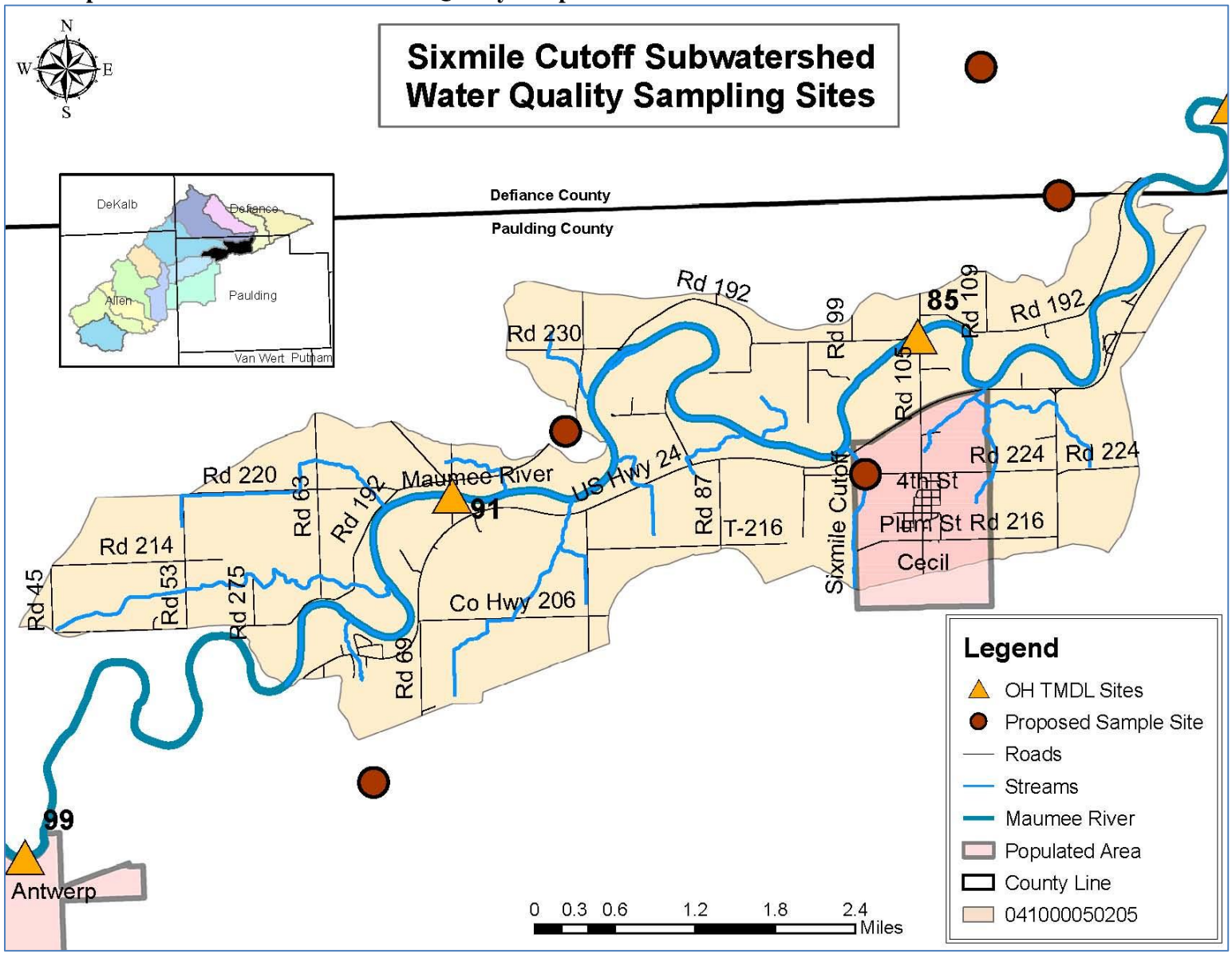
3.3.13 Sulphur Creek Sub-watershed Water Quality Analysis

Water quality was analyzed in 2012 by the OEPA in their efforts to acquire information for a TMDL for the WLEB at one site; site 79, on the Maumee River mainstem, located in the Sulphur Creek Sub-watershed. However, as described in Section 3.3.12, that sample site provides a more representative sample of the pollutant load from Gordon and Platter Creek Sub-watersheds. It should be noted that sample site 76 is located approximately one river mile downstream from the confluence of the Sulphur Creek sub-watershed to Snooks Run. Therefore, the data from site 76, located in Snooks Run sub-watershed is more representative of what the land uses from Sulphur Creek are contributing to the river. Site 76 will be discussed in the following Section.

The Defiance County SWCD has one site chosen to conduct water quality sampling should they acquire funds to do so. Due to the lack of historic water quality data, and samples being taken during an extreme drought season, a representative sample of water quality in the Sulphur Creek sub-watershed cannot be presented from the OEPA sample site 79. However, an analysis of available data was performed and will be used as a baseline of water quality from land uses in Gordon Creek and Platter Creek sub-watersheds at this time. Figure 3.14 shows the location of the sample sites in the Sulphur Creek sub-watershed and Table 3.31 shows the analysis of the OEPA water quality data.

Figure 3.15: Sulphur Creek Sub-watershed Water Quality Sample Sites



The OEPA collected water quality samples in the Sulphur Creek Sub-watershed just below the confluence of Gordon and Platter Creeks in the Maumee River biweekly (except for *E. coli* samples which were collected monthly between Jun. and Sept. 2012). Table 3.31 shows that *E. coli* exceeded the state standard of 235 CFU/100ml once, however the average fell well below the standard, TKN exceeded the target level in 100% of the samples analyzed, nitrate+nitrites exceeded the target level in 83%, and TSS exceeded the target in 33% of the samples analyzed.

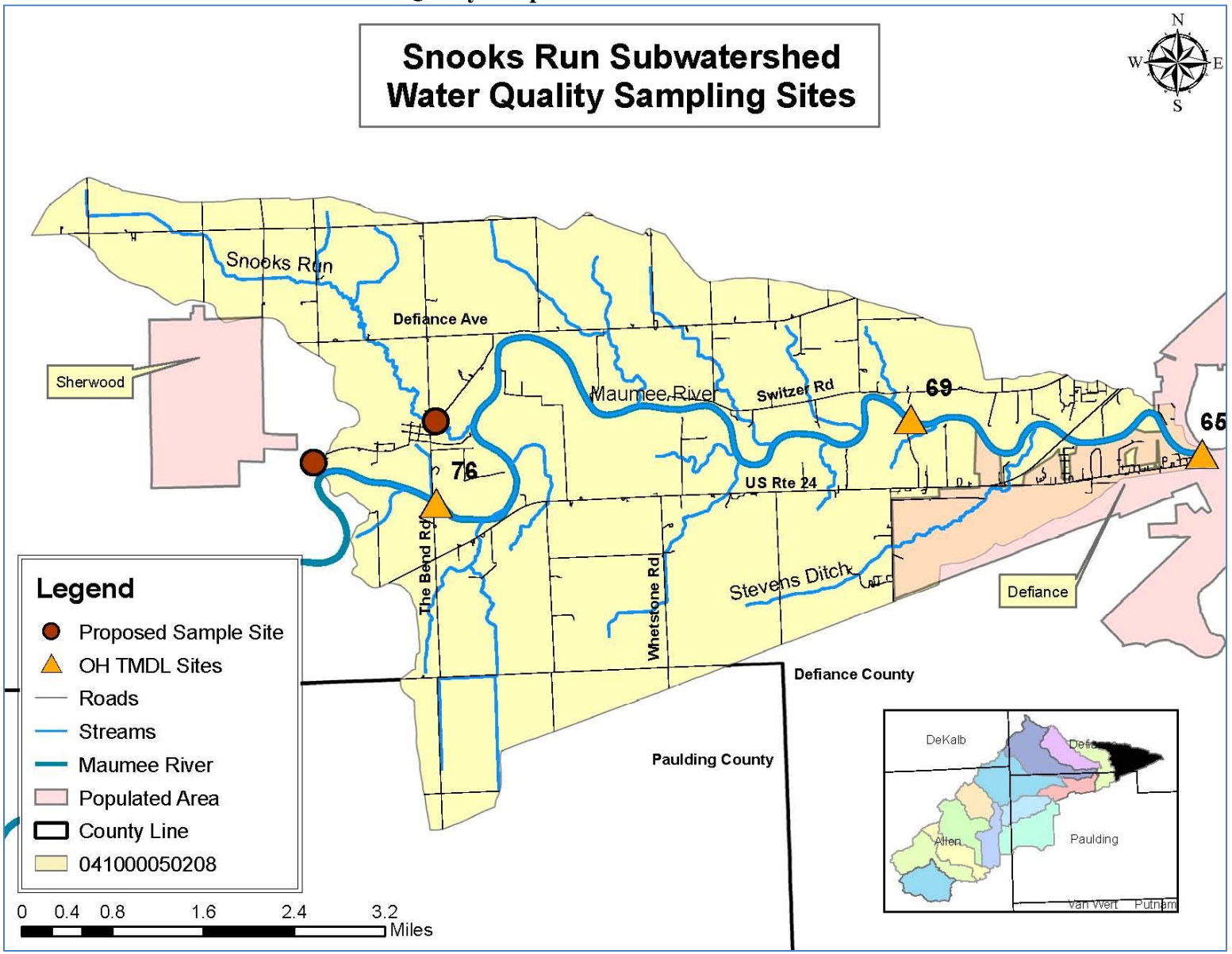
Table 3.31: OEPA-Site 79 Water Quality Analysis Gordon, Platter, Sulphur Creek Sub-watersheds

Maumee River (OH EPA Maumee River @ State Route 127)				
Parameter	**Mean**	**Unit**	**# of Times Does Not Meet Target**	**% Does not Meet Target**
D.O.	7.508	mg/L	0/6	0%
E. coli	106 (Mean)	CFU/100ml	1/5 (235 CFU/100 ml)	20%
Ammonia	0.074	mg/L	0/6	0%
pH	8.257	SU	0/6	0%
Phosphorus	0.135	mg/L	0/6	0%
TDS	467	mg/L	0/6	0%
Temperature	25.115	Celsius	0/6	0%
TSS	23.167	mg/L	2/6	33%
Nitrate+Nitrite	3.176	mg/L	5/6	83%
Nitrite	0.031	mg/L	0/6	0%
TKN	1.075	mg/L	6/6	100%

3.3.14 Snooks Run Sub-watershed Water Quality Analysis

Snooks Run Sub-watershed is the farthest downstream sub-watershed located in the Upper Maumee River Watershed. About 15-20% of the city of Defiance is located within the sub-watershed and the Defiance Water Treatment Plant intake is located within the sub-watershed. The OEPA conducted water quality analysis at three sites in the Snooks Run Sub-watershed; Sites 76, 69, and 65 which is at the Defiance Water Treatment Plant, during the summer of 2012. The Defiance County SWCD has identified a site that they propose to be a water quality sample site and are in the process of acquiring funds to begin the sampling efforts. Due to the lack of historic water quality data, and samples being taken during an extreme drought season, a representative sample of water quality in the Snooks Run sub-watershed cannot be presented. However, an analysis of available data was performed and will be used as a baseline of water quality in the sub-watershed at this time. Figure 3.15 shows the location of the sample sites in the Snooks Run sub-watershed and Tables 3.32 and 3.33 show the analysis of the OEPA water quality data.

