



**Study Plan for the
2014 Biological and Water Quality Survey
of the Southwest Ohio River Tributaries
Hamilton, Butler, Clermont, and Brown Counties, Ohio**



Division of Surface Water
June 11, 2014

Study Plan
for the
2014 Biological and Water Quality Survey
of the
Southwest Ohio River Tributaries and Upper Mill Creek
Hamilton, Butler, Clermont, and Brown Counties, Ohio

6/11/14

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County Sheriff Offices

- Brown Co.: (937) 378-4435 (Dial 911 for emergency help)
- Butler Co.: (513) 785-1300 (Dial 911 for emergency help)
- Clermont Co.: (513) 732-7500 (Dial 911 for emergency help)
- Hamilton Co.: (513) 946-6400 (Dial 911 for emergency help)

Area Hospitals/Emergency Rooms (Maps in Appendix A)

- Mercy Hospital Clermont 3000 Hospital Drive (off SR 32) Batavia OH
- University Hospital Emergency University of Cincinnati University of Cincinnati College of Medicine Cincinnati, OH 45229
- Mercy West Hospital 3300 Mercy Health Blvd. Cincinnati Ohio 45211

Introduction

During the 2014 field season (June through October) chemical, physical, and biological sampling will be conducted on twenty selected streams in the Southwest Ohio River Tributaries and Mill Creek watersheds to assess and characterize water quality conditions (Table 1). Aquatic Life Use designations have been verified for eight of twenty streams. Sampling of the remainder represents the initial assessment of these streams by Ohio EPA using approved protocols to assess aquatic life use designations and evaluate biological community condition. The study area involves fourteen HUC 12 watershed assessment units: 0509020111 (03, 04, 06 and 07); 0509020112 (01-04, 06 and 08); 0509020301 (01 and 03); 0509020302 (02 and 03).

Information collected as part of this survey will support TMDL development for the study area. The objectives of the TMDL process are to estimate pollutant loads from the various sources within the basin, define or characterize allowable loads to support beneficial uses, and to allocate pollutant loads among different pollutant sources through appropriate controls (e.g., NPDES permitting, storm water management, 319 proposals, NPS controls or other abatement strategies).

The components of the TMDL process supported by this survey are primarily the identification of impaired waters, verification (and redesignating if necessary) of beneficial use designations, gathering ambient information that will factor into the wasteload allocation, and ascribing causes and sources of use impairment. These data are necessary precursors to the development of effective control or abatement strategies (e.g., NPDES permitting, storm water management, 319 proposals, NPS controls or other abatement strategies).

The 2014 sampling effort is structured to characterize point source and nonpoint source impacts, including those from unsewered communities and agricultural activities. Additionally, habitat restoration projects Table 2a contains a list of NPDES facilities in the basin. CSO/SSO overflows with respective downstream sampling locations are listed in table 2b. Sampling locations with geographical coordinates and types of sampling scheduled for the study area are listed in Table 1.

Sampling Objectives:

- Monitor and assess the chemical, physical, and biological integrity of the water bodies within the study area.
- Assess physical habitat influences on stream biotic integrity.
- Determine recreational water quality.
- Evaluate the appropriateness of existing use designations and assign uses to undesignated streams. The Ohio EPA is obligated to review, evaluate, or recommend (where appropriate) beneficial uses prior to initiating any permitting actions to a water body. Waterbodies proposed for sampling with no existing aquatic life use are noted in Table 1
- Characterize the degree of aquatic resource degradation attributable to various land uses, including agricultural practices, and urbanization.
- Determine any aquatic impacts from known potential sources, including point source dischargers, and from unsewered communities. Sampling will include effluent grabs from the Clermont County Ninemile Creek , Butler County Upper Mill Creek Regional and Glendale WWTPs

- Collect fish samples for the Ohio Sport Fish Tissue Monitoring Program (used to assess chemical contaminant levels in fish) from Mill Creek at Sharon Road. (RM 16.57).
- Evaluate pre-construction conditions for planned 319 funded projects, the West Chester Service Center Bio-retention Swales and the Wildermuth Stream and Wetland Restoration, on Mill Creek and the East Branch Mill Creek, respectively and post-construction habitat improvements that related to Mill Creek Confluence Project (Twin Creek Preserve).

SAMPLING ACTIVITIES

Geo-Referenced Site Labels

The sites listed in the study plan table are coded with EA3 Station IDs that link data across several tables. They must be included on all field, lab and sample sheets and reported with all data results. If for some reason a location other than the one listed in the study plan is sampled, and that location is a trivial distance away from the one listed in the table and is fully representative of the EA3 Station, use the river mile listed in the study plan, and simply record the location information separately. An exact river mile can be assigned later to an Absolute Location Point (ALP) if warranted. If the location is not representative of the site listed on the study plan due to distance or a confounding factor, it should probably not be sampled, but if it is, it should be separated as a new station.

