Alternatives and Implementation for the Cuyahoga South Watershed Master Plan

Kim Colich, NEORSD, Project Manager

Jocelyn Anleitner, CDM Smith, Water Resource Engineer

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CDM Smith

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Key Topics

- Regional Stormwater Program
- CRS Master Plan Progress
  - Risk Assessment
  - Problem Identification
  - Alternatives Development
  - Alternatives Evaluation
- Use of AGOL

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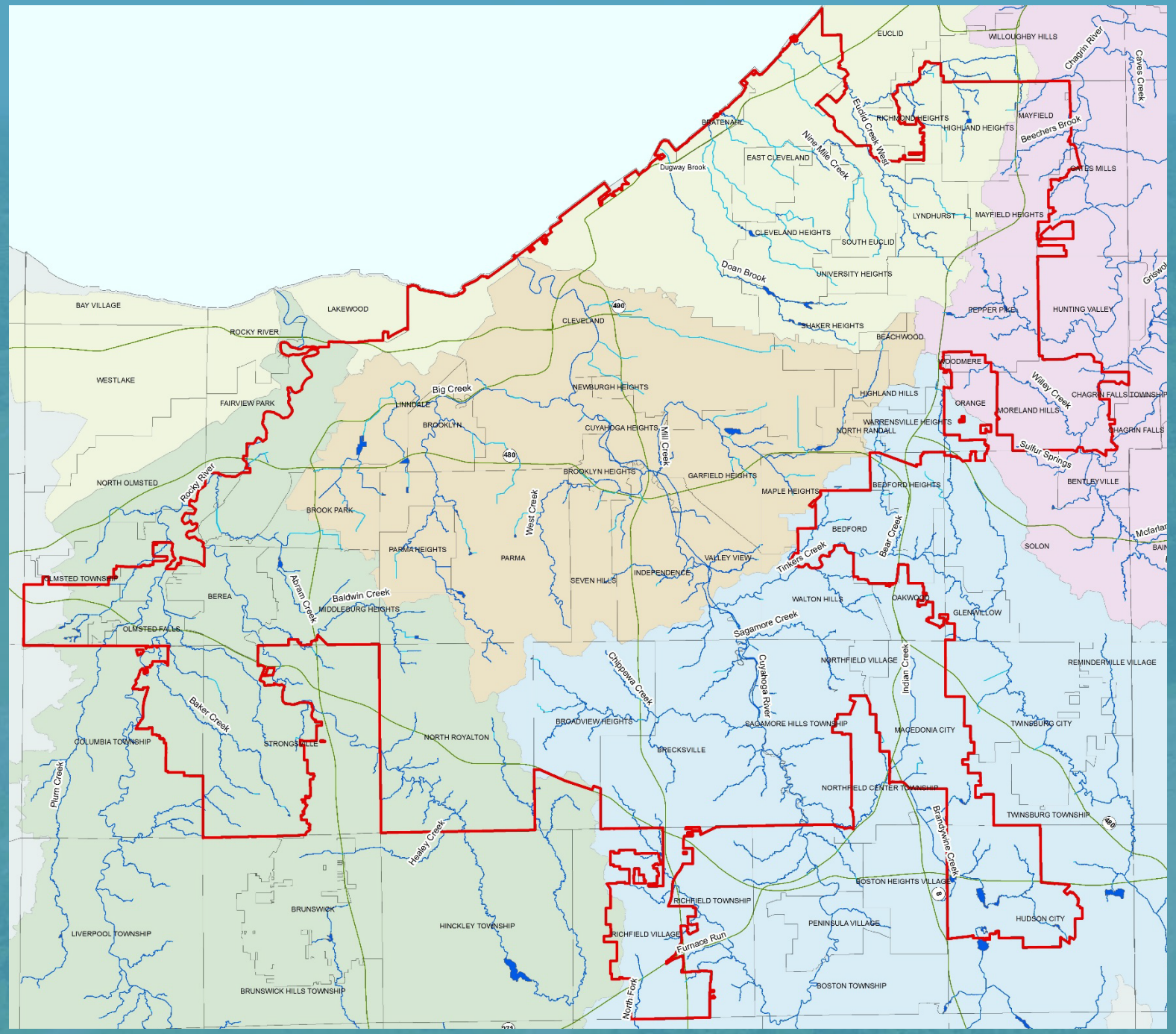

Regional Stormwater Program

- Miles of Regional Stormwater Service Area Assets: 443*
  - Only 405 miles in 2006

* current (anticipated to increase)

