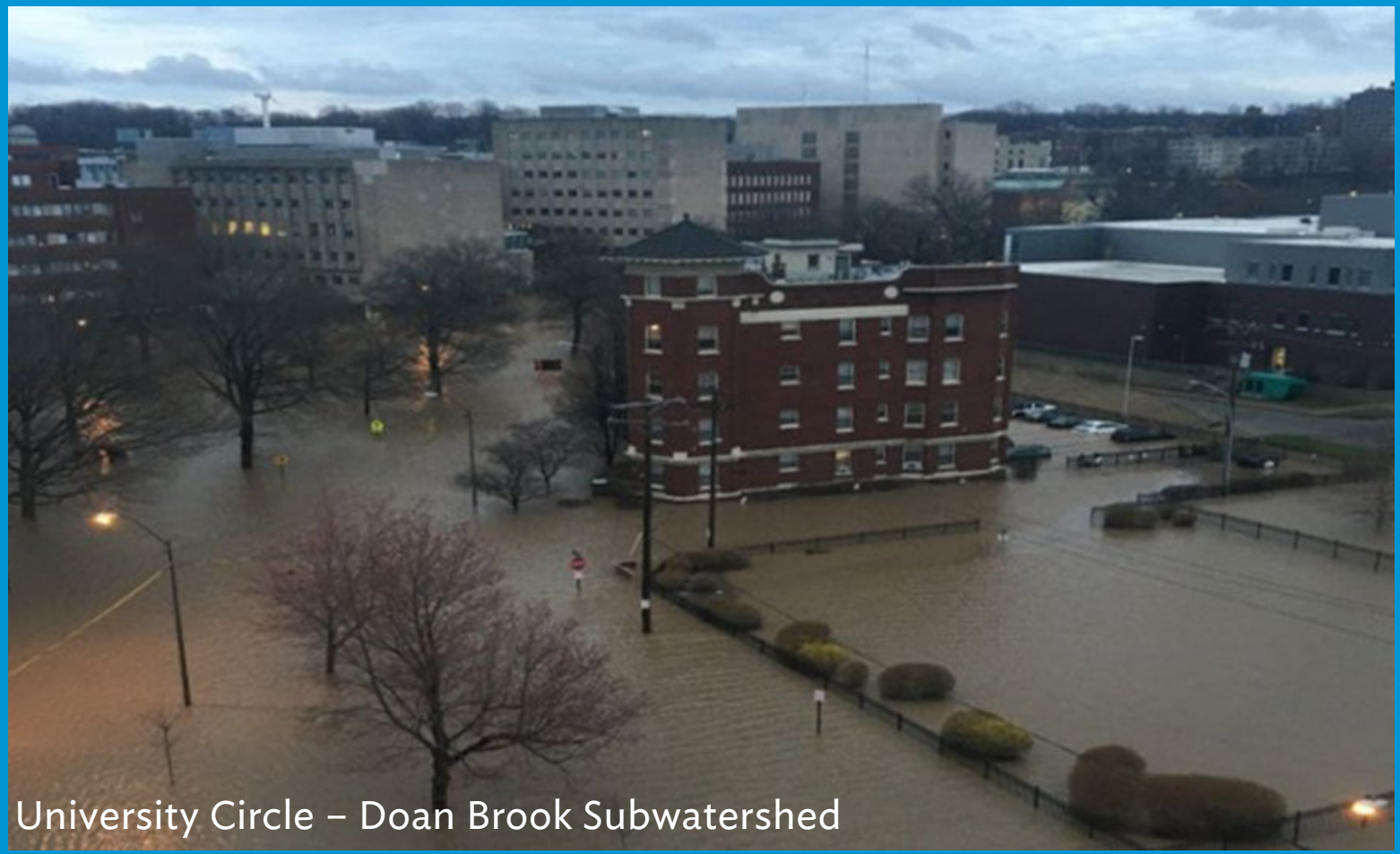
Storage Alternatives Being Consider

Storage Type	Application	Limitations
Conventional: In-line Basin	Enough elevation difference to allow ponding	Flat areas with upstream connections
Conventional: Off-line Basin	Where stormwater can be diverted, storage, and released at a different location	Limited areas within built-out communities; streams with little to no floodplain width.
Decentralized: Underground Storage, Bioswales	High impervious areas, locations with limited space, Public ROW, flat areas without conventional storage opportunities	Some locations will require private property owner buy-in; Increases the number of SCMs requiring O&M