Sentinel Sites

To aid in the development of a TMDL model(s), sentinel sites have been established at six locations (Table 1). At each sentinel site, water quality samples are collected monthly beginning prior to the more encompassing survey that starts on June 15th. The purpose of the sentinel sites is to establish a baseline of water chemistry values under varying flow conditions. Stream stage is to be measured to the nearest hundredth of a foot as given by the water line against a designated bridge piling or abutment. Sampling events at sentinel sites, both chemistry and flow measurement, should cover a range of stream flow conditions from the 10th to 90th percentiles.

Chemical/Physical Water and Sediment

Chemical sampling locations within the study area are listed in Table 1. Conventional chemical/physical water quality samples will be collected 5-6 times at 42 designated locations. Sediment samples will be collected at nine locations. Datasondes® will be deployed at fourteen locations. Chemical parameters to be tested are listed in Table 3. Surface water sampling will occur across a variety of flow conditions, from lower flows to moderate and higher flows.

Bacteriological Sampling

Water samples will be collected at 27 chemistry sites for bacteriological analyses to determine the attainment status of the Primary Contact recreational use of the streams within the study area. Testing will include *Escherichia coli* (E. coli) bacteria. Each site will be sampled 8-12 times.

Chlorophyll

Benthic and sestonic chlorophyll a samples are to be collected at fourteen sites noted in Table 1. Benthic and sestonic chlorophyll samples are to be collected at least once, and should be timed to coincide with deployment of Datasonde© automated data loggers during stable, baseflow conditions (i.e., typically the second deployment).

Macroinvertebrate, Fish and Habitat Assessment

Macroinvertebrate and fish sampling will occur at 40 locations utilizing methods as listed in Table 1. Twelve sites will receive quantitative macroinvertebrate and two pass fish sampling. The remaining 28 sites are scheduled for qualitative macroinvertebrate sampling and single pass fish sampling. Qualitative Habitat Evaluation Index (QHEI) scores will be calculated at all fish sampling locations.

Fish Tissue

Fish tissue samples will be collected from one location as part of the Ohio Fish Tissue Consumption Monitoring Program. Fillet samples of edible size sport fish will be tested for organochlorinated pesticides, PCBs, mercury, lead, cadmium, arsenic, and selenium. Results will be used in the Ohio Sport Fish Consumption Advisory Program.

QUALITY ASSURANCE/SAMPLING METHODS

Ohio EPA Manuals

All biological, chemical, data processing, and data analysis methods and procedures adhere to those specified in the Surface Water Field Sampling Manual for water column chemistry, bacteria and flows (Ohio EPA 2013a), Biological Criteria for the Protection of Aquatic Life, Volumes II - III (Ohio EPA 1987, 1989a, 1989b, 2013b, 2013c), and The Qualitative Habitat Evaluation Index (QHEI); Rationale, Methods, and Application (Ohio EPA 1989c, 2006) for habitat assessment, Ohio EPA Sediment Sampling Guide and Methodologies (Ohio EPA 2012a), and Ohio EPA Fish Tissue Collection Guidance Manual (Ohio EPA 2012b).

Use Attainment

Attainment/non-attainment of aquatic life uses will be determined by using biological criteria codified in Ohio Administrative Code (OAC) 3745-1-07, Table 7-17. Numerical biological criteria are based on multimetric biological indices including the Index of Biotic Integrity (IBI) and modified Index of Well-Being (Miwb), indices measuring the response of the fish community, and the Invertebrate Community Index (ICI), which indicates the response of the macroinvertebrate community. Performance expectations for the basic aquatic life uses (Warmwater Habitat [WWH], Exceptional Warmwater Habitat [EWH], and Modified Warmwater Habitat [MWH] were developed using the regional reference site approach (Hughes et al. 1986; Omernik 1987). This fits the practical definition of biological integrity as the biological performance of the natural habitats within a region (Karr and Dudley 1981). Attainment of an aquatic life use is FULL if all three indices (or those available) meet the applicable criteria, PARTIAL if at least one of the indices did not attain and performance did not fall below the fair category, and NON if all indices either fail to attain or any index indicates poor or very poor performance. The results will be compared to WWH biocriteria for the appropriate ecoregion; either Interior Plateau (WAP) or Eastern Corn Belt Plain.

Recreational use attainment will be determined using *E. coli* bacteria, which are indicator organisms for the potential presence of pathogens in surface water resulting from the presence of untreated human or animal wastes, and they are the basis for recreational use water quality criteria in Rule 3745-1-07 of the Ohio Administrative Code (OAC).

