# Nine-Element Nonpoint Source Implementation Strategy (NPS-IS) for Twelvemile Creek HUC-12 (04100004 02 04)

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# Acronyms and Abbreviations

The acronyms and abbreviations below are commonly used by organizations working to restore Ohio's watersheds and are found throughout this NPS-IS document.

| Numbers | |
|---|---|
| §319 | Section 319 of the Clean Water Act |
| **A** | |
| ALU | Aquatic Life Use |
| **B** | |
| BMP | Best Management Practice |
| **C** | |
| CAFF | Confined Animal Feeding Facility |
| CRP | Conservation Reserve Program |
| CSA | Critical Sewage Area |
| CTIC | Conservation Tillage Information Center |
| **D** | |
| DAP | Domestic Action Plan |
| **E** | |
| EPT | *Ephemeroptera, Trichoptera* and *Plecoptera* – sensitive macroinvertebrate species |
| EQIP | Environmental Quality Incentives Program |
| **F** | |
| FLS | Federally Listed Species |
| **G** | |
| GLC | Great Lakes Commission |
| GLRI | Great Lakes Restoration Initiative |
| GLWQA | Great Lakes Water Quality Agreement |
| **H** | |
| H2Ohio | H2Ohio Initiative (Ohio state funding mechanism for water quality improvement) |
| HAB | Harmful Algal Bloom |
| HELP | Huron-Erie Lake Plains Ecoregion |
| HSTS | Home Sewage Treatment System |
| HUC | Hydrologic Unit Code |
| **I** | |
| IBI | Index of Biotic Integrity |
| ICI | Invertebrate Community Index |
| IJC | International Joint Commission |

**M**

| | |
|---|---|
| MIwb | Modified Index of Well Being |
| MTA | Million Tons per Annum |
| MWH | Modified Warmwater Habitat |

**N**

| | |
|---|---|
| NPDES | National Pollutant Discharge Elimination System |
| NPS | Nonpoint Source |
| NPS-IS | Nonpoint Source-Implementation Strategy |
| NRCS-USDA | Natural Resources Conservation Service-United States Department of Agriculture |

**O**

| | |
|---|---|
| ODA | Ohio Department of Agriculture |
| ODNR | Ohio Department of Natural Resources |
| OEPA | Ohio Environmental Protection Agency |
| OLEC | Ohio Lake Erie Commission |

**P**

| | |
|---|---|
| PAD-US | Protected Areas Database of the United States |

**Q**

| | |
|---|---|
| QHEI | Qualitative Habitat Evaluation Index |

**R**

| | |
|---|---|
| RM | River Mile |

**S**

| | |
|---|---|
| STEPL | Spreadsheet Tool for Estimating Pollutant Loads |
| SWCD | Soil and Water Conservation District |

**T**

| | |
|---|---|
| TMACOG | Toledo Metropolitan Area Council of Governments |
| TMDL | Total Maximum Daily Load |
| TSD | Technical Support Document |

**U**

| | |
|---|---|
| USEPA | United States Environmental Protection Agency |
| USFWS | United States Fish and Wildlife Service |
| USGS | United States Geological Survey |

**W**

| | |
|---|---|
| WAP | Watershed Action Plan |
| WLEB | Western Lake Erie Basin |
| WQS | Water Quality Standards (Ohio Administrative Code 3745-1) |
| WRP | Wetland Reserve Program |
| WWH | Warmwater Habitat |

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# CHAPTER 1: INTRODUCTION

The **Twelvemile Creek Hydrologic Unit Code (HUC)-12 (04100004 02 04)** is located in the central portion of Mercer County, Ohio and contains a watershed of 38.2 square miles (Figure 1). The **Twelvemile Creek HUC-12** contains Twelvemile Creek, an approximately 13.4 mile-long stream that flows northeast through Mercer County to the St. Marys River. The watershed is primarily rural, and land use is dominated by cultivated crop land (~94.5%). The **Twelvemile Creek HUC-12** has recently been identified as a priority watershed within the Western Lake Erie Basin (WLEB) for watershed planning and nutrient reduction efforts due to the estimated loadings of total phosphorus and dissolved reactive (soluble) phosphorus that flows into the tributaries of the Maumee River and eventually, Lake Erie.

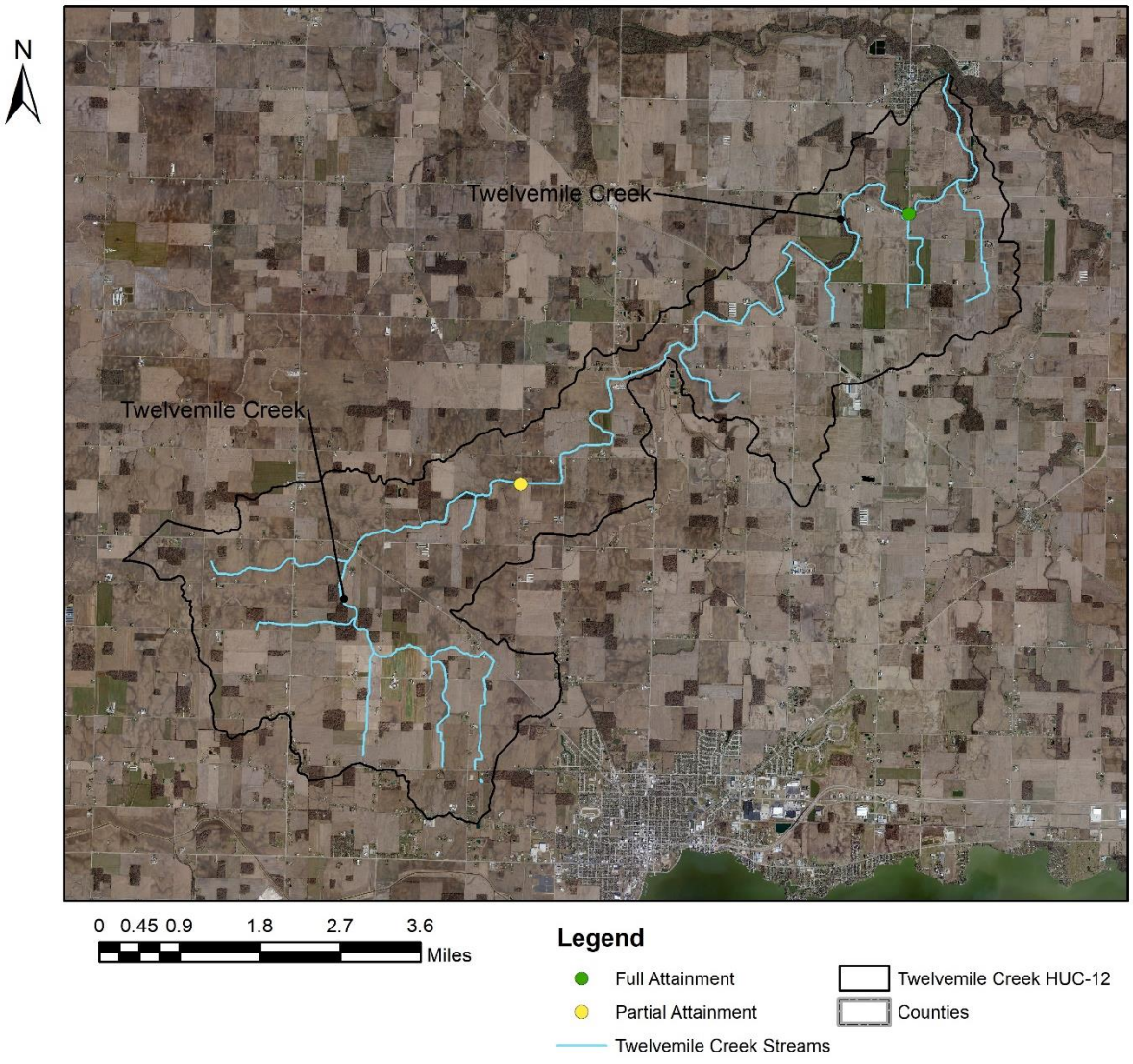



*Figure 1: Twelvemile Creek HUC-12 Overview*

While watershed plans could be all-inclusive inventories, the US Environmental Protection Agency (USEPA) identified nine critical elements to include in strategic planning documents for impaired waters. To ease implementation of projects addressing nonpoint source (NPS) management and habitat

restoration, current federal and state NPS and habitat restoration funding opportunities require strategic watershed plans incorporate these nine key elements, concisely to HUC-12 watersheds. In addition, the development of Nine-Element Nonpoint Source Implementation Strategies (NPS-IS) is critical to the efforts focused on implementing Ohio's Domestic Action Plan (DAP) to reduce total spring nutrient loadings to Lake Erie by 40% by the year 2025 (OLEC, 2018). The development of NPS-IS across the entire WLEB will address NPS pollution by accounting for both near-field (within stream/watershed) and far-field (loadings to Lake Erie) effects.

*Sediments and nutrients flow within tributaries to eventually reach the Maumee River and Lake Erie*

## 1.1 Report Background

The Ohio Environmental Protection Agency (OEPA) has historically supported watershed-based planning in many forms (OEPA, 2016). In 1997, OEPA issued guidance for the development of Watershed Action Plans (WAPs), which typically covered larger watersheds (HUC-10 to HUC-8 size). The WAPs included an outline and checklist to ensure USEPA's nine elements were included within each plan. The USEPA issued new guidance in 2013 and concluded Ohio's interpretation for WAP development did not adequately address critical areas, nor did it include an approach that detailed the nine elements at the project level (OEPA, 2016). In response, OEPA developed a new template for watershed planning in the form of a NPS-IS, ensuring NPS pollution is addressed at a finer resolution and that individual projects listed within each plan include each of the nine elements. The first NPS-IS plans were approved in 2017. Over time, these plans have evolved to not only address in-stream (near-field) water quality impairment from NPS pollution, but they also address reductions in nutrient loadings to larger bodies of water (far-field), particularly in the WLEB.

Because the St. Marys River flows through both Indiana and Ohio, assessment and planning efforts are often separated at the state line. A Total Maximum Daily Load (TMDL) study was conducted in Indiana, and the TMDL report was released in 2006. Formal watershed planning within the St. Marys River began as a result of this TMDL effort and led to the formation of the St. Marys River Watershed Steering Committee, spearheaded by the Allen County (Indiana) SWCD. The *St. Marys River Watershed Management Plan* was then developed for the Indiana portion of the watershed and approved in 2009. In 2015, OEPA sampled the St. Marys River and tributaries as an initial step in TMDL modeling for the Ohio portion of the watershed. The Ohio TMDL report has not yet been released.

In 2018, all subwatersheds (HUC-12s) within the Ohio portions of the St. Marys HUC-8, the Auglaize HUC-8 (including the Ottawa River, Little Auglaize River and Little Flatrock Creek), the Blanchard HUC-8 (including Eagle Creek) and the Platter Creek HUC-12 were recommended for designation as a "Watershed in Distress" due to relatively higher concentrations of phosphorus in surface waters contributing to harmful algal bloom (HAB) occurrence in Lake Erie. These waterways were found to have

flow-weighted mean concentrations of phosphorus two or more times the phosphorus loading goals set forth by the Great Lakes Water Quality Agreement (GLWQA) and the subsequent DAP developed by the State of Ohio (ODA, 2018). In 2019, the proposal to designate these watersheds as distressed was removed from state consideration. Focus is now on developing NPS-IS for these subwatersheds in preparation for basin-wide targeted nutrient reduction efforts. This NPS-IS for the **Twelvemile Creek HUC-12**, along with several other subwatersheds in both Mercer and Van Wert County, will help further move the goal towards covering all HUC-12's within the St. Marys River watershed.

Removal of NPS impairments and reduction in overall nutrient loss within the **Twelvemile Creek HUC-12** is crucial to the attainment of aquatic life use (ALU) standards within Twelvemile Creek, as well as reduction in severity, extent and occurrence of HABs within the WLEB. Within the **Twelvemile Creek HUC-12**, one waterway has been assessed by the OEPA. Twelvemile Creek is in *Full Attainment* of its Warmwater Habitat (WWH) ALU at one of its sampling locations and is in *Partial Attainment* at its upstream sampling location due to channelization, sedimentation and alteration in streamside cover. This NPS-IS will be used to strategically identify and outline key projects that should be implemented within the **Twelvemile Creek HUC-12** to address management of NPS issues that have both near-field and far-field impacts.