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Regional Stormwater Management Program Components

Stormwater Master Plans

Inspect & Maintain

Construct Projects

Encourage Good Practices

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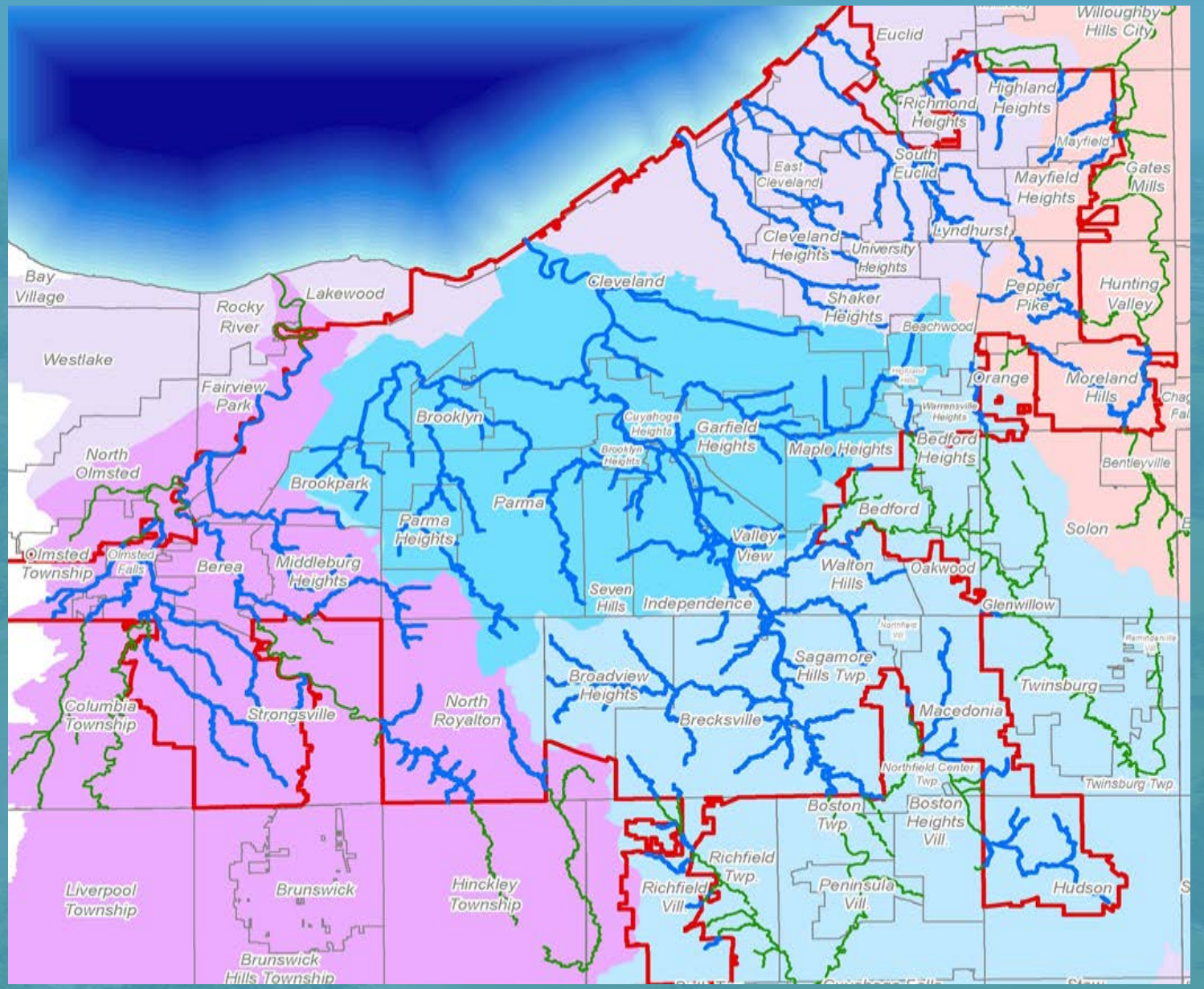
Program Goals

- Enhance Stream Function, Health, and Water Quality
- Reduce Flood and Erosion Risks
- Inspect, Operate, and Maintain Regional Assets
- Encourage Good Practices
- Assist with Policy Recommendations

Stormwater Master Plans

- Cuyahoga River South – In Progress
- Cuyahoga River North – In Progress
- Rocky River – In Progress
- Chagrin River & Lake Erie Direct Tribs – NTP 3rd Qrt 2018