Figure 3.16: Snooks Run Sub-watershed Water Quality Sample Sites



The OEPA conducted water quality analysis at Site 76 monthly between March and June, and September and November, and biweekly between June and September, except for *E. coli* which was sampled monthly between June and September. As can be seen in Table 3.32 D.O. exceeded the target level in one of eight samples analyzed, Nitrate+Nitrite exceeded the target level in 50%, TKN exceeded the target levels in 100% of samples analyzed, and TSS exceeded the target level in 90% of the samples analyzed. *E. coli* did not meet the state standard of 235 CFU/100ml in two of the five samples analyzed with the average measuring at 208 CFU/100ml.

Table 3.32: OEPA – Site 76 Water Quality Analysis for Sulphur Creek/Snooks Run Sub-watersheds

Snooks Run (OH EPA - 76; Maumee River @ The Bend Rd.)				
Parameter	**Mean**	**Unit**	**# of Times Does Not Meet Target**	**% Does not Meet Target**
D.O.	8.123	mg/L	1/8 > 9 mg/l	13%
E. coli	208.4 (Mean)	CFU/100ml	2/5 (235 CFU/100ml)	40%
Ammonia	<.05	mg/L	0/10	0%
pH	8.255	SU	0/8	0%
Phosphorus	0.117	mg/L	0/10	0%
TDS	442.4	mg/L	0/10	0%
Temperature	22.883	Celsius	0/8	0%
TSS	37.6	mg/L	9/10	90%
Nitrate+Nitrite	2.723	mg/L	5/10	50%
Nitrite	0.04	mg/L	0/10	0%
TKN	1.018	mg/L	10/10	100%

Heidelberg University conducted water quality analysis in Snooks Run at the Site known as "The Bend" (OH EPA Site 76) monthly in 2010 from March through November. As can be seen in Table 3.33 all parameters fell within target levels, however, chlorophyll–a, which is used as an indicator to determine the amount of nutrients in the water effecting algal growth, measured high on three instances; one in July, August, and September.

Table 3.33 – "The Bend" – Heidelberg University Water Quality Analysis

Snooks Run (Heidelberg University; Maumee River @ The Bend Rd.)				
Parameter	**Mean**	**Unit**	**# of Times Does Not Meet Target**	**% Does not Meet Target**
Chl - a	19.04	µg/L	3/8 > 10 µg/L	38%
DRP	< 0.01	µg/L	0/9	0%
Nitrate	1.85	mg/L	0/9	0%
Nitrite	0.009	mg/L	0/9	0%

The OEPA sampled water quality from site 69 biweekly between June and September, except for *E. coli* measurements which were taken monthly between June and September. As can be seen in Table 3.34 D.O. exceeded the target level in 33% of the samples analyzed, nitrate+nitrites exceeded the target level in 67% and TKN exceeded the target level in 100% of the samples analyzed. TSS exceeded the target level in 50% of the samples analyzed and *E. coli* never exceeded the state standard with the average measurement being less than 100 CFU/100ml.

Table 3.34: OEPA – Site 69 Water Quality Analysis Snooks Run Sub-watershed

Snooks Run (OH EPA - 69; Maumee River @ Intersection of Switzer Rd. and Dowe Rd)				
Parameter	**Mean**	**Unit**	**# of Times Does Not Meet Target**	**% Does not Meet Target**
D.O.	7.78	mg/L	2/6 > 9 mg/l	33%
E. coli	98.8 (Mean)	CFU/100ml	0/5 (235 CFU/100 ml)	0%
Ammonia	0.08	mg/L	0/6	0%
pH	8.32	SU	0/6	0%
Phosphorus	0.12	mg/L	0/6	0%
TDS	461	mg/L	0/6	0%
Temperature	25.66	Celsius	0/6	0%
TSS	35.33	mg/L	3/6	50%
Nitrate+Nitrite	3.4	mg/L	4/6	67%
Nitrite	0.05	mg/L	0/6	0%
TKN	0.99	mg/L	6/6	100%

The final sample site located within the Upper Maumee River Watershed is located at the Defiance WTP. The OEPA measured only the key parameters of concern for drinking water at the WTP intake site 65, with the exception of *E. coli* which was not measured. As can be seen in Table 3.35, ammonia exceeded the target level in 20% of five samples, and nitrate+nitrite exceeded the target level in 67% samples analyzed.

Table 3.35: OEPA – Site 65 Water Quality Analysis Snooks Run Sub-watershed

Site Location: OH EPA - 65; Maumee River @ Defiance WTP				
Parameter	**Mean**	**Unit**	**# of Times Does Not Meet Target**	**% Does not Meet Target**
Ammonia	0.61	mg/L	1/5	20%
Nitrate+Nitrite	4.94	mg/L	3/5	67%
Phosphorus	0.11	mg/L	0/5	0%

3.3.15 Summary of Water Quality Data

As can be gleaned from the sections above and Table 3.35 below, the major water quality problems observed throughout the watershed are from nitrogen, phosphorus, *E. coli* and sediment and/or turbidity. All of these pollutants can discharge from faulty septic systems, barnyard or animal feeding operation runoff, improper application of manure on crop land, conventional tillage on HEL and PHEL farmland, as well as from urban runoff from lawn fertilizer, excess stormwater and CSO events. However, high nutrient, and turbidity levels can also come directly from row crop fields either through surface runoff or tile discharge. High nutrient and turbidity levels may also be the cause of inadequate dissolved oxygen levels found throughout the project area at various times throughout the year. Atrazine also had very few exceedences of the EPA recommended MCLs after spring application, however atrazine is a minimal problem in comparison to *E. coli*, nutrients, and turbidity. Though, it should be noted that many best management practices that should be implemented to minimize the impact on water quality from nutrients and turbidity will also minimize the impact from herbicides and pesticides. Also of particular note are the low mIBI scores in Trier Ditch, Bullerman Ditch, and Zuber Cutoff sub-watersheds. Sources of pollutants will be easier to identify after combining the water quality analysis results with land use data.

Table 3.36 shows the average of all water quality data collected since 2003 per parameter per drainage area. Those values that are highlighted in pink exceed the target levels set by this project for that parameter.

Table 3.36: Summary of Water Quality Data (analysis and percent exceedance) per Parameter per Drainage Area

Para-meter	Trier Ditch	Buller-man Ditch	Six-mile Creek	Bottern Ditch	Black Creek	Marsh Ditch	Marie De-Larme Creek	Marie DeLarme and East Sixmile Cutoff Site 85	North Chaney Ditch	West Zuber Cutoff	Zuber Cutoff and West Sixmile Cutoff Site 91	Gordon Creek and Platter Creek Site 79	Sulphur Creek and West Snooks Run (site 76)	Snooks Run (Site 69)
Alachlor (ppb)	0.061 0%	0.165 0%	0.07 0%	0.11 0%	0.152 0%	0.096 0%	*	*	0.068 0%	0.357 0%	*	*	*	*
Atrazine (ppb)	0.24 0%	0.278 0%	0.864 8%	0.604 4%	0.816 0%	2.053 9%	*	*	0.224 0%	1.32 14%	*	*	*	*
Metol-achlor (ppb)	0.125 0%	0.347 0%	0.164 0%	0.225 0%	0.334 0%	0.307 0%	*	*	0.088 0%	0.804 0%	*	*	*	*
D.O. (mg/L)	7.18 13%	7.6 44%	6.798 32%	5.849 37%	5.522 26%	9.178 56%	8.031 30%	6.108 0%	6.636 16%	7.34 0%	6.648 0%	7.508 0%	8.123 13%	7.78 33%
E. coli (CFU/ 100ml)	446 59%	1012 47%	424.9 40%	1442.88 58%	1065 68%	712 45%	853.1 100%	186.6 40%	134.19 15%	815 83%	89.4 0%	106 20%	208.4 40%	98.8 0%
Nitrogen, Ammonia (mg/L)	*	0.14 10%	0.13 0%	0	0.08 33%	0.085 3%	0	0.129 0%	0.104 6%	*	0.097 0%	0.074 0%	<0.05 0%	0.08 0%
Nitrate+ Nitrite (mg/L)	0.149 0%	2.78 62%	2.238 17%	1.372 6%	1.56 11%	2.66 71%	0.767 33%	2.992 83%	1.774 31%	2.807 29%	2.836 67%	3.176 83%	2.723 50%	3.4 67%
Nitrite (mg/L)	*	0.07 0%	*	*	*	*	*	0.031 0%	0.04 0%	*	0.027 0%	0.031 0%	0.04 0%	0.05 0%

Para-meter	Trier Ditch	Buller-man Ditch	Six-mile Creek	Bottern Ditch	Black Creek	Marsh Ditch	Marie De-Larme Creek	Marie DeLarme and East Sixmile Cutoff Site 85	North Chaney Ditch	West Zuber Cutoff	Zuber Cutoff and West Sixmile Cutoff Site 91	Gordon Creek and Platter Creek Site 79	Sulphur Creek and West Snooks Run (site 76)	Snooks Run (Site 69)
TKN (mg/L)	*	1.39 86%	0.73 67%	0.8 67%	0.35 50%	1.4 100%	0	1.078 100%	1.059 100%	*	0.99 100%	1.075 83%	1.018 100%	0.99 100%
pH (SU)	8.052 0%	7.7 0%	7.946 0%	7.944 0%	7.918 0%	7.913 0%	8.083 0%	8.022 0%	7.987 0%	7.997 0%	8.065 0%	8.257 0%	8.255 0%	8.32 0%
TDS (mg/L)	453.8 0%	442.1 0%	460.2 3%	533.89 3%	425.1 0%	472.1 0%	593.3 0%	467 0%	447.6 0%	329.4 0%	458.5 0%	467 0%	442.4 0%	461 0%
TSS (mg/L)	*	39.65 68%	78.67 100%	49.667 67%	18.33 33%	53.12 62%	9 0%	12.667 0%	23.384 25%	*	14.667 0%	23.167 17%	37.6 90%	35.33 50%
Temp °C	20.77 0%	18.81 15%	19.64 0%	19.627 0%	18.92 0%	15.02 23%	17.65 0%	24.428 0%	21.77 0%	17.24 0%	24.48 0%	25.115 0%	22.883 0%	25.66 0%
Turbidity (NTU)	23.23 75%	46.27 92%	33.87 73%	27.447 79%	32.61 56%	65.86 91%	15.52 70%	*	36.41 61%	29.97 100%	*	*	*	*
Total P (mg/L)	0.088 46%	0.27 31%	0.269 57%	0.341 94%	0.3 67%	0.25 22%	0.08 67%	0.137 0%	0.135 27%	0.089 43%	0.153 0%	0.135 0%	0.117 0%	0.12 0%
CQHEI	81	77	83.5	82.33	91	88	*	*	85	72	*	*	*	*
mIBI	22	17	26.5	23.33	31	28	*	*	25	15	*	*	*	*

3.4 Land Use per Sub-watershed

This section will provide information that was obtained through windshield and desktop surveys of each sub-watershed, as well as information that has been gathered via government agencies (i.e. IDEM and OH EPA) and historic data found through research at the sub-watershed level. However it is important to note that there are particular trends that have been found watershed wide as described below.