## 1.2 Watershed Profile & History

The WLEB is composed of approximately 7,000,000 acres across the tri-state area of Ohio, Indiana and Michigan (Figure 2). The largest direct tributary to the WLEB is the Maumee River, flowing 137 miles through 18 counties in Indiana and Ohio. The WLEB watershed is broken into several subbasins at the HUC-8 level, including the St. Joseph, St. Marys, Auglaize, Blanchard, Tiffin, Ottawa-Stony, River Raisin, Cedar-Portage, Upper Maumee and Lower Maumee watersheds. The St. Marys HUC-8 (04100004) wholly contains the St. Marys River (~101 miles) from its headwaters in Auglaize County, Ohio to where its confluence with the St. Joseph River in Fort Wayne, Indiana forms the beginning of the Maumee River. The St. Marys HUC-8 contains a watershed of 794 square miles (508,618 acres) throughout Shelby, Auglaize, Mercer and Van Wert counties in Ohio and Allen, Wells and Adams counties in eastern Indiana. Larger tributaries to the St. Marys River include Kopp Creek, Twelvemile Creek, Blue Creek and Black Creek. The St. Marys HUC-8 is further divided into six smaller watersheds along its course, one of which is the *Twelvemile Creek-St. Marys River HUC-10 (04100004 02).*

The *Twelvemile Creek-St. Marys River HUC-10* has a drainage area of 115.1 square miles or 73,719 acres (Figure 3). Approximately 18 miles of the St. Marys River are contained within the *Twelvemile Creek-St. Marys River HUC-10* from river mile (RM) 89.1 where Fourmile Creek and Sixmile Creek empty into the river to the mouth of Twelvemile Creek at RM 71.4. Land use within the *Twelvemile Creek-St. Marys River HUC-10* is mainly agricultural and rural. Concentrated population centers are relatively small. The largest municipality in the watershed is Celina with a population of 10,400; however, only a portion of the city is contained within the *Twelvemile Creek-St. Marys River HUC-10* (US Census Bureau, 2010).

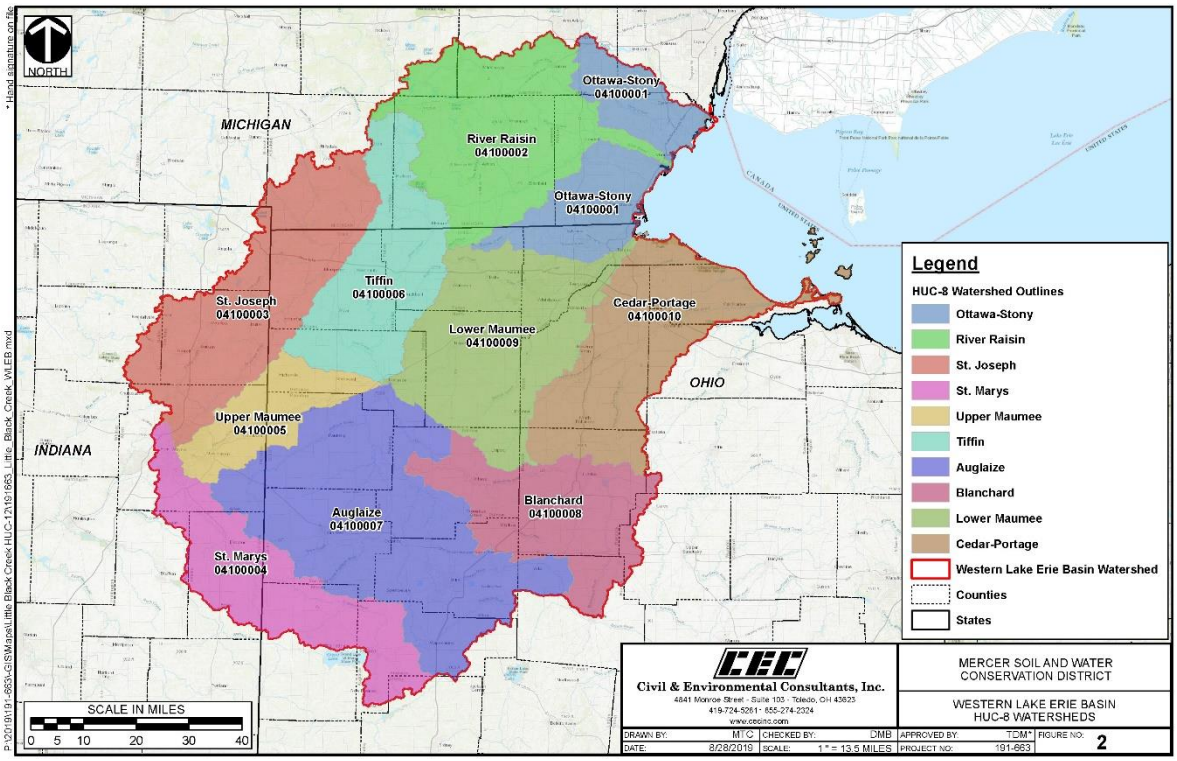



*Figure 2: Western Lake Erie Basin Watershed*

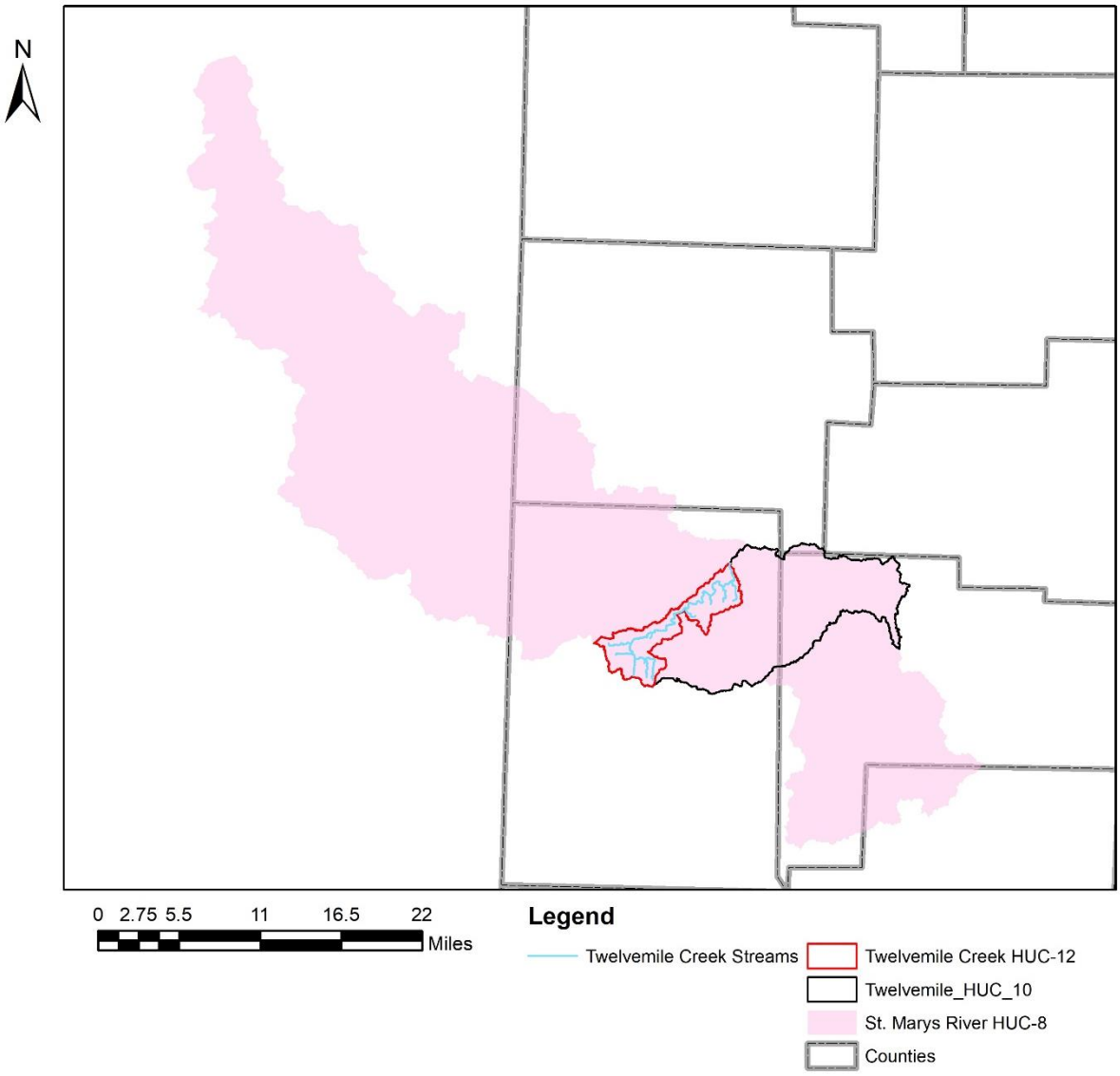



*Figure 3: Location of the Twelvemile Creek HUC-12*

The *Twelvemile Creek-St. Marys River HUC-10* contains five HUC-12 watersheds, one of which is the **Twelvemile Creek HUC-12.** The **Twelvemile Creek HUC-12** wholly contains Twelvemile Creek, a 13.4 mile-long stream that enters the St. Marys River at approximately RM 71.2. The Twelvemile Creek watershed is similar in land use setting and characteristics as the overall larger HUC-10 watershed, supporting mostly agricultural land use.

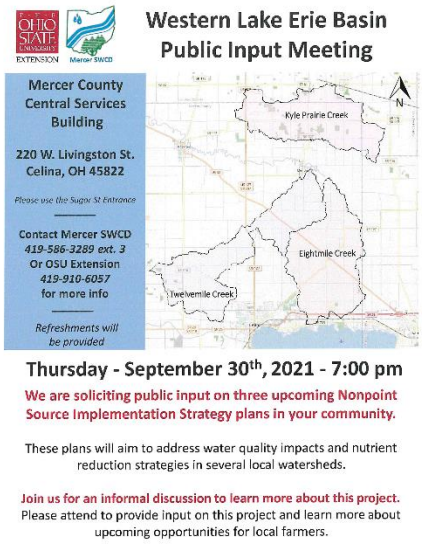
## 1.3 Public Participation and Involvement

Watershed planning is best accomplished by collaboration and input from a diverse group of entities, including governmental agencies, private businesses, academia, non-profit groups, neighborhood organizations, agricultural landowners, producers and service providers, as well as the public at large. Mercer SWCD is dedicated to providing local leadership in conservation and the wise use of soil, water

and related resources through a balanced cooperative program that protects, restores and improves those resources.

Mercer SWCD frequently partners with other county agencies, particularly with Mercer County's Community and Economic Development Agency – Agricultural Solutions (Ag Solutions). Ag Solution's mission is to identify and eliminate, through the use of technology and environmentally sound farming practices, agricultural factors that are negatively impacting the environmental health of all Mercer County Watersheds, while also enhancing the vibrant, prosperous farming economy that is an integral part of the local community. Both Mercer SWCD and Ag Solutions have been active leaders in watershed planning, project development and solution implementation. Their recent planning and implementation efforts have focused in the Grand Lake St. Marys region, and the WLEB portion of the county, starting with a focus on the St. Marys River watersheds.

Chapters 1, 2 and 3 of this NPS-IS were primarily prepared using the *Biological and Water Quality Study of the St. Marys River and Tributaries, 2015, Technical Report EAS/2018-11-01* (OEPA, 2018b) and the *2018 Ohio Integrated Report* (OEPA, 2018a*).* Project information for Chapter 4 was compiled by collaborative meetings with organizational stakeholders, community partners and local landowners.




Mercer SWCD held a public meeting regarding NPS-IS development and current state and federal agricultural programs on September 30, 2021 in Celina to engage area landowners and organizational stakeholders in the planning process. In addition, Mercer SWCD solicited individual input from potential cooperating landowners and stakeholder organizations working within the **Twelvemile Creek HUC-12**, such as the Mercer County Engineers Office and Mercer County Health Department, as well as those that work regionally throughout the WLEB, including Mercer Landmark, the Ohio Farm Bureau, The Nature Conservancy, The West Central Land Conservancy, Black Swamp Conservancy, Maumee Valley Conservancy District and the Ohio Department of Natural Resources (ODNR).

# CHAPTER 2: HUC-12 WATERSHED CHARACTERIZATION AND ASSESSMENT SUMMARY

## 2.1 Summary of HUC-12 Watershed Characterization

### 2.1.1 Physical and Natural Features

The **Twelvemile Creek HUC-12** is a subwatershed within the greater *Twelvemile Creek-St. Marys River HUC-10*. The *Twelvemile Creek-St. Marys River HUC-10* is comprised of five HUC-12 watersheds; this document focuses on the #04 hydrologic unit—the **Twelvemile Creek HUC-12**. The largest stream within this subwatershed is Twelvemile Creek, an approximately 13.4 mile-long stream that flows northeast to meet the St. Marys River. In total, Twelvemile Creek drains 38.2 square miles (24,448 acres) and has an average fall of 3.7 ft/mile (ODNR, 2001).

Including the length of Twelvemile Creek, approximately 23 miles of streams and ditches are within the boundaries of the **Twelvemile Creek HUC-12**. Of the ~23 miles of waterways within the **Twelvemile Creek HUC-12**, only a few miles of open stream are maintained under Mercer County's Ditch Maintenance program.