Questions

Pepper Luce Creek Stabilization at Shaker Blvd

Chagrin River/Lake Erie Direct Tributaries Stormwater Master Plan



University Circle – Doan Brook Subwatershed

Stormwater Master Planning as of 10/1/2021

Cuyahoga River South

Completion Date: June 2019

100 % Complete

Cuyahoga River North

Completion Date: July 2020

100% Complete

Rocky River

Completion Date: November 2020

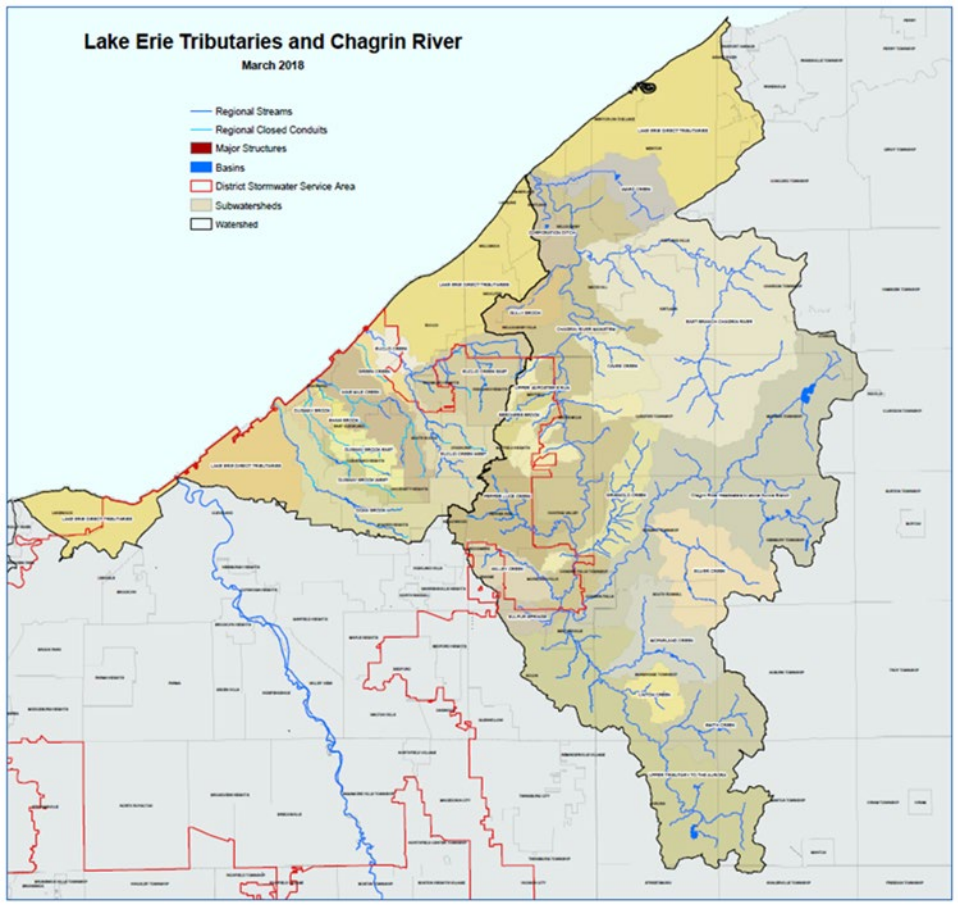
100% Complete

Chagrin River / Lake Erie Tribs

Completion Date: November 2021

98% Complete

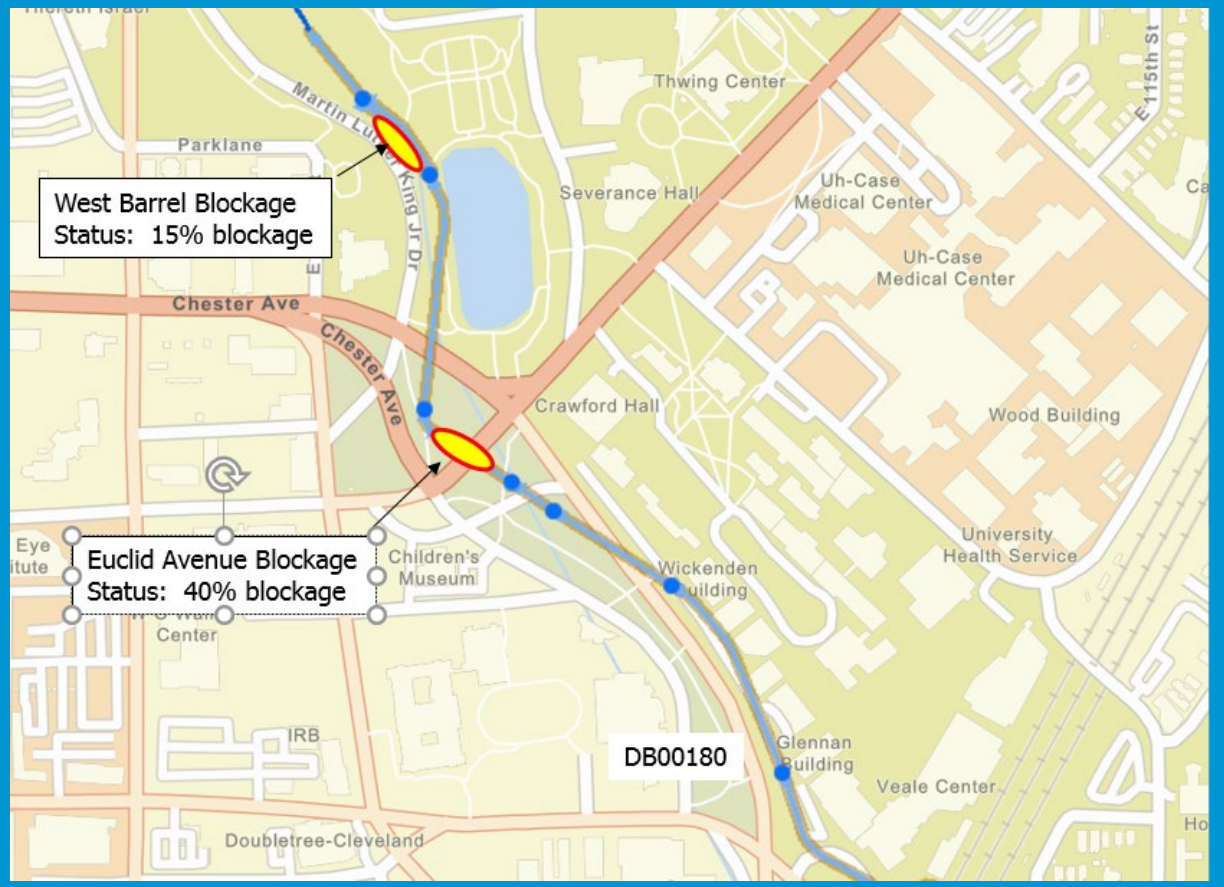
Stormwater Master Plan
Problem Area Determination



Watershed	Problem Areas
Beechers Brook	3
Chargrin Small Tribs	4
Doan Brook	6
Dugway Brook	5
Euclid Creek E.B.	7
Euclid Creek Main	2
Euclid Creek W.B.	7
Nine Mile Creek	5
Pepper Luce Creek	8
Sulfur Spring	1
Willey Creek	4
Totals	**52**

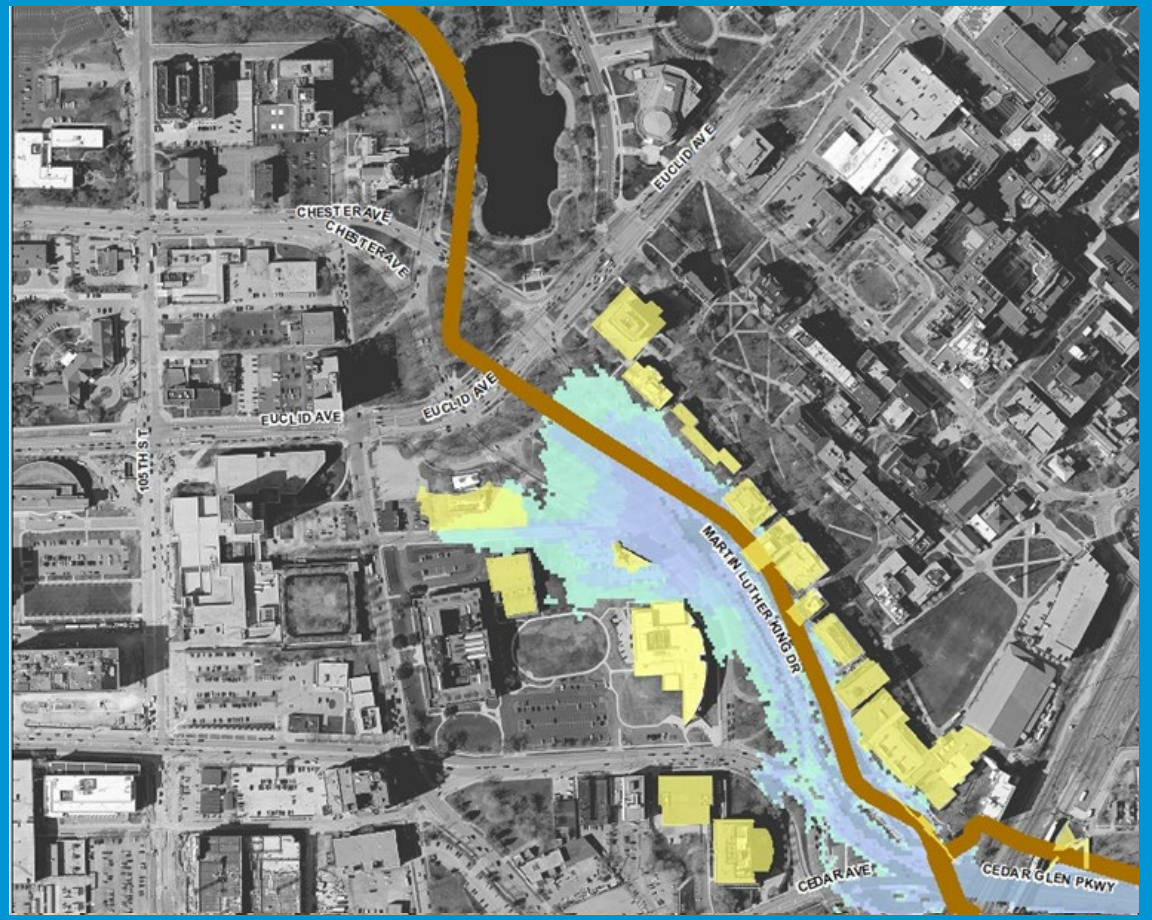
Chagrin River / Lake Erie Direct Tributaries SWMP
University Circle – Debris Removal Early Action