Stream Habitat Evaluation

Physical habitat is evaluated using the Qualitative Habitat Evaluation Index (QHEI) developed by the Ohio EPA for streams and rivers in Ohio (Rankin 1989). Various attributes of the available habitat are scored based on their overall importance to the establishment of viable, diverse aquatic faunas.

Evaluations of type and quality of substrate, amount of instream cover, channel morphology, extent of riparian canopy, pool and riffle development and quality, and stream gradient are among the metrics used to evaluate the characteristics of a stream segment, not just the characteristics of a single sampling site. As such, individual sites may have much poorer physical habitat due to a localized disturbance yet still support aquatic communities closely resembling those sampled at adjacent sites with better habitat, provided water quality conditions are similar. QHEI scores from hundreds of segments around the state have indicated that values higher than 60 were generally conducive to the establishment of warmwater faunas while those which scored in excess of 75-80 often typify habitat conditions which have the ability to support exceptional faunas.

Biological Community Assessment

Macroinvertebrates will be collected from artificial substrates and/or natural stream habitats. Artificial substrate collections will be collected at all sites with greater than 20 mi² drainage areas or at reference site locations. This sample provides quantitative data and consists of a composite sample of five modified Hester-Dendy multiple-plate artificial substrate samplers colonized for six weeks. Qualitative sampling will be conducted at all sampling locations. This sampling effort consists of an inventory of all observed macroinvertebrate taxa from the natural stream habitats at each site with no attempt to quantify populations other than notations on the predominance of specific taxa or taxa groups within major macrohabitat types (e.g., riffle, run, pool, margin). Detailed macroinvertebrate assemblage sampling protocols are documented in Biological Criteria for the Protection of Aquatic Life, Volume III (1989b, 2013c).

Fish will be sampled at each sampling location using pulsed DC headwater, or wading electrofishing methods depending on watershed size at each sampling zone. Sites with drainage areas greater than 20 mi² or at reference site locations will be sampled twice during the sampling index period. Fish are processed in the field which includes identifying each individual to species, counting individuals at all sites, weighing individuals at wading and boat sites, and recording any external abnormalities. Detailed fish assemblage sampling protocols are documented in Biological Criteria for the Protection of Aquatic Life, Volume III (1989b, 2013c).

Sediment

Fine grained multi-incremental sediment samples will be collected in the upper 4 inches of bottom material using either decontaminated stainless steel scoops or Ekman dredges. Collected sediment will be placed into appropriate containers, placed on ice (to maintain 4oC) and shipped to the Ohio EPA lab. Sampling and decontamination protocols will follow those listed in the Ohio EPA Sediment Sampling Guide and Methodologies (2012a)

Chlorophyll

Benthic and sestonic chlorophyll a samples will be collected and preserved using appropriate methods, as outlined in Appendix II of Surface Water Field Sampling Manual for water column chemistry, bacteria and flows (Ohio EPA 2013a) and delivered to the Ohio EPA Division of Environmental Services lab for analyses. Alkalinity must be requested as a routine water quality parameter at all study sites along with the routine field parameters, especially temperature and pH.

Surface Water

Surface water grab samples will be collected and preserved using appropriate methods, as outlined in Surface Water Field Sampling Manual for water column chemistry, bacteria and flows (Ohio EPA 2013a) and delivered to the Ohio EPA Division of Environmental Services lab for analyses. Field measurements

of dissolved oxygen, pH, temperature, and conductivity will be made using YSI 650 MDS and Professional Plus meters along with all grab samples for surface water chemistry. Datasonde® continuous recorders will be placed at select locations to evaluate diel measurements of dissolved oxygen, pH, temperature, and conductivity.

Bacteria

Water samples will be collected into appropriate containers, cooled to 4°C, and transported to the Belmont Laboratories (Englewood, OH) within 6 hours of sample collection. All samples will be analyzed for *E. coli* bacteria using U.S.EPA approved methods (STORET Parameter Code 31648).

Fish Tissue

Tissue fillet samples will be collected from fish of edible size, and species preferred for analysis may include spotted bass, largemouth bass, smallmouth bass, flathead catfish, walleye, saugeye, white bass, common carp, freshwater drum, and channel catfish. When possible, composite samples (by species) will be collected using a minimum of three fish and a minimum of 150 grams of material. At each sampling location, an attempt will be made to collect five fish species for fillet tissue analysis. Fish will be sampled using electrofishing boat methods at the reservoir and wading method at the remainder sites. Sampling locations are listed in Table 2. Fish used for tissue analysis will be filleted in the field using decontaminated stainless steel fillet knives. Filleted samples will be wrapped in aluminum foil, placed in a sealed plastic bag, and placed on dry ice. Sampling and decontamination protocols will follow those listed in the Ohio EPA Fish Collection Guidance Manual (2012b). Fish tissue samples will be stored in chest freezers at the Ohio EPA Groveport Field Facility prior to delivery to DES.

