

# MAUMEE RIVER STUDY PLAN

**FINAL**

**Maumee River LRAUs:** 041000059001, 041000099001, 041000099002

**Auglaize River LRAU:** 041000079001

**Tiffin River LRAU:** 041000069001



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<p style="text-align: center;"><b>Hospitals</b> (see attached maps)</p> <p style="text-align: center;"><u>St. Charles Mercy Hospital, Toledo:</u> ER 419-696-7411 General (419) 696-7200</p> <p style="text-align: center;"><u>Henry County Hospital, Napoleon:</u> ER 419-591-3800 General (419) 592-4015</p> <p style="text-align: center;"><u>Wood County Hospital, Bowling Green:</u> ER 419-354-8910 General (419) 354-8900</p> <p style="text-align: center;"><u>Mercy Defiance Hospital, Defiance:</u> ER 419-785-3966 General (419) 782-8444</p> <p style="text-align: center;"><u>Hicksville Memorial Hospital, Hicksville:</u> ER Not Listed General (419) 542-6692</p> <p style="text-align: center;"><u>Paulding County Hospital, Paulding:</u> ER Not Listed General 419.399.4080</p>	

## INTRODUCTION

During the 2012 field season chemical, physical, and biological sampling will be conducted in the Maumee River mainstem and lower Tiffin River and Auglaize River mainstems to assess and characterize water quality conditions. Comprehensive river monitoring will occur in the following Large River Assessment Units (LRAU):

Maumee River – Indiana Border to Tiffin River (42.11 miles), #041000059001  
Maumee River – Tiffin River to Beaver Creek (34.44 miles), # 041000099001  
Maumee River – Beaver Creek to Maumee Bay (31.32 miles) #041000099002  
Auglaize River – Ottawa River (RM 33.26) to mouth, # 041000079001  
Tiffin River – Brush Creek to mouth (19.67 miles), #041000069001

The entire length of the Maumee River (RM 107.87- 0) has not been completely assessed since 1997 and therefore will have a thorough assessment of the mainstem, including the freshwater estuary section near the mouth. Additionally, LRAU segments of the lower Auglaize River and lower Tiffin River will be assessed. Table 1 contains a list of all the NPDES facilities on or in close proximity to the Maumee River, Auglaize River, and Tiffin River within the study reaches. The sampling effort is structured to characterize point source and non-point source impacts, including those from unsewered communities and agricultural activities.

Sampling locations, geographical coordinates, and types of sampling scheduled for the study area are listed in Table 2.

### ***Sampling Objectives***

- Monitor and assess the chemical, physical and biological integrity of the entire length of the Maumee River, and lower sections of the Auglaize River and Tiffin River.
- Assess conditions in impounded, free-flowing, and freshwater estuary segments.
- Determine aquatic impacts from known potential pollution sources including point source dischargers.
- Assess physical habitat influences on river biotic integrity.
- Determine recreational water quality and use attainment.
- Collect fish samples for the Ohio Sport Fish Tissue Monitoring Program (used to assess chemical contaminant levels in fish).
- Report on the status of aquatic life, recreation, public water supply and fish consumption uses in the Integrated Water Quality Monitoring and Assessment Report.
- Collect data needed for TMDL development.

## SAMPLING METHODS/QUALITY ASSURANCE

### ***Field Measurements***

Multi-probe field measurements will be collected in conjunction with all water samples for the following parameters:

- Temperature (°C)
- Conductivity/Specific conductance (µmhos/cm)
- Dissolved oxygen (mg/l) + percent oxygen saturation
- pH (S.U.)

Field measurements will be recorded on the laboratory sample submission form. For field instruments with data logging capabilities, the field readings may be logged to the system using a unique site identification number. Logged field meter data will then be uploaded to the Ohio EPA EA3 data management system using meter-specific software obtained from the manufacturer(s) and the Division of Surface Water Field Data Uploading Application software developed for this purpose (Ohio EPA, 2009b). Datasondes® will be deployed at sentinel and regular water quality sampling sites to collect continuous hourly measurements of dissolved oxygen, pH, water temperature, and conductivity over a 48 hour period.

### ***Water Sampling***

Chemical sampling locations within the study area are listed in Table 2. Conventional chemical/physical water quality samples will be collected about ten times during the period of March 1, 2012 through December 31, 2012 at the sentinel sites under a range of flow conditions. Conventional water chemistry samples will be collected at least five times at all other designated locations during the period of June 1 through October 15 (summer index period). Non-sentinel site sampling will be targeted for low and base flow conditions. To gain information about phosphorus fractions, all sentinel sites will be tested for orthophosphate in addition to total phosphorus. The two Maumee River gage sites will also be tested for total dissolved phosphorus to determine if this data is useful for identifying sources. Sampling will be conducted for water column organics analysis, including herbicides, according to the following schedule:

- One round of sampling for semi-volatile organic compounds (Method 625) will be done at select sites as indicated by a “CO” in Table 2 during the summer index period. The results will be evaluated and a second set of samples will be collected if necessary.
- Five rounds of sampling for herbicides (Method 525.2) will be done at Public Water Supply intakes as indicated by a “W” in Table 2. Sampling will start as early as March 1 and duties will be coordinated between DDAGW-CO and DSW-NWDO staff. Spring runoff events will be targeted if possible.

All Surface water grab samples will be collected from the upper 12 inches of river water and divided into appropriate containers. Collected water will be preserved using appropriate methods, as outlined in Parts II and III of the Manual of Ohio EPA Surveillance Methods and Quality Assurance Practices (Ohio EPA 2012a) and delivered to the Ohio EPA lab for analysis. The analyte list and analytical methods to be used for surface water samples is provided in Table 3.

### ***Sediment Sampling***

Sediment samples will be collected at locations indicated in Table 2 using the procedures outlined in the Ohio EPA sediment sampling manual (Ohio EPA 2012b). Chemical parameters to be tested for sediment samples and analytical methods are listed in Table 3. 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

glass jars with Teflon-lined lids (organics testing) and HDPE plastic containers (metals testing), placed on ice (to maintain 4°C) and delivered to the Ohio EPA DES laboratory. Analysis of sediment samples will include semi-volatile organic constituents, pesticides, PCB's, and heavy metals including mercury.

### ***Bacteriological Sampling***

Samples will be collected at all of the sentinel sites and nearly all chemistry sampling sites as listed in Table 2 for bacteriological analyses to determine the attainment status for recreational uses. Testing will be for counts of *E. coli* bacteria. Water samples will be collected into sterilized polyethylene containers, cooled to 4°C, and transported to the NWDO contract laboratory within 6 hours of sample collection. All samples will be analyzed for *E. coli* bacteria using U.S.EPA approved methods (STORET Parameter Code 31633). Sites will be sampled five times during the recreation season (May 1 – October 15) under normal flow regimes in order to assess ambient bacteria levels when recreation is most likely to occur. Sentinel testing sites will have bacteria samples collected ten times during the period of March 1, 2012 through December 31, 2012. Ohio EPA staff will assess each sampling site to determine the appropriate recreational criteria to apply using the definitions provided in OAC 3745-1-07(B)(4). Nearby USGS gaging stations (Table 5) may be consulted in order to determine appropriate flow regimes in which to schedule sampling events. The bacteria samples are collected independent from the water chemistry samples.

### ***Macroinvertebrate Community Assessment***

Macroinvertebrates will be collected from artificial substrates and from the natural habitats. Quantitative sampling using artificial substrates will be conducted at all sampling sites. The artificial substrate collection provides quantitative data and consists of a composite sample of 5 modified Hester-Dendy (HD) multiple-plate samplers colonized for six weeks. At the time of the artificial substrate collection, a qualitative multihabitat composite sample is also collected. This sampling effort consists of an inventory of all observed macroinvertebrate taxa from the natural 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). Macroinvertebrate sampling in impounded sections of river and the Maumee freshwater estuary will incorporate the following procedures: at each sampling location, two HDs will be set – one mid-channel to capture the best flow conditions, and one nearer shore as a backup set.

### ***Fish Assemblages and Habitat***

Fish will be sampled at each sampling location with boat mounted pulsed DC current. Two passes will be conducted at each fish community assessment site (Table 3). Detailed biological sampling protocols are documented in the Ohio EPA manual Biological Criteria for the Protection of Aquatic Life, Volume III (Ohio EPA, 1989b). Qualitative Habitat Evaluation Index (QHEI) scores will be calculated for the river habitat at all fish sampling locations. Boat access points are noted in Table 4.