- SWMP Study inspection of Doan Brook culvert confirmed a ~40% debris blockage beneath Euclid Avenue & ~15% blockage near culvert outfall
- Debris consisted of small pebbles to large cobbles
- Debris blockage resulting in a <5-year Level of Service



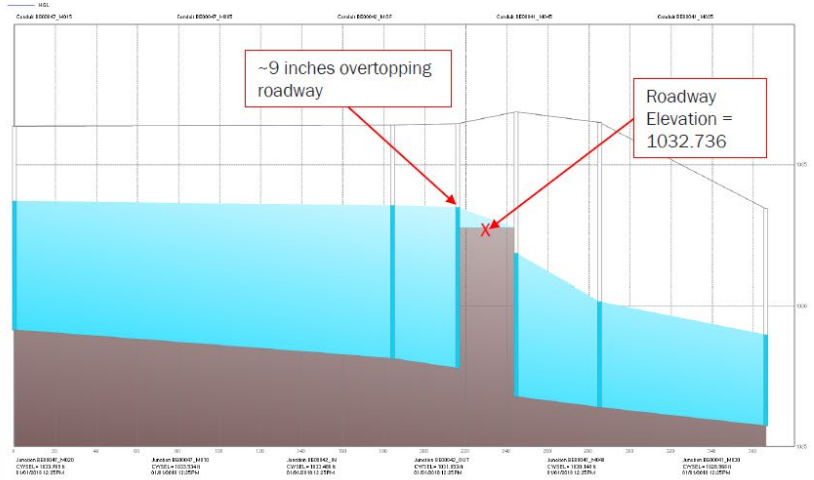
Chagrin River / Lake Erie Direct Tributaries SWMP
University Circle – Debris Removal Early Action

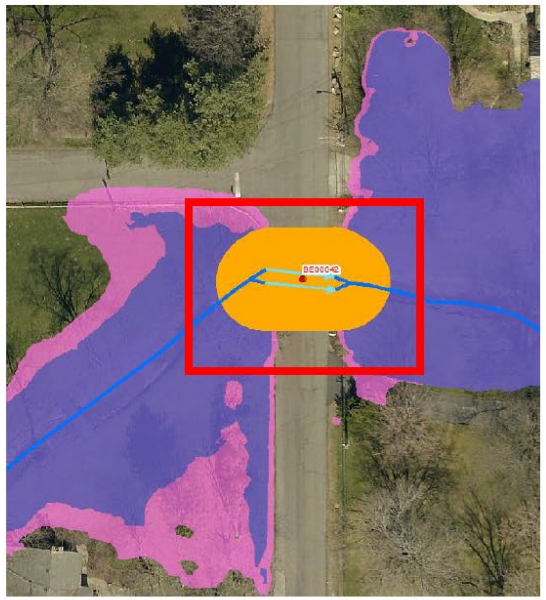
- 1,950 Cu. Yd. debris removed as of end of February 2021
- Removal of debris increased the Level of Service from the 5-year to 10-year storm event
- SWMP Study investigating additional alternatives that may raise the Level of Service to ~25-year storm event

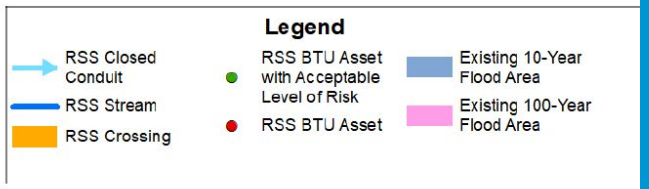


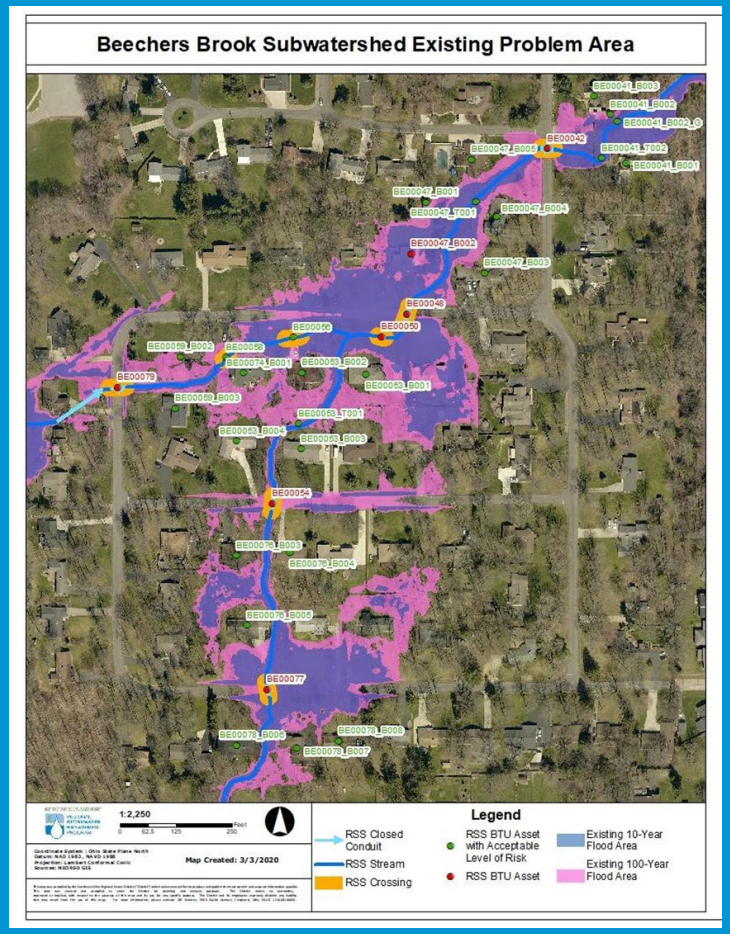
Chagrin River / Lake Erie Direct Tributaries SWMP
Mayfield Village – Worton Park Dr. Early Action