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Stormwater Master Plan Objectives

Operational Performance Evaluation	Identify areas of erosion and flooding through modeling, field assessments, and monitoring
Alternatives Development & Evaluation	Comprehensive set of solutions, incorporating stream health, function, habitat, and water quality improvements
Development of Master Plans	Recommended policies, construction projects, maintenance activities, and areas for preservation

CRS Master Plan Progress

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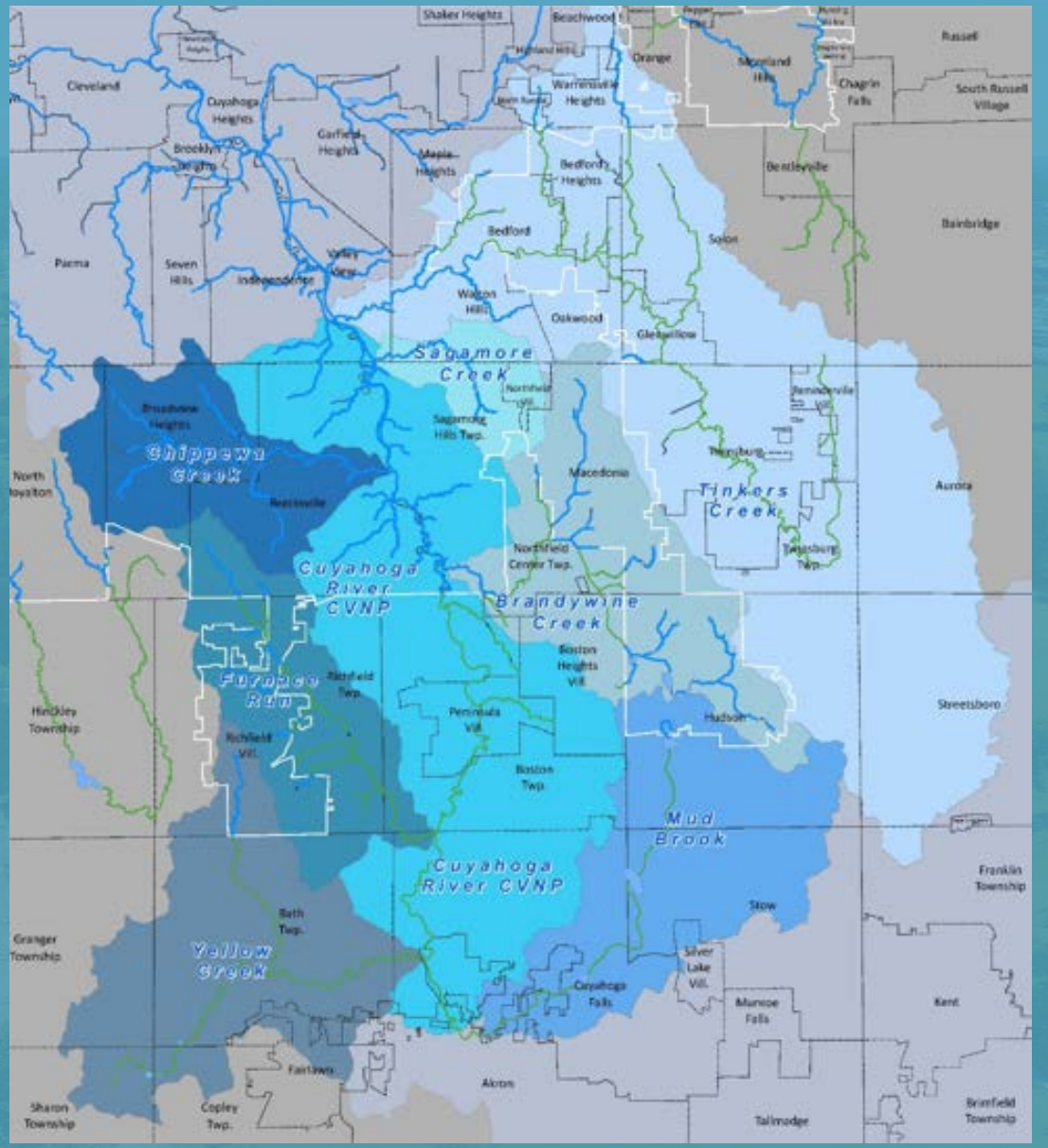
Cuyahoga River South SWMP Overview

- Total Study Area – 288 sq. miles
  - 89 sq. miles in Stormwater Service Area
  - 9 Subwatersheds
  - 24 Member Communities
  - Includes Cuy. Mainstem Alternatives Development
- Began August 2016
- Development/Refinement of SWMP Standards