### ***Fish Tissue***

Tissue fillet samples will be collected from fish of edible size, and species preferred for analysis include largemouth bass, smallmouth bass, flathead catfish, walleye, saugeye, white bass, common carp, freshwater drum, channel catfish and smallmouth buffalo. 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 boat electrofishing methods. 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 Tissue Collection Manual (2012c). Fish tissue samples will be stored in chest freezers at the Ohio EPA Groveport Field Facility prior to delivery to DES.

**Nutrients**

To help evaluate the potential for continued, new, or abated nutrient impairment, additional analyses are being requested. Specifically, water column chlorophyll a samples should be collected twice during the summer during stable base flow conditions from sentinel and impounded sites (see table 2). Optimally, those samples should be collected in concert with the deployment of automated data loggers that record hourly dissolved oxygen, pH, temperature and conductivity. Additionally, samples for analysis of 5-day biochemical oxygen demand and alkalinity should, at a minimum, accompany the chlorophyll a samples collected from the Maumee River mainstem, and optimally be collected during each of the chemical sampling runs. A dissolved phosphorus sample should be collected with each chlorophyll a sample.

**Flow Monitoring**

Flow measurements will be collected periodically at the sentinel site locations under varying flow conditions in order to develop a rating curve for water depth and/or bridge tape readings vs. stream flow. Bridge tape readings will be collected at each sentinel site every time a water sample or flow measurement is collected. Stream flow measurements will be taken using either wading or floating acoustic Doppler flow velocity meters. Stream velocity measurements will be integrated with stream depth measurements to calculate the total stream flow using established USGS methods.

**Quality Control**

An acid blank will be run on new lots of acids used for preservation of samples. Matrix spike duplicates will be collected for organic water samples at a minimum of 5 percent. Field meters will be calibrated daily, using manufacturer guidelines and requirements noted in the Manual of Ohio EPA Surveillance Methods and Quality Assurance Practices (Ohio EPA 2012a).

**Ohio EPA Manuals**

All biological, chemical, EPA laboratory, data processing, and data analysis methods and procedures adhere to those specified in the Manual of Ohio EPA Surveillance Methods and Quality Assurance Practices (Ohio EPA 2012a), Biological Criteria for the Protection of Aquatic Life, Volumes II - III (Ohio Environmental Protection Agency 1987, 1989a, 1989b), The Qualitative Habitat Evaluation Index (QHEI); Rationale, Methods, and Application (Rankin 1989) for habitat assessment, Ohio EPA Sediment Sampling Guide and Methodologies (Ohio EPA 2012b), and Ohio EPA Fish Tissue Collection Manual (Ohio EPA 2012c).

**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 7-15. 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 or MWH-I biocriteria for the Huron Erie Lake Plain ecoregion.

Recreational use attainment will be determined using *E. coli* bacteria. *E. coli* 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.

### ***Sampling Summary***

A summary of the number of samples to be collected during the 2012 survey is provided in Table 6.

## **RAP BENEFICIAL USE IMPAIRMENTS**

The Maumee Area of Concern (AOC) does not include the entire Maumee River watershed. It includes the lower reach and tributaries, as well as some of the neighboring watersheds. The boundaries of the Maumee [Area of Concern](#) (AOC) were originally identified in 1987 as the area extending from the Bowling Green water intake near Waterville along the Lower Maumee River at river mile 22.8 downstream to Maumee Bay. The area includes direct drainage into the waters that are within Lucas, Ottawa and Wood counties. This includes Swan Creek, Ottawa River (Ten Mile Creek), Duck Creek, Otter Creek, Grassy Creek, Cedar Creek, and Crane Creek. In 1992, this area was extended to the east to include Turtle Creek, Packer Creek, and the Toussaint River. The Maumee Area of Concern (AOC) covers 775 square miles. The Maumee AOC was again modified in 2010 to align its boundaries with 10-digit HUCs. This change primarily added the headwaters of Swan Creek and the Ottawa River to the Maumee AOC and changed the upstream boundary of the Maumee River mainstem to approximately RM 21 (just upstream of the State Route 64 bridge in Waterville).

A Maumee RAP is currently in the process of addressing beneficial use impairments (BUI's) identified for the AOC (for information see U.S.EPA's web site: <http://www.epa.gov/greatlakes/aoc/maumee.html>). Concurrent with this sampling plan, two additional monitoring efforts are underway in the lower Maumee River assessment unit (HUC 04100099002). One is in conjunction with the Great Lakes Restoration Initiative (GLRI) and the other is a Great Lakes Legacy Act (GLLA) sediment site characterization. Data collected, as outlined in this study plan, will also help the Maumee RAP program to better determine the status of BUIs within the Maumee AOC. Goals and procedures for Ohio EPA's monitoring efforts in the Maumee River freshwater estuary related to a nearshore Lake Erie monitoring grant under the GLRI are included in a separate monitoring plan (Ohio EPA 2011).

Table 1. Facilities regulated by the National Pollution Discharge Elimination System in the Maumee River study area.

Facility Name	Ohio EPA #	County	River Mile <sup>1</sup>	Comments
<b>Maumee River</b>				
Boston Weatherhead / Dana Corp.	21C00004	Paulding	98.53, 0.3	0.003 MGD Carbon Adsorption Ground Water treatment
Antwerp WWTP	2PA00037	Paulding	94.47, 1.72, 2.7	0.330 MGD Lagoon– continuous discharge
Zylstra Dairy LLC	21K00013	Paulding	94.47, 7.5	Storm Water, Manure discharge to fields
Oolman Dairy Ltd	21K00008	Paulding	94.47, 3.6	Storm Water, Manure discharge to fields
Cecil WWTP	2PA00033	Paulding	84.3, 0.4	0.025 MGD Sequencing Batch Reactor
Brentwood MHP	2PY00044	Paulding	82.98	0.010 MGD Package Plant – Sand Filters
Vagabond Village	2PR00179	Paulding	82.75	0.0136 MGD Holding Tanks, Septic System
Sherwood WWTP	2PA00017	Paulding	77.32, 0.7	0.160 MGD Stabilization Pond
Diehl Food Ind. Inc.	21H00057	Defiance	64.32	Non-contact cooling water
Defiance WWTP	2PD00013	Defiance	62.04	6.0 MGD Tricking Filter, Activated Sludge
GM Defiance NPA Systems	21N00004	Defiance	61.95	2.0 MGD Sand Filtration for process water, stormwater/ landfill sed basin discharges
General Motors Powertrain	21N00202	Defiance	61.95	0.1008 MGD Granular Activated Carbon for landfill leachate treatment
Metal Management of Ohio	21S00026	Defiance	60.91	1.0 MGD sand filtration and storm water
Camp Libbey	2PR00166	Defiance	59.8	Lagoon for Sanitary and food wastes
Florida WWTP	2PA00091	Henry	49.11, 4.3	0.48 MGD Lagoon – controlled discharge
Napoleon WTP	21W00190	Henry	47.2	Filtrate to sludge lagoon discharge
Napoleon WWTP	2PD00000	Henry	46.05	2.5 MGD Alum addition with post aeration
Campbell’s Soup Supply Co.	21H00021	Henry	45.8	10 MGD Tricking filter for process water, 7 spray irrigation discharges from RM 44.65 to 43.38
Universal Cooperatives	21F00019	Henry	44.64, 0.2	0.4 MGD Carbon filter, stabilization pond for storm water
Northstar Steel	21D00015	Henry	42.48	0.29 MGD Metal removal, clarification, pH adjustment
Worthington Steel	21D00014	Henry	42.48	0.129 MGD Clarification, pH adjustment
Liberty Center WWTP	2PB00039	Henry	40	0.25 MGD Oxidation Ditch
UMC Widewater Retreat	2PR00067	Henry	36.14, 0.4	Lagoon System – controlled discharge
McClure WTP	21V00062	Henry	35.65, 0.6	Lime storage storm water, waste water settling lagoons
River Bend MHP	2PY00026	Henry	34.8	0.005 MGD Package Plant
Grand Rapids WWTP	2PA00029	Wood	31.26, 0.4	0.180 MGD Oxidation Ditch
NWS Williamsburg on the River	2PG00097	Wood	26.74	0.05 MGD Package Plant
Tontogany Area WWTP	2PB00024	Wood	24.15, 3.6	0.10 MGD Lagoon System
McDowell WTP	21W00010	Lucas	23.04	Lime sludge lagoon, backwash water
Hanson Aggregates MW-Waterville	21J00047	Lucas	22.3	Sedimentation Pond
Haskins WWTP	2PA00026	Wood	21.65,0.86	0.300 MGD Sequencing Batch Reactor
Maumee River WWTP	2PK00000	Lucas	18.2	22.5 MGD Activated Sludge
Perrysburg WWTP	2PD00002	Lucas	14.55	5.4 MGD Activated Sludge
Pilkington N. America - Rossford	21N00030	Lucas	8.18-7.05	Process water and leachate lagoon and storm water – several outfalls
Norfolk Southern Corp. 001 & 002	21T00015	Lucas	7.1, 0.8	Screening, sediment & grit removal of process water and storm water
Delta Fuels, Inc.	21N00226	Lucas	3.75	Oil / Water Separator storm water outfall

Table 1. Continued.