BE00042 – Worton Park Drive



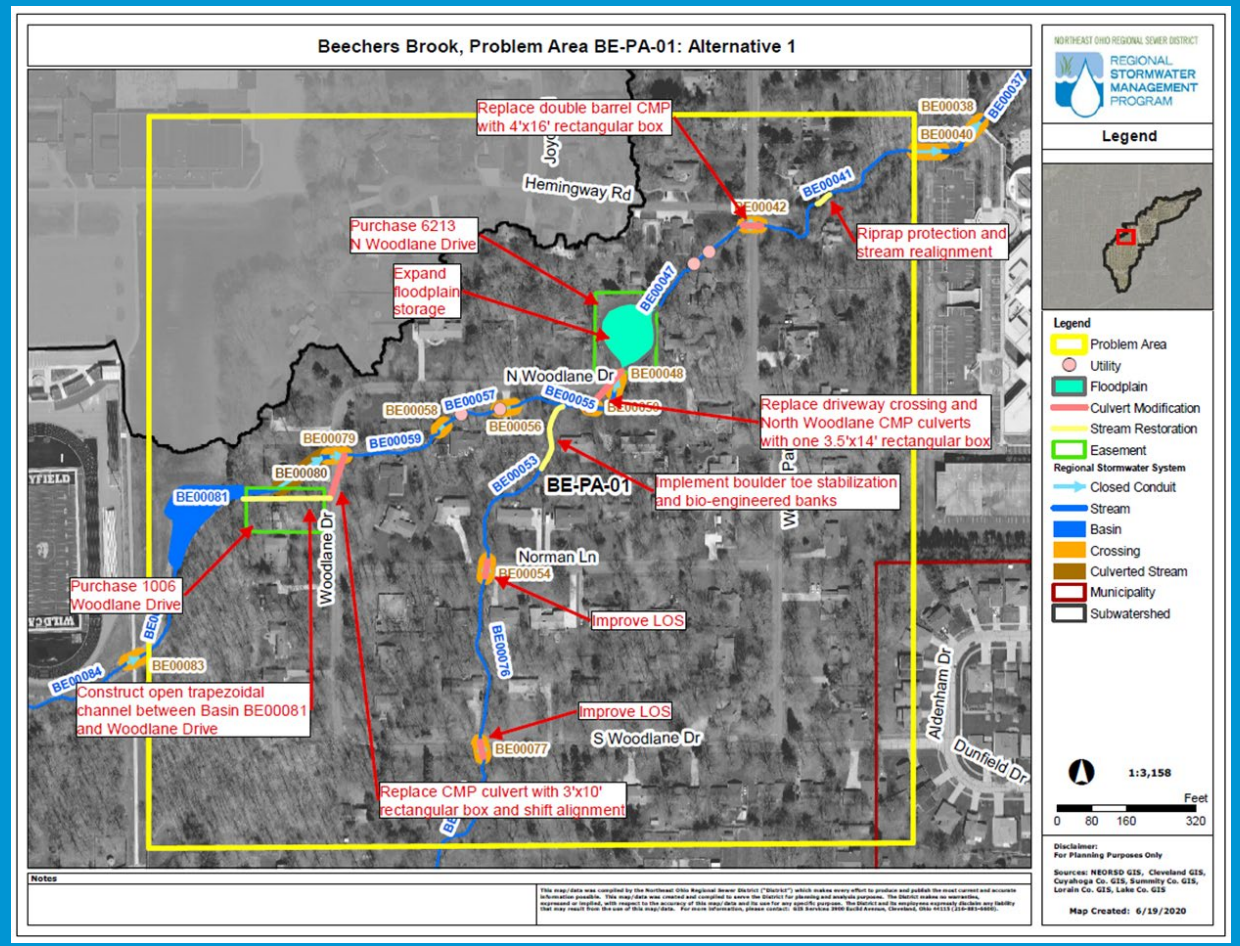






Chagrin River / Lake Erie Direct Tributaries SWMP
Mayfield Village – Worton Park Dr. Early Action

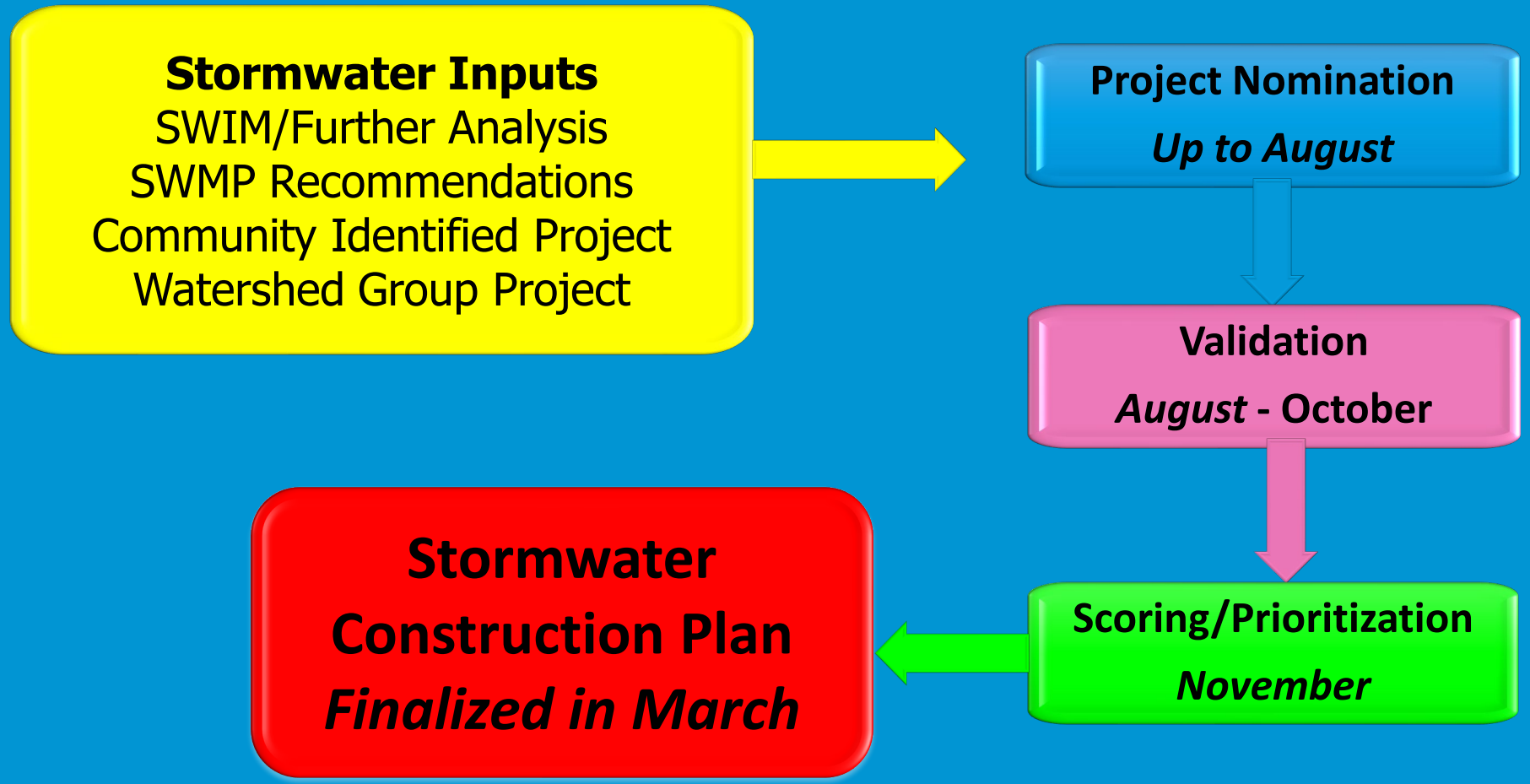
- Replace Worton Park Double-barrel CMP with 4’x16’ rectangular box
- Two property acquisitions
- Create expanded floodplain on parcel located at 6213 N. Woodland Dr.
- Channel improvements between BE0001 and Woodland Dr.
- Bank stabilization at 6206 N. Woodlane Drive parcel.



Northeast Ohio Regional Sewer District

REGIONAL STORMWATER MANAGEMENT

Stormwater Project Nomination Process



Chagrin River / Lake Erie Direct Tributaries Stormwater Master Plan
Advanced Stormwater Planning

Goal to ready projects for full design

- Projects that require additional information to understand full RSS impacts
- Are Cost Prohibitive w/o phasing
- Breakdown of complex, preferred alternatives into manageable projects
- Acquisition/Easement procurement
- Coordination considerations with outside stakeholders
- Current ASP contract started in 2020; opening RFQ for 2nd contract this fall.