The predominant land use in the project area is agriculture, as can be seen in Table 2.5, and Figure 2.13 in Section 2.5, encompassing nearly 78% of the total land use in the project area. Landowners using modern farming practices are scattered throughout the project area. The stream bank buffer inventory conducted as part of this project in 2013 revealed that 71% of the parcels within the UMRW have a riparian buffer less than 60 feet, with 57% of those parcels having a stream buffer equal to 0 – 10 feet in total width. The windshield survey conducted as part of this project, which took place between April and June, 2012, consisted of two people driving each road within the UMRW and looking for potential issues of land use, farming techniques, or urban issues. The car was stopped at each bridge and observations were recorded about the surrounding land use, and any potential water quality problems. The windshield survey revealed that streambank and surface runoff erosion is a major issue contributing to NPS in surface waters, as is livestock with access to open water. Leaky septic systems may be a significant contributor to surface and ground water pollution, as well as most of the rural community utilizes on-site sewage treatment. In most cases, erosion control, buffering ditch banks, septic system education, and livestock management will be BMPs that will help to remediate the pollution issues in the UMRW.

Although there are few urban areas in the project area contributing to less than 15% of the land use, it has been found that urban stakeholders do influence the water system in the project area, especially in the larger cities including Fort Wayne and New Haven at the headwaters of the Maumee. Education and outreach activities, as well as cost-share incentives and BMPs regarding septic tanks, proper fertilizer use, and stormwater management will be the most effective way of managing urban NPS in the UMRW. The utilization of small scale urban BMPs such as rain barrels and rain gardens will help with stormwater management in urban settings and provide a great resource for educational outreach. It will also be beneficial to work with the City and County Parks Departments on ways to improve water based recreation such as streambank stabilization projects, log jam removal, and installation of pervious walking paths and/or trails along the rivers. However, the quickest and most dramatic results in reducing nonpoint source pollutants in the UMRW lie in utilizing BMP installation within the agricultural community.

3.4.1 Trier Ditch Sub-watershed Land Use

The primary influence on water quality in the Trier Ditch sub-watershed is agriculture even though nearly half of the City of New Haven and a portion of the City of Fort Wayne is located within Trier Ditch Sub-watershed. Table 3.36 shows the percentage of Trier Ditch Sub-

watershed that is in each land use and Figure 3.16 is a map showing the delineation of land use in the sub-watershed. Using National Land Cover Data acquired from the USGS and analyzed in ArcGIS, over 57% of the land use in Trier Ditch sub-watershed is in cultivated crops, and over 32% of the watershed is developed. However, only 5.5% of the developed land is either a medium or high intensity developed area.

There were eight locations identified as potential problems during the windshield survey conducted in 2012 in the Trier Ditch sub-watershed. Two locations totaling approximately 4900 feet of streambank are eroding along tributaries in agricultural area of the Trier Ditch sub-watershed. Five locations totaling approximately 4210 feet of streambank are eroding along tributaries in the urban areas of the Trier Ditch sub-watershed. The urban erosion taking place on Highway 930 is located next to a carwash where the parking lot is directly adjacent to the stream with little to no buffer in place and many of the other locations are denude of vegetation. Streambank stabilization BMPs will need to be installed in these identified areas to prevent future erosion of the banks. There was one location in the Trier Ditch sub-watershed where there is potential for manure to runoff of a horse pasture field. While the animals are fenced out of the stream, there is a manure pile adjacent to the stream ditch. Proper manure management will help to prevent livestock runoff from contaminating surface waters. Table 3.37 shows the observations that were made during the windshield survey and the approximate number of feet or locations that will need to be remediated to improve water quality in the Trier Ditch sub-watershed and Figure 3.17 shows the location of each of the observations.

There are several potential point sources of pollution in the Trier Ditch sub-watershed including one NPDES permitted facility which discharges into the Trier Ditch (Table 3.38), two brownfield sites (Table 3.39) and 35 underground storage tanks (USTs), 16 of which are considered leaking underground storage tanks (LUSTs) (Table 3.40). There is one CSO located within Trier Ditch sub-watershed. Most of the sites are located within the political boundaries of Fort Wayne and New Haven. These sites pose a threat to both ground and surface water. If the contents held in any of the facilities leak it can leach through the soil and reach groundwater contaminating drinking water wells of local residents, or leach into surface waters and decrease water quality and affect aquatic life.

One brownfield site, located at 110 Lincoln Highway E, has restrictions for development due to Volatile Organic Compounds (VOCs) being found in soil and groundwater. Both Brownfield sites were issued Comfort Letters which basically states that the property owners are exempt of liability due to Indiana Law or IDEM policy. Six of the 16 LUSTs located in the Trier Ditch sub-watershed are still active and are leaking their contents and pose a significant risk to ground and/or surface water. The LUSTs located in Trier Ditch are listed in Table 3.40 which tells the location of the LUST, its priority for cleanup and the area that is affected by the leak. Note that some facilities may be listed in the table more than once due to the fact that there may have been multiple instances of the UST leaking. Figure 3.18 shows the location of each of the point sources of pollution.

Table 3.36: Land Use in the Trier Ditch Sub-watershed

Open Water	Developed Open Space	Developed Low Intensity	Developed Medium Intensity	Developed High Intensity	Deciduous Forest	Grassland Herbaceous	Row Crops	Woody Wetland	Emergent Herbaceous Wetlands	Total	Unit
100.54	2129.31	2766.1	670.99	311.65	1303.96	329.71	10410.16	3.33	13.67	18039.42	Acres
0.56%	11.80%	15.33%	3.72%	1.73%	7.23%	1.83%	57.71%	<0.5%	<0.5%	100%	%

Table 3.37: Windshield Survey Observations in the Trier Ditch Sub-watershed

Observation	Bank Erosion (Agriculture)	Bank Erosion (Urban)	Pasture Runoff
Number	4900 ft	4210 ft	1

Table 3.38: NPDES Facilities Located in the Trier Ditch Sub-watershed

Permit Name	Permit #	County Name	Street Address	City	State Code	State Water Body Name	Effluent Exceedances (3 yrs)	Enforcement Actions (I=informal; F=formal) (5 yrs)
New Haven CSS*	INM020346	Allen	815 Lincoln Hwy E	New Haven	IN	Martin Drain and Trier Ditch to Maumee	0	0

*CSS – Combined Sewer System

Table 3.39: Brownfield Sites Located in the Trier Ditch Sub-watershed

BFD Site #	Name	Address	City	County	Financial Assistance	Other Actions	ERC (NR-Not Required)	Land Use Restriction(s), Contaminants of Concern	Remediation Date for ERC and/or Closure Letter
4110304	EFFT Equities	4429 Allen Martin Dr	Fort Wayne	Allen	N/A	Comfort Letter 05/13/2011	NR	N/A	N/A
4120506	Cap 'N Cork	110 Lincoln Hwy E	New Haven	Allen	N/A	Comfort Letter 07/30/2012	Yes	No Water Wells (VOCs in soil and groundwater)	12/4/2013

*ERC – Environmental Restrictive Covenant

Table 3.40: Leaking Underground Storage Tanks in the Trier Ditch Sub-watershed

UST FACILITY ID	NAME	STREET ADDRESS	CITY	STATE	PRIORITY	AFFECTED AREA	STATUS
22543	Merlin Geraroot	7101 E Tillman Rd	FORT WAYNE	IN	Low	Soil	NFA-Unconditional Closure
2033	VERIZON Ft. Wayne SE CO	7033 Hessen Castle Rd	FORT WAYNE	IN	Low	Soil	NFA-Unconditional Closure
825	Allen County Highway	8317 Tillman Rd	FORT WAYNE	IN	Low	Soil	NFA-Unconditional Closure
9482	Crown Enterprises	4221 Adams Center Rd	FORT WAYNE	IN	Low	Soil	NFA-Unconditional Closure
1995	Mcmillen Park	3900 Hessen Cassel Rd	FORT WAYNE	IN	Low	Soil	Discontinued (active)
6124	McMillian Express	3505 Wayne Trace	FORT WAYNE	IN	Medium	Soil, Groundwater	NFA-Unconditional Closure
8211	Roadway Express Inc	3513 Adams Center Rd	FORT WAYNE	IN	Low	Soil	Discontinued (active)
839	Former Smith Sub	6134 Moeller Rd	FORT WAYNE	IN	Low	Soil	NFA-Unconditional Closure
6324	Navistar International	3402 Meyer Rd	FORT WAYNE	IN	Medium	Soil, Groundwater	NFA-Unconditional Closure
15247	Jones Transfer Co	5929 Moeller Rd	FORT WAYNE	IN	Medium	Soil, Groundwater	NFA-Unconditional Closure
10552	Doc Rickers	1316 US 30 E	New Haven	IN	Medium	Soil, MTBE, Groundwater	NFA-Unconditional Closure
15527	Norm's Point Service	445 Lincoln Hwy W	New Haven	IN	Medium	Soil, Groundwater	Active
					Low	Soil	Discontinued (active)
6765	Speedway NO 6150	103 Lincoln Hwy E	New Haven	IN	Low	Soil	Active
					Medium	Soil, Groundwater	NFA-Conditional Closure

UST FACILITY ID	NAME	STREET ADDRESS	CITY	STATE	PRIORITY	AFFECTED AREA	STATUS
11870	Lassus Bros Oil Handy Dandy #28	633 Broadway	New Haven	IN	Low	Soil	Deactivated (no release confirmed)
14201	Virgil C Brockman	201 Main St	New Haven	IN	Low	Soil	NFA-Unconditional Closure
9729	Mcintosh Energy	404 Broadway	New Haven	IN	Medium	Soil	Active
					Medium	MTBE, Groundwater, Free Product	Active