Facility Name	Ohio EPA #	County	River Mile <sup>1</sup>	Comments
<b><i>Maumee River</i></b>				
Sunoco Inc. R&M Marine Terminal	2IG00009	Lucas	3.4	API separator
Toledo Bay View WWTP	2PF00000	Lucas	1.25	130 MGD Activated Sludge
<b><i>Auglaize River</i></b>				
Tall Oaks Family Center	2PR00128	Putnam	28.0, 1.5	0.015 MGD Package Plant – sand filtration
Oakwood WWTP	2PB00031	Paulding	19.82	0.15 MGD Stabilization Pond
Stone Co Inc.-Auglaize Plant	2IJ00026	Paulding	11.12	1.44 MGD Sedimentation pond discharge
Defiance Co. Auglaize River Lagoon WWTP	2PH00022	Defiance	8.35	0.223 MGD Stabilization Lagoon
Belden's Subdivision WWTP	2PG00050	Defiance	6.85	0.015 MGD Activated Sludge
Auglaize Pines Subdivision WWTP	2PG00051	Defiance	6.55	0.015 MGD Activated Sludge
Defiance County Landfill	2IN00111	Defiance	4.8, 0.7	Sedimentation pond discharge
Defiance Mun WTP	2IW00060	Defiance	2.3, 0.85	Lime Sludge Lagoons
<b><i>Tiffin River</i></b>				
Evansport WWTP	2PG00055	Defiance	20.6	0.050 MGD Activated Sludge
Evergreen Lane Office Complex	2PG00052	Defiance	7.3	0.015 MGD Activated Sludge
Park Place MHP	2PY00065	Defiance	5.0, 1.03	0.0125 MGD Sand Filtration

1 – Discharge points on tributaries to the Maumee, Auglaize, or Tiffin Rivers are noted by two river miles (e.g. 5.0, 1.03), the tributary confluence point to the main river (first river mile number), and the wastewater discharge point on the tributary (second river mile number).

Table 2. Maumee River, Auglaize River, and Tiffin River sampling locations.

River Mile	EA3 Station	Sample Type	Location	Latitude	Longitude	Purpose
<b>Maumee River (04-001)</b>						
NA	NA	M,F,C,D	New Haven USGS gage - IN	41.08487	-85.02131	Indiana - downstream Ft. Wayne
104.7	P06K09	M,F,C,FT,D,B	1.0 mile west of Antwerp	41.1739	-84.7717	Baseline –most upstream site in Ohio
99.0	201868	M,F,C,FT,D,SE,N,B	Antwerp@ Antwerp City Park	41.1839	-84.7325	Sentinel Site
91.5	P06S08	M,F,C,FT,D,B	NE of Antwerp – Eater Rd.	41.2219	-84.6697	Downstream Antwerp, CAFO area
85.3	P06K06	M,F,C,FT,D,B	N of Cecil @ CR 105	41.2378	-84.6022	Downstream Marie DeLarme Creek
79.7	P06K05	M,F,C,FT,D,B	US 127	41.2619	-84.5564	Downstream Gordon Creek
76.1	P06S07	M,F,C,FT,D,SE,N,B	The Bend Road	41.2753	-84.5150	Sentinel Site, downstream Sherwood
69.0 (R)	P06K03	M,F,C,FT,D,B	Dst Intersection Switzer/Dowe Rds.	41.2842	-84.4344	Upstream Tiffin River/Auglaize River
65.84	500180	W	Defiance WTP Intake	41.2786	-84.3853	River water intake quality
65.0	P06K01	FT	Dst. Tiffin River/Upst Auglaize River	41.2878	-84.3706	Upstream Defiance/ impounded
62.3	P09W32	M,F,C,CO,D,N,B	SR 281 – north bank	41.2911	-84.3236	Dst. Auglaize R./ Upst. Defiance WWTP/ Impounded
60.4	P09W19	M,F,S,FT	0.5 miles upst. Independence dam	41.2914	-84.2819	Dst. Defiance GMC/ Impounded
59.9	201895	C,CO,D,SE,N,B	Directly dst. Independence dam	41.2910	-84.2788	Sentinel Site, downstream Independence dam
58.1 (R)	201858	M,F	2 miles dst. Independence dam	41.2908	-84.2461	Free flowing river/ dst. Independence dam
52.1	201856	M,F,C,FT,D,B	Near Girty Island	41.3306	-84.1533	Dst. Florida/ Impounded
47.1	500200	M,F,C,FT,D,W,B	Napolean WTP Intake	41.3858	-84.1319	Water Intake/ Impounded/ Upst. Napolean WWTP
42.5	201851	M,F,C,FT,D,SE,N,B	SR 6	41.4097	-84.0586	Sentinel Site/Downstream Campbell Soup/ Impounded
35.91	NA	W	McClure WTP Intake	41.41842	-83.94169	River water intake quality
32.7 (R)	P11S42	M,F,C,S,FT,D,N,B	Upstream Grand Rapids dam	41.4150	-83.8772	Dst. end of Grand Rapids dam impoundment
31.6 (R)	P11K33	M,F,C,D,SE,N,B	SR 578	41.4136	-83.8603	Sentinel Site/ Dst. Grand Rapids dam/ free flowing
26.7 (R)	P11K31	M,F,C,FT,D,B	Near Bend View-Canal Lands Metrpt	41.4481	-83.7858	Downstream Grand Rapids
23.16	500170	W	Bowling Green WTP Intake	41.4761	-83.7389	River water intake quality
20.6 (R)	500080	M,F,C,FT,D,SE,N,B	Waterville, SR 64	41.5000	-83.7128	Sentinel Site
16.5	301740	M,F,C,FT,D,SE,N,B	Buttonwood Recreation Area	41.54804	-83.67494	Sentinel Site/ last site before freshwater estuary
13.0	301644	M,F,C,D,B	Downstream Ewing Island	41.5717	-83.6247	Upper freshwater estuary
9.4	P11S39	M,F,C,FT,D,B	Near Eagle Point Colony	41.6089	-83.5794	Upper freshwater estuary (GLRI site)
5.8	201838	M,F,C,CO,FT,D,B	Anthony Wayne bridge	41.6389	-83.5344	Upst. Swan Creek/ middle freshwater estuary (GLRI site)
3.6	301641	M,F,C,CO,D,B	Downstream I-280	41.6603	-83.5078	Downstream Swan Creek/ middle freshwater estuary
0.5	P11S32	M,F,C,CO,FT,D,B	At mouth	41.6942	-83.4667	Downstream Toledo WWTP near Maumee Bay (GLRI site)

Table 2. Continued.