The physiography of the **Twelvemile Creek HUC-12** is defined by features from glacial activity of Wisconsinan time. As the Erie ice lobe advanced and retreated, the Ft. Wayne and Wabash Moraines were deposited, truncating the northern and southern boundaries, respectively, of many tributaries to the St. Marys River along the middle stretch of the river (OEPA, 2018b). Soils within the **Twelvemile Creek HUC-12** are mainly fine-grained and are predominantly the Blount and Pewamo Silty Clay Loam (Figure 4). These soils are derived mainly from lacustrine deposits and lake-planed moraine, consist of clayey silts and sand and are typically poorly drained (OEPA, 2018b).

*Stream gradients are low in the HELP Ecoregion*

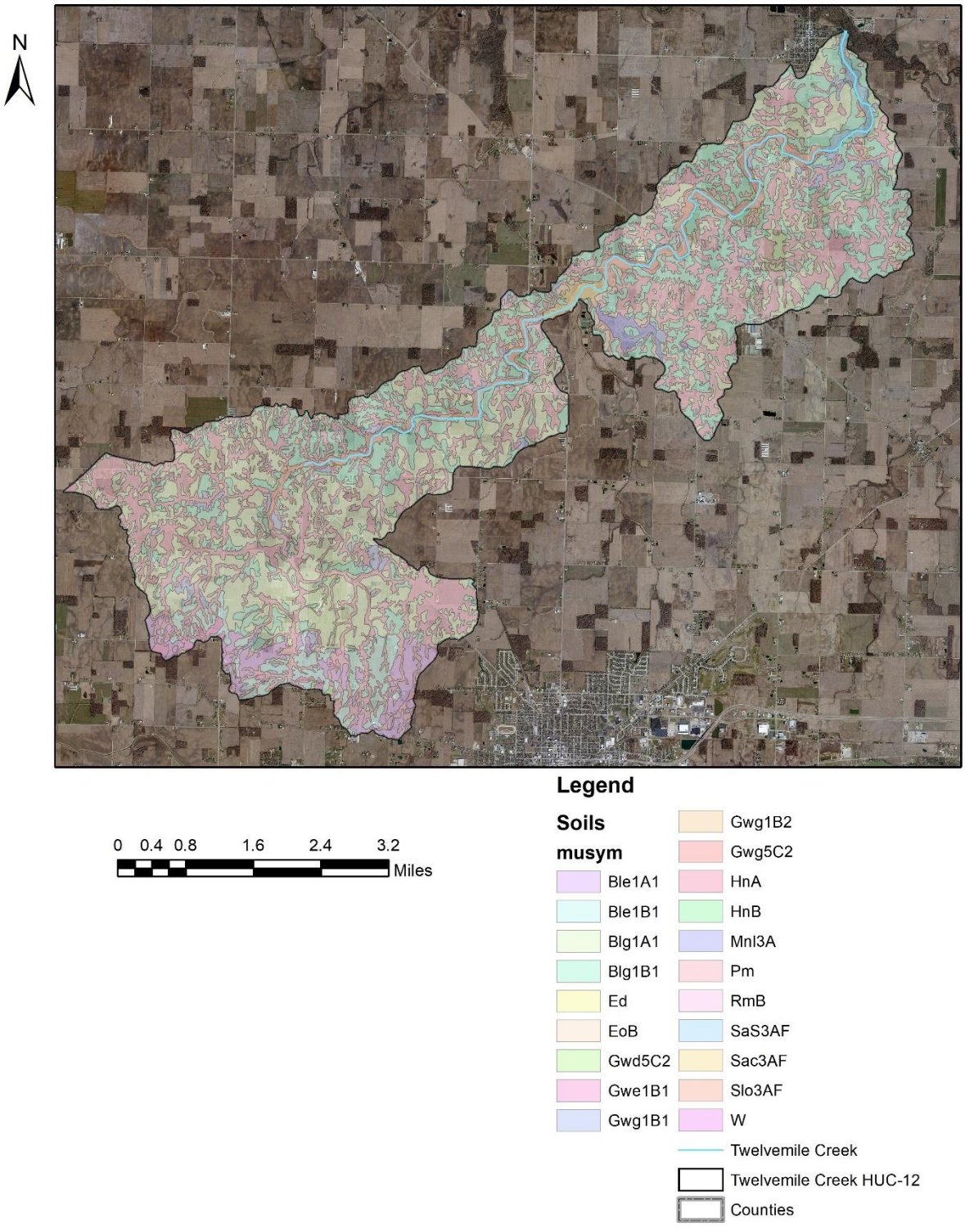



*Figure 4: Soils within the Twelvemile Creek HUC-12*

The **Twelvemile Creek HUC-12** is wholly contained within the Huron-Erie Lake Plains (HELP) ecoregion. The ecoregion is characterized by a broad and nearly level lake plain, with extensive lacustrine and still-water deposits (OEPA, 2018b). Stream gradients within the HELP ecoregion are typically low, and adjacent lands are typically poorly drained. Settlement in this poorly drained area prompted the necessity for a vast system of drainage networks. Nearly 70% of streams within the HELP ecoregion have been channelized or hydrologically modified to varying degrees for drainage conveyance (OEPA, 2018b). Elm-ash swamp and beech forests were typical in the HELP ecoregion prior to settlement (USEPA, 2013). Wetland areas are now sparse throughout the **Twelvemile Creek HUC-12** (Figure 5). Today, the ecoregion is characterized by extensive corn, soybean, vegetable and livestock production.

*Row crop production is prevalent in Mercer County*

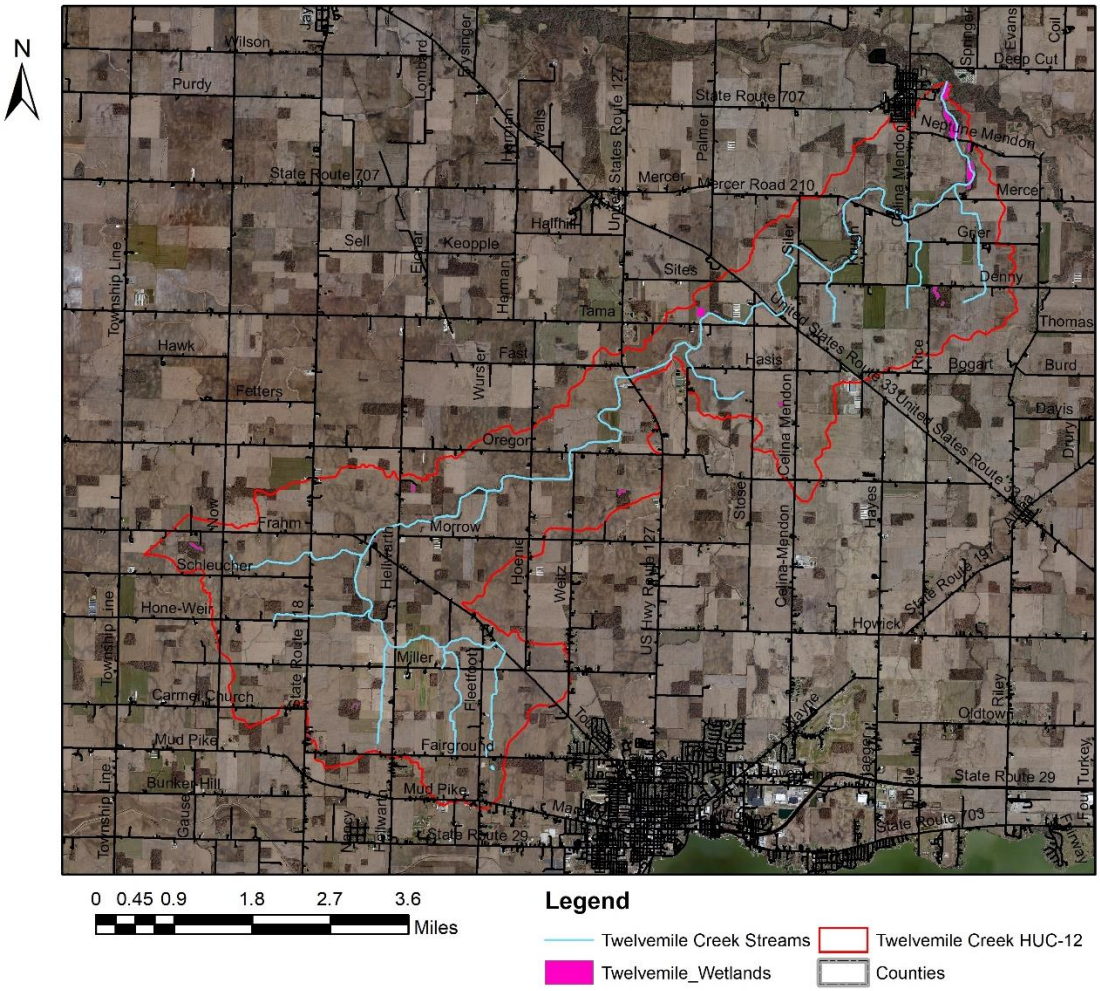



*Figure 5: Wetlands within the Twelvemile Creek HUC-12*

There is one facility located within the Twelvemile Creek HUC-12 that is covered by a National Pollutant Discharge Elimination System permit (NPDES; Ohio EPA 2019b). This facility is beyond the scope of this NPS-IS plan; however, the facility is briefly discussed herein:

- **Country Time Subdivision WWTP** (2PG00120) is a sanitary treatment facility that processes domestic sewage from the Country Time Subdivision just west of US Route 127 on the south side of Fast Road. The facility is permitted to discharge 8,000 gallons per day through one outfall to Twelvemile Creek. The NPDES permit includes monitoring requirements (but not limits) for phosphorus concentrations and requirements and limits nitrogen effluent concentrations. The facility is authorized to transfer sewage sludge to another NPDES permittee or to a landfill.

Currently, there are no Ohio Department of Agriculture (ODA)-permitted Confined Animal Feeding Facilities (CAFFs) located within the **Twelvemile Creek HUC-12.** A portion of an ODA-permitted facility is located in the watershed, but it is only the front buildings and stormwater pond. All livestock and manure storage are located in the neighboring Eightmile Creek HUC-12, so the farm is therefore accounted for in that HUC-12's NPS-IS. A small number of livestock operations within the watershed include mostly swine and turkeys; however, these numbers are growing. Several new turkey barns have been built over the last few years. An estimate of the number of animals existing in the **Twelvemile Creek HUC-12** can be found in Table 1.

**Table 1: Estimated Animal Counts in the Twelvemile Creek HUC-12**

| Livestock Type | Number of Farms | Animal Units |
|---|---|---|
| Swine | 4 | 3,200 |
| Beef Cattle | 6 | 300 |
| Dairy | 1 | N/D |
| Turkey | 2 | 5,000 |

*(Source: Mercer SWCD)*

*NOTES*
*N/D No data available*

The population within the **Twelvemile Creek HUC-12** is sparse, estimated at 1,000, with approximately 259 housing units (WSU, 2013). The Country Time Subdivision is located within the HUC-12 (as noted above and has a NPDES permit), along with a clustered residential development along Fleetfoot Road just north of Mud Pike Road (Figure 6). The Mercer County Comprehensive Plan noted the need for addressing failing HSTS throughout the county, as well as the need to continue expansion of the County's sewer subdistricts in populated residential areas (WSU, 2013).

