



# Nine-Element Nonpoint Source Implementation Strategic Plan (NPS-IS Plan)

**Preston Run – Maumee River HUC-12  
(04100009-02-01)**

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## I. Introduction

The Preston Run – Maumee River watershed (HUC-12 04100009-0201) is situated within the larger Lower Maumee subbasin. Preston Run is a direct tributary to the mainstem Maumee where it enters the river in the City of Defiance. The Maumee River is a significant contributor of nutrients to Lake Erie due to nonpoint source (NPS) runoff. The recent problems in Lake Erie have been well documented. After years of seeing improved water quality, this trend has reversed itself and the lake again faces serious water quality issues. Algal blooms have extended from Maumee Bay all the way to the Cleveland shoreline in recent years.

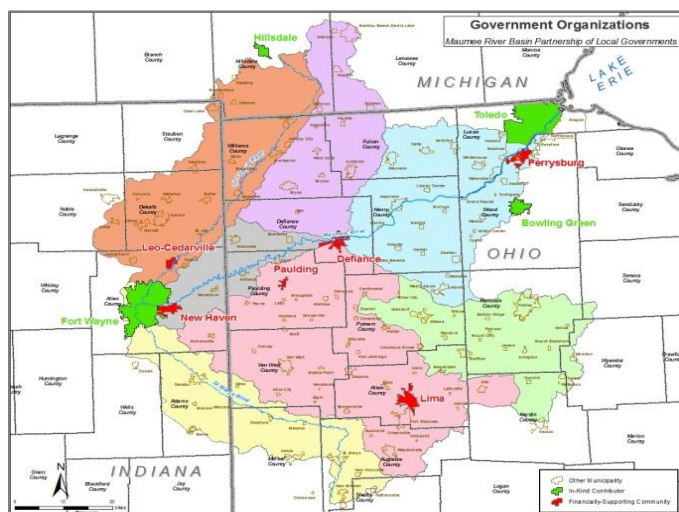


Maumee River at Defiance

The Preston Run – Maumee River watershed (Figure 1) and the City of Defiance are uniquely positioned to play a key role in addressing water quality concerns in the Western Lake Erie Basin (WLEB). The Preston Run – Maumee River watershed is immediately downstream from the confluence of three major tributaries that join to form the Lower Maumee (HUC-8: 04100009). The other three, the Upper Maumee (04100005), the Tiffin (04100006), and the Auglaize (04100007), are all located within the City of Defiance municipal boundary limits.

State and Federal NPS funding is now closely linked to strategic implementation-based planning that meets the U.S. Environmental Protection Agency (USEPA) nine minimum elements of a watershed plan. The City of Defiance has taken the lead in authoring this NPS Implementation Strategy (NPS-IS). Defiance is working with numerous other groups and municipalities; all of which have agreed to

collaborate towards reducing pollutant loads that contribute to Harmful Algal Blooms (HABs) in the WLEB and water quality impairments in the Maumee River.



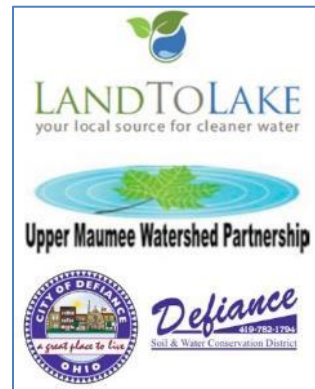
These collaborative relationships will facilitate implementation of practices that not only improve the HUC 12, but also *contribute to the 40 percent* load reduction goals for Lake Erie that are documented in Domestic Action Plans.

### I.1 Background

This NPS-IS was created to complement the array of water quality management activities being conducted in the Defiance area. The community recognizes that it is part of a broader regional effort involving state,

***Located in the heart of the Maumee Basin, the City of Defiance and the Preston Run – Maumee River watershed are uniquely positioned to play a key role in addressing water quality concerns in the WLEB.***

municipal, agricultural, business, and federal leaders to improve the quality of Lake Erie. The shared goals between the City of Defiance and the Defiance County Soil and Water Conservation District (SWCD) brought their offices together to develop the *Land to Lake* joint venture. *Land to Lake* is designed to get the area community involved in protecting the water resources of the Maumees River Basin (MRB) throughout Defiance County.