River Mile	EA3 Station	Sample Type	Location	Latitude	Longitude	Purpose
<b>Auglaize River (04-100)</b>						
28.5 (R)	500110	M,F,C,FT,D,B	Cloverdale @SR 114/Cascade Park	41.0208	-84.2889	Free flowing river/ baseline
19.3	500130	M,F,C,FT,D,B	Oakwood @ SR 613	41.09247	-84.38197	Downstream Blanchard River/ Impounded?
15.0 (R)	P06S10	M,F,C,FT,D,N,B	Charloe @ CR 138	41.1286	-84.4319	Impounded reference site – lake or impounded river
8.9	204259	L,B	Defiance Power Dam Reservoir-L2	41.2056	-84.4387	Impounded site – lake or impounded river
5.9	204258	M,F,L,S,FT,D,N	Defiance Power Dam Reservoir-L1	41.2372	-84.4019	Impounded site – lake or impounded river
4.1 (R)	500290	M,F,C,FT,D,SE,N,B	Harding Road	41.2536	-84.3925	Free flowing/ downstream Defiance Power Dam
<b>Tiffin River (04-600)</b>						
18.7 (R)	500300	M,F,C,FT,D,B	Evansport @ SR 191	41.4272	-84.3894	Upper end of Large River Assessment Unit
14.1 (R)	P07K01	M,F,C,FT,D,B	Stever Road	41.3881	-84.3961	Channel modified reference site
7.0 (R)	P07S05	M,F,C,FT,D,B	Evansport Road	41.3464	-84.4189	Natural reference site
0.9 (R)	500160	M,F,C,FT,D,SE,N,B	Dey Road	41.2903	-84.3856	Sentinel Site
<b>South Turkeyfoot Creek</b>						
1.97	P09W11	SE,N	Township Road P-3	41.3931	-83.9800	Sentinel Site
<b>Bad Creek</b>						
2.47	P11S04	SE,N	South of Colton @ CR T	41.4433	-83.9606	Sentinel Site
<b>Beaver Creek</b>						
2.74	P10K02	SE,N	SE of Gr. Rapids @ Wintergreen Rd	41.3936	-83.845	Sentinel Site

- C – Chemistry Site
- CO – Chemistry organic
- B – Bacteria site
- F – Fish Site
- FT – Fish Tissue Site
- M – Macroinvertebrate Site
- S – Sediment site
- D – Datasonde© site (continuous recorder for D.O., pH, temperature, and conductivity)
- N – Chlorophyll a / Nutrient site
- SE – Sentinel Site
- W – Public Water Supply Intake
- R – Reference site
- L – Lake chemistry

Type	Number of Sites
Water chemistry	31(5 are freshwater estuary)
Lake chemistry	2
Organic water chemistry	5
Public water supply intake	4
Bacteria	31
Fish	33 (5 are freshwater estuary )
Macroinvertebrate	33 (5 are freshwater estuary )
Fish Tissue	28 (4 are freshwater estuary )
Sediment	3
Nutrients (chlorophyll a)	16
Sentinel	12
Datasonde©	31

Table 3. List of chemical/physical water quality parameters to be analyzed/ measured in surface water, sediment, and fish tissue from the Maumee River study area, 2012. Water samples will be collected 5 times (organics once), and sediment once. Bacteria samples will be collected 5 times during the recreational use period. Sampling locations will be monitored for dissolved oxygen, pH, temperature, and conductivity using Datasonde© continuous recorders (Table 2).

Parameters	Test Method	Water (RL)	Sediment	Fish Tissue
Alkalinity	USEPA 310.1	X (5 mg/l)		
BOD, 5-DAY	SM 5210B	X (2 mg/l)		
Carbonaceous BOD, 20-day	OEPA 310.2	X (3 mg/l)		
Solids, Dissolved (TDS)	SM 2540C	X (10 mg/l)		
Solids, Suspended (TSS)	SM 2540D	X (5 mg/l)		
Ammonia-N	USEPA 350.1	X (0.05 mg/l)		
Total Kjeldahl Nitrogen (TKN)	USEPA 351.2	X (0.2 mg/l)		
Nitrate-Nitrite	USEPA 353.1	X (0.5 mg/l)		
Nitrite	USEPA 353.2	X (0.02 mg/l)		
Chloride	USEPA 325.1	X (5 mg/l)		
Chemical Oxygen Demand (COD)	USEPA 410.4	X (20 mg/l)		
Sulfate	USEPA 375.2	X (10 mg/l)		
Total Phosphorus	USEPA 365.4	X (0.01 mg/l)		
Total Dissolved Phosphorus	USEPA 365.4	X (0.01 mg/l)		
Orthophosphate (as P)	USEPA 365.1	X (0.01 mg/l)		
ICP 1 (Al,Ba,Ca,Fe, Mg, Mn, Na, K, Sr, Zn, Hardness)	USEPA 200.7	X		
ICPMS 1 (As,Cd,Cr,Cu, Ni,Pb,Se)	USEPA 200.8	X		
BNA Organics (SVOCs)	USEPA 625	X	X (8270C)	
Herbicides	USEPA 525.2	X		
pH	Field Meter	X		
Conductivity	Field Meter	X		
Dissolved Oxygen (mg/l and % saturation)	Field Meter	X		
Temperature	Field Meter	X		
E.coli	USEPA 1103.1	X		
Chlorophyll a	USEPA 445.0	X		
Percent Solids	SM 2540G		X	
Cadmium, Chromium, Copper, Lead, Nickel	USEPA 200.8		X	
ICPMS 6 (As,Cd,Pb,Se)	USEPA 200.8/ SM3113B			X
Mercury	USEPA 245.1		X	X
PCBs	OEPA 590.1		X	X
Pesticides	OEPA 590.1			X
Percent Lipids	OEPA 581.5			X

Table 4. Boat access points in the Maumee River study area, 2012.

Ramp Name	River Mile	River Side	Latitude	Longitude	Type	Locked
<b>Maumee River</b>						
Along Road 250a	104.75	Right	41.1734	-84.7716	Open area along road?	
SR 49	100.6	right	41.1982	-84.7466	SE bridge corner	
Roads 53 & 192	95.5	left	41.2062	-84.7074	Along 192	
Eater Road	91.5	right	41.2218	-84.6698	SW bridge corner – gravel drive	
End of TR 278	87.9	right	41.23296	-84.6380	Front of house	
Cr 105	85.35	Left/right	41.2384	-84.6016	NE/SE bridge corners – open areas	
Private home @ Platter Creek mouth	80.1	left	41.2628	-84.5603	0.4 miles upstream US127 – open area	
The Bend Road	76.3	Left/right	41.2751	-84.5157	Canoe launch river right @ bridge	
Private home – backyard	69.1	left	41.2851	-84.4352	Open grass area to river	
Auglaize R. confluence	64.0	left	41.2889	-84.3550	Pontiac Park boat ramp	
Auglaize R. confluence	63.8	Right	41.2877	-84.3513	Kingsbury Park boat ramp	
Independence Dam St.Park	60.6	Left	41.2947	-84.2913	Large boat ramp complex	
Dst. Independence dam	59.9	Left	41.2919	-84.2797	Road running along river	
Adj. Riverview Ave.	48.3	left	41.3740	-84.1489	Boat ramp with parking lot	
Napoleon City ramp	47.6	left	41.3819	-84.1386	Boat ramp with parking lot	
Mary Jane Thurston SP	33.1	Right	41.4127	-83.8869	Boat ramp with parking lot	
SR 578	31.6	Left	41.4150	-83.8602	Open area NE corner of bridge?	
Van Tassel Wildlife Area	29.6	Right	41.4284	-83.8292	Boat ramp with parking lot	
Hedges I./ Otsego Park	26.7	Right	41.4457	-83.7823	Gravel ramp	
Weir Rapids/Rangeline Rd	25.1	Right	41.4616	-83.7672	Ramp with parking lot	
Farnsworth Park	23.3	left	41.4767	-83.7488	Boat ramp with parking lot	
Waterworks Park	21.2	left	41.4938	-83.7162	Open area at end of parking lot	
Waterville School/Sentinel	20.8	Left	41.4994	-83.7153	Open area at end of parking lot	
Buttonwood Recreation Area	16.5	right	41.5480	-83.6749	end of road at parking lot	
Orleans Park	14.6	right	41.5605	-83.6434	Boat ramp with parking lot - FW estuary	
End of Ewing Island	13.5	Right	41.5668	-83.6263	Maple St. -Boat ramp with parking lot	
Walbridge Park	8.9	Left	41.6165	-83.5781	Boat ramp with parking lot	fee
New Harrison Marina	1.5	left	41.6881	-83.4826	Boat ramp with parking lot	
Cullen Park	0.2	left	41.7045	-83.4748	Boat ramp with parking lot	fee
<b>Auglaize River</b>						
Cascade Park	28.6	Right/ left	41.0193	-84.2879	Open gravel areas to river at park	
Cooper St. @ Oakwood	19.1	right	41.0945	-84.3820	Boat ramp @ end of Cooper St.	
Private ramp @ CR 138	15.0	right	41.1279	-84.4304	SE corner of bridge	Fee?
Defiance Power Dam	5.7	Right	41.2366	-84.4007	Open gravel area above dam	
Harding Rd./Bronson Park	4.1	Left	41.2550	-84.3923	Open area NE side of bridge?	
<b>Tiffin River</b>						
SR 191 @ Evansport	18.7	Left	41.4274	-84.3892	Open area @ NE corner of bridge	
Upstream Stevers Rd	14.5	Left	41.3897	-84.3935	Open area along CR 88, upst cemetery	
Field recon needed	7.0					
Field recon needed	0.9					

Table 5. Maumee River/Auglaize River/ Tiffin River flow statistics at four USGS gaging stations, May - November.