Specific landmarks and features within this watershed include:

- Shroyer Trucking
- Country Time Subdivision
- Alethiea Christian Church
- Northern part of Mercer DD
- Northern part of Mercer County Engineer Campus

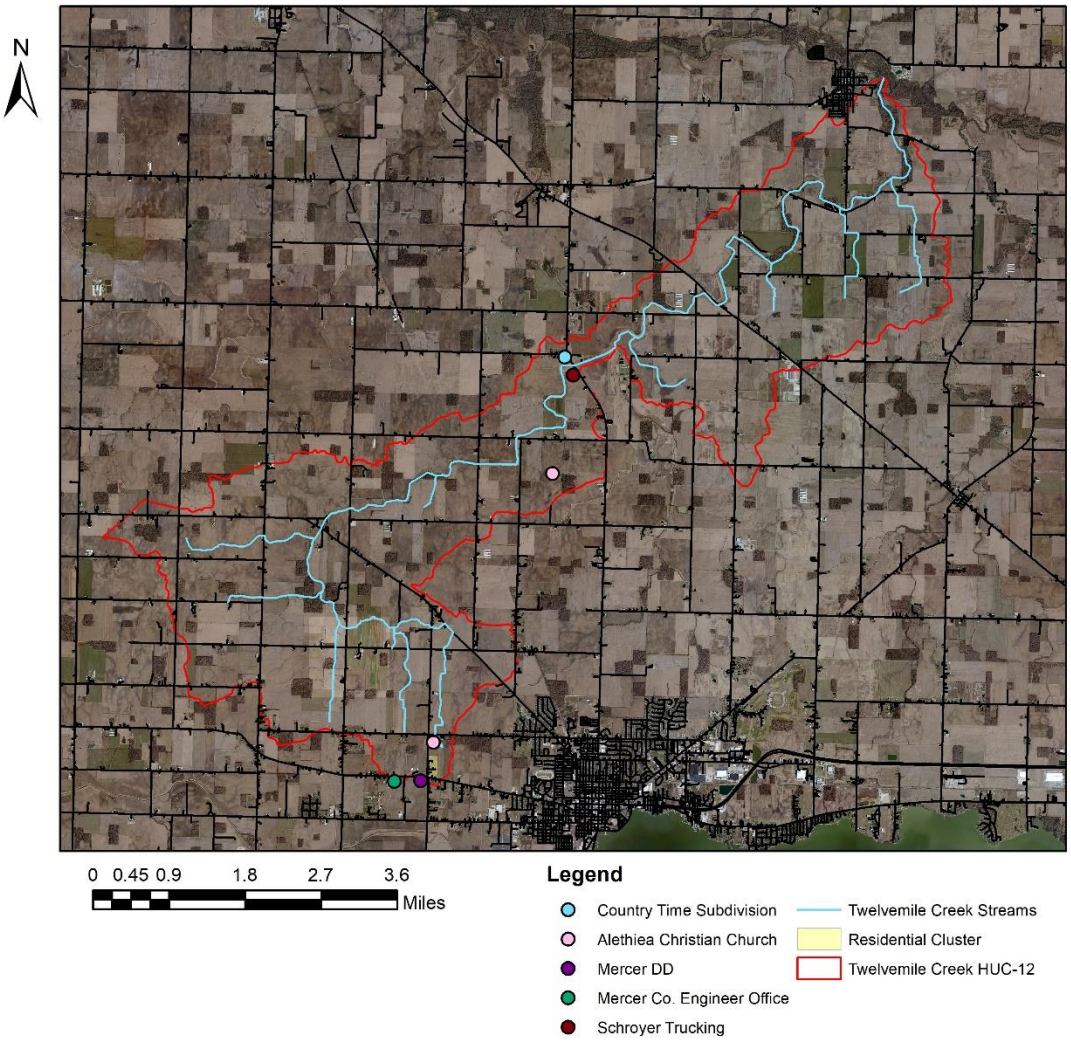



*Figure 6: Points of Interest in the Twelvemile Creek HUC-12*

### 2.1.2 Land Use and Protection

Land use within the **Twelvemile Creek HUC-12** is predominately rural (Figure 7). The dominant land use activity within the **Twelvemile Creek HUC-12** is cultivated crop production (94.5%), with forested areas covering the next largest portion of the watershed (4.6%) (Table 2).

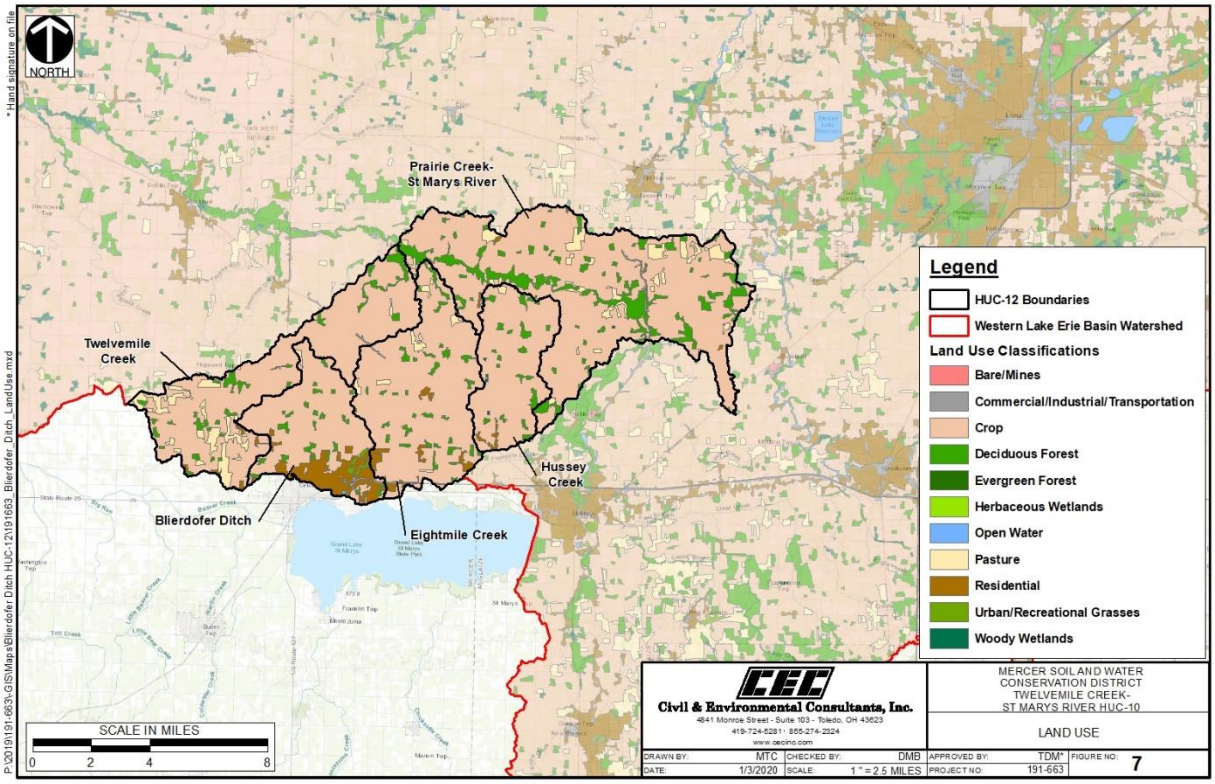



*Figure 7: Land Use in the Twelvemile Creek-St. Marys River HUC-10*

**Table 2: Land Use Classifications in the Twelvemile Creek HUC-12**

| Land Use | Twelvemile Creek HUC-12 (04100004 02 04) | | |
|---|---|---|---|
| | Area ($mi^2$) | Area (acres) | % Watershed Area |
| Commercial/Industrial/Transportation | 0.06 | 35.9 | 0.15% |
| Cropland | 36.1 | 23,113 | 94.5% |
| Deciduous Forest | 1.75 | 1,117.8 | 4.55% |
| Pasture | 0.14 | 90.4 | 0.35% |
| Residential | 0.14 | 90.5 | 0.35% |
| **Total** | **38.2** | **24,448** | **100.00%** |

*(Source: Homer, 2015)*

There is one park listed for this watershed in the United States Geological Survey's (USGS) Protected Areas Database of the United States (PAD-US) (Table 3). Two threatened or endangered species are listed for Mercer County by the US Fish and Wildlife Service (USFWS) (Table 4). Twelvemile Creek is not currently listed in Appendix A of the *Ohio Mussel Survey Protocol*, indicating that mussels may be present, but the Federally Listed Species (FLS) on USFWS's listing are not expected to be found (ODNR, 2018).

**Table 3: Parks in Twelvemile Creek HUC-12**

| Name | Acreage | Description |
|---|---|---|
| Eden Haven Park | 3.6 | Local park with playground equipment and shelters (Mercer Co. owned) |

*(Source: USGS, 2019a)*

**Table 4: Threatened and Endangered Species in Mercer County**

| Species | Status | Habitat Characteristics |
|---|---|---|
| Indiana bat (*Myotis sodalis*) | Endangered | Hibernates in caves and mines and forages in small stream corridors with well-developed riparian woods, as well as upland forests |
| Northern long-eared bat (*Myotis septentrionalis*) | Threatened | Hibernates in caves and mines and swarms in surrounding wooded areas in autumn; roosts and forages in upland forests during late spring and summer |

*(Source: USFWS, 2018)*

Most land within the **Twelvemile Creek HUC-12** is privately owned; therefore, knowledge of conservation practices may be limited. Some conservation practices, such as the use of conservation tillage, can be estimated from crop tillage transects from prior years. These tillage tracts include areas in the WLEB watershed within Mercer County. Over time, the use of conservation tillage has increased. During a five- year period spanning from 2006-2010, conservation tillage was observed on an average of 60% of fields annually during Conservation Technology Information Center (CTIC) surveys conducted in the month of June. Data from June surveys in 2016-2018 indicate conservation tillage has increased to an average use on 66% of fields (Mercer SWCD, 2019).

There has been one certified Environmental Quality Incentives Program (EQIP) practice completed within the **Twelvemile Creek HUC-12** since 2017 (Mercer County NRCS). Additionally, since 2008, Mercer SWCD has assisted local landowners in the **Twelvemile Creek HUC-12** in the installation of 18,582 linear feet of grassed waterways, covering 16.2 acres and draining surface water from 2,030 row crop acres. In addition, six Conservation Reserve Program (CRP) wetlands have been created, totaling 37.4 wetland/upland grass acres (12.4 acres pool), draining agricultural runoff from a minimum of 50 acres. The majority of these wetlands are located in the floodplain of Twelvemile Creek; therefore, watershed acreage treated is variable. Future nutrient reduction projects implemented through this NPS-IS and available state and federal programming will be compiled to track progress made towards nutrient reduction and conservation goals across the **Twelvemile HUC-12** and the greater WLEB watershed.

## 2.2 Summary of HUC-12 Biological Trends

The OEPA sampled the **Twelvemile Creek HUC-12** in 2015, as documented in the *Biological and Water Quality Study of the St. Marys River and Tributaries, 2015, Technical Report EAS/2018-11-01* (OEPA, 2018b). This report serves as the Technical Support Document (TSD) for the TMDL study for the St. Marys River, which is still under agency preparation. All sample sites of this assessment unit were verified to be WWH segments.

A summary of the sample locations and their biological status in the **Twelvemile Creek HUC-12** is provided in Table 5. For reference, water quality standards (WQS) for the HELP Ecoregion are presented in Table 6.

**Table 5: Biological Indices Scores for Sites in Twelvemile Creek HUC-12**

| Twelvemile Creek HUC-12 (04100004 02 04) | | | | | | | |
|---|---|---|---|---|---|---|---|
| **River Mile** | **Drainage Area ($mi^2$)** | **IBI** | **MIwb[a]** | **ICI[b]** | **QHEI** | **Attainment Status** | **Location** |
| **Twelvemile Creek (WWH)** | | | | | | | |
| 11.01 H | 11.6 | 32 | N/A | F* | 32 | Partial | NW of Celina @ Hoenie Rd. |
| 1.80 W | 36.0 | 30 ns | 8.4 | 34 | 34.8 | Full | S of Mendon @ Celina-Mendon Rd. |

*(Source: OEPA, 2018b)*

*NOTES*

*IBI* *Index of Biotic Integrity*

*a* *The Modified Index of Well Being (MIwb) is not applicable to headwater sites (drainage ≤20 $mi^2$).*

*ICI* *Invertebrate Community Index*

*b* *Narrative evaluation used in lieu of ICI (G=Good; MG=Marginally Good; H Fair =High Fair; F=Fair; L Fair=Low Fair; P=Poor; VP=Very Poor).*

*QHEI* *Qualitative Habitat Evaluation Index*

*H* *Headwater sample*

*W* *Wadable stream*

*N/A* *Not applicable*

*ns* *Nonsignificant departure from biocriteria (<4 IBI or ICI units, or 4 IBI or ICI units, or >0.5 MIwb units)*

*** Indicates significant departure from applicable biocriteria (>4 IBI or ICI units, or >0.5 MIwb units)*

**Table 6: Water Quality Standards for the Huron-Erie Lake Plains Ecoregion**

| HELP Ecoregion | MWH Standards[a] | | | WWH WQS Standards | | |
|---|---|---|---|---|---|---|
| | Wading | Headwater | Boat | Wading | Headwater | Boat |
| IBI | 22 | 20 | 20/22 | 32 | 28 | 34 |
| MIwb | 5.6 | N/A | 5.7/5.7 | 7.3 | N/A | 8.6 |
| ICI | 22 | 22 | 22 | 34 | 34 | 34 |
| QHEI[b] | 43.5 | 43.5 | 43.5 | 60 | 60 | 60 |

*(Source: OEPA, 2013b)*

*NOTES*

*WQS Water quality standards*

*WWH Warmwater Habitat*

*a Modified Warmwater Habitat (MWH) standards are dependent on type of MWH. MWH-C (due to channelization) is listed first; MWH-I (due to impoundment) is listed second.*

*b QHEI is not criteria included in Ohio WQS; however, it has been shown to be highly correlated with the health of aquatic communities. In general, sites scoring 60 or above support healthy aquatic assemblages indicative of WWH.*

*N/A MIwb not applicable to headwaters sampling locations with drainage areas ≤ 20 $mi^2$.*

### *Fishes (Modified Index of Well-Being [MIwb] & Index of Biotic Integrity [IBI])*

In general, fish communities performed well in all headwater sites sampled in the St. Marys watershed in 2015, as only one site showed impairment, attributed to wastewater effluent. Within Twelvemile Creek the headwater sample met the attainment goal for WWH at IBI=32. The wading sample was close to meeting the WWH standard at IBI=30 and the MIwb exceeded the WWH standard at 8.4.