Stormwater Master Plan
Data Sharing with Community Members

- Culverted Stream CCTV/PACP Reports
- Spherical Imagery of Open Streams
- Inventory of RSS Crossings
- RSS Asset Inspection records

Chagrin River / Lake Erie Direct Tributaries SWMP – Community Coordination

- Meet with communities
  - Stormwater Master Plan Review

- SWMP Recommendations and Community Report – 4th Quarter 2021

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

Questions

Lower Shaker Lake – Doan Brook Subwatershed

Stormwater Inspection & Maintenance (SWIM)

- Inspection and Maintenance Update
- SWIM Demolition Services

SWIM
2021 Inspection Program

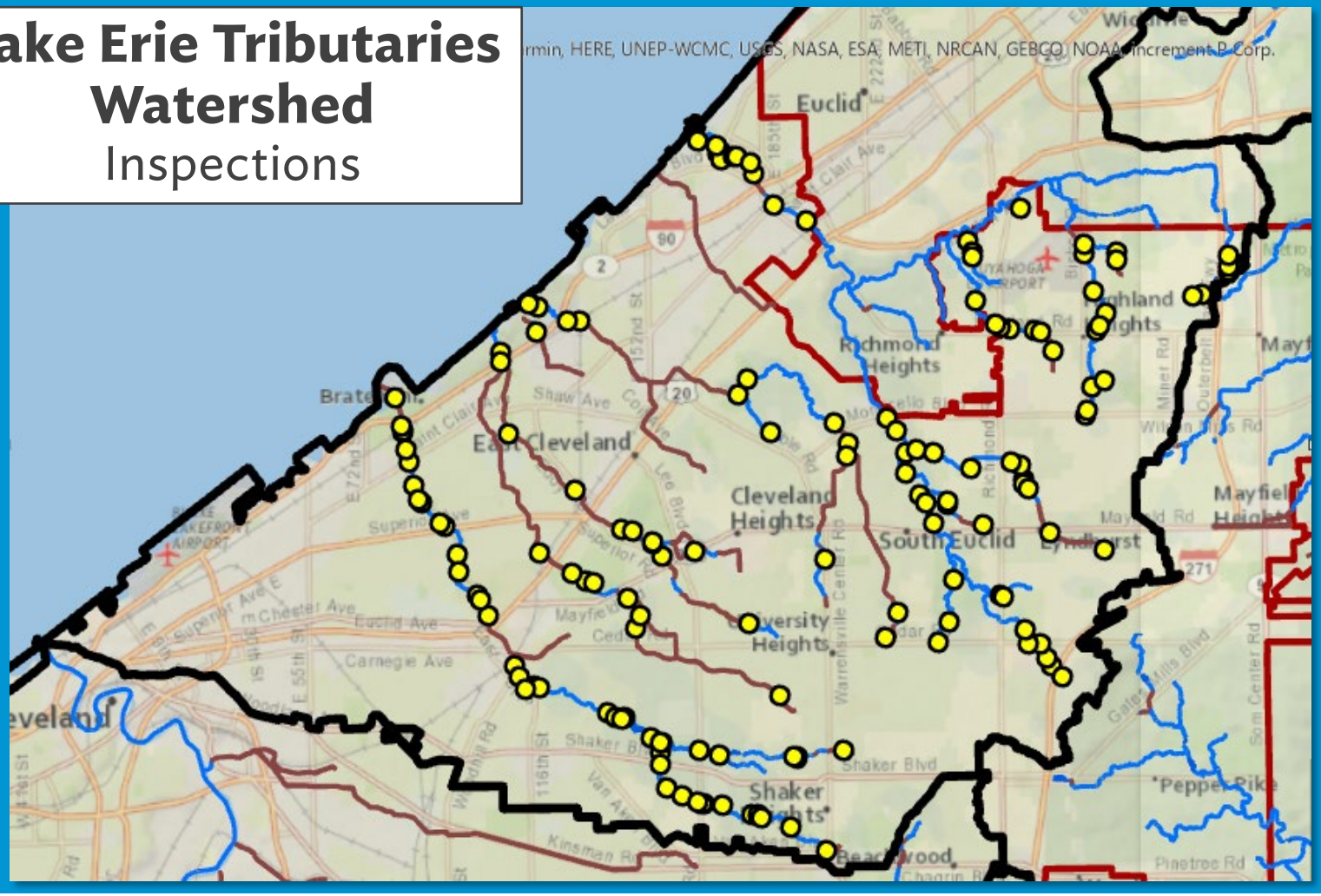

Big Creek, Parma

Northeast Ohio Regional Sewer District

REGIONAL STORMWATER MANAGEMENT

SWIM
2021 Inspection Program

Lake Erie Tributaries Watershed
Inspections



Completed SWIM Inspections 01/2021-09/2021

190 Total Inspections
- 157 SWIM Inspections
- 33 Responsible Party Benchmark Inspections

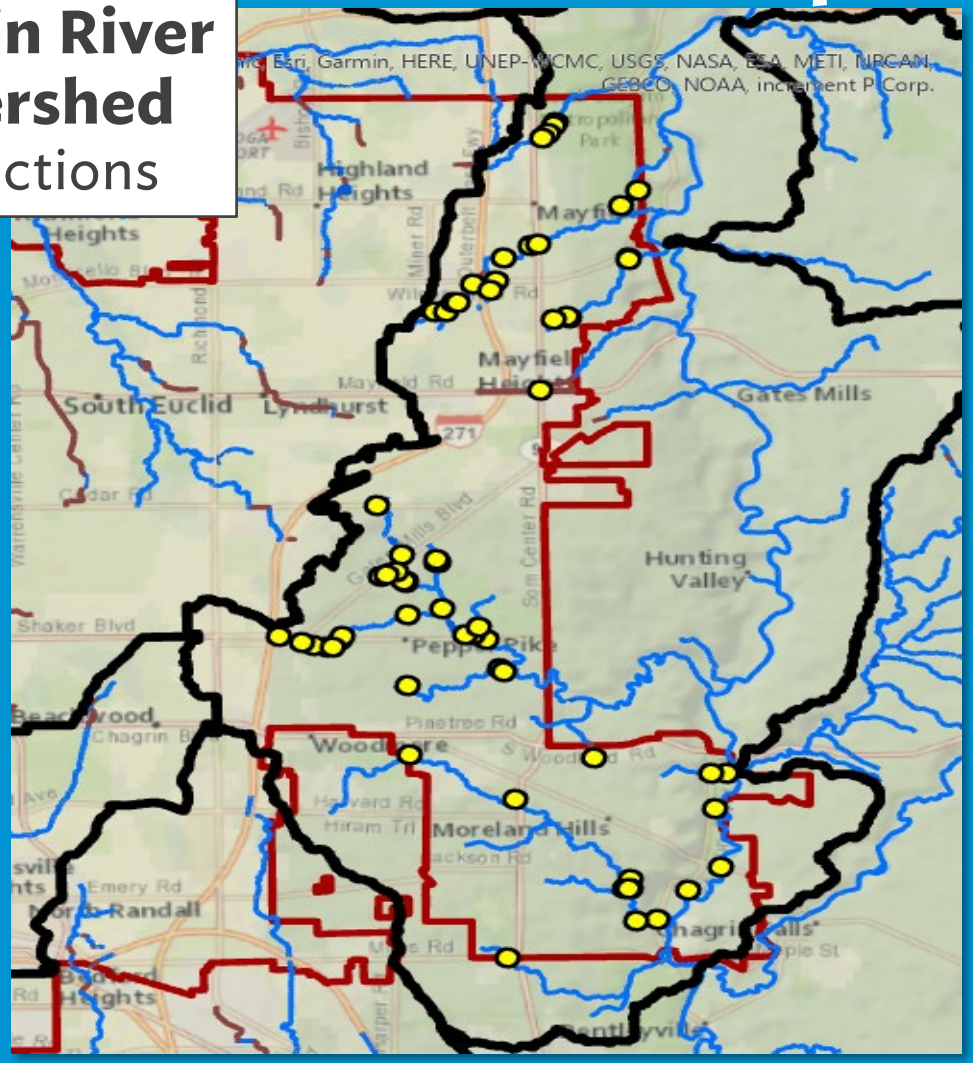
SWIM Inspections
Stream
Basin
Crossing
Culverted Stream
Major Structure
WAC Watersheds
District Stormwater Service Area