Field Quality Control Samples

Ten percent of the sediment, water, and bacteria samples will be submitted to the lab as field duplicates. One Datasonde® recorder site will have two instruments placed in the river as field duplicates. Field blanks will occur at a minimum of 5 percent of the water samples. Field instruments will be calibrated daily, using manufacturer guidelines and requirements noted in the Manual of Ohio EPA Surveillance Methods and Quality Assurance Practices (Ohio EPA 2013a). Matrix spike duplicates will be collected for organic water samples at a minimum of 5 percent.

Table 1. Sampling locations and types of sampling scheduled for the Southwest Ohio River Tributaries study area.

Station Code	Location Description	River Mile	Drain Area	Aquatic Life Use	Lat.	Long.	Sampling	Issue
Q01S19	MILL CREEK E OF HAMILTON @ LIBERTY-FAIRFIELD RD.	26.35	3.90	WWH	39.37939	-84.47832	C,B,F,Mq	Assess 319 improvements
Q01W08	MILL CREEK NEAR PORT UNION @ ST. RT. 747	22.06	20.60	WWH	39.33738	-84.46238	C,MQ,F2	Assess 319 improvements
Q01W05	MILL CREEK NEAR CRESCENTVILLE @ CRESCENTVILLE RD.	18.69	27.00	WWH	39.29920	-84.43440	C,D,N,B,MQ,F2,Sd,Sn	Sentinel Site
Q01W03	MILL CREEK 30 FT. UPST. CONFL E. FK. MILL CREEK	17.96	32.50	WWH	39.28970	-84.43440	C,MQ,F2	Assess 319 improvements
Q01S17	MILL CREEK NE OF GLENDALE @ KEMPER RD.	17.61	44.80	WWH	39.28440	-84.43310	C,D,N,B,MQ,F2,Sd	WWTP impacts
600400	MILL CREEK AT SHARONVILLE @ SHARON RD.	16.57	50.50	WWH	39.26934	-84.43215	C,D,N,B,MQ,F2,Sd,T	WWTP impacts
Q01S04	GLENDALE WWTP 001 OUTFALL TO TOWN RUN (16.91)	0.92	1.90		39.27231	-84.44731	C,B	Effluent Sample
Q01S02	TOWN RUN (16.91) DST. GLENDALE WWTP @ CHESTER RD.	0.67	2.10	None	39.27420	-84.44420	C,D,N,F,Mq,Sd	WWTP impacts
Q01G01	E. FK. MILL CREEK NEAR WEST CHESTER @ WEST CHESTER RD.	3.17	5.00	WWH	39.32600	-84.41520	C,F,Mq	Assess 319 improvements
600460	E. FK. MILL CREEK NEAR WEST CHESTER @ ALLEN RD.	1.85	8.10	WWH	39.31337	-84.42642	C,D,N,F,Mq	Assess 319 improvements
301418	E. FK. MILL CREEK NEAR WEST CHESTER UST WWTP	1.15	9.00	WWH	39.30387	-84.43119	F,Mq	Preconstruction Willdermuth 319
Q01E01	BUTLER CO. UPPER MILL CREEK REGIONAL WWTP 001 OUTFALL	1.07	9.00		39.30294	-84.43123	C,B	Effluent Sample
Q01P01	E. FK. MILL CREEK NEAR CRESCENTVILLE @ CRESCENTVILLE RD.	0.76	9.20	WWH	39.29890	-84.42970	C,D,N,B,MQ,F2,Sd,Sn	Sentinel Site
Q01S24	E. FK. MILL CREEK NEAR CRESCENTVILLE @ MOUTH	0.01	9.70	WWH	39.28970	-84.43360	C,MQ,F2	Assess 319 improvements
Q01K24	RAPID RUN NEAR CINCINNATI @ BENDER RD.	0.70	6.32	LRW	39.10302	-84.66154	C,B,F,Mq	HUC 12 Spatial coverage
Q01K23	MUDDY CREEK NEAR CHEVIOT @ EBENEZER RD.	5.4	7.60	WWH*	39.13470	-84.65110	C,B,F,Mq	Aquatic Life Use
609040	MUDDY CREEK NEAR CINCINNATI @ HILLSIDE RD.	1.96	12.10	WWH*	39.12220	-84.68750	C,D,N,B,F,Mq,Sd,Sn	Sentinel Site, Aquatic Life Use
X01W07	BULLSKIN CREEK NE OF CEDRON @ DUNBAR RD.	4.38	27.70	WWH	38.81030	-84.04140	C,D,N,MQ,F2	HUC 12 Spatial coverage