### *Macroinvertebrates (Invertebrate Community Index [ICI])*

In 2015, ICI scores at the headwater sample on Twelvemile Creek was rated at fair with a significant departure from applicable biocriteria. The wading sample on Twelvemile Creek met the WWH standard for ICI. Many habitat attributes within Twelvemile Creek typically contribute to macroinvertebrate impairment in streams within the HELP ecoregion (high embeddedness, lack of riffle, sedimentation etc.).

### *Habitat (via Qualitative Habitat Evaluation Index [QHEI])*

Ohio EPA sampling crews documented various water quality and habitat attributes during the QHEI assessment in the summer of 2015 (Table 7). QHEI was measured at a total of 25 sampling locations that were located in the HELP Ecoregion throughout the St. Marys watershed. Two of these locations were in Twelvemile Creek. In general, habitat in the HELP tributaries was severely degraded, with an average QHEI score of 41.25 (n=25). The habitat in Twelvemile Creek scored below this HELP average at both sites. Most HELP tributaries have not recovered from extensive hydromodification, and low stream power and silt-clay soil composition in upland areas have prevented the reestablishment of positive stream features (OEPA, 2018b).

**Table 7: QHEI Matrix with WWH and MWH Attribute Totals for Sites in the Twelvemile Creek HUC-12**

| Twelvemile Creek HUC-12 (04100004 02 04) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Key QHEI Components | | | WWH Attributes | | | | | | | | | | | MWH Attributes | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | High Influence | | | | | | Moderate Influence | | | | | | | | | | | | |
| River Mile | QHEI Score | Gradient (ft/mi) | Not Channelized or Recovered | Boulder/Cobble/Gravel Substrate | Silt Free Substrates | Good/Excellent Development | Moderate/High Sinuosity | Extensive/Moderate Cover | Fast Current/Eddies | Low/Normal Embeddedness | Max Depth >40 cm | Low/Normal Embeddedness | WWH Attributes | Channelized/No Recovery | Silt/Muck Substrates | No Sinuosity | Sparse/No Cover | Max Depth <40 cm | High Influence Modified Attributes | Recovering Channel | Heavy/Moderate Silt Cover | Sand Substrate (Boat) | Hardpan Substrate Origin | Fair/Poor Development | Low Sinuosity | Only 1 or 2 Cover Types | Intermediate/Poor Pools | No Fast Current | High/Moderate Embeddedness | High/Moderate Riffle Embeddedness | No Riffle | Moderate Influence MWM Attributes |
| Twelvemile Creek (WWH) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11.0 | 32.0 | 1.61 | | | | | | | | | | | 0 | • | • | • | • | • | 5 | • | • | | | • | • | | | • | • | • | • | 8 |
| 1.8 | 34.8 | 1.92 | | | | | | | | | • | | 1 | • | • | • | • | | 4 | | • | | | • | • | | • | • | • | • | | 7 |

*(Source: OEPA, 2018b)*

*NOTES*
*QHEI Qualitative Habitat Evaluation Index*
*WWH Warmwater Habitat*
*MWH Modified Warmwater Habitat*

Strong correlations exist between habitat attributes and a stream's ability to support healthy aquatic assemblages (OEPA, 1999). The presence of certain attributes are shown to have a larger negative impact on fish and macroinvertebrate communities. Streams designated as WWH should exhibit no more than four total MWH habitat attributes; additionally, no more than one of those four should be of high-influence (OEPA, 2013b). Neither sampling location within the **Twelvemile Creek HUC-12** met this target. The QHEI scores at both locations are well below the target of 60 for WWH.

## 2.3 Summary of HUC-12 Pollution Causes and Associated Sources

As listed in the 2018 *Biological and Water Quality Study of the St. Marys River and Tributaries*, the OEPA has determined that the biological impairments in the **Twelvemile Creek HUC-12** exist at one sampling location in the upstream portion of Twelvemile Creek (Table 8). Impairment at this site is from channelization due to sedimentation/siltation and alteration in streamside covers. The downstream location was in full attainment status of its WWH designation.

**Table 8: Causes and Sources of Impairments for Sampling Locations in the Twelvemile Creek HUC-12**

| Twelvemile Creek HUC-12 (04100004 02 04) | | | | |
|---|---|---|---|---|
| **River Mile** | **Primary Cause(s)** | **Primary Source(s)** | **Attainment Status** | **Location** |
| **Twelvemile Creek (WWH)** | | | | |
| 11.01[H] | Sedimentation/siltation; Alteration in streamside covers | Channelization | Partial | NW of Celina @ Hoenie Rd. |
| 1.80[W] | -- | -- | Full | S of Mendon @ Celina Mendon Rd. |

*(Source: OEPA, 2018b)*

*NOTES*
*H Headwater sample*
*W Wadable stream*

The OEPA has estimated spring phosphorus loadings from individual subwatersheds throughout the greater WLEB watershed. These estimates also include a breakdown of estimated loads from contributing sources of NPS pollutants, such as agricultural lands/activities, developed/urban lands, failing HSTS and natural sources (Table 9). Efforts to reduce nutrients from each of these contributing sources will focus on reaching the 40% reduction goal outlined by Annex 4 of the GLWQA and the Ohio DAP.

**Table 9: Estimated Spring Nutrient Loadings from Contributing NPS Sources in the Twelvemile Creek HUC-12**

| | **Agricultural Load (lbs)** | **Developed/Urban Load (lbs)** | **Natural Load (lbs)** | **HSTS Load (lbs)** | **NPS Total (lbs)** |
|---|---|---|---|---|---|
| Current Estimates* | 13,000 | 460 | <100 | 160 | 13,000 |
| Target Estimates* | 7,700 | 200 | <100 | 100 | 8,000 |

*(Ohio DAP, 2020)*

*NOTES*
**Estimated using two significant figures*

## 2.4 Additional Information for Determining Critical Areas and Developing Implementation Strategies

Assessment data from the 2015 TMDL sampling event and data referenced in the 2018 *Biological and Water Quality Study of the St. Marys River and Tributaries, 2015, Technical Report EAS/2018-11-01* and the *2018 Integrated Report* were used in the development of this NPS-IS (OEPA, 2018a; OEPA, 2018b). Any additional documents and/or studies created by outside organizations that were used as supplemental information to develop this NPS-IS are referenced in Chapter 5 (Works Cited), as appropriate.

# CHAPTER 3: CRITICAL AREA CONDITIONS & RESTORATION STRATEGIES

## 3.1 Overview of Critical Areas

Overall, two sampling sites are located in the **Twelvemile Creek HUC-12**, both of which are located in Twelvemile Creek. The aquatic communities in the downstream, wadable sampling location is in *Full Attainment* of the WWH designation; however, the upstream, headwaters sampling location was in *Partial Attainment* of the WWH designation. The impairment cause is listed as channelization due to sedimentation/siltation and alteration in streamside covers (OEPA, 2018b). Sedimentation may be decreased by the implementation of agricultural best management practices (BMPs) that help stabilize soil loss from row crop fields. In addition, BMP implementation that reduces soil loss also simultaneously helps reduce nutrient loss, as nutrients are adsorbed to soil particulates. Land use activities contribute to far-field impairment in Lake Erie. Actions implemented to address far-field effects do also have a positive impact on near-field aquatic communities and help maintain WQS attainment within the **Twelvemile Creek HUC-12**.

Critical areas have been identified to address far-field effects of nutrients in Lake Erie, the end receiving waterbody of drainage from the **Twelvemile Creek HUC-12** (Figure 8)**.** As outlined by the OEPA, nutrient reduction targets have been set for contributing sources of phosphorus. At this time, nutrient reduction strategies and projects have been identified for two critical areas contributing to far-field impairment (Table 10). Additional critical areas may be developed in subsequent versions of this NPS-IS.

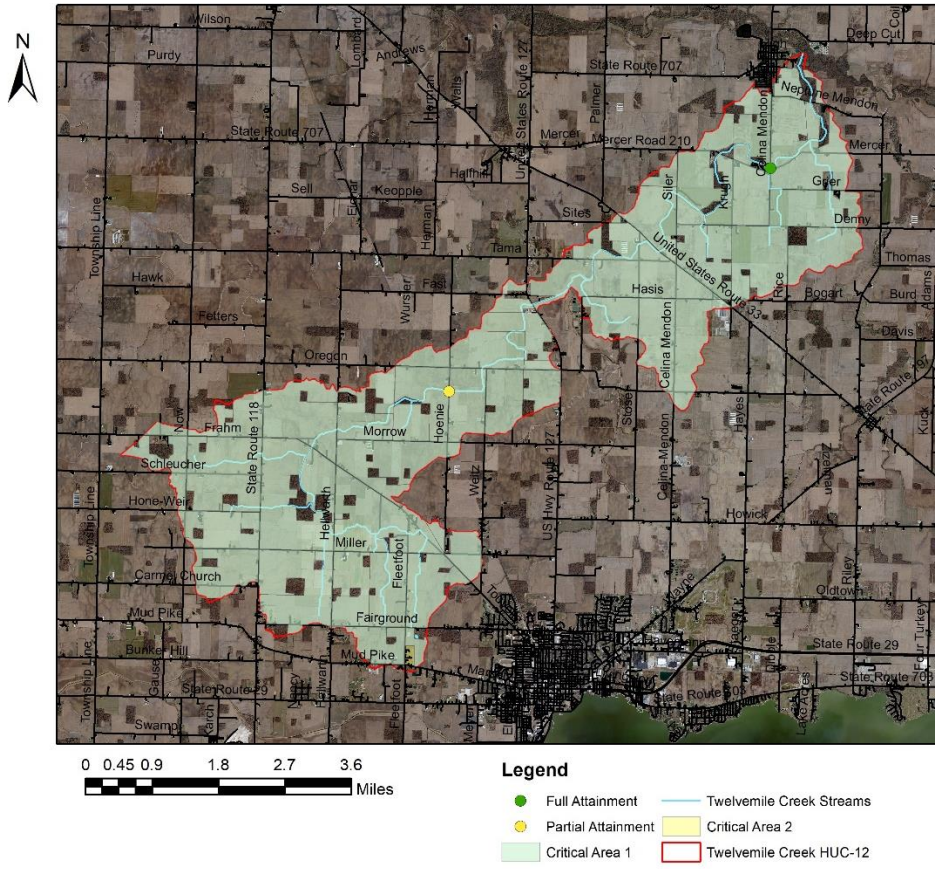



*Figure 8: Twelvemile Creek HUC-12 Critical Area Overview*

**Table 10: Twelvemile Creek HUC-12 Critical Area Descriptions**

| Critical Area Number | Critical Area Description | Impairments Addressed |
|---|---|---|
| 1 | Nutrient Reduction in Prioritized Agricultural Lands | Far-field (Lake Erie) |
| 2 | Nutrient Reduction in Unsewered Areas | Far-field (Lake Erie) |

## 3.2 Critical Area #1: Conditions, Goals & Objectives for Nutrient Reduction in Prioritized Agricultural Lands

### 3.2.1 Detailed Characterization

Ohio's Nutrient Mass Balance Study (OEPA, 2018c) estimated 88% of the nutrient loadings to Lake Erie via the Maumee River were primarily from nonpoint sources, related to land use activities, with only small contributions from failing HSTS and NPDES permitted facilities. This estimate is consistent with several other studies. Given the dominance of agricultural land use throughout the greater WLEB watershed, the use of best management practices (BMPs) are recommended for agricultural operations to minimize nutrient loss to local waterways and drainage ditches through surface and tile flow. While BMPs are encouraged on all agricultural lands, certain lands are more prone to nutrient loss than others and are prioritized for BMP implementation. *Critical Area #1* contains prioritized agricultural lands throughout the entire **Twelvemile Creek HUC-12** (Figure 9).