Northeast Ohio Regional Sewer District
REGIONAL STORMWATER MANAGEMENT

SWIM

2021 Inspection Program

Chagrin River Watershed
Inspections



Completed SWIM Inspections 01/2021-09/2021

70 Total Inspections

- 49 SWIM Inspections
- 21 Responsible Party Benchmark Inspections

SWIM Inspections
Stream
Basin
Crossing
Culverted Stream
Major Structure
WAC Watersheds
District Stormwater Service Area

Northeast Ohio Regional Sewer District

REGIONAL STORMWATER MANAGEMENT

SWIM

2021 Inspection Program

Northeast Ohio Regional Sewer District

REGIONAL STORMWATER MANAGEMENT

SWIM
2021 Inspection Program

Dugway East, Cleveland Heights

Northeast Ohio Regional Sewer District

REGIONAL STORMWATER MANAGEMENT

SWIM
2021 Maintenance Program

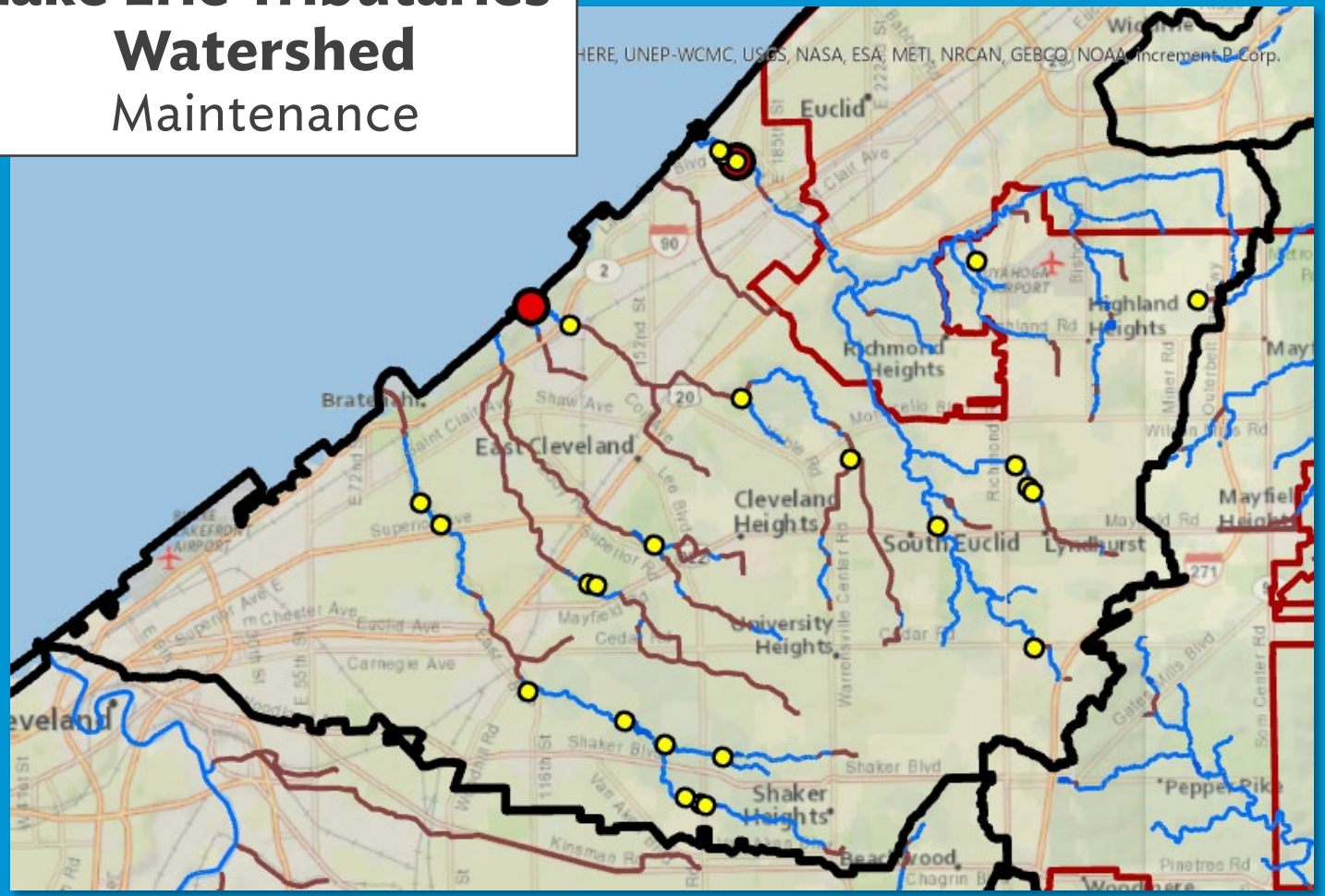
Northeast Ohio Regional Sewer District

REGIONAL STORMWATER MANAGEMENT

SWIM

2021 Maintenance Program

Lake Erie Tributaries Watershed
Maintenance



Maintenance Projects
01/2021 – 09/2021

Project Type	Projects (Count)	Debris Removed (CY)	Sediment Removed (CY)
Sediment & Debris	30	739	20
Other	2	15	0
Total	**32**	**754**	**20**