Station Code	Location Description	River Mile	Drain Area	Aquatic Life Use	Lat.	Long.	Sampling	Issue
X01W08	BULLSKIN CREEK @ FELICITY CEDRON RURAL RD.	2.96	48.00	WWH	38.80080	-84.05860	C,D,N,B,MQ,F2,Sd,Sn	Sentinel Site
302698	W. BR. BULLSKIN CREEK @ MT. ZION RD.	4.65	5.74	WWH*	-84.03556	38.86845	C,B,F,Mq	Aquatic Life Use
X01W09	W. BR. BULLSKIN CREEK E OF FELICITY @ RICHEY RD.	0.59	25.00	WWH*	38.83580	-84.05170	C,B,MQ,F2	Aquatic Life Use
302697	MIDDLE BRANCH BULLSKIN CR UPST BULLSKIN RD	0.05	5.40	WWH*	38.81906	-84.04139	C,B,F,Mq	Aquatic Life Use
302696	E. BR. BULLSKIN CREEK @ LANE OFF LANG RD	4.7	10.50	WWH*	38.83054	-83.98307	C,B,F,Mq	Aquatic Life Use
302695	E. BR. BULLSKIN CREEK @ DUNBAR RD	0.4	15.80	WWH*	38.81059	84.03556	C,F,Mq	Aquatic Life Use
302694	CROOKED RUN @ OLD CARNTOWN RD	0.7	0.86	WWH*	38.79278	-84.13168	C,F,Mq	Aquatic Life Use
X01W12	BEAR CREEK NW OF CHILO, ADJ. BEAR CREEK RD.	1.72	7.80	WWH	38.80158	-84.16011	C,B,F,Mq	HUC 12 Spatial coverage
302693	MAPLE CREEK @ MAPLE CREEK RD	1.62	7.70	WWH*	38.82219	-84.20704	C,B,F,Mq	Aquatic Life Use
302692	LITTLE INDIAN CREEK E OF MOSCOW, ADJ LAUREL MOSCOW RD	0.85	4.90	WWH*	38.86789	-84.21814	C,B,F,Mq	Aquatic Life Use
302691	BIG INDIAN CREEK @ BEECH RD, UPST BEECH RUN	8.7	5.40	WWH	38.88132	-84.10611	C,F,Mq	HUC 12 Spatial coverage
302689	BIG INDIAN CREEK @ SR 222	6.9	10.80	WWH	38.87570	-84.12979	C,F,Mq	HUC 12 Spatial coverage
X01W04	BIG INDIAN CREEK E OF POINT PLEASANT @ ST. RT. 743	4.89	27.40	WWH	38.88000	-84.16080	C,D,N,B,MQ,F2	HUC 12 Spatial coverage
609080	BIG INDIAN CREEK AT POINT PLEASANT @ ST. RT. 756	1.71	37.70	WWH	38.88970	-84.20810	C,D,N,B,MQ,F2,Sd,Sn	Sentinel Site
X01W06	N. FK. INDIAN CREEK @ LAUREL - POINT ISABEL RD.	0.93	10.90	WWH*	38.89920	-84.17310	C,B,F,Mq	Aquatic Life Use
302688	BOAT RUN @ US 52	0.2	3.65	WWH*	38.92567	-84.25626	C,B,F,Mq	Aquatic Life Use
X01W13	TWELVEMILE CREEK @ LAUREL-LINDALE RD.	6.44	6.80	WWH	38.96780	-84.20110	C,F,Mq	HUC 12 Spatial coverage
302534	TWELVEMILE CREEK @ FAGINS RUN RD, DST FAGINS RUN	2.08	18.30	WWH	38.96742	-84.26954	C,D,N,B,F,Mq,Sd,Sn	Sentinel Site
302687	TENMILE CREEK DST POND RUN RD	3.61	5.66	WWH	39.00851	-84.25941	C,F,Mq	HUC 12 Spatial coverage
609050	TENMILE CREEK NEAR PALESTINE @ U.S. RT. 52	1.23	12.80	WWH	39.00798	-84.30060	C,D,N,B,F,Mq	HUC 12 Spatial coverage