Flow Gage	Gage Number	20%ile (cfs)	50%ile (cfs)	80%ile (cfs)
Maumee R. – New Haven (IN)	04183000	440	788	1430
Maumee R. -Defiance	04192500	434	1170	4110
Maumee R. - Waterville	04193500	339	961	3530
Auglaize R. - Defiance	04191500	49	221	896
Tiffin R. - Stryker	04185000	27	66	210

Table 6. Sampling summary for the 2012 Maumee River survey.

Sample Type	Total Sites	Total Samples
<b>Fish</b> (2 passes per site)	33	66
<b>Macroinvertebrates</b>		
Hester Dendy Samples	33	33
Mid-channel sets (impounded-8, freshwater estuary-5)	13	13
Total		46
<b>Water Chemistry</b>		
Inorganic water chemistry (Large River Survey template)	31 (12 Sentinel Sites)	215
Recreational Use Sites ( <i>E. coli</i> )	31 (9 Sentinel Sites)	200
Organic Water chemistry sites		
BNA (625)	5	5-10
Organic Water Intake sites		
Herbicides (525.2)	4	20
<b>Chlorophyll a</b> (impounded + sentinel)	16	32
<b>Sediment Chemistry</b> (metals + Hg + pest + BNA + PCB)	3	3
<b>Fish Tissue</b>	28	140

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## REFERENCES

- Ohio EPA. 1987a. Biological criteria for the protection of aquatic life: Volume I. The role of biological data in water quality assessment. Division of Water Quality Monitoring and Assessment, Surface Water Section, Columbus, Ohio.  
<http://www.epa.ohio.gov/dsw/bioassess/BioCriteriaProtAqLife.aspx>
- Ohio EPA. 1987b. Biological criteria for the protection of aquatic life: Volume II. Users manual for biological field assessment of Ohio surface waters. Division of Water Quality Monitoring and Assessment, Surface Water Section, Columbus, Ohio  
<http://www.epa.ohio.gov/dsw/bioassess/BioCriteriaProtAqLife.aspx>
- Ohio EPA. 1989a. Addendum to biological criteria for the protection of aquatic life: Users manual for biological field assessment of Ohio surface waters. Division of Water Quality Planning and Assessment, Surface Water Section, Columbus, Ohio.  
[http://www.epa.ohio.gov/portals/35/documents/BioCrit88\\_Vol2Addendum.pdf](http://www.epa.ohio.gov/portals/35/documents/BioCrit88_Vol2Addendum.pdf)
- Ohio EPA. 1989b. Biological criteria for the protection of aquatic life: Volume III. Standardized biological field sampling and laboratory methods for assessing fish and macroinvertebrate communities. Division of Water Quality Planning and Assessment, Columbus, Ohio.  
<http://www.epa.ohio.gov/dsw/bioassess/BioCriteriaProtAqLife.aspx>
- Ohio EPA. 2006. Methods for Assessing Habitat in Flowing Waters: Using the Qualitative Habitat Evaluation Index (QHEI). Division of Surface Water, Columbus, Ohio.  
<http://www.epa.ohio.gov/portals/35/documents/QHEIManualJune2006.pdf>
- Ohio EPA. 2009b. DSW field data uploading application instruction manual. Division of Surface Water. Columbus, Ohio.
- Ohio EPA. 2010. Methods for assessing habitat in Lake Erie shoreline waters using the Quantitative Habitat Evaluation Index (QHEI) approach (Version 2.1). Division of Surface Water. Columbus, Ohio.  
[http://www.epa.ohio.gov/portals/35/documents/QHEIManual\\_LakeErieShoreline\\_June2010.pdf](http://www.epa.ohio.gov/portals/35/documents/QHEIManual_LakeErieShoreline_June2010.pdf)
- Ohio EPA. 2011. 2011-2013 Lake Erie Nearshore Monitoring Study Plan. Division of Surface Water. Columbus, Ohio.
- Ohio EPA. 2012a. Ohio EPA manual of surveillance methods and quality assurance practices, 2012. Division of Surface Water, Columbus, Ohio.  
[http://www.epa.ohio.gov/portals/35/documents/Field\\_Manual\\_4\\_13\\_12\\_revision.pdf](http://www.epa.ohio.gov/portals/35/documents/Field_Manual_4_13_12_revision.pdf)
- Ohio EPA. 2012b. Sediment sampling guide and methodologies, 3<sup>rd</sup> edition. March 2012. Division of Surface Water, Columbus, Ohio.  
<http://www.epa.ohio.gov/portals/35/guidance/sedman2012.pdf>
- Ohio EPA. 2012c. State of Ohio Cooperative Fish Tissue Monitoring Program, Fish Tissue Collection Manual. April, 2012.  
<http://www.epa.ohio.gov/portals/35/fishadvisory/FishCollectionGuidanceManual12.pdf>
- Rankin, E.T. 1989. The qualitative habitat evaluation index (QHEI): rationale, methods, and application. Division of Water Quality Planning and Assessment, Columbus, Ohio.  
<http://www.epa.state.oh.us/dsw/bioassess/BioCriteriaProtAqLife.html>



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### Directions to Henry County Hospital

1600 East Riverview Avenue  
Napoleon, OH 43545  
419-592-4015

#### From the North

Take State Route 108 South  
Turn left (East) onto State Route 24  
Exit State Route 24 at the Industrial Drive exit  
Turn right off of the exit ramp  
Turn left on State Route 424/Riverview Avenue  
The Henry County Hospital will be on the left hand side approximately 2 miles

#### From the West

Take State Route 24 East  
Exit State Route 24 at the Industrial Drive exit  
Turn right off of the exit ramp  
Turn left on State Route 424/Riverview Avenue  
The Henry County Hospital will be on the left hand side approximately 2 miles

#### From the South

Take State Route 108 North to Napoleon  
Turn right on State Route 424/Riverview Avenue  
The Henry County Hospital will be on the left hand side approximately 4 miles

#### From the East

Take State Route 24 West to Napoleon  
Turn left on State Route 424/Riverview Avenue  
The Henry County Hospital will be on the right hand side approximately 2 miles

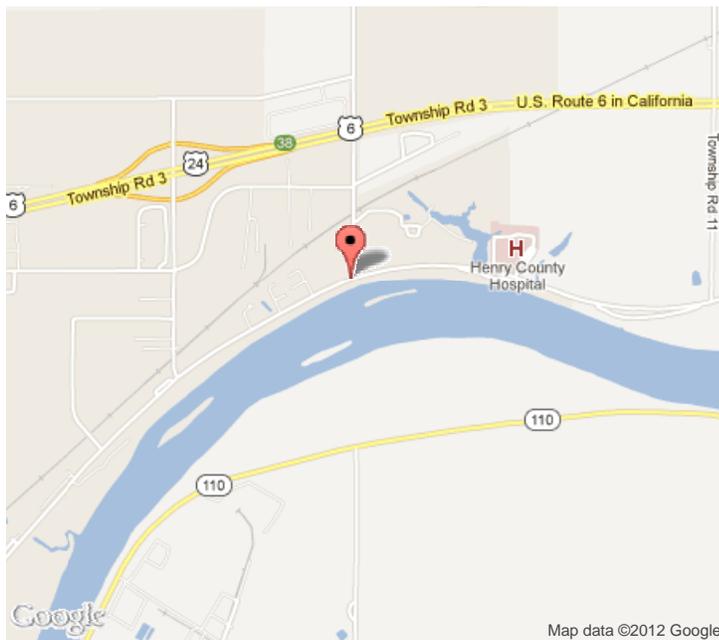


For more information about the services offered at Henry County Hospital contact [info@henrycountyhospital.org](mailto:info@henrycountyhospital.org)