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SWMP Process

Operation Performance Evaluation (Chapter 3)	Alternatives Evaluation (Chapter 8)		Master Plan Recommendations (Chapters 9 & 10)
ID Project Areas • Determine BRE ✓ Structural integrity ✓ Hydraulic condition ✓ Sediment/debris blockages • ID assets not meeting ALR • Group deficient assets into Project Areas	**Screen SCMs** • ID Opportunities/Constraints • Protect/Restore Function • Increase Function ✓ Reduce Runoff/ Restore Stream-Floodplain ✓ Enhance Storage – Conveyance ✓ Acquisition/Risk Mitigation • Formulate Two Alternatives	**Evaluate Alternatives** • Size to achieve ALR • Estimate costs • Define multiple benefits • Consider cost-risk tradeoffs • ID Business Case (TBL) • Select Preferred Alternative • Check watershedwide performance	**Phase/Prioritize Projects** • Long-term strategy ✓ Affordability ✓ Prioritization ✓ Strategic Phasing • Near-term actions ✓ Construction Projects ✓ Maintenance Projects ✓ Site-specific policies ✓ CIP Phasing

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SWMP Incorporates Asset Management

- Business Risk Exposure (BRE) = condition x criticality
- Identify assets not meeting Acceptable Level of Risk (≥20)

Criticality
Consequence of failure

	3	4	5	6	7	8	9
1							
2							
3							
4							
5							

Condition
Current state

Criticality Examples:
Highway 9
Local Road 6
Home 6
Shed 3
Stream 3

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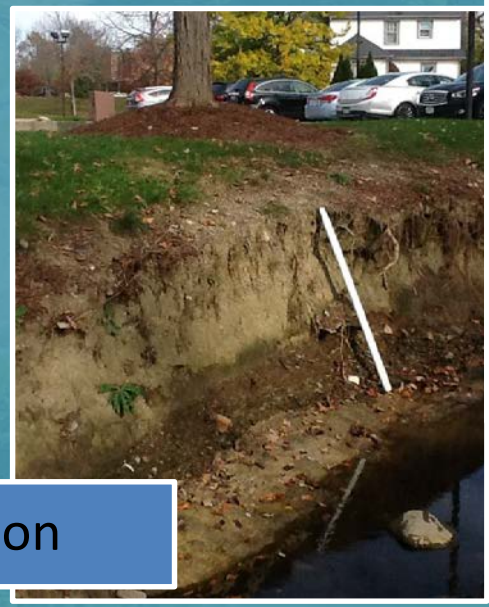
Condition Ratings

- SWMPs assess the RSS condition through field inspection & modeling

1	Fully Functional as designed
2	Fully Functional for current conditions
3	Functions as needed for current conditions
4	Less than full function for current conditions
5	Major investment to restore operation

Hydraulic Performance

Sediment & Debris



Erosion

Structural Integrity

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Project Area Identification

- Identify underlying source of risk
- Group problem assets together when solutions are interrelated

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Alternatives Development

SCMs to Preserve Existing RSS Function	SCMs to Increase RSS Function	
• Floodplain/riparian area protection • Removal/Modification of Unsustainable Development • SWM policies for development • Debris/Sediment Management (e.g., Trash rack/sediment forebay maintenance/installation) • Deteriorated structure repair/ replacement (e.g., Spot-repair bank/bed erosion) • Operation/maintenance of assets	**Runoff Reduction/Stream Restoration SCMs** • Decentralized green infrastructure • Decentralized detention within LSS • Stream and floodplain restoration • Streambank rehabilitation/restoration **Land Acquisition/Risk Mitigation SCMs** • Flood Proofing • Raise roadway elevations • Buyouts/property acquisition • Mitigate risks higher than the Acceptable Level of Risk (ALR)	**RSS Storage / Conveyance SCMs** • Retrofit regional detention • Add new regional detention • Transportation crossing replacement • Culverted stream replacement • Stream channelization / daylighting • Floodwall and levee

SCM Screening

Risk/Location/Assets	Runoff Reduction/Stream Restoration SCMs	RSS Storage/Conveyance SCMs	Land Acquisition/Risk Mitigation SCMs
Flooding of twelve businesses and 1,500 feet of Highland Road (Asset BR00110).	Infeasible to reduce 100-year runoff volume 1,660 acre-ft, required to adequately reduce flood stage below buildings, roadways,	Flooding caused by development encroaching into floodplain rather than hydraulic constraint on the RSS. Flood berm with local drainage protects building, roadway, with marginal impact to riparian area/ wetland	Flooding of five buildings begins during 25-year design storm. Flooding of four parking lots begin during 10-year design storm. Local roadway is passable during 10- to 25-year design storm; impassable during 50- to 100-year design storm. Preserves stream function/ health.