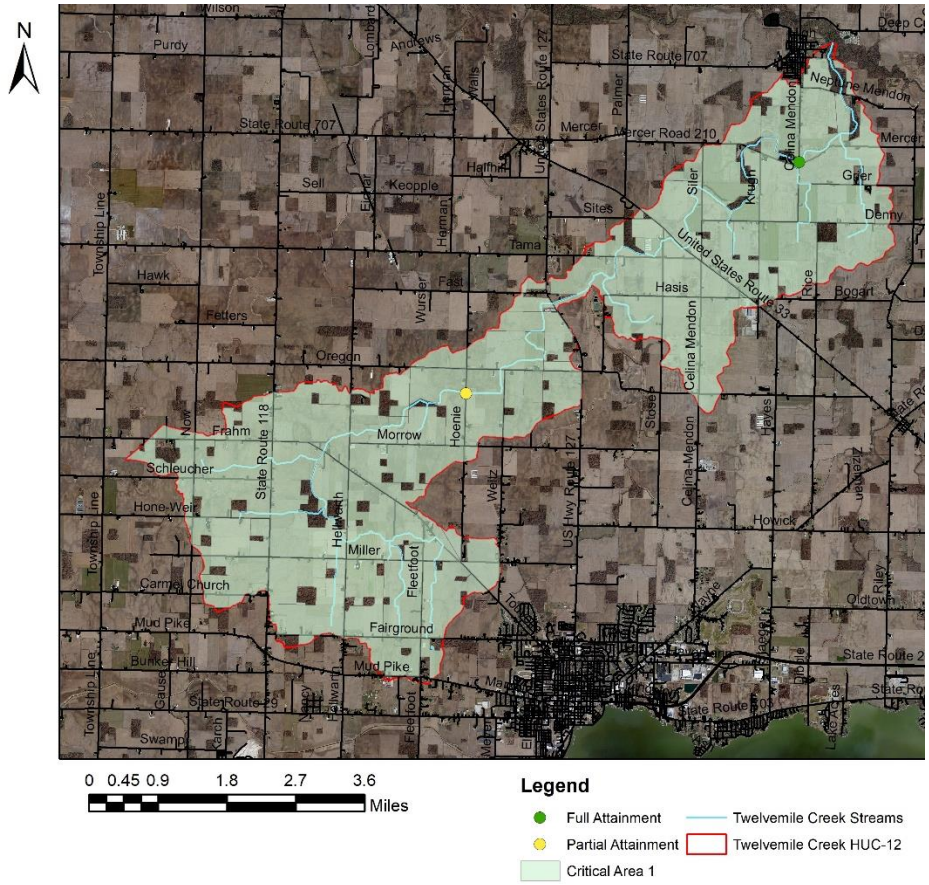



*Figure 9: Twelvemile Creek HUC-12 Critical Area #1*

Of the 23,113 crop acres in the **Twelvemile Creek HUC-12**, prioritized lands are operations that meet one or more of the following criteria:

- Lands directly adjacent to streams or drainage waterways;
- Lands without a current (<3 years) nutrient management plan;
- Lands with high soil phosphorus levels (>40 ppm Mehlich); and/or,
- Lands with recurrent gully erosion.

### 3.2.2 Detailed Biological Conditions

Fish community data for the two sampling locations within **Twelvemile Creek HUC-12** are summarized below (Table 11). Analysis of the abundance, diversity and pollution tolerance of existing fish species found by OEPA at each sampling location, in relation to the corresponding QHEI score, aids in the identification of causes and sources of impairment. The fish communities at both sampling locations scored either at or just below the target for WWH for IBI (goal for headwater sites = 28; goal for wadable sites = 32). Habitat scores fell short of expected scores to support WWH communities (QHEI target = 60), which is common in streams within the HELP ecoregion. These streams, typically channelized, often do not recover enough to show positive stream habitat attributes, particularly when drainage maintenance is ongoing in these areas. While the fish communities at both sites are in attainment, pollution tolerant species are still abundant within Twelvemile Creek.

**Table 11: Critical Area #1 – Fish Community and Habitat Data**

| Twelvemile Creek HUC-12 (04100004 02 04) | | | | | | | |
|---|---|---|---|---|---|---|---|
| **RM** | **Drainage Area ($mi^2$)** | **Total Species** | **QHEI** | **IBI** | **MIwb[a]** | **Predominant Species (Percent of Catch)** | **Narrative Evaluation** |
| **Twelvemile Creek (WWH)** | | | | | | | |
| 11.01 H | 11.6 | 18 | 32 | 32 | N/A | Bluntnose minnow (27%), Fathead minnow (19%), Central stoneroller (14%) | Fair |
| 1.80 W | 36.0 | 24 | 34.8 | 30ns | 8.4 | Bluntnose minnow (50%), Central stoneroller (17%), Largemouth Bass (7%) | Fair - Marginally Good |

*(Source: OEPA, 2018b)*

*NOTES*
*QHEI* *Qualitative Habitat Evaluation Index*
*IBI* *Index of Biotic Integrity*
*a* *The Modified Index of Well Being (MIwb) is not applicable to headwater sites (drainage ≤20 $mi^2$).*
*H* *Headwater sample*
*W* *Wadable stream*
ns *Nonsignificant departure from biocriteria (<4 IBI or ICI units, or 4 IBI or ICI units, or >0.5 MIwb units)*
*N/A* *Not applicable*

Characteristics of the aquatic macroinvertebrate community for the Twelvemile Creek sampling locations in *Critical Area #1* are summarized below (Table 12). Again, analysis of the abundance, diversity, and pollution tolerance of existing aquatic macroinvertebrates (bugs) found by OEPA at these

sampling locations, related to QHEI scores, can aid in the identification of causes and sources of impairment. The macroinvertebrate communities at RM 11.01 received a qualitative score of Fair with significant departure from applicable biocriterion for WWH attainment (ICI goal = 34). Macroinvertebrate communities at RM 1.80, though receiving a qualitative score of Good, performed well despite the number of MWH habitat attributes (MWH high influence=4; MWH low-influence=7).

**Table 12: Critical Area #1 – Macroinvertebrate Community Data**

| Twelvemile Creek HUC-12 (04100004 02 04) | | |
|---|---|---|
| **RM** | **ICI Score-Narrative[a]** | **Predominant Species (Tolerance Categories)** |
| **Twelvemile Creek (WWH)** | | |
| 11.01 H | N/A – Fair<br>1 sensitive taxa | Beetles (MT), Snails (T), Midges (F, T) |
| 1.80 W | 34 - Good<br>3 sensitive taxa | Caddisflies (F), Damselflies (F), Fingernail Clams (F), Midges (F) |

*(Source: Ohio EPA, 2018b)*

*NOTES*

*a Narrative evaluation used in lieu of ICI (G=Good; MG=Marginally Good; F=Fair; L Fair=Low Fair; P=Poor; VP=Very Poor).*

*H Headwater sample*

*W Wadable stream*

*Tolerance Categories: VT=Very Tolerant, T=Tolerant, MT=Moderately Tolerant, F=Facultative, MI=Moderately Intolerant, I=Intolerant.*

### 3.2.3 Detailed Causes and Associated Sources

The downstream sampling location within the **Twelvemile HUC-12** is in *Full Attainment* of the WWH designation, and the upstream sampling location is in *Partial Attainment* of the WWH designation. The cause of non-attainment status is due to channelization caused by sedimentation/siltation and alteration in streamside covers (OEPA, 2018b). The analysis of the QHEI scoring shows a substantial presence of high- and moderate-influence MWH habitat attributes throughout these headwater tributaries in the St. Marys region. Many of these habitat attributes (i.e., heavy/moderate silt cover, channelization with no recovery, high embeddedness, etc.) are likely a result of land use activities, which are mainly agricultural operations within the watershed.

From a far-field perspective, agricultural land use activities contribute to excessive nutrient loadings to Lake Erie that result in eutrophication and the formation of HABs. The use of a variety of BMPs on private agricultural lands, at both in-field and edge-of-field locations can help reduce the amount and concentration of nutrient-laden surface runoff and tile drainage. Many BMPs can not only address reduction of nutrients in surface and drainage water, but they can also simultaneously address the loss of sediment from agricultural lands, which contributes to sediment-covered substrates in local waterways. In addition, a reduction of sediment loss to local waterways can also reduce nutrient loss to near-field and far-field waterbodies, as nutrients will also adsorb to sediment particles, potentially becoming dissolved at a later time. The implementation of BMPs on agricultural lands that are prone to sediment and nutrient loss serves as a benefit for both near-field and far-field waterbodies.

### 3.2.4 Outline Goals and Objectives for the Critical Area

The overarching goal of any NPS-IS is to improve water quality scores or meet nutrient reduction goals in order to remove a waterbody's impairment status. Agricultural land use activities in *Critical Area #1* contribute to far-field impairment through excessive nutrient loss (phosphorus) to local waterways that flow to Lake Erie. Through the GLWQA Annex 4 and the subsequent DAP for the State of Ohio, nutrient target loads have been set for the Maumee River, which is the largest contributing waterbody to the WLEB and is fed by the St. Marys River, to which Twelvemile Creek is a tributary. These phosphorus target loads have been set at levels that are 40% lower than the current estimated loadings. Ohio's Nutrient Mass Balance Study has also shown that a large portion of the nutrient load to Lake Erie occurs during springtime rains (OEPA, 2018c).

Many objectives within the **Twelvemile Creek HUC-12** align with the priorities of the H2Ohio Initiative, a water quality initiative with a focus on phosphorus reduction. This program provides economic incentives to producers who develop nutrient management plans for their fields and implement effective and cost-efficient BMPs that include: soil testing, variable rate fertilization, subsurface nutrient application, manure incorporation, conservation crop rotation, cover crops, drainage water management structures, two-stage channel construction, edge of field buffers and headwaters and coastal wetlands that reduce agricultural runoff (H2Ohio, 2019).

#### *Goals*

The OEPA has modeled nutrient loadings associated with various land uses and sources within each HUC-12 in the Maumee River Basin, and has set phosphorus reduction goals for each associated source, based upon springtime load estimates. To achieve the desired phosphorus reduction from agricultural land use in the **Twelvemile Creek HUC-12**, the following goal has been established:

*Goal 1.* Reduce springtime phosphorus loading contributions in *Critical Area #1* to a level at or below 7,700 lbs/year (40% reduction).
NOT ACHIEVED: Current spring load contribution is estimated to be 13,000 lbs/year.

#### *Objectives*

In order to make substantive progress toward the achievement of the springtime phosphorus load reduction goal of 5,300 lbs for the **Twelvemile Creek HUC-12**, effort must commence on more widespread implementation, according to the following objectives within *Critical Area #1.*

*Objective 1:* Reduce erosion and nutrient loss through the installation of grassed waterways that receive/treat surface water from at least 3,000 acres.

*Objective 2:* Implement nutrient management planning on at least 8,000 additional acres[1].

[1] Approximately 3,500 acres are covered under certified nutrient management plans in the Twelvemile Creek HUC-12.

*Objective 3:* Create, enhance and/or restore at least 120 acres of wetlands for treatment of agricultural runoff and/or nutrient reduction purposes from 3,000 total agricultural acres.

*Objective 4:* Plant cover crops on at least 3,500 additional acres annually.

*Objective 5:* Install at least three miles (15,840 linear feet) of two-stage channel design to create functional floodplain bench.

These objectives will be directed towards implementation on prioritized agricultural lands and are estimated to reach the phosphorus spring load reduction goal (Table 13). Additional conservation activities within the **Twelvemile Creek HUC-12**, both on priority and secondary lands, may also make incremental progress towards phosphorus reduction goals. The implementation of BMPs included in these objectives, as well as BMPs implemented through federal and state programs and other voluntary efforts will be tracked to monitor progress towards phosphorus reduction goals within the watershed.

**Table 13: Estimated Nutrient Loading Reductions from Each Objective**

| Objective Number | Best Management Practice | Total Acreage Treated | Estimated Annual Phosphorus Load Reduction (lbs) | Estimated Spring Phosphorus Load Reduction (lbs) |
|---|---|---|---|---|
| 1 | Grassed Waterways[a] | 3,000 | 1,350 | 880 |
| 2 | Nutrient Management (Planning and Implementation)[b] | 8,000 | 3,890 | 2,530 |
| 3 | Wetlands[c] | 3,000[d] | 1,500 | 980 |
| 4 | Cover Crops | 3,500 | 530 | 350 |
| 5 | Two Stage Channel | 1,700 | 1,130 | 740 |
| TOTAL | | 19,200* | 8,400 | 5,480 |

*(Source Model: Spreadsheet Tool for Estimating Pollutant Loads (STEPL), Version 4.4, (USEPA, 2019))*

*NOTES*

*a Grassed Waterways phosphorus reduction efficiency estimated from reference values listed in OSUE, 2018.*

*b Nutrient Management consists of "managing the amount (rate), source, placement (method of application) and timing of plant nutrients and soil amendments to budget, supply and conserve nutrients for plant production; to minimize agricultural nonpoint source pollution of surface and groundwater resources; to properly utilize manure or organic byproducts as a plant nutrient source; to protect air quality by reducing odors, nitrogen emissions (ammonia, oxides of nitrogen) and the formation of atmospheric particulates; and/or to maintain or improve the physical, chemical and biological condition of soil," as defined by the STEPL guidance documents (Tetra Tech, 2018).*

*c Phosphorus load reduction for wetlands was calculated using the estimated 5-year average cropland nutrient yield in the Maumee River watershed from 2013-2017 (1.05 lbs/acre phosphorus), provided by Heidelberg University National Center for Water Quality Research.*

*d If drainage water is routed through restored/created wetlands, it is assumed a 50% reduction in phosphorus from total nutrient yield for the drainage area, with a 25:1 ratio of drainage area to the receiving wetland. For this objective of 80 wetland acres, total drainage area is 2,000 acres.*

** More than one BMP may be implemented within fields.*

Water quality monitoring is an integral part of the project implementation process. Both project-specific and routinely scheduled monitoring will be conducted to determine progress towards meeting the goals (i.e., water quality standards and nutrient reduction targets). Through an adaptive management process, the aforementioned objectives will be reevaluated and modified as necessary. Objectives may be added to make further progress towards attainment or reduction goals, or altered, as a systems approach of multiple BMPs can accelerate the improvement of water quality conditions. The *Nonpoint Source Management Plan Update* (OEPA, 2013a) will be utilized as a reevaluation tool for its listing of all eligible NPS management strategies to consider including:

- Urban Sediment and Nutrient Reduction Strategies;
- Altered Stream and Habitat Restoration Strategies;
- Nonpoint Source Reduction Strategies; and,
- High Quality Waters Protection Strategies.