Maintenance Type
- Other
- Debris/Sediment Removal

- Stream
- Basin
- Crossing
- Culverted Stream
- Major Structure

- WAC Watersheds
- District Stormwater Service Area

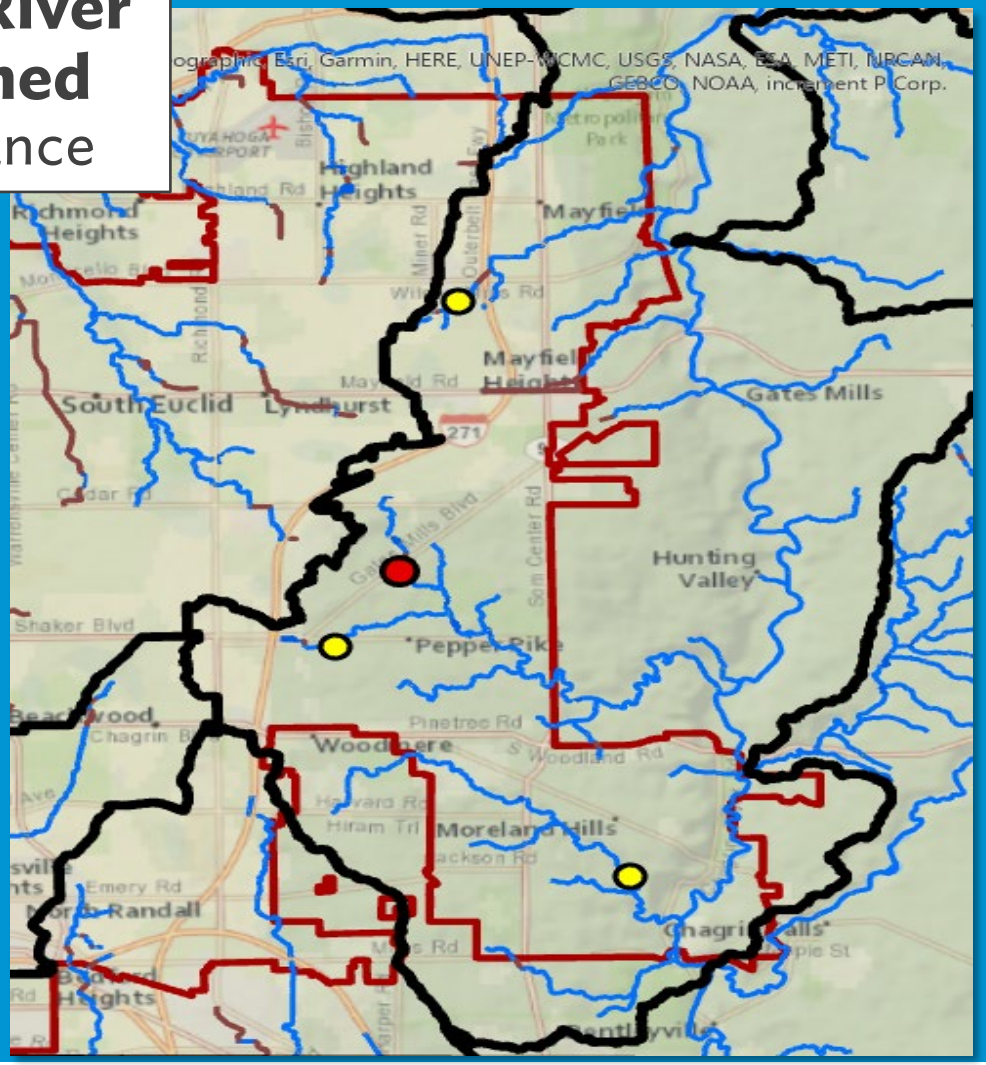
Northeast Ohio Regional Sewer District

REGIONAL STORMWATER MANAGEMENT

SWIM

2021 Maintenance Program

Chagrin River Watershed
Maintenance



Maintenance Projects
01/2021 – 09/2021

Project Type	Projects (Count)	Debris Removed (CY)	Sediment Removed (CY)
Sediment & Debris	3	105	0
Other	1	0	0
Total	**4**	**105**	**0**

Maintenance Type
- Other
- Debris/Sediment Removal

- Stream
- Basin
- Crossing
- Culverted Stream
- Major Structure

- WAC Watersheds
- District Stormwater Service Area

Northeast Ohio Regional Sewer District

REGIONAL STORMWATER MANAGEMENT

SWIM

2021 Maintenance Program

Northeast Ohio Regional Sewer District

REGIONAL STORMWATER MANAGEMENT

SWIM

2021 Maintenance Program

Northeast Ohio Regional Sewer District

REGIONAL STORMWATER MANAGEMENT

SWIM
Demolition Services Update

SWIM
Demolition Services Update

Anticipated Expenditure: $500,000 **Estimated Contract Period: 2 years**

Purpose: The purpose of this contract is to support the implementation of the Regional Stormwater Management Program through the demolition of structures on properties acquired for the completion of water resource projects along the Regional Stormwater System.

Demolition at Forest Overlook Drive, Seven Hills

Northeast Ohio Regional Sewer District

REGIONAL STORMWATER MANAGEMENT

Questions

Pepper Luce Creek Stabilization at Shaker Blvd

Northeast Ohio Regional Sewer District

REGIONAL STORMWATER MANAGEMENT

Stormwater Design and Construction

Northeast Ohio Regional Sewer District

REGIONAL STORMWATER MANAGEMENT

Rocky River Tributary Stabilization & Re-Alignment, North Royalton

Stormwater Design

Baldwin Creek Relief Culvert at Stormes Drive
City of Parma

Project Goals:

- Reduce flood risk
- Increase conveyance with new culvert

Consultant: EMH&T

Estimated Construction: $1.7M

Construction NTP: 1st Qrt 2022

Facts to Note:

- Almost all work is being performed in public R/W
- Future basin expansion project will continue to reduce flood risk in this neighborhood

Northeast Ohio Regional Sewer District

REGIONAL STORMWATER MANAGEMENT

Big Creek Flood Reduction near Sprague Road
Cities of North Royalton and Parma

Project Goals:

- Upsize Sprague Road crossing to reduce roadway flooding
- Increase storage through floodplain expansion
- Daylight existing culvert

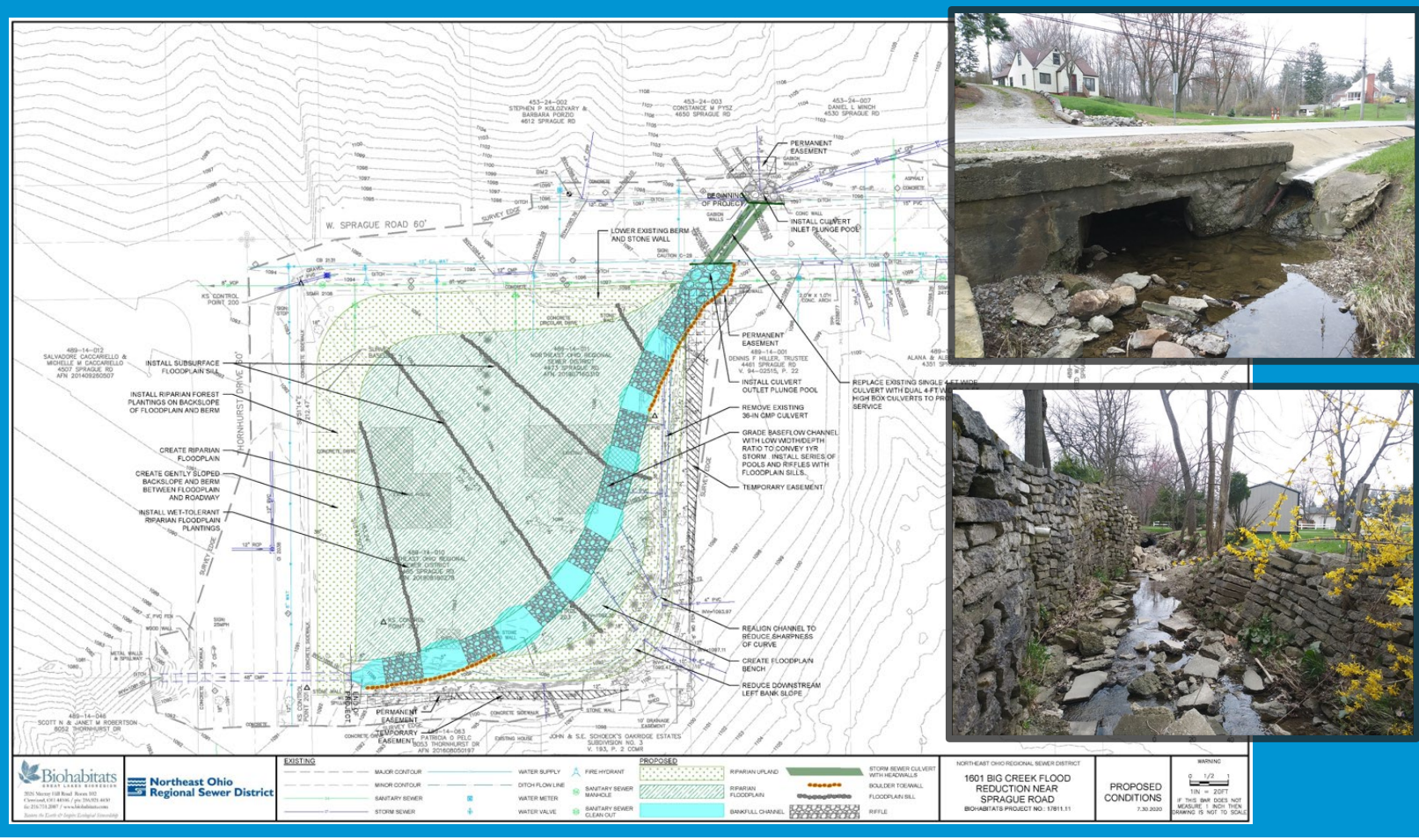
Consultant: Biohabitats, Inc.