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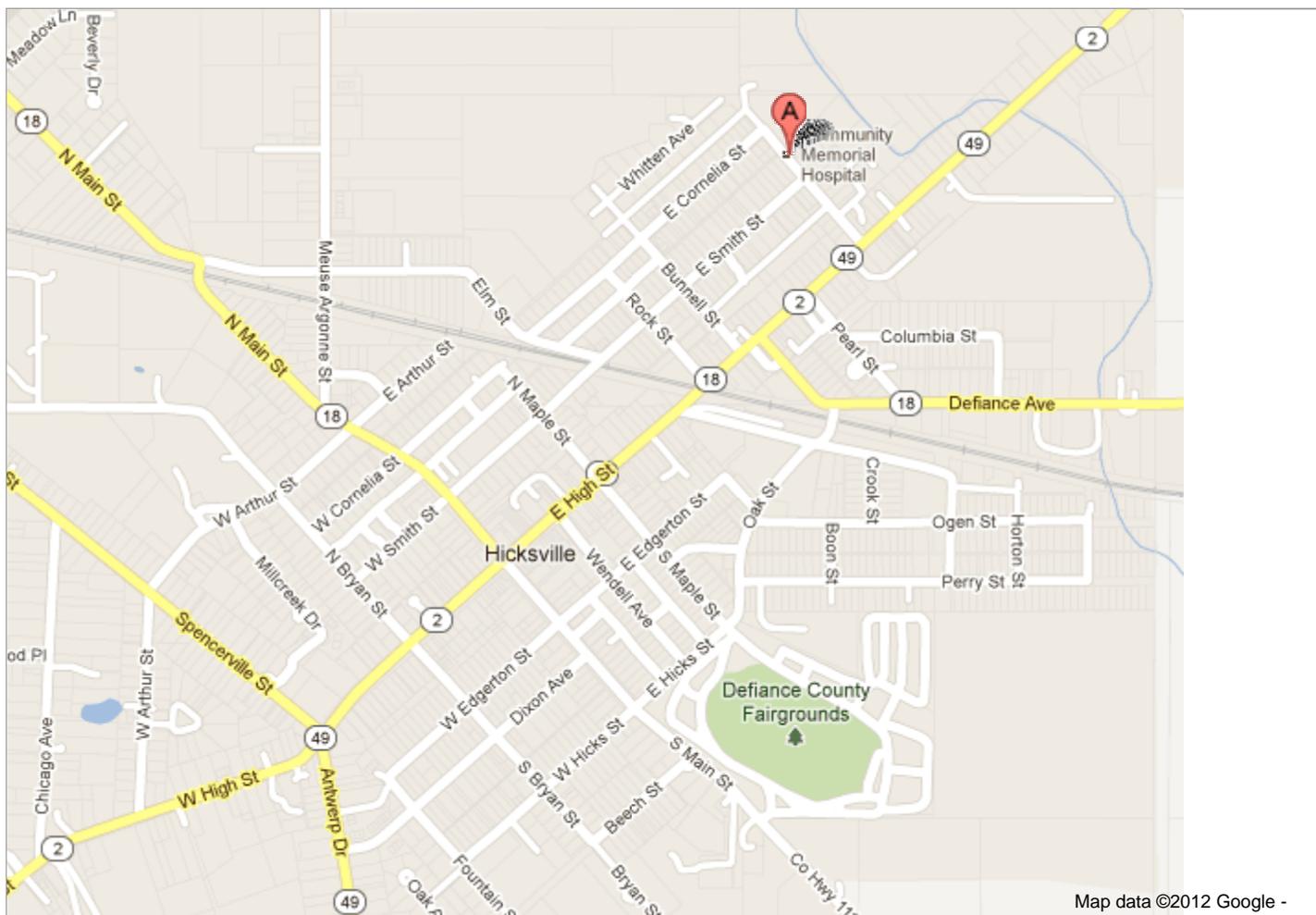
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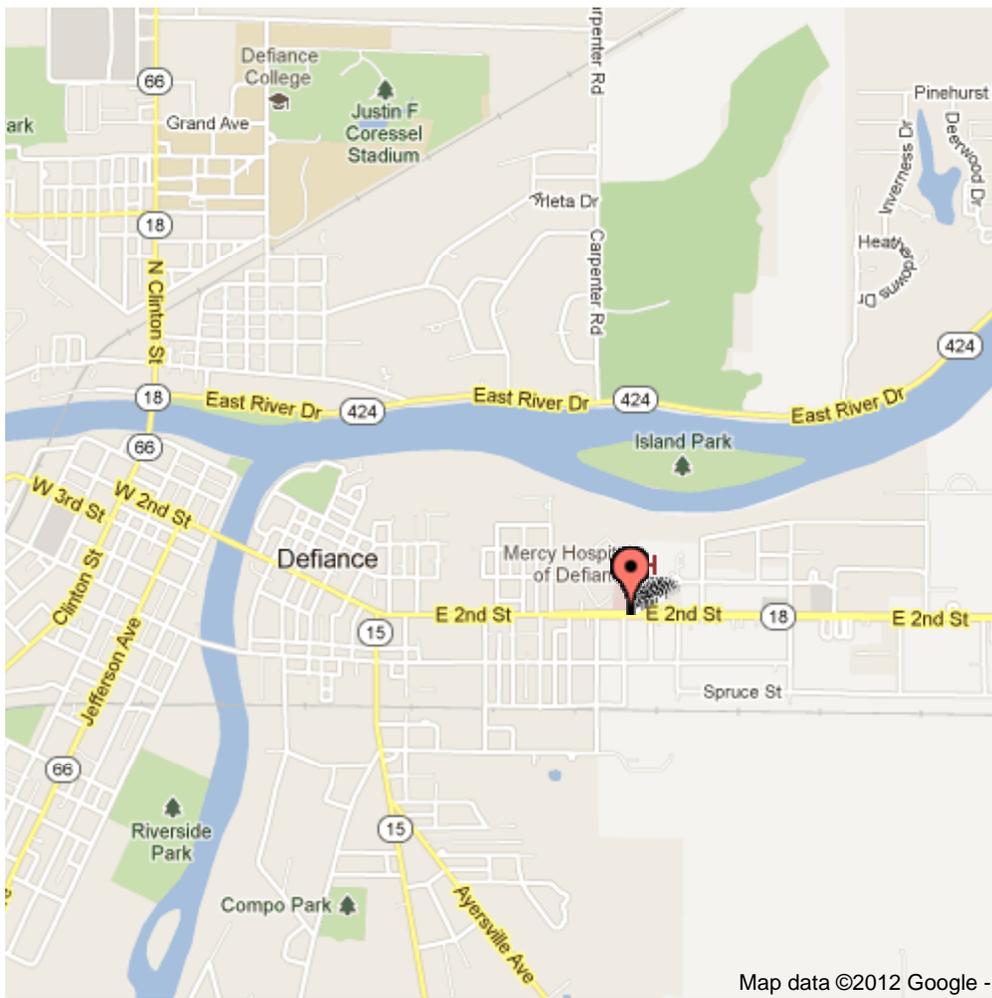
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# Mercy Defiance Hospital

## Directions



The hospital is located behind the Mercy Defiance Clinic at 1404 E. Second Street.

### [Directions to Mercy Defiance Hospital, Ohio using Google Maps](#)

#### From Toledo

Rt. 24 West  
 Rt. 281 (Domersville Rd.) turn left  
 E. Second St. turn right  
 1404 E. Second St.