Legend:	Constraint	Opportunity if done with other projects	Opportunity

Triple Bottom Line Evaluation

Criteria/Subcriteria
Economics
Life Cycle Costs
Flood Damage Mitigation
Erosion Damage Mitigation
Social
Community Benefits
Sustainable Development/Infrastructure
Public Acceptance
Environmental/Stream Function and Health
Geomorphology
Vertical Stability
Lateral Stability
Habitat
Habitat Preservation/Restoration Outcome

Criteria/Subcriteria
Environmental/Stream Function and Health
Aquatic Biology
Fish Biology
Natural Land Preservation/Restoration
Runoff Volume, Baseflow, and Pollutant Loading
Operations and Maintenance
Frequency
Simplicity
Accessibility Requirements
Implementation
Construction Impacts
Property Acquisition
Ease of Construction
Regulatory complexity

ArcGIS Online (AGOL)

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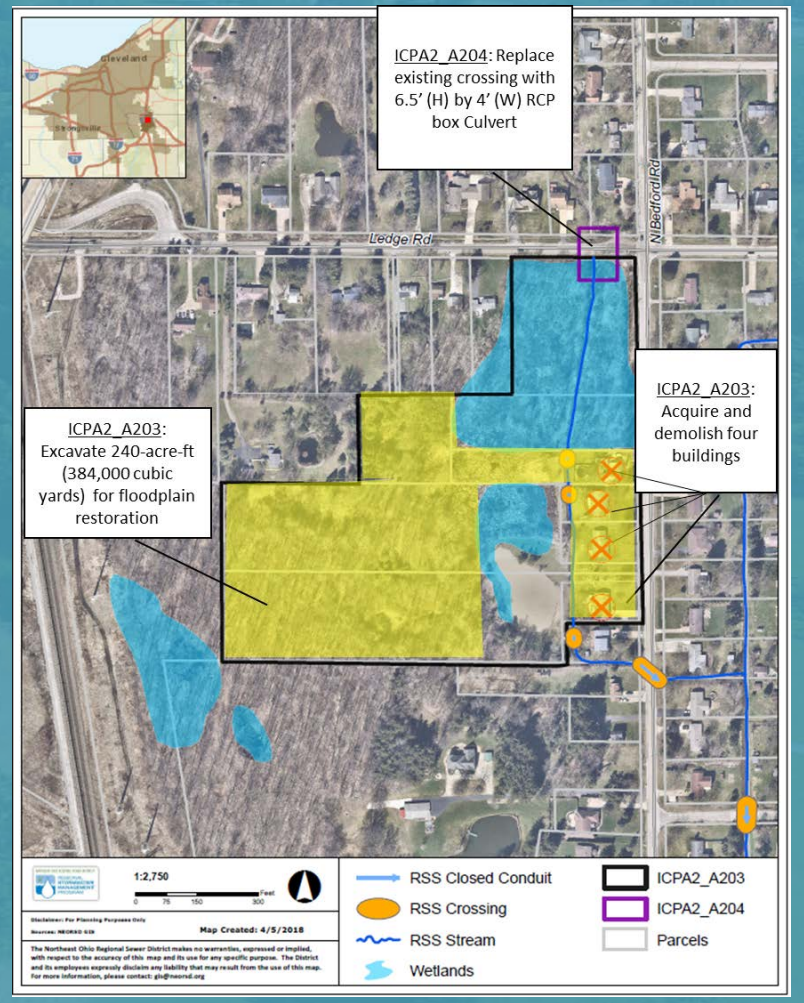
http://neorsd.maps.arcgis.com/home/webmap/viewer.html?webmap=0c8658180c35492f9f048a5b5dd5d5fc

What's next?

- Approximately 60 project areas total
- O&M Recommendations
- Community Reports



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Questions

- Kim Colich
  Senior Project Manager
  NEORSD
  216-881-6600, Ext. 6451
  ColichK@neorsd.org

- Jocelyn Anleitner
  Water Resources Engineer
  CDM Smith
  216-912-1006
  AnleitnerJV@cdmsmith.com

Northeast Ohio Regional Sewer District

CDM Smith

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