Estimated Construction: $940K

Construction NTP: early 2022

Facts to Note:

- Fee simple land acquisition of 2 parcels
- Easements necessary on 4 parcels



Northeast Ohio Regional Sewer District

REGIONAL STORMWATER MANAGEMENT

Pepper Luce Creek Culvert Replacement & Rehabilitation at Gates Mills Boulevard

City of Pepper Pike

Project Goals:

- Rehabilitate and replace failing culverts
- Enlarge a detention basin to reduce flood risks to Gates Mills Blvd

Consultant: Jacobs Engineering Group

Estimated Construction: $2.2M

Construction NTP: 2nd Qrt 2022

Facts to Note:

- City of Pepper Pike is utilizing Community Cost Share for the rehabilitation of the upstream culvert

Northeast Ohio Regional Sewer District

REGIONAL STORMWATER MANAGEMENT

Mill Creek Culverted Streams Rehabilitation
City of Garfield Heights

Project Goals:

- Rehabilitate several culverted stream assets in the Mill Creek Subwatershed

Consultant: Brown and Caldwell

Estimated Construction: $1.5M

Construction NTP: early 2023

Facts to Note:

- Daylighting alternative of MC00058 to be evaluated as alternative

Northeast Ohio Regional Sewer District

REGIONAL STORMWATER MANAGEMENT

Culverted Streams Rehabilitation District-wide

Goals:

- Rehabilitate/replace culverted streams to reduce risk of failure
- Daylight streams currently in culverts, if feasible, to open streams to floodplains and increase water quality
- ***Budget ~$1.5M annually for rehab of these assets***

	A	B	C	D	
1	**Rank**	**Asset**	**Material**	**SWIM Score**	**Notes**
2	1	WB00084	CMP	4	Under the junkyard. Very poor condition. Milligan neigh
3	2	WB00173	RCP	5	Kollieda Ditch. Failure at the crown. Rest of pipe is "fair"
4	3	HC00053	CMP	4	Potential impact to Brecksville Road. Transitions to CMP
5	4	CH00175	CMP/RCP	5	Concrete has full depth spalling in the box. CMP with tot
6	5	BK00520	CMP	4	Compressed with open joint. Invert loss. Driveways imp
7	6	BD00296	CMP	4	Worse condition than BK00520 but in backyards. Not un
8	7	DE00015	CMP/RCP	4	Concrete with large voids in the invert. Past history of fai
9	8	PC00226	CMP/RCP	4	DS of Ursuline College. Ripped invert at the inlet. Perfor
10	9	EW00145	CMP	4	Invert with perforations. Previously lined. Potential impa
11	10	BC00037	CMP/RCP	4	Under multiple businesses. RCP with spalling and expose
12	11	DE00017	RCP	4	Holes in the concrete invert, missing brick, infiltration ru
13	12	DW00091	RCP	4	Sagging crown. Under driveway/local roadway.

Northeast Ohio Regional Sewer District

REGIONAL STORMWATER MANAGEMENT

Questions

Beecher's Brook Restoration w/ Educational Signage

Northeast Ohio Regional Sewer District

REGIONAL STORMWATER MANAGEMENT

Stormwater Construction

Northeast Ohio Regional Sewer District

REGIONAL STORMWATER MANAGEMENT

West Creek at Sandpiper Drive in the City of Parma

Rocky River Tributary Stabilization and Re-Alignment Along Ridge Road in City of North Royalton

Substantial Completion Anticipated
September 2021

Contract Amount: $438,471.10

Lineal Feet of Stream Work: 323’

Northeast Ohio Regional Sewer District

REGIONAL STORMWATER MANAGEMENT

Pepper Luce Creek Stabilization Near Lander Road

Substantial Completion Anticipated
September 2021

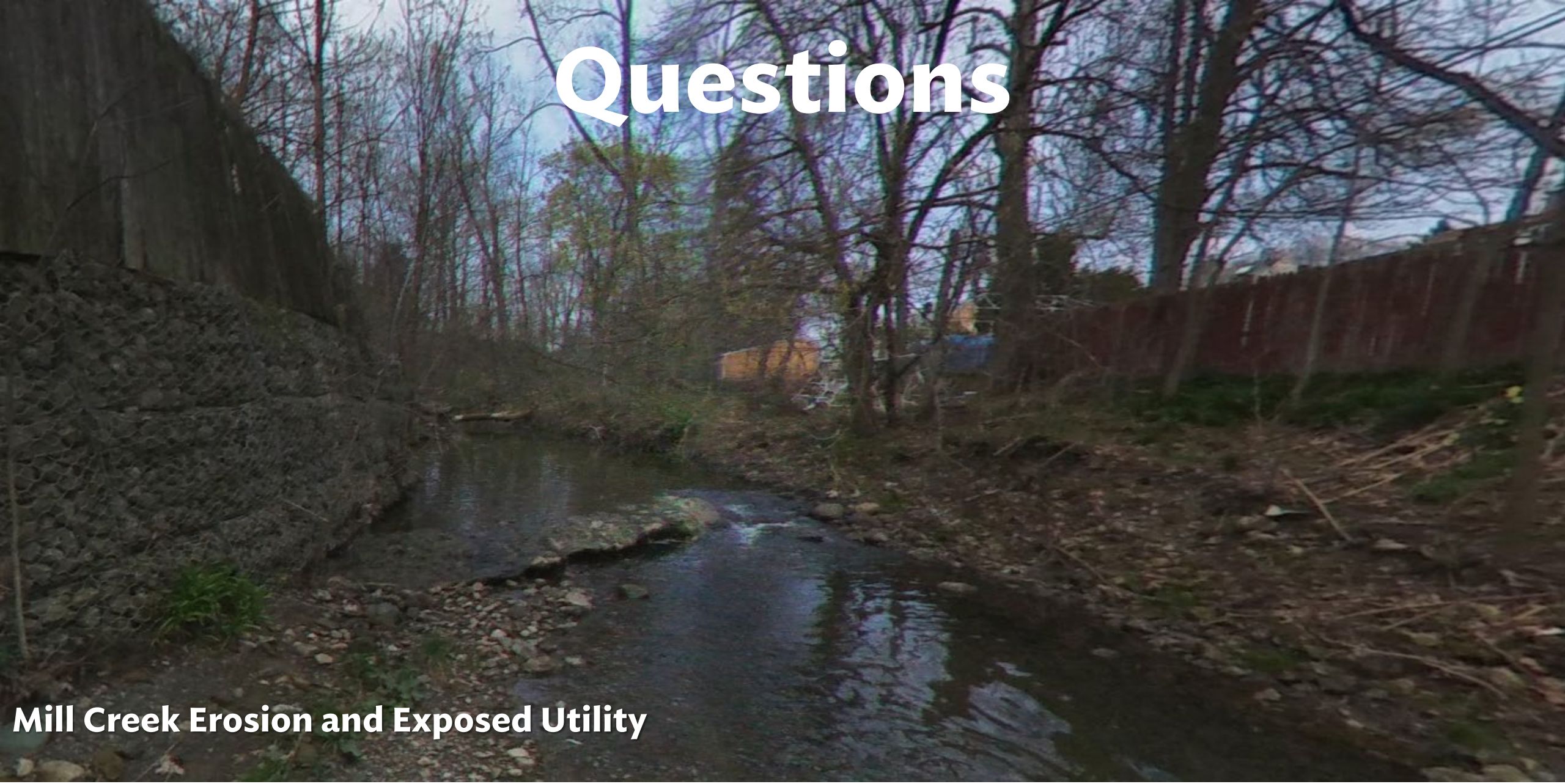
Contract Amount: $593,034.90

Lineal Feet of Stream Work: 575’

Northeast Ohio Regional Sewer District

REGIONAL STORMWATER MANAGEMENT

Questions



Mill Creek Erosion and Exposed Utility

WTL Contact

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Stormwater Program: Community Resources
http://www.neorsd.org/communitystormwaterresources.php