## 3.3 Critical Area #2: Conditions, Goals & Objectives for Nutrient Reduction from HSTS in Twelvemile Creek HUC-12

### 3.3.1 Detailed Characterization

Ohio's Nutrient Mass Balance Study (OEPA, 2018c) estimated a small percentage (4%) of the nutrient loadings to Lake Erie via the Maumee River were from contributions from failing HSTS (OEPA, 2018a). This estimate is consistent with estimates from several other studies. The OEPA has modeled nutrient loadings associated with various land uses and sources within each HUC-12 in the Maumee River Basin, and has set phosphorus reduction goals for each associated source, including failing or inefficient HSTS, based upon springtime load estimates. *Critical Area #2* contains a cluster of homes near the intersection of Fleetfoot Rd. and Mud Pike Rd., as well as approximately 75 unmapped, unsewered households with compromised HSTS within the **Twelvemile Creek HUC-12** (Figure 10).

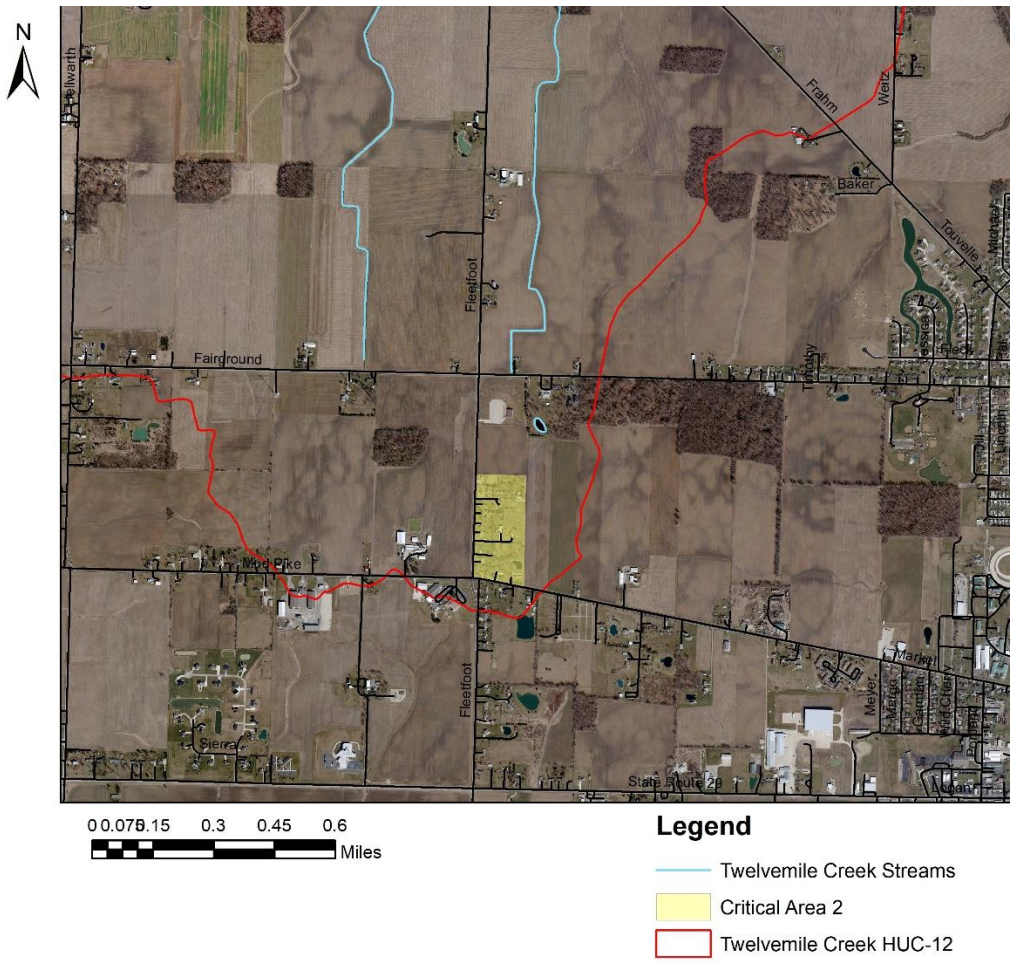



*Figure 10: Twelvemile Creek HUC-12 Critical Area #2*

The cluster of homes located along Fleetfoot Rd. and Mud Pike Rd. covers an area of approximately 22 acres. There are approximately 15 homes are unsewered in this area. A tributary to Twelvemile Creek is approximately 1,400 feet to the north of this critical area.

### 3.3.2 Detailed Biological Conditions

Biological data do not exist for this critical area, as no streams or open ditches that flow directly through *Critical Area #2* have been assessed by the OEPA.

### 3.3.3 Detailed Causes and Associated Sources

The area of Fleetfoot Rd. and Mud Pike Rd. has been an area of pollution concern in the past. The open ditch to the north of the Critical Area has seen several complaints of discolored water within the last 10 years. Sanitary sewer improvements or efforts undertaken to repair failing or inefficient HSTS within this area and through a case-by-case basis throughout the **Twelvemile Creek HUC-12** will not only prevent the distribution of human waste into the environment, but would also help contribute to progress on meeting overall WLEB nutrient reduction goals set by the GLWQA and Ohio's DAP.

### 3.3.4 Outline Goals and Objectives for the Critical Area

The overarching goal of any NPS-IS is to improve water quality scores or meet nutrient reduction goals in order to remove a waterbody's impairment status. Elimination of HSTS nutrient contributions should be addressed to reduce the amount of fecal materials and nutrients introduced to the environment and local waterways. In order to meet the 40% overall nutrient reduction goals of the Ohio DAP, reductions in nutrient contributions from failing HSTS should also be considered. Using current estimates from the OEPA Division of Surface Water, springtime phosphorus load contributions from HSTS should be no more than 100 lbs. Current estimates are 160 lbs., resulting in the need of an overall reduction by 60 lbs.

#### *Goals*

The OEPA has modeled nutrient loadings associated with various land uses and sources within each HUC-12 in the Maumee River Basin, and has set phosphorus reduction goals for each associated source, based upon springtime load estimates. To achieve the desired phosphorus reduction from HSTS in the **Twelvemile Creek HUC-12**, the following goal has been established:

*Goal 1.* Reduce springtime phosphorus loading contributions in *Critical Area #2* to a level at or below 100 lbs/year (40% reduction).
NOT ACHIEVED: Current springtime load contribution is estimated to be 160 lbs/year.

TMACOG's HSTS study (2018) estimated the annual phosphorus load from the entire **Twelvemile Creek HUC-12** to be 0.18 metric tons per annum (MTA), with a total household count of 259. Using these numbers, an average household's yearly Total phosphorus contribution in this watershed is 0.00069 MTA, equivalent to 1.38 lbs per year within the **Twelvemile Creek HUC-12**. Using the estimate of at least 15 households in this area, phosphorus loads could be reduced by 21 lbs annually, accounting for approximately 10 lbs for the springtime load. Approximately 75 additional failing HSTS outside of this identified area would need to be replaced to fully meet the 60 lb springtime load reduction target. Sanitary sewer connection to isolated or sparsely populated areas is not likely.

#### *Objectives*

In order to make substantive progress toward the achievement of the springtime phosphorus load reduction goal of 60 lbs for the **Twelvemile Creek HUC-12**, effort must commence on more widespread implementation, according to the following objectives within *Critical Area #2.*

*Objective 1:* Reduce HSTS contributions through replacement efforts or sanitary sewer infrastructure connection for at least 15 households in the area near Fleetfoot Rd. and Mud Pike Rd.

*Objective 2:* Reduce HSTS contributions through replacement efforts for at least 75 unmapped, unclustered households on an individualized, case-by-case basis.

Water quality monitoring is an integral part of the project implementation process. Both project-specific and routinely scheduled monitoring will be conducted to determine progress towards meeting the goals

(i.e., water quality standards and nutrient reduction targets). Through an adaptive management process, the aforementioned objectives will be reevaluated and modified as necessary. Objectives may be added to make further progress towards attainment or reduction goals, or altered, as a systems approach of multiple BMPs can accelerate the improvement of water quality conditions. The *Nonpoint Source Management Plan Update* (OEPA, 2013a) will be utilized as a reevaluation tool, as well as other state and federal agency resources for its listing of all eligible NPS management and nutrient reduction strategies to consider including:

- Urban Sediment and Nutrient Reduction Strategies;
- Altered Stream and Habitat Restoration Strategies;
- Nonpoint Source Reduction Strategies; and,
- High Quality Waters Protection Strategies

# CHAPTER 4: PROJECTS AND IMPLEMENTATION STRATEGY

Projects and evaluation needs identified for the **Twelvemile Creek HUC-12** are based upon identified causes and associated sources of NPS pollution. Over time, these critical areas will need to be reevaluated to determine progress towards meeting restoration, attainment and nutrient reduction goals. Time is an important variable in measuring project success and overall status when using biological indices as a measurement tool. Some biological systems may show fairly quick response (i.e., one season), while others may take several seasons or years to show progress towards recovery. In addition, reasons for the impairment other than those associated with NPS sources may arise. Those issues will need to be addressed under different initiatives, authorities or programs that may or may not be accomplished by the same implementers addressing the NPS issues.

Implementation of practices described in this NPS-IS plan will also contribute to nutrient load reduction (specifically the 40% reduction in phosphorus load) to protect and restore use attainment in Lake Erie. Nutrient load reduction efforts are consistent with the Lake Erie Collaborative Agreement through the International Joint Commission (IJC) and Ohio's DAP (OLEC, 2018).

For the **Twelvemile Creek HUC-12** there are two *Project and Implementation Strategy Overview Tables* (subsection 4.1, 4.2). Future versions of this NPS-IS may include subsequent sections as more critical areas are refined and more projects become developed to meet the requisite objectives within a critical area. The projects described in the *Overview Table* have been prioritized using the following three-step prioritization method:

Priority 1 — Projects that specifically address one or more of the listed Objectives for the Critical Area.

Priority 2 — Projects where there is land-owner willingness to engage in projects that are designed to address the cause(s) and source(s) of impairment or where there is an expectation that such potential projects will improve water quality in the **Twelvemile Creek HUC-12**.

Priority 3 — In an effort to generate interest in projects, an information and education campaign will be developed and delivered. Such outreach will engage citizens to spark interest by stakeholders to participate and implement projects like those mentioned in Priority 1 and 2.

Project Summary Sheets (PSS) are in subsection 4.1.1 and 4.2.1; these provide the essential nine elements for short-term and/or next step projects that are in development and/or in need of funding. As projects are implemented and new projects developed, these sheets will be updated. Any new PSS created will be submitted to the state of Ohio for funding eligibility verification (i.e., all nine elements are included).