NFA-No Further Action

Figure 3.17: Land Use in the Trier Ditch Sub-watershed

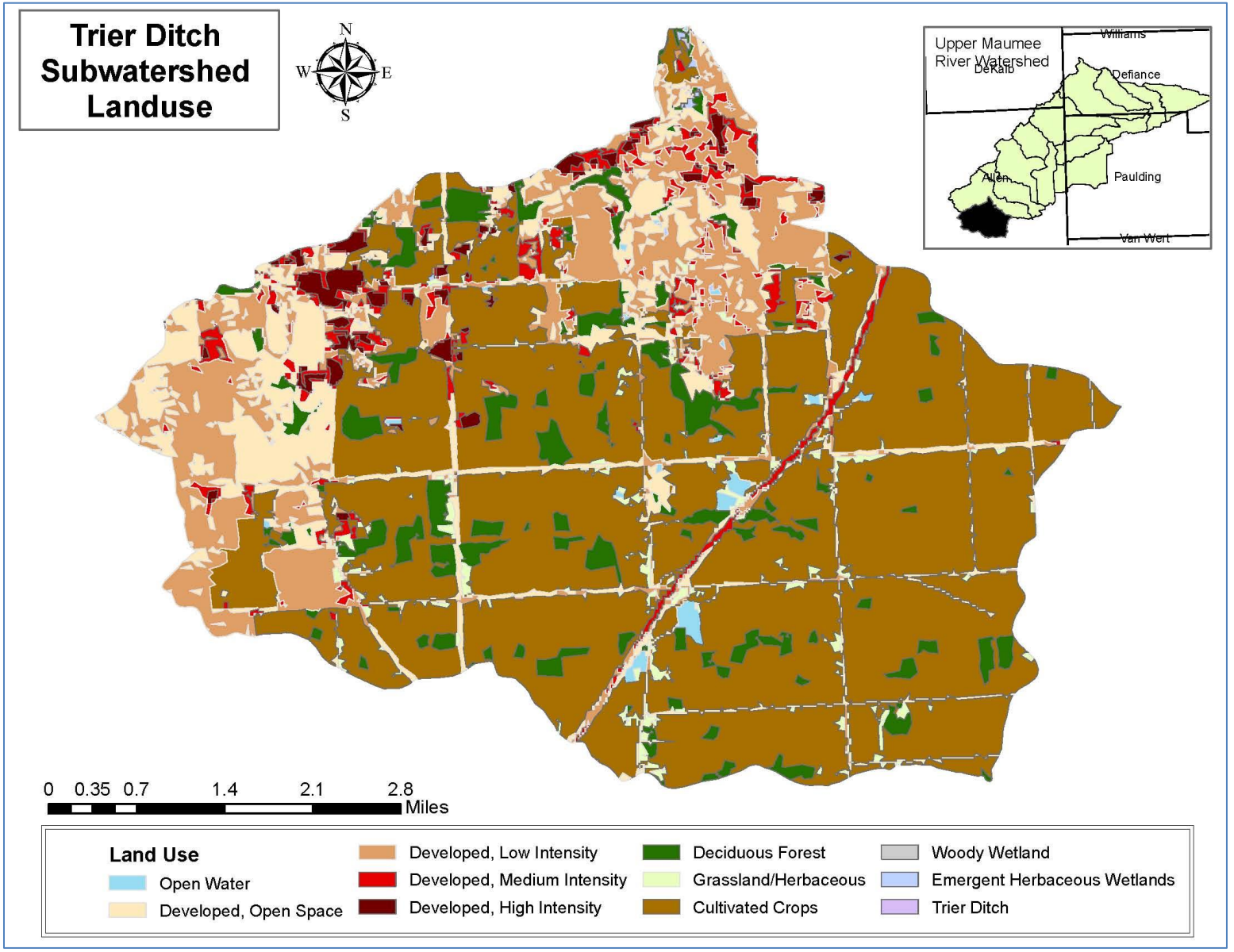


Figure 3.18: Windshield Survey Observations in the Trier Ditch Sub-watershed

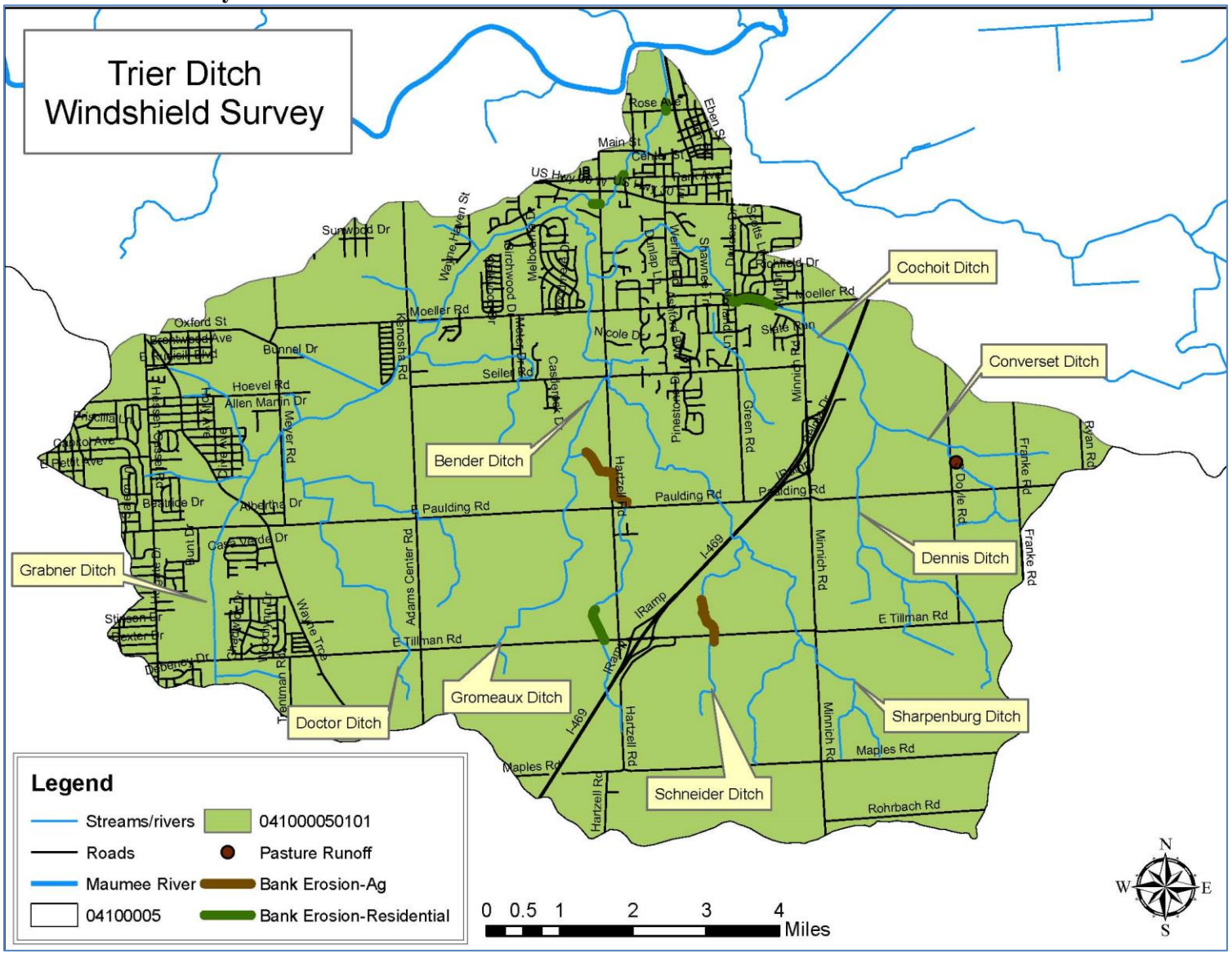
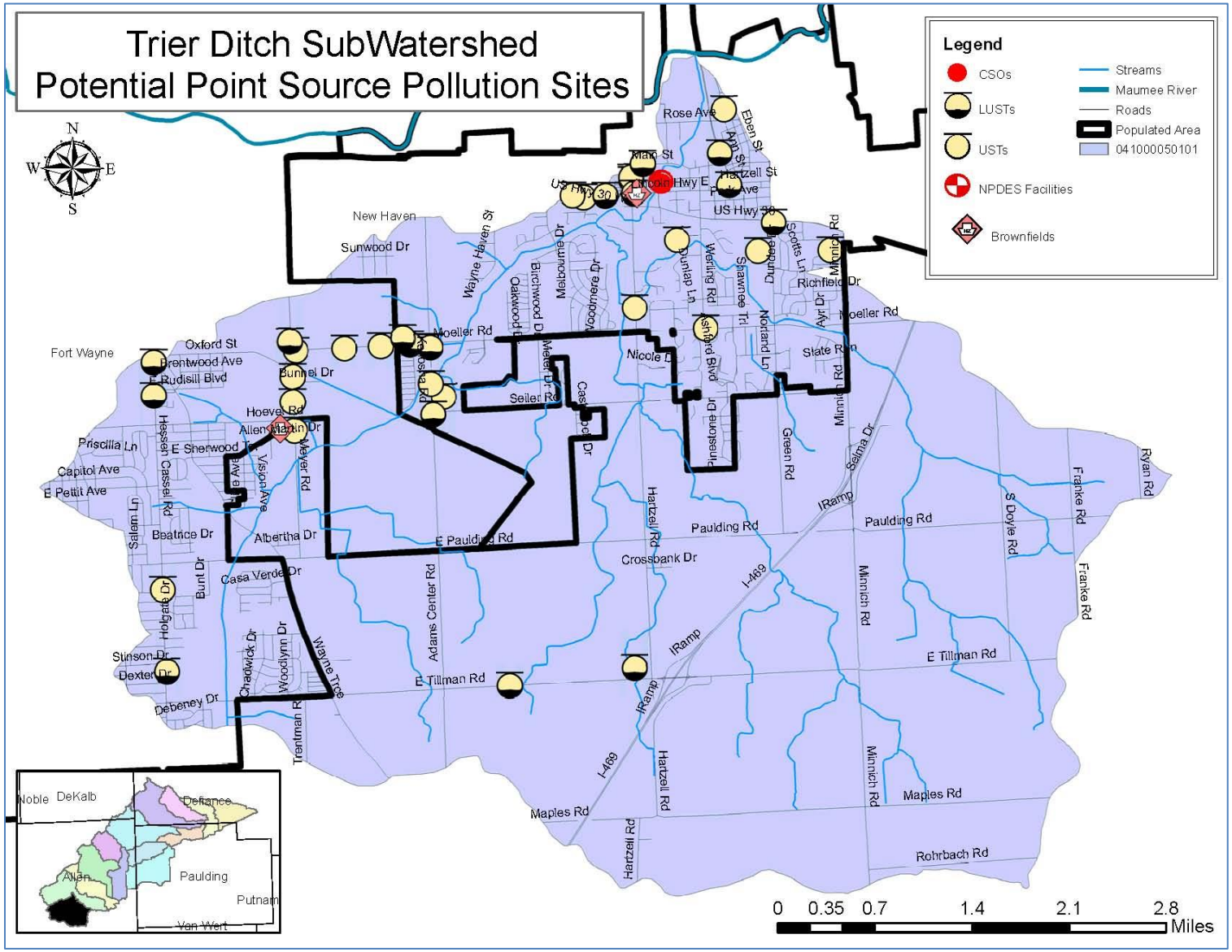


Figure 3.19: Point Sources of Pollution in the Trier Ditch Sub-watershed



Water quality data collected at the one sample site in Trier Ditch, located upstream of the NPDES permitted facility, indicates there is a problem with *E. coli*, phosphorus, and turbidity in the watershed. The high measurements of the above mentioned parameters may also be the reason that the macroinvertebrate community is suffering in Trier Ditch. Referring back to Figure 3.16, it can be seen there is a mixed land use in the surrounding area from high density developed areas to cultivated crop land. All the surrounding land uses may contribute to the excess pollutants in the water. The increase in impervious surfaces of New Haven and Fort Wayne surrounding the water sample site allows for stormwater carrying fertilizer runoff from turf grass, debris from roadways, and pathogens from pets and wildlife to flow directly into surface waters. All the agricultural land in the watershed (nearly 58% of the land use) eventually drains into the sample site as well. Much of the crop land in the UMRW, including those in the Trier Ditch sub-watershed are tiled which is a direct conduit for excess fertilizer and sediment to reach surface waters. There is also the potential for surface flow of the same potential contaminants, however a negligible amount of the soil present in the watershed is considered HEL or PHEL and, and there is a high adoption of conservation tillage practices in the watershed with over 60% of corn and 80% of beans in some kind of conservation tillage. Though, it is important to continue to promote conservation tillage as a sustainable farming practice. Livestock operations may also be contributing to an excess in pollutants in surface water. One livestock operation was identified during the windshield survey that is likely contributing to the high nutrient, pathogen, and turbidity readings in the watershed, though there are likely more facilities in the watershed that could benefit from livestock best management practices to limit polluted runoff.

3.4.2 Bullerman Ditch Sub-watershed Land Use

The primary influence on water quality in the Bullerman Ditch sub-watershed is the urban areas of Fort Wayne and New Haven, Indiana; however a large percentage of the watershed is also in production as prime agricultural land. Table 3.41 shows the percentage of Bullerman Ditch Sub-watershed that is in each land use and Figure 3.19 is a map showing the delineation of land use in the sub-watershed. Using National Land Cover Data acquired from the USGS and analyzed in ArcGIS, over 61% of the land use in Bullerman Ditch sub-watershed is developed, and over 32% of the watershed is agricultural. However, only 13% of the developed land is either a medium or high intensity developed area. Though the percentage of land in medium or high intensity development is low, it is significant as the 2010 Census estimates that there are approximately 2,293.4 persons per square mile in Fort Wayne, which can have a significant impact on the environment, especially with the high amount of impervious surfaces within the city limits.