Station Code	Location Description	River Mile	Drain Area	Aquatic Life Use	Lat.	Long.	Sampling	Issue
302686	TRIB. TO TENMILE CREEK (3.58) ADJ. COLE RD	0.01	3.50	WWH*	39.00893	-84.25947	C,F,Mq	Aquatic Life Use
X01W01	NINEMILE CREEK UPST. WWTP @ LOCUST CORNER RD.	0.79	8.10	WWH	39.02960	-84.31100	C,D,N,B,F,Mq	HUC 12 Spatial coverage
X01E03	CLERMONT CO. NINEMILE CREEK WWTP 001 OUTFALL TO NINEMILE CRK	0.19	8.40		39.02330	-84.31560	C,B	Effluent Sample
609010	EIGHTMILE CREEK NEAR CINCINNATI @ U.S. RT. 52 (OLD KELLOG)	0.2	3.70	WWH	39.03441	-84.33226	C,B,F,Mq	HUC 12 Spatial coverage
302685	FIVEMILE CREEK @ FIVEMILE RD	2.37	3.38	WWH	39.05341	-84.37190	C,F,Mq	HUC 12 Spatial coverage

C – Water Chemistry sampling

D – Datasonde[®] site

N – Nutrient site – Follow procedures outlined in the Chlorophyll *a*, BOD5 and Sonde site selection (revision #3) dated March 10, 2014

B – Bacteria site

Sn – Sentinel site

Sd – Sediment site - Full Organic Scan [Pesticides (including Chlordane), BNAs, TOC and PCBs], Full Metals Scan (including Hg and Ag), Percent Solids

L – Lake site

T – Fish Tissue site

F2, – Two pass fish site

F – Single pass fish site

MQ – Macroinvertebrate quantitative site

Mq – Macroinvertebrate qualitative site

Table 2a. NPDES dischargers covered by the 2014 Integrated Biological and Water Quality Survey of the Southwest Ohio Tributaries.

NPDES	Facility	ADF (MGD)	Design (MGD)	Stream	Notes
1PW00020	Airy Pointe Condo Association WWTP	0.01	0.016	West Fork	
1PB00012	Glendale STP	0.68	0.75	Town Run	
1IC00018	Xtek Inc. Plant No 2	0.13		unnamed tributary of Mill Creek	
1PK00016	Upper Mill Creek Water Reclamation Facility	8.68	16	East Fork Mill Creek	
1PT00016	Monroe Elem School	0.0041	0.0096	unnamed tributary of Boat Run	
1PV00046	Lakeside Estates MHP	0.02	0.0304	Ferguson Run	
1PV00026	Hi-View Estates MHC WWTP	0.02	0.0378	unnamed tributary of Twelve Mile Creek	
1PV00027	Hilltop Enterprises Hilltop Estates MHP	0.035	0.075	unnamed tributary of Fagin Run	
1PV00085	Chestnut Lane Manufactured Home Park	0.003167	0.0039	unnamed tributary of Fagin Run	
1PV00102	Tall Timbers MHP	0.03	0.053	Briggs Run	
1PV00000	Tradewinds MHP	0.02	0.0555	unnamed tributary of Ten Mile Creek	
1IY00030	Pierce Union Batavia WTP	0.67		Ten Mile Creek	
1PK00008	Nine Mile Creek WWTP	1.51	3	Nine Mile Creek (Ohio River Backwaters)	Small sanitary
1GS00009	Hamilton County June Berry WWTP	0.000001	<0.025	unnamed tributary of Eight Mile Creek	Small sanitary
1GS00007	Hamilton Co Breezy Point STP	0.0056	<0.025	unnamed tributary of Eight Mile Creek	
1IY00127	Felicity WTP	0.006		Bullskin Creek (Ohio River backwater)	
1PH00011	Felicity WWTP	0.17	0.25	unnamed tributary of Bear Creek	
1GN00004	Finishing Technology Inc.	0.0005		Mill Creek	Noncontact cooling water

Bold - Majors

Table 2b. CSO/SSO overflow locations.

CSO/SSO ID Number	SSO or CSO	HUC 12	Downstream OEPA Sampling Locations (Station Code)
915A	SSO	50902030103	600400
1025	SSO	50902030103	600400
1635	SSO	50902030103	600400
522	CSO	50902030203	Q01K23 and 609040
518	CSO	50902030203	Q01K23 and 609040
198	CSO	50902030203	Q01K23 and 609040
1061	SSO	50902030203	Q01K23 and 609040
523	CSO	50902030202	Q01K24
1061	SSO	50902030202	Q01K24

Table 3. Chemical/physical water quality parameters to be analyzed/measured in surface water, sediment, and fish tissue from the Southwest Ohio River Tributaries and Upper Mill Creek watershed sampling locations. Not all sites will be sampled for all parameters. Water samples will be collected 5-6 times (organics at all sentinel sites only), sediment once. Bacteria samples will be collected 8-12 times during the recreation season. Select sampling locations will be monitored for dissolved oxygen, pH, temperature, and conductivity using Datasonde© continuous recorders (Table 1).