## 4.1 Critical Area #1 Project and Implementation Strategy Overview Tables

| Table 14: Twelvemile Creek HUC-12 (04100004 02 04) — Critical Area #1 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Goal** | **Objective** | **Project #** | **Project Title (EPA Criteria g)** | **Lead Organization (EPA criteria d)** | **Time Frame (EPA Criteria f)** | **Estimated Cost (EPA Criteria d)** | **Potential/Actual Funding Source (EPA Criteria d)** |
| **Urban Sediment and Nutrient Reduction Strategies** | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| **Altered Stream and Habitat Restoration Strategies** | | | | | | | |
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| **Agricultural Nonpoint Source Reduction Strategies** | | | | | | | |
| 1 | 3,5 | 1 | Houts Ditch Two-Stage Channel and Wetland Project | Mercer County | Short (1-3 yrs) | $650,000 | Ohio EPA §319, GLRI, NRCS-USDA CRP; H2Ohio |
| 1 | 1 | 2 | Grassed Waterways in Twelvemile Creek HUC-12 | Mercer SWCD/ Mercer Ag Solutions | Short (1-3 yrs) | $70,000 | Ohio EPA §319, GLRI, GLC |
| 1 | 3 | 3 | Wetland Creation and Restoration | Mercer SWCD/ Mercer Ag Solutions | Short (1-3 yrs) | $70,000 | NRCS-USDA CRP, H2Ohio |
| 1 | 2,4 | 4 | Nutrient Management Planning and Cover Crops | Mercer SWCD | Medium | $150,000-$175,000 | H2Ohio, NRCS-USDA EQIP |
| **High Quality Waters Protection Strategies** | | | | | | | |
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| **Other NPS Causes and Associated Sources of Impairment** | | | | | | | |
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### 4.1.1 Project Summary Sheet(s)

The Project Summary Sheets provided below were developed based on the actions or activities needed to achieve nutrient reduction targets in the **Twelvemile Creek HUC-12**. These projects are considered next step or priority/short term projects and are considerably ready to implement. Medium and longer-term projects will not have a Project Summary Sheet, as these projects are not ready for implementation or need more thorough planning.

| **Table 15: Critical Area #1 – Project #1** | | |
|---|---|---|
| **Nine Element Criteria** | **Information needed** | **Explanation** |
| *n/a* | **Title** | Houts Ditch Two-Stage Channel and Wetland Project |
| *criteria d* | **Project Lead Organization & Partners** | Mercer County; Mercer SWCD; Mercer Ag Solutions |
| *criteria c* | **HUC-12 and Critical Area** | Twelvemile Creek HUC-12 (041000040204) – *Critical Area #1* |
| *criteria c* | **Location of Project** | Houts Ditch, a tributary to Twelvemile Creek |
| *n/a* | **Which strategy is being addressed by this project?** | Agricultural Nonpoint Source Reduction |
| *criteria f* | **Time Frame** | Short (1-3 years) |
| *criteria g* | **Short Description** | This project will create approximately 6,000 feet of two-stage channel. The project will also include the construction of 4 to 5 acres of open water wetlands adjacent to the channel and up to 10 acres of upland grass buffer. |
| *criteria g* | **Project Narrative** | This project will consist of a two-stage channel improvement on private property near the Hasis and Stose Road intersection. The project location has a watershed of approximately 570 acres which is all agricultural land, much of which receives manure application. The project involves five different landowners, who are all in agreement of completing the project. Two-stage channel design will occur along a 6,000 linear foot section of the ditch to decrease erosion, create capacity within the stream and create a functional floodplain bench for the attenuation of nutrients and sediment. This project will also include a perpetual conservation easement or will be enrolled in the county's ditch maintenance program so that the land can remain privately-owned.<br><br>Additionally, 4-5 acres of wetlands will be constructed on the north side of the channel along with upland buffer area through the CRP program (for a total of 15 acres in the program). The bottom of these wetlands will be at ditch level, allowing for additional water treatment and floodplain connection along the channel. |
| *criteria d* | **Estimated Total cost** | $650,000 |
| *criteria d* | **Possible Funding Source** | Ohio EPA §319, GLRI, H2Ohio GLC, NRCS-USDA CRP |

| Table 15: Critical Area #1 – Project #1 | | |
|---|---|---|
| **Nine Element Criteria** | **Information needed** | **Explanation** |
| *criteria a* | **Identified Causes and Sources** | Cause: Channelization and nutrient loadings, leading to far-field impacts<br>Source: Agricultural land use activities |
| *criteria b & h* | **Part 1: How much improvement is needed to remove the NPS impairment for the whole Critical Area?** | Objective #3: Create or restore at least 120 acres of wetlands<br>Objective #5: Install at least three miles of two-stage channel |
| | **Part 2: How much of the needed improvement for the whole Critical Area is estimated to be accomplished by this project?** | Objective #3: Install 15 acres of wetlands and buffer of 120 acres needed (12%).<br>Objective #5: Install 1.1 miles of two-stage channel of 3 miles needed (37%).<br><br>Goals: The overall goal in *Critical Area #1* is to reduce estimated total spring phosphorus loads. Current estimates indicate 13,000 lbs. of phosphorus in the spring load is attributed to agricultural land use activities. In order to meet the GLWQA nutrient reduction goals, spring loadings must be reduced by 40%, or 5,300 lbs. It is expected that this project will cause a decrease in spring phosphorus loadings by 393 lbs, or 7%. |
| | **Part 3: Load Reduced?** | Estimated annual reduction: 1060 #N/year; 598 #P/year; 450 tons of sediment per year |
| *criteria i* | **How will the effectiveness of this project in addressing the NPS impairment be measured?** | Mercer SWCD and Mercer County will design and verify installation of the wetland and two stage channel. It is generally unrealistic to monitor load reduction from individual agricultural practices; however, ambient monitoring is conducted throughout the WLEB by organizations such as OEPA, NOAA, and Heidelberg University. These entities will continue long term monitoring on various tributaries in the Maumee basin to track load reduction trends. |
| *criteria e* | **Information and Education** | Project information will be shared at the Mercer SWCD annual meeting and in their brochure of accomplishments. Project highlights will also be shared on social media and/or Mercer SWCD's website. |

| Table 16: Critical Area #1 – Project #2 | | |
|---|---|---|
| **Nine Element Criteria** | **Information needed** | **Explanation** |
| *n/a* | **Title** | Grassed Waterways in Twelvemile Creek HUC-12 |
| *criteria d* | **Project Lead Organization & Partners** | Mercer Soil and Water Conservation District; Mercer County Ag Solutions |
| *criteria c* | **HUC-12 and Critical Area** | Twelvemile Creek HUC-12 (041000040204) – *Critical Area #1* |
| *criteria c* | **Location of Project** | Private landowner – near the intersection of Frahm Pike and Hellwarth Roads<br>Private landowner – west of Celina Mendon Road south of Village of Mendon |
| *n/a* | **Which strategy is being addressed by this project?** | Agricultural Nonpoint Source Reduction |
| *criteria f* | **Time Frame** | Short (1-3 years) |
| *criteria g* | **Short Description** | Install grassed waterways to treat approximately 465 acres of drainage area in agricultural fields impacted by gully erosion. |
| *criteria g* | **Project Narrative** | Mercer SWCD will work with a local landowner in prioritized agricultural land to install 3.3 acres (~3,500 feet) of grassed waterway in areas impacted by gully erosion. One waterway will filter surface water from approximately 235 acres and the other waterway will filter surface water from approximately 230 acres of cultivated cropland before water is routed to Twelvemile Creek, which eventually leads to the St. Marys River. |
| *criteria d* | **Estimated Total cost** | $70,000 |
| *criteria d* | **Possible Funding Source** | Ohio EPA §319, GLRI, GLC, NRCS-USDA CRP, EQIP |
| *criteria a* | **Identified Causes and Sources** | Cause: Nutrient loadings, leading to far-field impacts<br>Source: Agricultural land use activities |
| *criteria b & h* | **Part 1: How much improvement is needed to remove the NPS impairment for the whole Critical Area?** | Objective #1: Install grassed waterways that receive/treat surface water from at least 3,000 acres |
| | **Part 2: How much of the needed improvement for the whole Critical Area is estimated to be accomplished by this project?** | Objective #1: Install grassed waterways that treat water from 465 acres of 3,000 acres (16%).<br><br>Goals: The overall goal in *Critical Area #1* is to reduce estimated total spring phosphorus loads. Current estimates indicate 13,000 lbs. of phosphorus in the spring load is attributed to agricultural land use activities. In order to meet the GLWQA nutrient reduction goals, spring loadings must be reduced by 40%, or 5,300 lbs. It is expected that this project will cause a decrease in spring phosphorus loadings by 141 lbs, or 2.7%. |
| | **Part 3: Load Reduced?** | Estimated annual reduction: 350 #N/year; 216 #P/year; 176 tons sediment/year |

| Table 16: Critical Area #1 – Project #2 | | |
|---|---|---|
| **Nine Element Criteria** | **Information needed** | **Explanation** |
| *criteria i* | **How will the effectiveness of this project in addressing the NPS impairment be measured?** | Mercer SWCD will design and verify installation of the grassed waterways. It is generally unrealistic to monitor load reduction from individual agricultural practices; however, ambient monitoring is conducted throughout the WLEB by organizations such as OEPA, NOAA, and Heidelberg University. These entities will continue long term monitoring on various tributaries in the Maumee basin to track load reduction trends. |
| *criteria e* | **Information and Education** | Project information and funding availability will be advertised on the Mercer SWCD website and through other outreach means (announcements in newsletters, newspapers, field days and other regularly occurring meetings). Targeted announcements will be sent via direct mailings, and Mercer SWCD will engage in individual landowner discussions regarding BMP implementation and available assistance, if initial participation is low. On-going and post-project implementation accomplishments will be promoted through similar venues, media and discussions. |

| Table 17: Critical Area #1 – Project #3 | | |
|---|---|---|
| **Nine Element Criteria** | **Information needed** | **Explanation** |
| *n/a* | **Title** | Wetland Creation and Restoration |
| *criteria d* | **Project Lead Organization & Partners** | Mercer Soil and Water Conservation District; Mercer County Ag Solutions |
| *criteria c* | **HUC-12 and Critical Area** | Twelvemile Creek HUC-12 (041000040204) – *Critical Area #1* |
| *criteria c* | **Location of Project** | Private landowner – west of Celina Mendon Road south of Village of Mendon |
| *n/a* | **Which strategy is being addressed by this project?** | Agricultural Nonpoint Source Reduction<br>Urban Sediment and Nutrient Reduction |
| *criteria f* | **Time Frame** | Short (1-3 years) |
| *criteria g* | **Short Description** | This project will consist of the creation and restoration of approximately 2-3 acres of wetland pool along with an additional 8-9 acres of grass and tree buffer on private property. |
| *criteria g* | **Project Narrative** | Approximately 30 acres of cropland drain to the proposed wetland area. 2-3 acres of existing cropland will be excavated to form wetland pool areas. An additional 3 acres will be planted to trees and 5-6 acres will be planted to upland grasses. This project is being completed in private property utilizing the USDA-CRP and H2Ohio programs. |
| *criteria d* | **Estimated Total cost** | $70,000 |
| *criteria d* | **Possible Funding Source** | H2Ohio, NRCS-USDA CRP |
| *criteria a* | **Identified Causes and Sources** | Cause: Nutrient loadings, leading to far-field impacts<br>Source: Agricultural land use activities and urban development activities |
| *criteria b & h* | **Part 1: How much improvement is needed to remove the NPS impairment for the whole Critical Area?** | Objective #3: Create, enhance and/or restore at least 120 acres of wetlands for treatment of agricultural runoff and/or nutrient reduction purposes from 3,000 total agricultural acres. |
| | **Part 2: How much of the needed improvement for the whole Critical Area is estimated to be accomplished by this project?** | Objective #3: Create, enhance and/or restore at least 11 acres of 120 acres of wetlands for treatment of agricultural runoff and/or nutrient reduction purposes from 3,000 total agricultural acres (10%).<br><br>Goals: The overall goal in *Critical Area #1* is to reduce estimated total spring phosphorus loads. Current estimates indicate 13,000 lbs of phosphorus in the spring load is attributed to agricultural land use activities. In order to meet the GLWQA nutrient reduction goals, spring loadings must be reduced by 40%, or 5,300 lbs. It is expected that this project will cause a decrease in spring phosphorus loadings by 98 lbs, or 1.8%. |
| | **Part 3: Load Reduced?** | Estimated annual reduction: 70 #N/year; 150 #P/year; 13 tons sediment/year |

| Table 17: Critical Area #1 – Project #3 | | |
|---|---|---|
| **Nine Element Criteria** | **Information needed** | **Explanation** |
| *criteria i* | **How will the effectiveness of this project in addressing the NPS impairment be measured?** | Mercer SWCD will design and verify installation of the wetland. It is generally unrealistic to monitor load reduction from individual agricultural practices; however, ambient monitoring is conducted throughout the WLEB by organizations such as OEPA, NOAA, and Heidelberg University. These entities will continue long term monitoring on various tributaries in the Maumee basin to track load reduction trends. |
| *criteria e* | **Information and Education** | Project information will be shared at the Mercer SWCD annual meeting and in their brochure of accomplishments. Project highlights will also be shared on social media and/or Mercer SWCD's website. |

## 4.2 Critical Area #2 Project and Implementation Strategy Overview Table

| Table 18: Twelvemile Creek HUC-12 (04100004 02 04) — Critical Area #2 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Goal** | **Objective** | **Project #** | **Project Title (EPA Criteria g)** | **Lead Organization (EPA criteria d)** | **Time Frame (EPA Criteria f)** | **Estimated Cost (EPA Criteria d)** | **Potential/Actual Funding Source (EPA Criteria d)** |
| **Urban Sediment and Nutrient Reduction Strategies** | | | | | | | |
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| **Altered Stream and Habitat Restoration Strategies** | | | | | | | |
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| **High Quality Waters Protection Strategies** | | | | | | | |
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| | | | | | | | |
| **Other NPS Causes and Associated Sources of Impairment** | | | | | | | |
| 1 | 1,2 | - | HSTS Replacement and/or Sanitary Sewer Infrastructure | TBD | TBD | TBD | TBD |
| | | | | | | | |

At this time, no short-term projects have been identified for *Critical Area #2*; therefore, no Project Summary Sheets are included.

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