There were nineteen locations identified as potential problems during the windshield survey conducted in 2012 in the Bullerman Ditch sub-watershed. One location totaling approximately 1032 feet of streambank is eroding along tributaries in the agricultural area of the Bullerman Ditch sub-watershed. Six locations, totaling approximately 2465 feet of streambank are eroding along tributaries in the urban areas of the Bullerman Ditch sub-watershed. The urban erosion taking place on Stellhorn Rd east of Lehmeyer Rd and on State St at Miller's Merry Manor Retirement Community both present with severe bank erosion and are prime locations to

install a two-stage ditch to remediate the eroding banks. Most of the urban erosion taking place is due to the increased amount of stormflow from the impervious surfaces running over turf grass adjacent to the ditches that are mowed directly to the streambank with little to no buffer. Streambank stabilization BMPs will need to be installed in these identified areas to prevent future erosion of the banks.

It should be noted that it was observed during the windshield survey that residential land owners typically mow their turf lawns to the stream or ditch bank, leaving no strong buffer to help slow the flow of stormwater. This practice can often lead to streambank erosion, as well as allow for fertilizers and pet waste to enter directly into surface waters.

There were nine locations where either rip rap or a concrete drain was present directing stormwater from turf lawns, parking lots, and in one case a cemetery. This poses a threat to water quality by limiting any infiltration of polluted storm water, thus acting as a direct conduit for urban NPS such as road salt, dirt, fertilizer and pesticides, oil and other automobile waste to reach open water. There were also three locations where the banks of the stream were armored with either rip rap or cement. This poses a threat to water quality by not allowing for slowing and infiltration of stormwater prior to it being deposited into open water. Table 3.42 shows the observations that were made during the windshield survey and the approximate number of feet or locations that will need to be remediated to improve water quality in the Bullerman Ditch sub-watershed and Figure 3.20 shows the location of each of the observations.

There are several potential point sources of pollution in the Bullerman Ditch sub-watershed including two NPDES permitted facilities which discharge into the Bullerman Ditch sub-watershed (Table 3.43) and 138 underground storage tanks (USTs), 61 of which are considered leaking underground storage tanks (LUSTs). All of the sites are located within the political boundaries of Fort Wayne and New Haven. These sites pose a threat to both ground and surface water. If the contents held in any of the facilities leak it can leach through the soil and reach groundwater contaminating drinking water wells of local residents, or leach into surface waters and decrease water quality and affect aquatic life. Eleven of the 61 LUSTs located in the Bullerman Ditch sub-watershed are still active and are leaking their contents and pose a significant risk to ground and/or surface water. The LUSTs located in Bullerman Ditch are listed in Table 3.44 which tells the location of the LUST, its priority for cleanup and the area that is affected by the leak. Note that some facilities may be listed in the table more than once due to the fact that there may have been multiple instances of the UST leaking.

There are four locations where Brownfield funds were spent to investigate the site for contamination and/or develop a plan for remediation in the Bullerman Ditch sub-watershed. The City of Fort Wayne also received Brownfield funds to conduct investigations of contamination sites community wide. Therefore, a specific site cannot be identified as that money was spent at several locations community wide. Through communications with the Brownfield program with the City of Fort Wayne it was learned that specific sites where the community wide Brownfield funds were spent are not known. Table 3.45 lists the areas where

Brownfield funds were used and if any restrictions at that site were put in place due to findings of the site assessment.

Bullerman Ditch sub-watershed has a superfund site located within its boundaries. The Fort Wayne Reduction Dump, owned by Waste Management, is a 35 acre site located within the 100 year flood plain along the Maumee River on the Fort Wayne, New Haven political boundary. It operated as a landfill which accepted hazardous waste, between 1966 and 1974. Hazardous waste was found to be leaking into soil and groundwater during a feasibility study which took place in the 1980s. In April 2011, the third, five-year review of the site took place and was conducted by the US EPA. To date activity that has taken place to clean-up the site includes;

1) Digging up/removing over 27,000 waste-containing drums
2) Collecting and treating groundwater
3) Installation of erosion control mats and planting vegetation
4) Instituting land restrictions and ground water monitoring.

The next step for this Superfund site is to develop a long-term stewardship plan which will include regular inspections to ensure clean-up efforts at the site are still in place and effective. The next scheduled review of the site will be in 2014.

The Fort Wayne Reduction Dump Superfund Site is located within an underserved community, most of which obtains their drinking water from ground wells. Therefore, consistent monitoring of groundwater and the integrity of the pollution barriers put in place at the site are integral to the safety of the people working and residing around the site. For more information on the Fort Wayne Reduction Dump Superfund Site visit www.epa.goc/superfund/sites/.

The City of Fort Wayne and New Haven have CSOs which discharge to the Maumee River or its tributaries, totaling 14 outfalls located within the Bullerman Ditch sub-watershed. The City of New Haven developed a Long Term Control Plan (LTCP) for its CSO to completely eliminate it by pumping its waste water to the Fort Wayne WWTP. The City of Fort Wayne's LTCP, released in December 2007, includes plans to eliminate all CSO events from CSO 48, located at Morton St. on the Maumee River, and to limit all other CSO events into the Maumee River to a maximum of four CSO events annually by improving treatment capacity of waste water during storm event through a variety of different measures. Table 3.46 is a list of the CSOs present in the watershed and the approximate location of each of those outfalls.

Figure 3.21 shows the location of each of the point sources of pollution located within the Bullerman Ditch sub-watershed.

Table 3.41: Land Use in the Bullerman Ditch Sub-watershed

Open Water	Dev. Open Space	Dev. Low Intensity	Dev. Medium Intensity	Dev. High Intensity	Deciduous Forest	Ever-green Forest	Shrub/ Scrub	Grassland/H erbaceous	Row Crops	Woody Wet-land	Emergent Herbaceous Wetlands	Total	Unit
409.1	4380	6031.65	1684.997	1107.34	657.0007	1.136	40.59	120.589	7006	43.88	81.734	21564	Acres
1.90	20.31	27.97	7.81	5.14	3.05	<1	<1	<1	32.49	<1	<1	100%	%

Table 3.42: Windshield Survey Observations in the Bullerman Ditch Sub-watershed

Observation	Bank Erosion (Agriculture)	Bank Erosion (Urban)	Armored Surface Drain	Armored Banks
Number	1032 ft	2465 ft	128 ft	103 ft

Table 3.43: NPDES Permitted Facilities in the Bullerman Ditch Sub-watershed

Permit Name	Permit #	County Name	Street Address	City	State Code	State Water Body Name	Effluent Exceedances past 3 yrs (Substance)	Enforcement Actions (I=informal; F=formal) (5 yrs)
Fort Wayne WWTP	IN0032191	Allen	2601 Dwenger Ave	Fort Wayne	IN	Maumee River	4 (Chlorine, *E. coli*, TSS)	2(I) 2(F)
Norfolk Southern Railway	IN0000485	Allen	7315 Nelson Rd	Fort Wayne	IN	Trier Ditch to Maumee River	2 (Napthalene, TSS)	0

Table 3.44: Leaking Underground Storage Tanks in the Bullerman Ditch Sub-watershed

UST FACILITY ID	NAME	STREET ADDRESS	CITY	STATE	PRIORITY DESCRIPTION	AFFECTED AREA DESCRIPTION	DESCRIPTION
2943	Clark Store #1822	3220 Wayne Trace	FORT WAYNE	IN	Medium	Soil, MTBE, Groundwater	Active
15463	Fire Station #9	2530 E Pontiac St	FORT WAYNE	IN	Low	Soil	NFA-Unconditional Closure
6240	Navistar International Corp	2911 Meyer Rd	FORT WAYNE	IN	Medium	Soil	NFA-Unconditional Closure
1943	Fruehauf Transportation Div	2612 E Pontiac St	FORT WAYNE	IN	Low	Soil	Discontinued (active)
19364	Ray's Self Service Carwash	2510 Pioneer	FORT WAYNE	IN	Low	Soil	NFA-Unconditional Closure
7440	Karl Schmidt Unisia Inc	2425 South Coliseum Road	FORT WAYNE	IN	Low	Soil	NFA-Unconditional Closure
6177	Kipfers Stop & Go	2510 S Coliseum Blvd	FORT WAYNE	IN	Low	Soil	NFA-Unconditional Closure
11311	Cf Motorfreight Fort Wayne	2532 Bremer Rd	FORT WAYNE	IN	Low	Soil	NFA-Unconditional Closure
					Medium	Soil, Groundwater	NFA-Unconditional Closure
7869	Preston Trucking Company Inc	2424 Bremer Drive	FORT WAYNE	IN	Low	Soil	NFA-Unconditional Closure

UST FACILITY ID	NAME	STREET ADDRESS	CITY	STATE	PRIORITY DESCRIPTION	AFFECTED AREA DESCRIPTION	DESCRIPTION
22747	Facility Closed	2401 Meyer Rd	FORT WAYNE	IN	Medium	Soil	Active
4063	Waste Mgt Inc Of Ft Wayne In	2220 Bremer Rd	FORT WAYNE	IN	Low	Soil	Discontinued (active)
					Medium	Soil, Groundwater	NFA-Conditional Closure
7759	Professional Maintenance	2501 Wayne Trace	FORT WAYNE	IN	Low	Soil	NFA-Unconditional Closure
6327	North Am Moving & Storage Inc	2122 Bremer Dr	FORT WAYNE	IN	Medium	Soil	NFA-Unconditional Closure
7961	Rea Magnet Wire	4300 New Haven Avenue	FORT WAYNE	IN	Low	Soil	Discontinued (active)
2120	Gladieux Trading & Marketing Fort Wayne	4133 New Haven Ave	FORT WAYNE	IN	Low	Soil	Discontinued (active)
20886	Alro Steel	4929 New Haven	FORT WAYNE	IN	Low	Soil	Discontinued (active)
					Medium	Soil, Groundwater	NFA-Unconditional Closure
1306	Speedway #8526	6244 Lincoln Hwy E	FORT WAYNE	IN	Medium	Soil, Groundwater	Active
					Medium	Soil, Groundwater	Discontinued (active)
8015	Ryder Truck Rental Inc	5225 New Haven Ave	FORT WAYNE	IN	Low	Soil	Discontinued (active)
					Medium	Soil	NFA-Unconditional

UST FACILITY ID	NAME	STREET ADDRESS	CITY	STATE	PRIORITY DESCRIPTION	AFFECTED AREA DESCRIPTION	DESCRIPTION
							Closure
15228	Poinsatte Motors Inc East	6507 Us 30 East	FORT WAYNE	IN	Low	Soil	No Paper File
2993	Clark Oil & Refining #0653	6925 SR 930 E	FORT WAYNE	IN	Medium	Soil, MTBE, Groundwater	NFA-Unconditional Closure
6464	Tokheim Corporation	1600 Wabash Avenue	FORT WAYNE	IN	Low	Soil	NFA-Unconditional Closure
24221	Dave Klopfenstein	1501 Lincoln Hwy E	New Haven	IN	Low	Soil	NFA-Unconditional Closure
6336	New Haven Wire & Cable Inc	1605 Sr E	New Haven	IN	Medium	Soil, Groundwater	Active
9269	Home Lumber Of New Haven Inc	2101 Sr 14 E	New Haven	IN	Low	Soil	Discontinued (active)
10330	Section Shop Roundhouse	Hartzell	FORT WAYNE	IN	Medium	Soil, Groundwater	Discontinued (active)
2122	Cloverleaf Union 76	4335 Us 30 E	FORT WAYNE	IN	High	Surface Water, Soil, MTBE, Groundwater, Free Product, Ecologically Sensitive Area	Active
5210	Roundy's Lake End Sales Division	6916 E Nelson Rd	FORT WAYNE	IN	High	Soil, Groundwater, Free Product	NFA-Unconditional Closure
3439	Lancorp Inc	1314 Meyer Rd	FORT WAYNE	IN	Low	Soil	Discontinued (active)
2332	Penske Truck Leasing Fort Wayne	5250 Old Maumee Rd	FORT WAYNE	IN	Low	Soil	NFA-Unconditional Closure