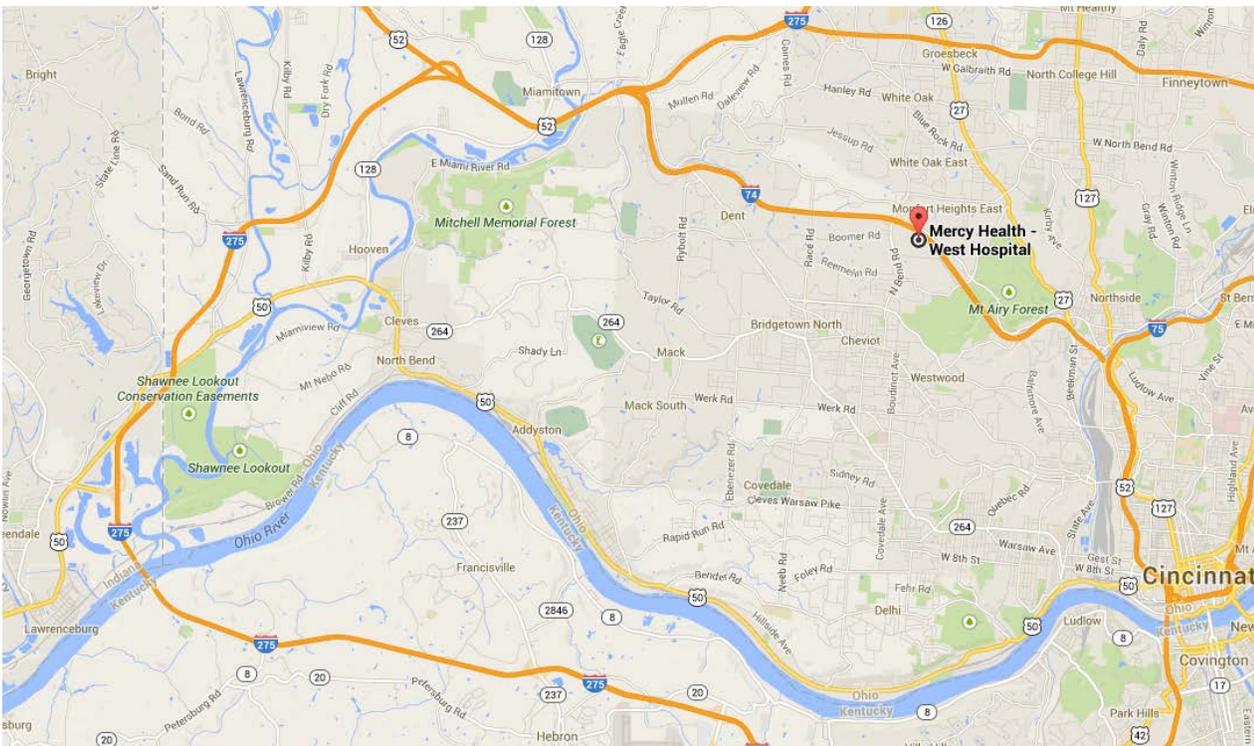
Parameters	Test Method	Water	Sediment	Fish Tissue
CBOD, 20 day	OEPA 310.2	X		
ALKALINITY, TOTAL	SM 2320B	X		
SOLIDS, DISSOLVED (TDS)	USEPA 160.1	X		
SOLIDS, SUSPENDED (TSS)	USEPA 160.2	X		
AMMONIA	USEPA 350.1 SM 4500-NH3 B+E	X	X	
TKN	USEPA 351.2	X		
NITRATE-NITRITE	USEPA 353.1	X		
Nitrite	USEPA 354.1	X		
Chloride	USEPA 325.1	X		
COD	USEPA 410.4	X		
TOTAL PHOSPHORUS	USEPA 365.4 USEPA 365.4	X	X	
ORTHOPHOSPHATE, Dissolved	USEPA 365.1	X		
SULFATE	ASTM 05160 92	X		
ICP 1 (Al,Ba,Ca, Fe, Mg, Mn, Na, Ni, K, Sr, Zn, Hardness)	USEPA 200.7	X		
ICP 3 (Al,Ba,Ca,Fe,Mg,Mn,Na,K,Sr,Zn)	USEPA 200.7		X	
ICPMS 1 (As,Cd,Cr,Cu,Ni,Pb,Se)	USEPA 200.9, SM 3113B	X		X
ICPMS 2 (As,Cd,Cr,Cu,Ni,Pb,Se)	USEPA 200.9, SM 3113B		X (plus Ag)	
MERCURY, TOTAL	USEPA 245.1,7470A,7471A	X	X	X (245.1)
pH – grab	FIELD SONDE	X – field		
Conductivity – grab	FIELD SONDE/ USEPA 120.1	X – field / lab		
Dissolved Oxygen – grab	FIELD SONDE	X – field		
Temperature – grab	FIELD SONDE	X – field		
Herbicides	USEPA 525.2	X		
Acid Herbicides	USEPA 515	X		
Carbamates Insecticides	USEPA 531	X		
Glyphosate	USEPA 547	X		
E.coli	OEPA 660.1	X		
SVOCs (BNAS)	USEPA 625/USEPA 8270C	X	X	
Pesticides/PCBs/ Chlordane	USEPA 608/USEPA 8081A, 8082	X	X	X (OEPA 590.1)
Percent Solids	SM 2540G		X	X
Total Organic Carbon	OEPA 335.2		X	
Particle Size	OEPA 160.1		X	
Benthic Chlorophyll a	USEPA 445		OTHER	