#### From 75

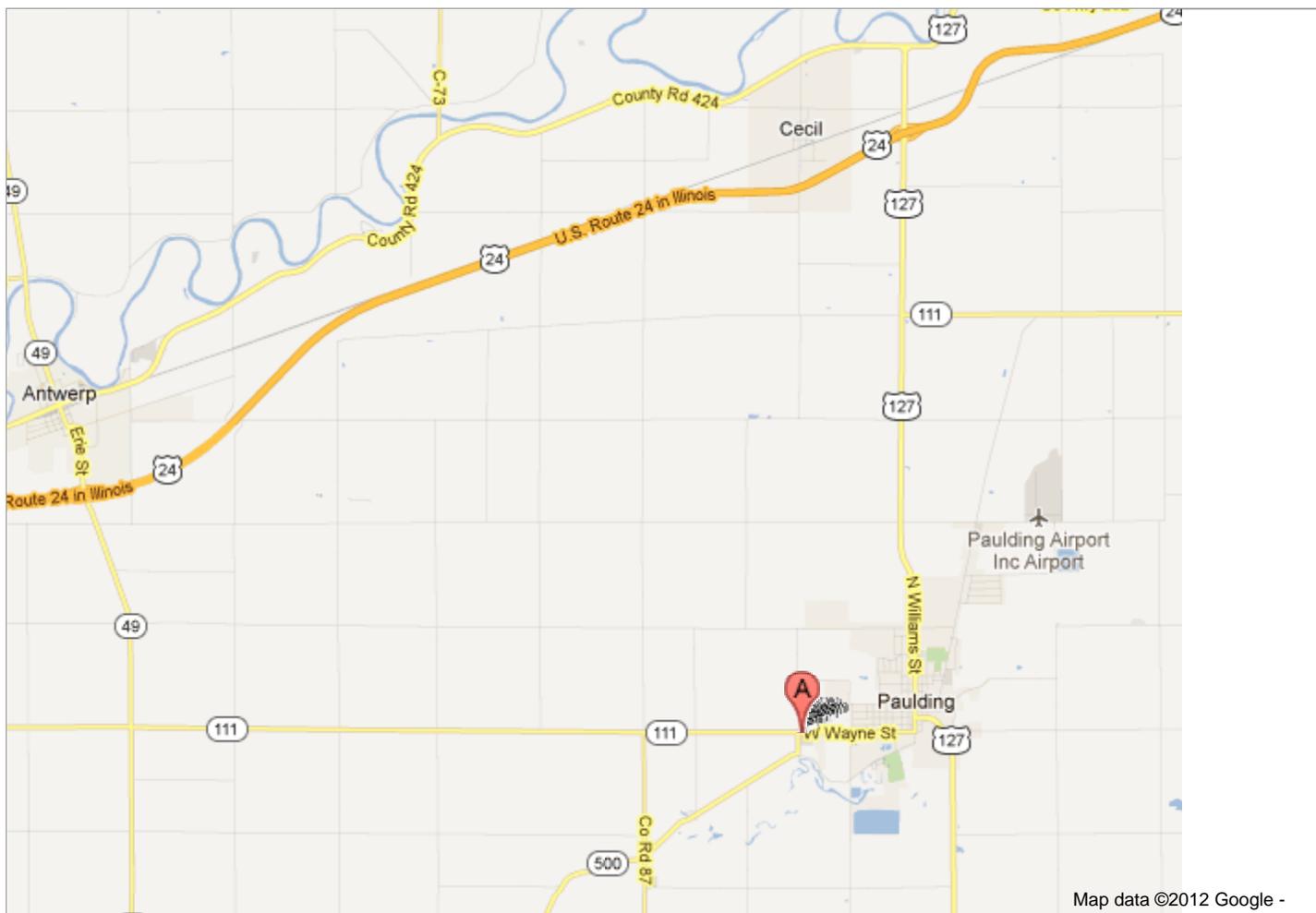
I-75 North  
Exit 125 - Rt. 309/Rt. 117 West (toward Lima)  
Rt. 65 North  
Rt. 15 North  
E. Second St. turn right  
1404 E. Second St.

### **From Ohio Turnpike**

I-80 West  
Exit 64 - I-75 South  
Merge to I-475 West/Rt. 23 North  
Exit Rt. 24 West Waterville  
Rt. 281 (Domersville Rd.) turn left  
E. Second St. Turn right  
1404 E. Second St.  
**[www.mercyweb.org](http://www.mercyweb.org)**



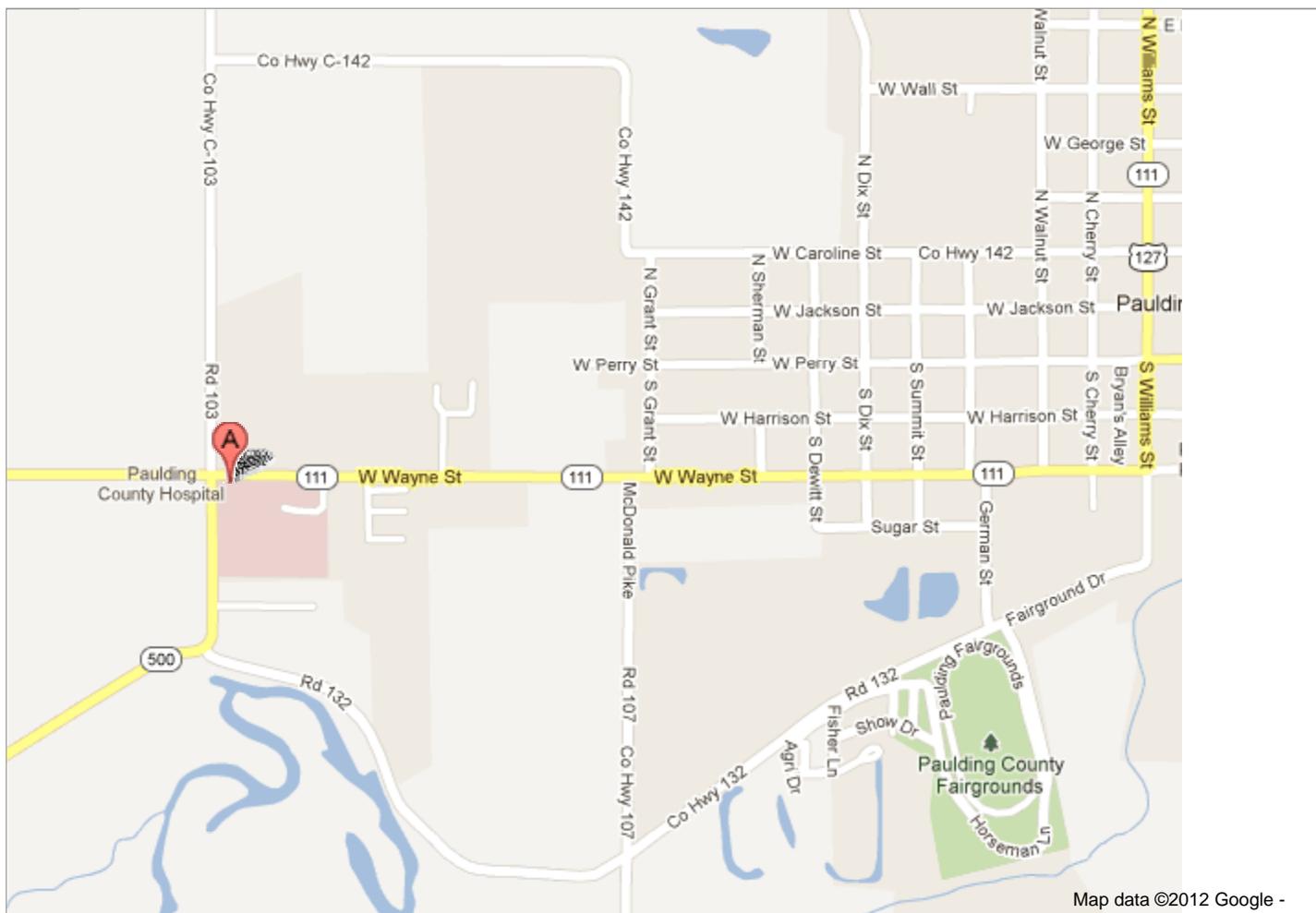
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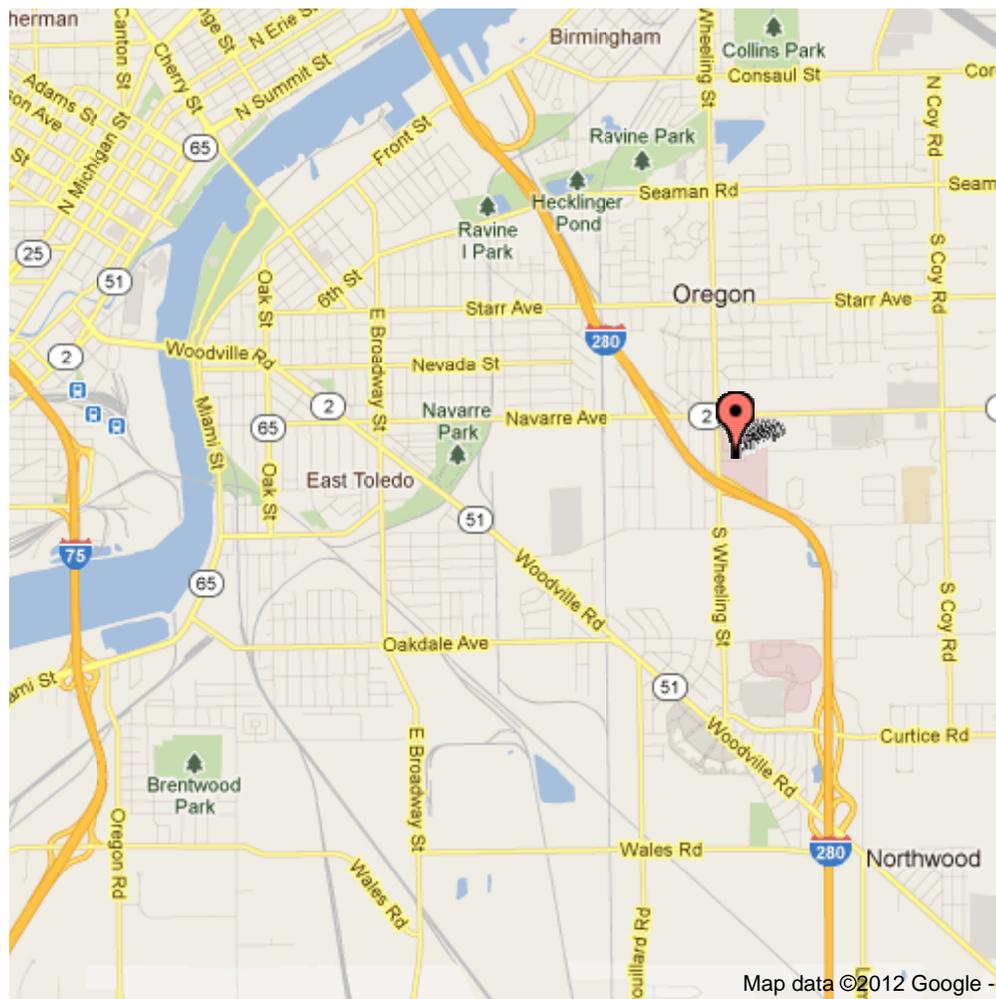
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# Mercy St. Charles Hospital