UST FACILITY ID	NAME	STREET ADDRESS	CITY	STATE	PRIORITY DESCRIPTION	AFFECTED AREA DESCRIPTION	DESCRIPTION
1711	United Parcel Service	4930 Old Maumee Rd	FORT WAYNE	IN	Low	Soil	NFA-Unconditional Closure
24342	Taylor-Blackburn Battery Warehouse	1802 Maumee Ave	FORT WAYNE	IN	Low	Soil	NFA-Unconditional Closure
20031	Tuthill Corporation	2110 Summit St	New Haven	IN	Low	Soil	Discontinued (active)
19632	Abandoned Station	1736 Maumee Ave	FORT WAYNE	IN	Low	Soil	Discontinued (active)
15008	Omnisource Corp	3101 Maumee Ave	FORT WAYNE	IN	Low	Soil	NFA-Unconditional Closure
10133	Omnisource Corp	3101 Maumee Ave	FORT WAYNE	IN	High	Soil, Free Product	Active
					Low	Soil, MTBE	Active
					Low	Soil	Discontinued (active)
					Low	Soil	NFA-Unconditional Closure
6260	Zent's	6806 Parrot Road	FORT WAYNE	IN	Low	Soil	NFA-Unconditional Closure
24628	Comcast Former Tower	1431 Rose Ave	New Haven	IN	Low	Soil	NFA-Unconditional Closure

UST FACILITY ID	NAME	STREET ADDRESS	CITY	STATE	PRIORITY DESCRIPTION	AFFECTED AREA DESCRIPTION	DESCRIPTION
1961	Fort Wayne Water Pollution Control	2601 Dwenger Ave	FORT WAYNE	IN	Low	Soil	NFA-Unconditional Closure
					Medium	Soil, MTBE, Groundwater, Free Product, Drinking Water	NFA-Unconditional Closure
8671	Aalco Distributing Company Inc.	909 Grant Avenue	FORT WAYNE	IN	Medium	Soil, MTBE, Groundwater	NFA-Unconditional Closure
18802	Jack F Eiser Sales Company Incorporated	820 Schick St	FORT WAYNE	IN	Low	Soil	Discontinued (active)
14231	Do Mccomb & Sons Funeral Homes I	1140 Lake Ave	FORT WAYNE	IN	Low	Soil	Discontinued (active)
11803	Speedway NO 5505	1222 N Coliseum Blvd	FORT WAYNE	IN	Medium	Soil, Groundwater	Active
18841	Wpc Plant Lagoons	5500 Lake Ave	FORT WAYNE	IN	Low	Soil	NFA-Unconditional Closure
14608	Crossroad Ft Wayne Children Home	2525 Lake Ave	FORT WAYNE	IN	Low	Soil	NFA-Unconditional Closure
638	Speedway #5158	4101 Lake Ave	FORT WAYNE	IN	Low	Soil	NFA-Unconditional Closure
18029	VA Medical Center	2121 Lake Ave	FORT WAYNE	IN	High	Soil, Groundwater, Free Product	Active
14765	Charter Beacon Hospital	1720 Beacon St	FORT WAYNE	IN	Low	Soil	NFA-Unconditional Closure

UST FACILITY ID	NAME	STREET ADDRESS	CITY	STATE	PRIORITY DESCRIPTION	AFFECTED AREA DESCRIPTION	DESCRIPTION
5464	Marathon Unit #2492	3606 E State Blvd	FORT WAYNE	IN	Low	Soil	NFA-Unconditional Closure
					Medium	Soil, Groundwater	NFA-Unconditional Closure
10636	Jiffy Lube	3129 E State Blvd	FORT WAYNE	IN	Low	Soil	Discontinued (active)
5420	Georgetown Marathon	6230 E State Blvd	FORT WAYNE	IN	Medium	Soil, Groundwater	NFA-Unconditional Closure
					Low	Soil	NFA-Unconditional Closure
139	Georgetown Shell	6321 E State Blvd	FORT WAYNE	IN	Low	Soil	Discontinued (active)
15468	Fire Station #14	3400 Reed Rd	FORT WAYNE	IN	Low	Soil	NFA-Unconditional Closure
11861	Lassus Bros Oil Handy Dandy #15	5545 Stellhorn Rd	FORT WAYNE	IN	Low	Soil	Discontinued (active)
					Medium	Soil	NFA-Unconditional Closure
129	Shell Oil Maplewood	6132 Stellhorn Rd	FORT WAYNE	IN	Low	Soil	Discontinued (active)
					Medium	Soil, Groundwater	NFA-Unconditional Closure

UST FACILITY ID	NAME	STREET ADDRESS	CITY	STATE	PRIORITY DESCRIPTION	AFFECTED AREA DESCRIPTION	DESCRIPTION
16217	Doc Rickers	6230 Stellhorn	FORT WAYNE	IN	Medium	Soil, Groundwater	Active
					Medium	Groundwater	Active
					Low	Vapors, Surface Water, Soil, Groundwater	NFA-Unconditional Closure
5430	Marathon Oil #2188	6303 Stellhorn Rd	FORT WAYNE	IN	High	Utility Lines, Soil, Groundwater	Discontinued (active)
					Medium	Soil, MTBE, Groundwater	NFA-Conditional Closure
14942	Mim Service	2201 E Washington Blvd	FORT WAYNE	IN	Medium	Soil	Active

NFA – No Further Action

Table 3.45: Brownfields Located in the Bullerman Ditch Sub-watershed

Site #	Name	Address	City	County	Financial Assistance	Other Actions	ERC (NR-Not Required	Land Use Restriction(s), Contaminants of Concern	Remediation Date for ERC and/or Closure Letter
4960018	Bowser Pump Plant	2513 Holton Ave	Fort Wayne	Allen	Remediation Grant Award 12/01/2005 Loan 04/05/1999	No Further Action Letter 10/25/2006, Site Status Letter 09/05/2002, Site Status Letter 07/31/2001	Yes	Maintain 12 inches of cover (Metals, VOCs, SVOCs in soil and VOCs in groundwater)	02/18/2003 and 11/27/2002
4081202	Connor Corp.	2701 Dwenger Ave	Fort Wayne	Allen		Petroleum Determination Letter 02/11/2009	NR		
4070614	CWEPA City of Fort Wayne	Comm-unity Wide	Fort Wayne	Allen	Federal Grant Matching 2007	Oversight	NR		
4111207	Former Clover-leaf Union 76	4335 SR 930	Fort Wayne	Allen		Comfort Letter 10/04/2012	Yes	No Residential, water wells, maintain affected area and manage soil (TPH in soil, VOCs in groundwater)	
4100905	Industrial Ware-house Facility	6916 Nelson Rd	New Haven	Allen		Site Status Letter 03/18/2011	Yes	No Groundwater Extraction	4/19/2011

*ERC – Environmental Restrictive Covenant

Table 3.46: Combined Sewer Overflow Outfalls in the Bullerman Ditch Sub-watershed

Site #	Location of Outfall	Latitude	Longitude	Receiving Water
1	487' SE of Paul Stemmler Pkwy	41.080472	-85.007694	Martin Drain
64	610' N of Northside Dr and Glazie Ave; east bank	41.074417	-85.084472	Maumee River
60	670' NE of Greenwall Ave and Maumee Ave	41.0785	-85.095222	Unnamed Ditch to Maumee River
58	390' NW of Edsall Ave and Dwenger Ave	41.079694	-85.100028	Maumee River
39	120' North of Hanna St and Berry St	41.080778	-85.129889	Maumee River
55	430' North of N Anthony Blvd and Wayne St	41.081306	-85.11475	Maumee River
50	100' North of Coombs St and Herbert St	41.083972	-85.123111	Maumee River
57	Stormwater Lifstation Wet Well	41.084222	-85.108028	Maumee River
48	350' West of Edgewater and Garfield	41.086139	-85.1175	Maumee River
62	200' West of Lavern Ave and State Blvd	41.097361	-85.094472	Baldwin Ditch
61	200' West of Lavern Ave and State Blvd	41.097389	-85.094472	Baldwin Ditch
2	3,350' West of Coliseum Blvd and 3,500' South of Lake Avenue	41.045	-85.0559	Maumee River
3	900' East of Pemberton Dr, and 1,600 South of Lake Avenue	41.0507	-85.0632	Wigman Drain
80	250' East, NE of Pemberton Dr and Niagara Dr	41.0457	-85.0644	Maumee River