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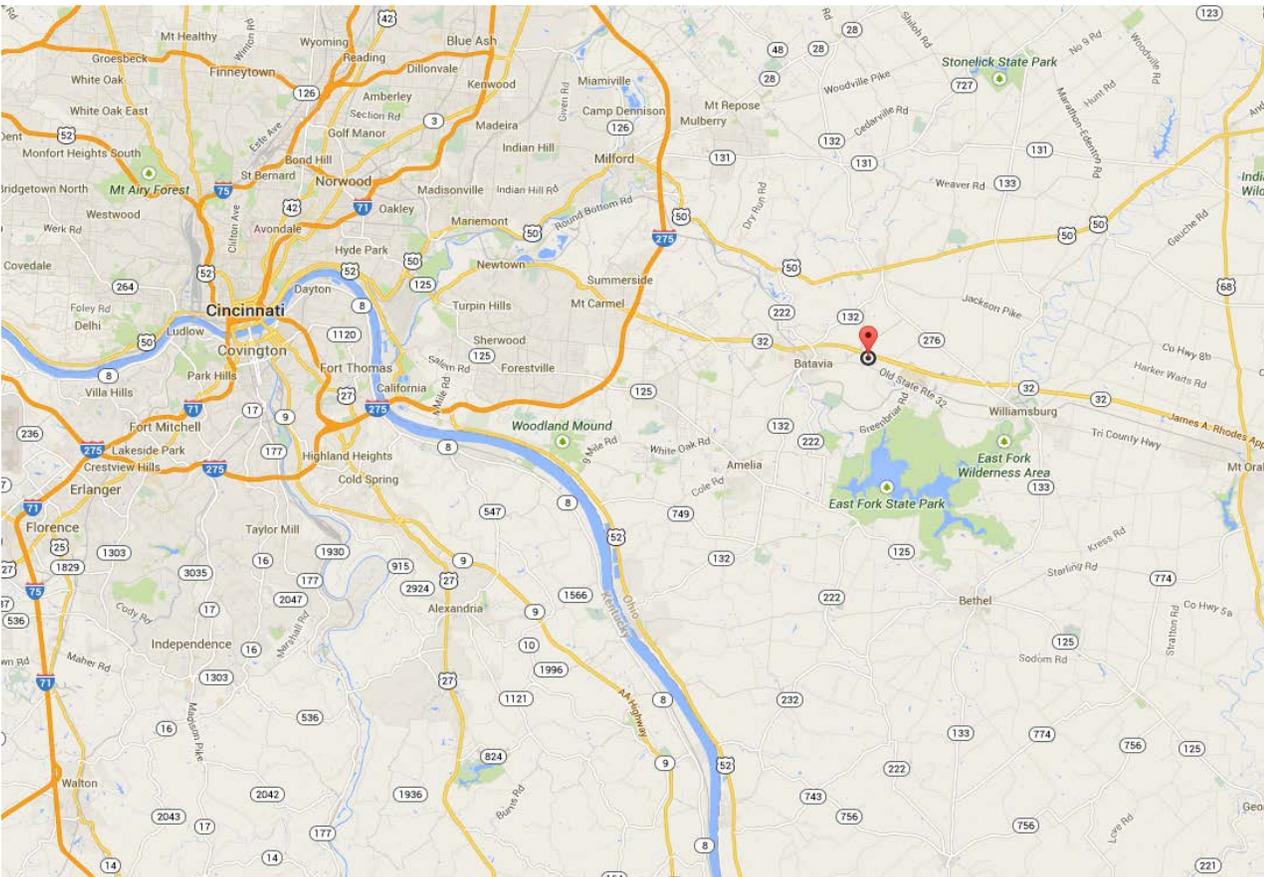
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Appendix A Hospital Maps

Mercy Health West Hospital, 3300 Mercy Health Blvd, Cincinnati, OH 45211



Mercy Hospital Clermont, 3000 Hospital Drive, Batavia, Ohio 45103



University of Cincinnati, University of Cincinnati College of Medicine, Cincinnati, OH 45229