## Maps & Directions



### [Directions to Mercy St. Charles Hospital using Google Maps](#)

#### **From Toledo & Points Northwest**

I-475 East to I-75 North to I-280 South. I-280 South to Exit 7, Oregon (State Route 2/Navarre). Turn left off of exit ramp onto Route 2 heading East. Turn right on Wheeling.

#### **From Toledo Downtown**

Head East on Cherry Street crossing Martin Luther King Bridge. Turn left on Starr. Follow Starr to Wheeling, Turn right on Wheeling. The hospital is on Wheeling at Navarre Avenue. Total miles from downtown to hospital is approximately 4 miles.

#### **From Toledo Express Airport**

Follow signs to I-80/90 (Ohio Turnpike). I-80/90 East to Exit 5, I-280. I-280 North to Exit 7, Oregon (State Route 2/Navarre). Turn right (North) off exit ramp onto Wheeling.

### **From Columbus & Central Points**

State Route 23 North. Connect with I-75 North near Findlay; follow signs toward Toledo. I-75 North to 795 East. 795 East to I-280 North. I-280 North to Exit 7, Oregon (State Route 2/Navarre). Turn right (North) off exit ramp onto Wheeling.

### **From Cincinnati/Dayton & Southwestern Points**

I-75 North towards Toledo. I-75 North to 795 East. 795 East to I-280 North to Exit 7, Oregon (State Route 2/Navarre). Turn right (North) off exit ramp onto Wheeling.

### **From Detroit & Points North**

I-75 South toward Toledo. I-280 South to Exit 7, Oregon (State Route 2/Navarre). Turn left off of exit ramp onto Route 2 heading East. Turn right on Wheeling.

### **From Detroit Airport**

Follow signs for Toledo to I-94. I-94 West to I-275. I-275 South to I-75 South towards Toledo. I-280 South to Exit 7, Oregon (State Route 2/Navarre). Turn left off of exit ramp onto Route 2 heading East. Turn right on Wheeling.

### **From Ohio Turnpike East or West Points**

I-80/90 (Ohio Turnpike) toward Toledo to Exit 5 (I-280). I-280 North to Exit 7, Oregon (Route 2/Navarre). Turn right (North) off exit ramp onto Wheeling.

### **From Cleveland Option #2**

I-80/90 (Ohio Turnpike) West toward Toledo to Exit 7, Sandusky. 250 North to State Route 2. State Route 2 West (through Port Clinton & Oak Harbor. Turn left on Wheeling.

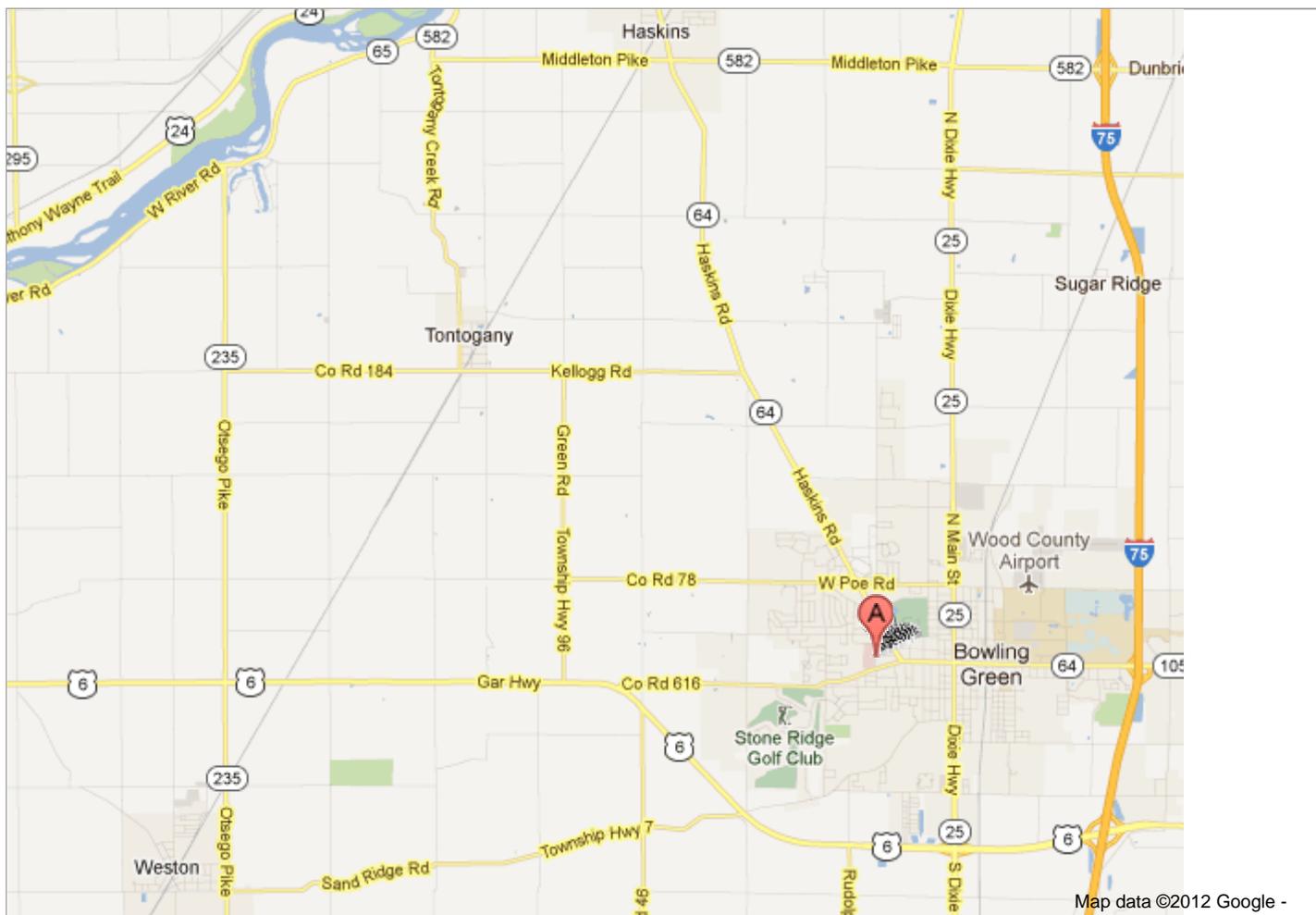
### **From Anthony Wayne Trail (US-24)**

Exit Collingwood Avenue/toward I-75 South  
Turn right on Collingwood Avenue  
Turn Left on Broadway Street  
Right on Clayton over bridge becomes Woodville Rd.  
Turn left on Navarre Avenue

**[www.mercyweb.org](http://www.mercyweb.org)**



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