Figure 3.20: Land Use in the Bullerman Ditch Sub-watershed

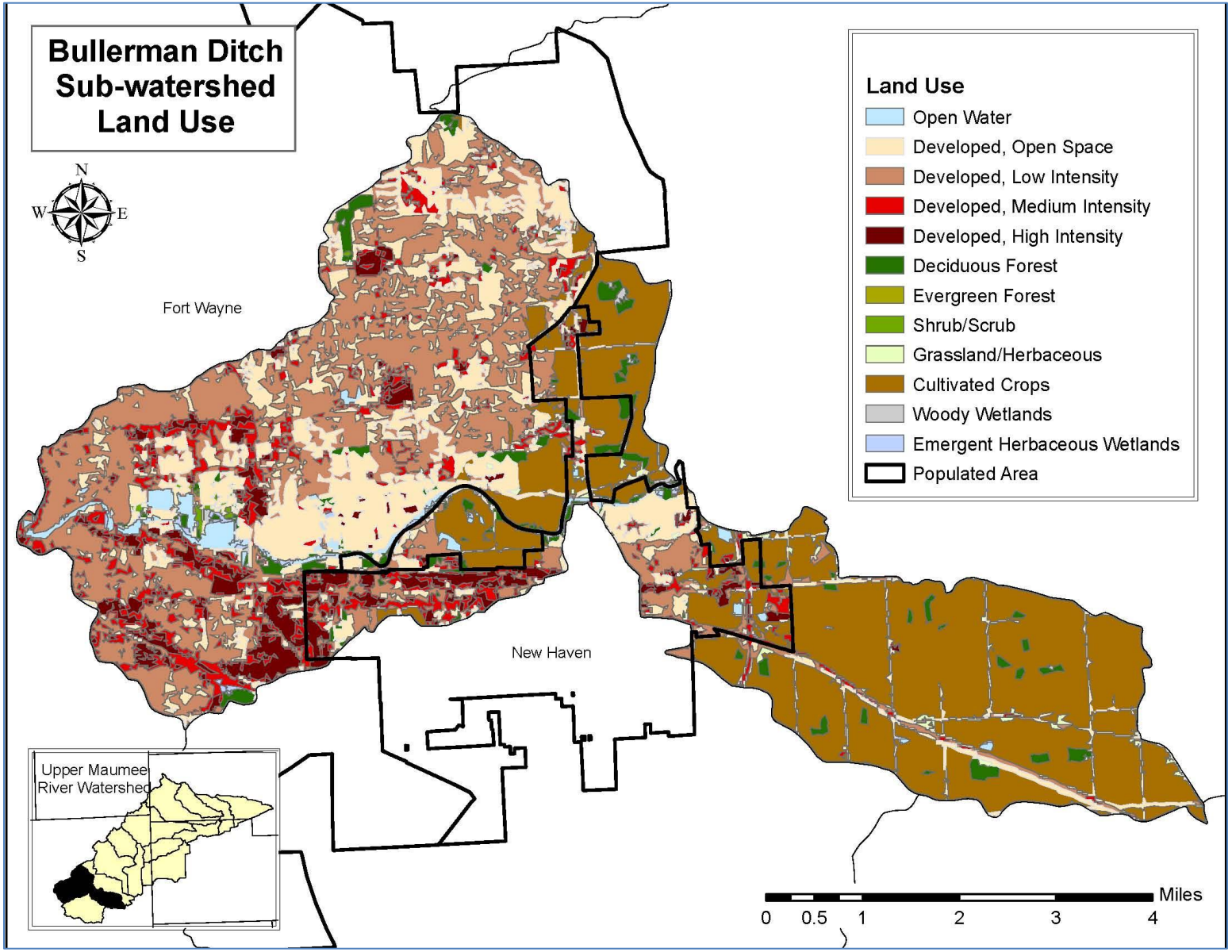


Figure 3.21: Windshield Survey Observations in the Bullerman Ditch Sub-watershed

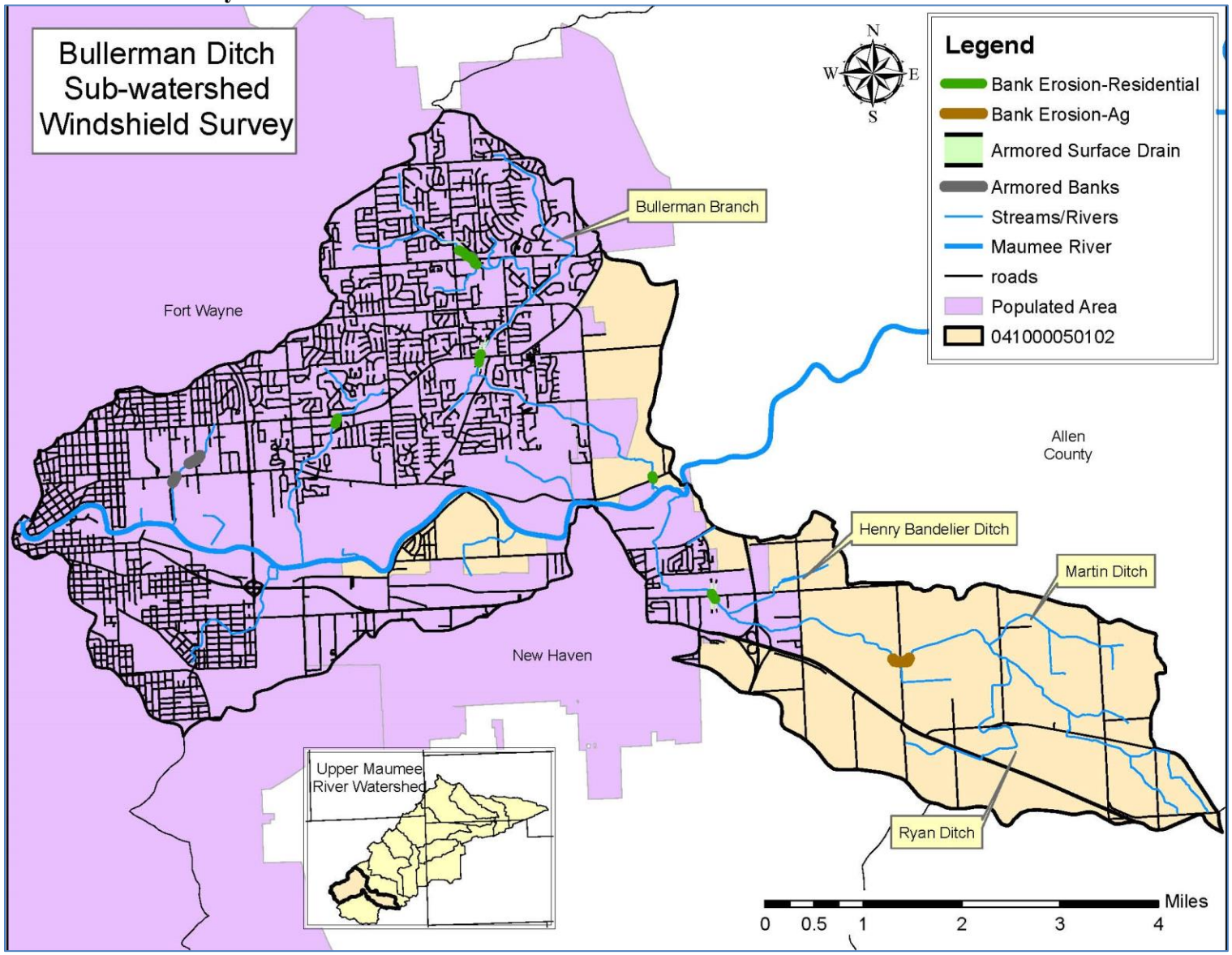
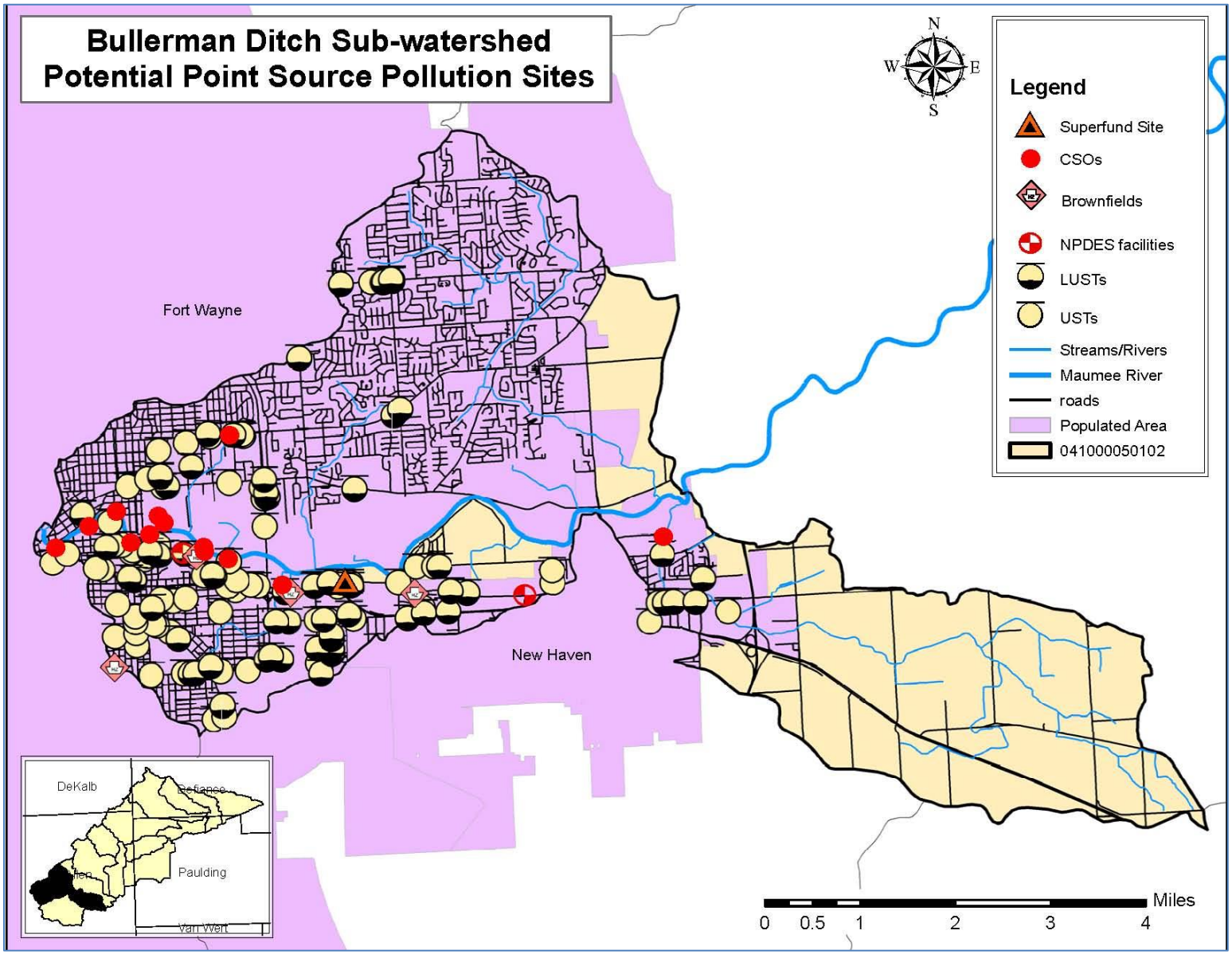


Figure 3.22: Point Source Pollution Sites in the Bullerman Ditch Sub-watershed



Water quality data collected in the Bullerman Ditch sub-watershed at five different locations indicate there is a problem with *E. coli* with an average measurement of over 100 CFU/100 ml in the watershed. The high *E. coli* readings may be due to the number of CSOs in the watershed. IDEM's sample site one is located downstream of four CSOs and is very close to one of the CSOs. Site one also had the highest reading for E. coli. IDEM's sample site two is located downstream of seven CSOs, though it is located at least a mile from the nearest CSO, giving the E. coli time to dilute in Maumee River. Fort Wayne measured E. coli at Landin Rd which is located downstream of 14 of the CSOs in the watershed and E. coli measurements at that site were the second highest in the watershed. There were a few spikes in E. coli levels at the project sample site (310) which may be due to the agricultural area which drains into that point or from failing on-site waste systems present in the rural areas of the watershed. The 14 CSOs present in the watershed may also be the reason that nutrient and sediment average levels were above the target levels set by this project. The City of Fort Wayne had a minimum of 27 CSO events occur at one or more CSO outfalls between January and July 2012; eleven of those events occurred during the recreational season in which the project was sampling water quality.

Nutrient and sediment levels exceeded the target levels set by this project at all water sample sites. Again, this could be due to the 14 CSOs present in the watershed. However, it is also likely that fertilizer and pet waste from the urban areas of the watershed are a source of the excess nutrients and sediment.

3.4.3 Sixmile Creek Sub-watershed Land Use

The primary influence on water quality in the Sixmile Creek sub-watershed is agriculture with over 75% of the land being classified as agricultural by the USGS. Table 3.47 shows the percentage of Sixmile Creek Sub-watershed that is in each land use and Figure 3.22 is a map showing the delineation of land use in the sub-watershed. Using National Land Cover Data acquired from the USGS and analyzed in ArcGIS, 75.12% of the land use in Sixmile Creek sub-watershed is in production with 73.76% of that being used strictly for cultivated crops, and over 18% of the watershed is developed due to the Northeastern portion of Fort Wayne city limits being located within the Sixmile Creek sub-watershed. However, only 3.2% of the developed land is either a medium or high intensity developed area.

