Northeast Ohio Regional Sewer District
Protecting Your Health and Environment

Level 3 Project Study Plan

2017 Cuyahoga River Environmental Monitoring

(1) Objectives

The lower Cuyahoga River has been designated as one of 42 Great Lakes Areas of Concern (AOC) by the International Joint Commission. Past monitoring indicated impairment of aquatic biota in the river and was the basis for the establishment of Total Maximum Daily Loads (TMDLs) for the Lower Cuyahoga River. The causes of impairment to the river were classified as organic enrichment, toxicity, low dissolved oxygen, nutrients and flow alteration (Ohio EPA, 2003)[1]. Recent monitoring by the Northeast Ohio Regional Sewer District (NEORSD), however, has shown recovery of the biological community in some reaches of the river. The purposes of this study are, therefore, are to determine the attainment status of the river in relation to point and nonpoint sources of pollution.

During the course of the study, fish communities, benthic macroinvertebrate communities, habitat and water chemistry will be surveyed at eight sites in the Cuyahoga River between River Mile (RM) 20.75 and RM 7.00. The results from these surveys will be used to characterize the overall fish and macroinvertebrate community health in the river.

Fish and macroinvertebrate community health will be evaluated through the use of Ohio EPA's Index of Biotic Integrity (IBI), Modified Index of Well-Being (MIwb) and Invertebrate Community Index (ICI). An examination of the specific characteristics of the biological communities will be used in conjunction with water quality data, the NEORSD Macroinvertebrate Field Sheet and Qualitative Habitat Evaluation Index (QHEI) results in order to identify impacts to the communities. Results will be compared to historic data to show temporal as well as spatial trends. Water chemistry data will also be compared to the Ohio Water Quality Standards to determine attainment of applicable uses (Ohio EPA, 2017).

In addition, chlorophyll *a* levels in the river may be measured at four locations (RMs 16.20, 10.75, 10.10, and 7.00) to assist in the determination of the impacts from nutrients in the river on the algal production. If completed, data sondes will be installed in the river as part of this sampling to provide a more comprehensive understanding of the relationship among algal production, nutrient levels, and dissolved oxygen diel swings in the river.

[1] See appendix H for a list of all references.

Finally, the data collected from this study may be used for pre-monitoring of the Route 82 dam removal. The dam is located downstream of RM 20.75 in the Cuyahoga Valley National Park. The removal of this dam is expected to improve fish populations and habitat upstream as well as improvements in the overall water quality of the Cuyahoga River.

(2) Point/Nonpoint Sources

Point Sources (Location on river)	Nonpoint Sources
Tinkers Creek (RM 16.36)	Urban runoff
Mill Creek (RM 11.49)	Landfills
West Creek (RM 11.05)	Spills
Southerly WWTC (RM 10.57)	Agricultural Runoff
Ohio Canal (RM 8.78)	
Big Creek (RM 7.20)	
Combined Sewer Overflows	
Storm Sewer Outfalls	

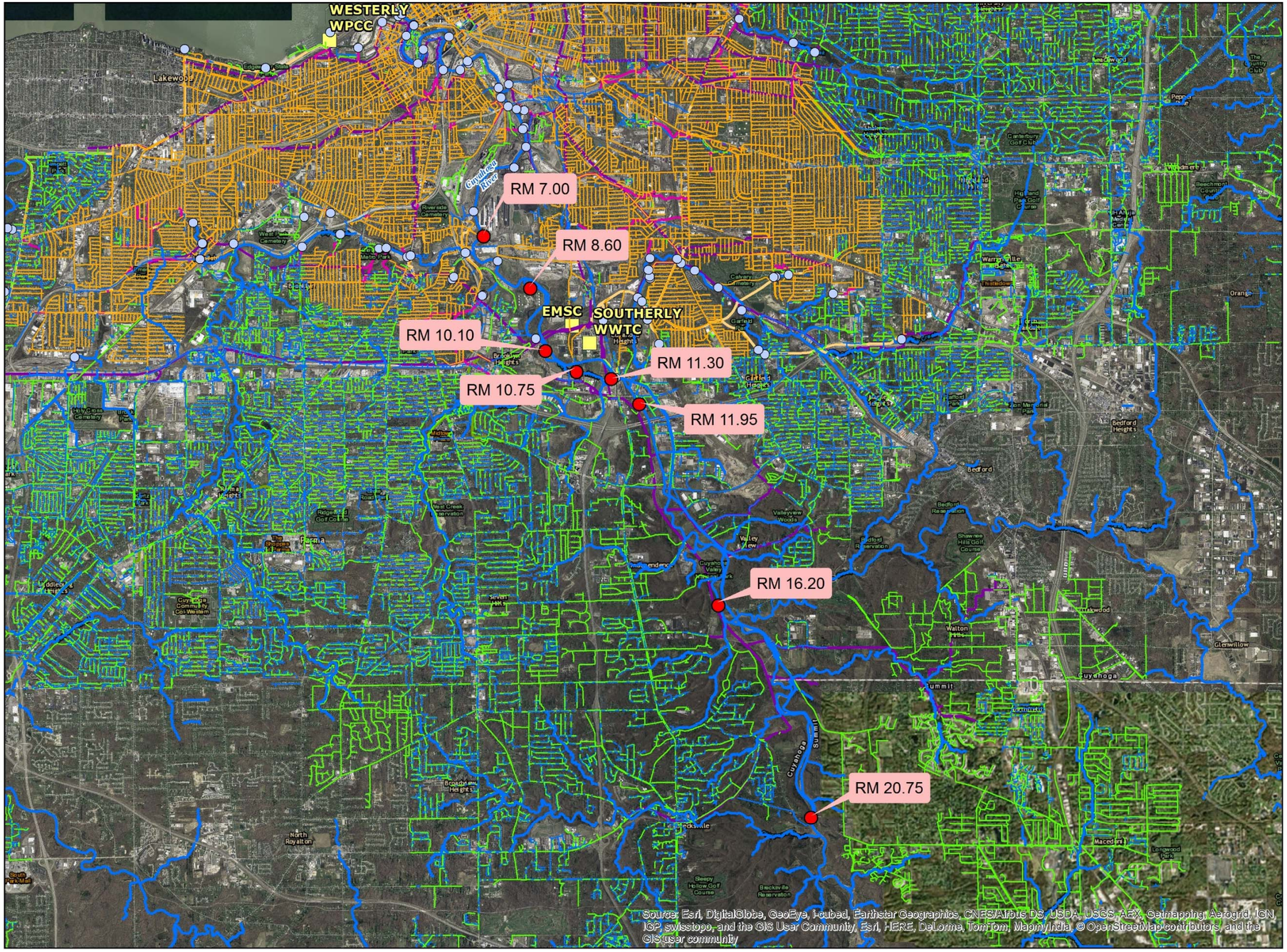
A map has been provided in Section 6 to show combined sewer overflows that may be influencing the water quality at each sample location. These sources, along with the ones listed in the table above, may be impacting the health of the fish and benthic macroinvertebrate communities in the Cuyahoga River watershed.