There were three locations identified as potential problems during the windshield survey conducted in 2012 in the Sixmile Creek sub-watershed. Two locations totaling approximately 8,215 feet of streambank are eroding along tributaries in agricultural areas of the Sixmile Creek sub-watershed. One location was observed to have large tile drains and no buffer at a stream running through a golf course. The large tile drains and no buffer allow for the excess fertilizer which is common practice at many golf courses, to run directly into the stream. It is not clear if the tile system at this location would allow most excess nutrients to bypass the buffer system, however, streambank stabilization and/or streambank buffer BMPs will need to be installed in these identified areas to prevent future erosion of the banks and to filter many pollutants out

prior to stormwater reaching open water sources. Table 3.48 shows the observations that were made during the windshield survey and the approximate number of feet that will need to be remediated to improve water quality in the Sixmile Creek sub-watershed and Figure 3.23 shows the location of each of the observations.

There are a few potential point sources of pollution in the Sixmile Creek sub-watershed. There are five USTs located in the Sixmile Creek sub-watershed, with three of those being LUSTs. However, all of the LUSTs have been closed except for the one located on Edgerton Rd which is still leaking and potentially contaminating soil and groundwater. If the contents held in any of the USTs leak it can leach through the soil and reach groundwater contaminating drinking water wells of local residents, or leach into surface waters and decrease water quality and affect aquatic life.

There is one Confined Feeding Operation located in Sixmile Creek sub-watershed on the eastern border of the watershed. Due to the size of the operation, it must follow certain state guidelines to manage the waste produced on site. Though, there is potential for spills and/or leaks from the manure holding facilities or while being transferred to other farms as fertilizer. Table 3.49 defines the CFO located within Sixmile Creek. There are no NPDES permitted facilities, brownfields, or CSOs located within the Sixmile Creek sub-watershed. The LUSTs located in Sixmile Creek sub-watershed are listed in Table 3.50 which tells the location of the LUST, its priority for cleanup and the area that is affected by the leak. Note that some facilities may be listed in the table more than once due to the fact that there may have been multiple instances of the UST leaking. Figure 3.24 shows the location of each of the point sources of pollution.

Table 3.47: Land Use in the Sixmile Creek Sub-watershed

Open Water	Dev. Open Space	Dev. Low Intensity	Dev. Medium Intensity	Dev. High Inten-sity	Decid-uous Forest	Ever-green Forest	Mixed Forest	Shrub/ Scrub	Grass-land/Herb-aceous	Pasture/ Hayland	Row Crops	Woody Wetland	Emergent Herb-aceous Wetlands	Total	Unit
182.94	1422.53	847.52	388.614	171.102	527.776	1.007	2.52	10.112	210.64	208.041	11,404.37	60.724	22.99	15460.9	Acres
1.18%	9.20%	5.48%	2.51%	1.1%	3.41%	<1%	<1%	<1%	1.36%	1.35%	73.8%	<1%	<1%	100%	%

Table 3.48: Windshield Survey Observations in the Sixmile Creek Sub-watershed

Observation	Bank Erosion (Agriculture)	Mowed Banks-Tiled
Number	8215.25 ft	881.45 ft

Table 3.49: Confined Feeding Operations in the Sixmile Creek Sub-watershed

Operation	Sub-watershed	Designation	Animal Type	Animal #
W R Farms	Sixmile Creek	CFO	Swine	1,495

Table 3.50: Leaking Underground Storage tanks in the Sixmile Creek Sub-watershed

UST FACILITY ID	INCIDENT NUMBER	NAME	STREET ADDRESS	CITY	COUNTY	PRIORITY DESCRIPTION	AFFECTED AREA DESCRIPTION	DESCRIPTION
17479	200402505	Dla New Haven Depot	15411 Dawkins Road	New Haven	Allen	Medium	Soil, Groundwater	NFA-Unconditional Closure
	199002504							NFA-Unconditional Closure
	199002516							NFA-Unconditional Closure
18992	199406521	ISCI - New Haven	15202 Edgerton Rd T-209	New Haven	Allen	Medium	Soil, Groundwater	Active
19645	200007500	Meijer Gas Station NO 138	10305 Maysville Rd	FORT WAYNE	Allen	Medium	Soil, MTBE, Groundwater	NFA-Unconditional Closure

Figure 3.23: Land Use in the Sixmile Creek Sub-watershed

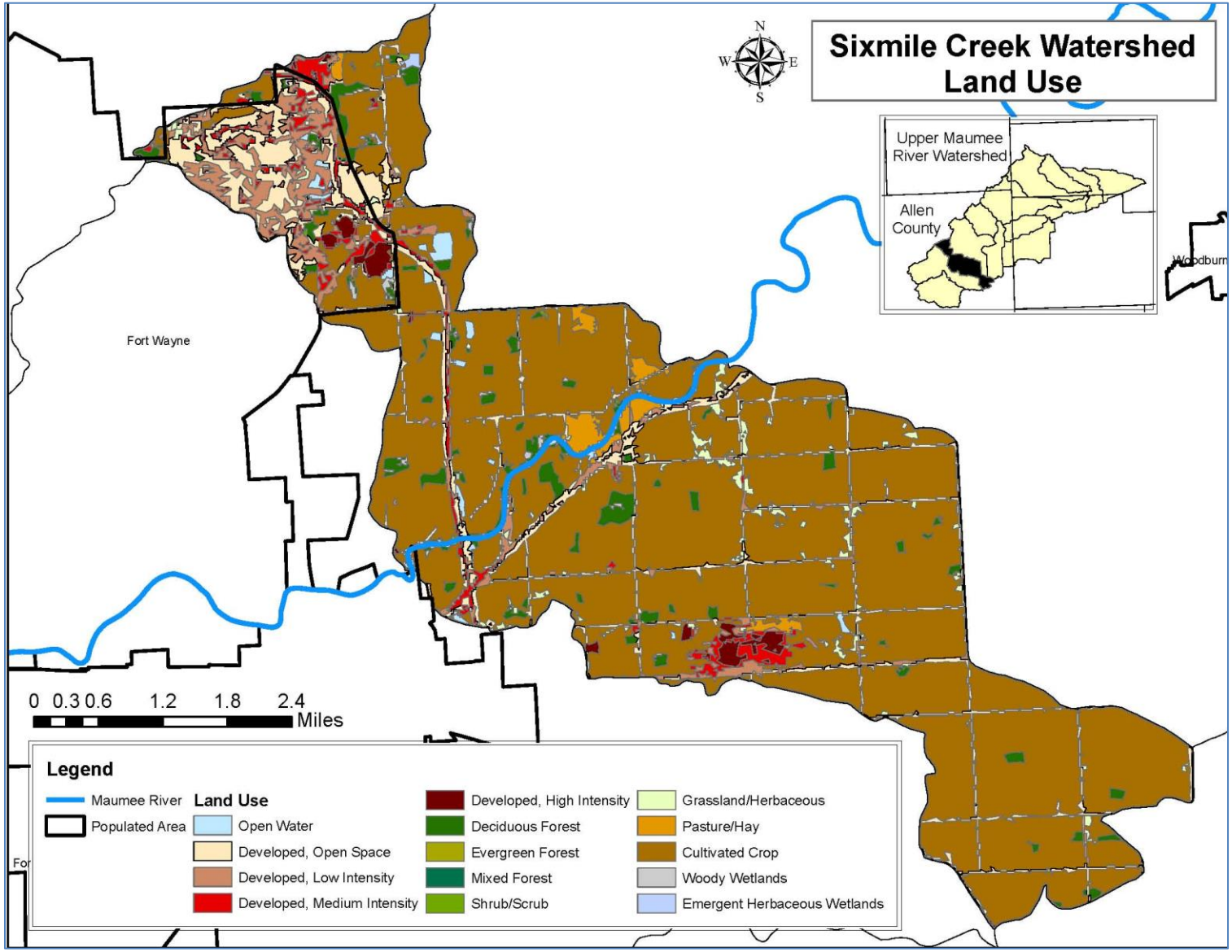


Figure 3.24: Windshield Survey Observations in the Sixmile Creek Sub-watershed

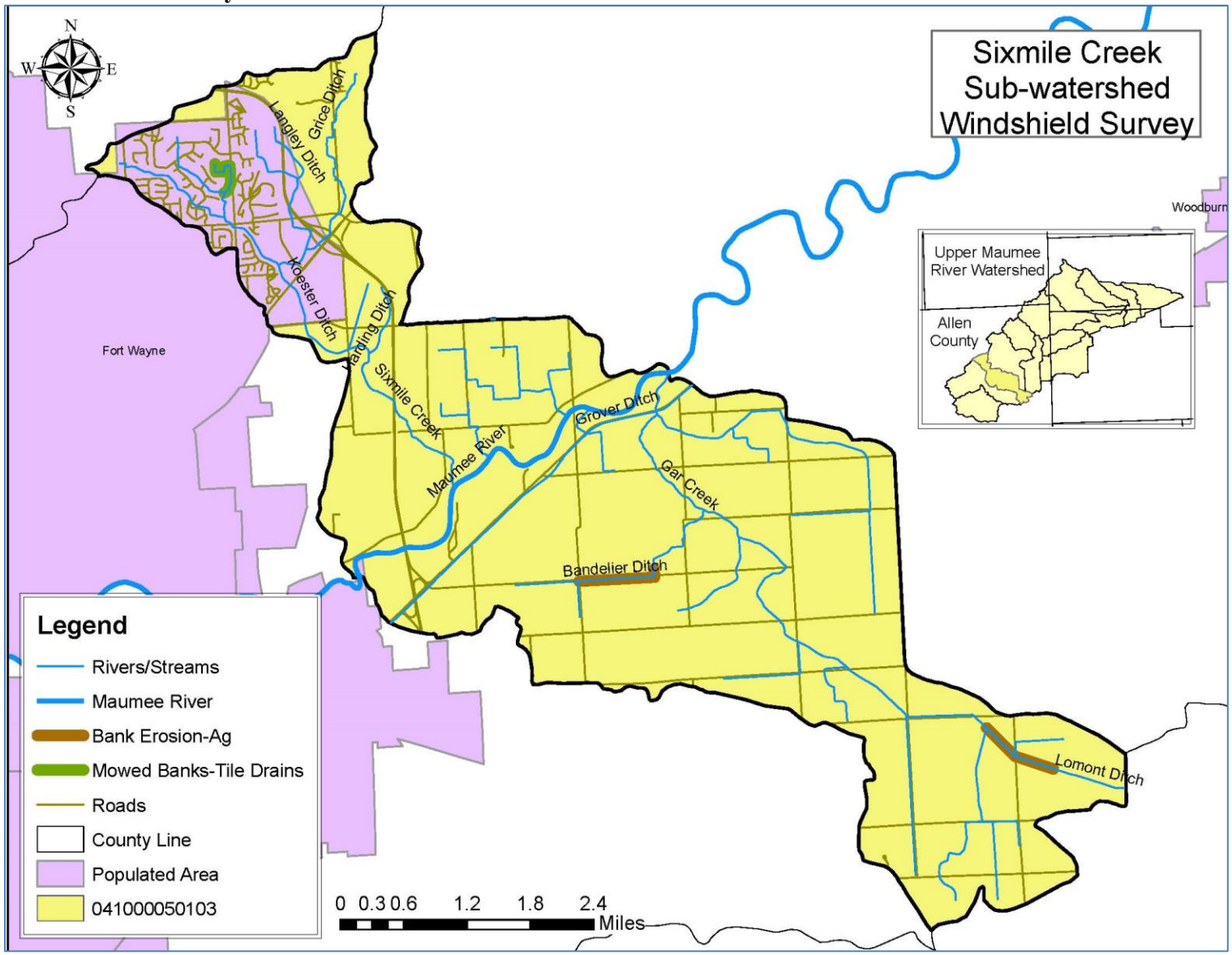


Figure 3.25: Point Source Pollution Sites in the Sixmile Creek Sub-watershed