(6) Sampling Locations

The following electrofishing and macroinvertebrate sample locations, listed from upstream to downstream, will be surveyed during the 2017 field season. Benthic macroinvertebrate and water chemistry collection sites are located near the midpoint of each electrofishing zone, indicated by RM, unless otherwise noted. GPS coordinates are recorded at the downstream end of each electrofishing zone.

Location	Latitude	Longitude	River Mile	Description	HUC	Purpose
Upstream of State Route 82	41.3207	-81.5875	20.75	Upstream of the State Route 82 dam and downstream of the confluence with Chippewa Creek	04110002 - Cuyahoga	Evaluate water chemistry, fish, macroinvertebrates and habitat upstream of Route 82 dam prior to removal.
Downstream of Tinkers Creek	41.3678	-81.6139	16.20	Downstream of confluence with Tinkers Creek near Old Riverview Road	04110002 - Cuyahoga	Background data for fish, habitat, macroinvertebrates, and chlorophyll *a*
Upstream of Mill Creek	41.4123 41.4101	-81.6364 -81.6346	12.10[2] 11.95	Upstream of the confluence with Mill Creek (I-480)	04110002 - Cuyahoga	Evaluate Mill Creek discharge on fish, habitat and macroinvertebrates
Downstream of Mill Creek	41.4179	-81.6446	11.30	Downstream of confluence with Mill Creek	04110002 - Cuyahoga	Evaluate Mill and West Creek discharges on fish, habitat and macroinvertebrates
Upstream of Southerly WWTC	41.4196	-81.6547	10.75	Upstream of Southerly WWTC effluent discharge	04110002 - Cuyahoga	Evaluate West Creek and Southerly WWTC discharges on fish, habitat and macroinvertebrates and Southerly WWTC discharge on chlorophyll *a* levels
Downstream of Southerly WWTC	41.4242	-81.6638	10.10	Downstream of Southerly WWTC effluent discharge	04110002 - Cuyahoga	Evaluate Southerly WWTC discharge on fish, habitat, macroinvertebrates, and chlorophyll *a* levels
Upstream of Big Creek	41.4381	-81.6680	8.60	Upstream of the confluence with Big Creek	04110002 - Cuyahoga	Evaluate Big Creek discharge on fish, habitat and macroinvertebrates
Downstream of Big Creek	41.4497	-81.6815	7.00	Downstream of the confluence with Big Creek	04110002 - Cuyahoga	Evaluate Big Creek discharge on fish, habitat and macroinvertebrates; Southerly WWTC discharge on chlorophyll *a* levels

[2] HD and water chemistry collection site



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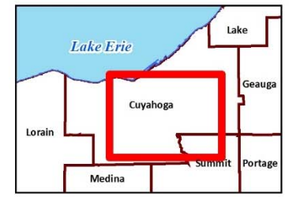
Overview Map



Legend

- Sample Point
- CSO Outfall
- Regional Drainage
- Local Combined Sewer
- Local Sanitary Sewer
- Local Storm Sewer
- NEORSD CSO Combined Sewer
- NEORSD CSO Responsibility Sewer
- NEORSD Intercommunity Relief Sewer
- NEORSD Interceptor
- District Facility

N

1 Mile