This NPS-IS is intended support community efforts to move toward an integrated approach in managing limited resources (technical/financial) while maximizing environmental benefits. Water quality management activities conducted by the City of Defiance include operation/maintenance of the City’s wastewater treatment plant (WWTP) and the collection system, implementation of the Combined Sewer Overflow (CSO) Long-term Control Plan (LTCP), and stormwater reduction projects developed through the Municipal Separate Storm Sewer System (MS4) program. In addition, the City has a vested interest in water quality management across the larger Maumees Basin; the River serves as its primary drinking water supply and provides recreational opportunities to the community.

The City’s integrated approach includes infrastructure capital requirements, CSO/SSO compliance, stormwater management, and drinking water supply. In addition, this integrated approach recognizes the overarching need to align transportation planning with watershed management activities. Not only do storm sewer networks typically follow road right-of-ways; other significant connected impervious surfaces (e.g., parking lots, driveways) are generally linked to the transportation system.

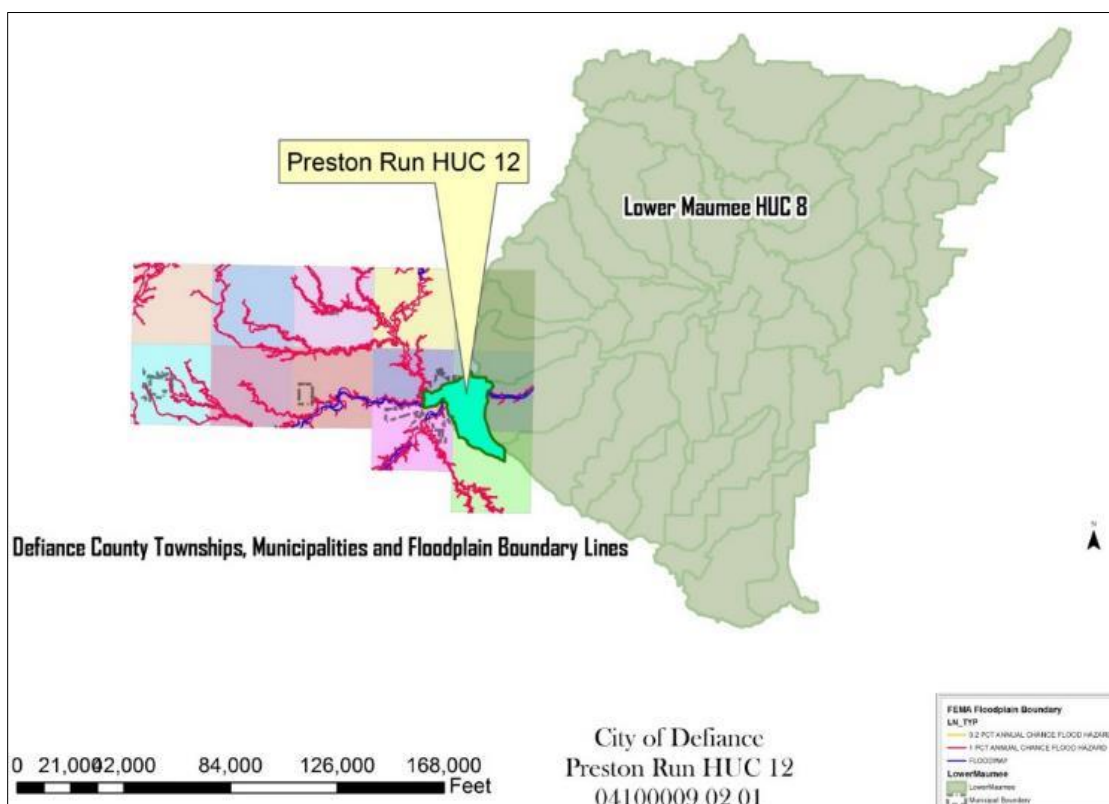


Figure 1. Preston Run – Maumees River Watershed relative to Lower Maumees subbasin

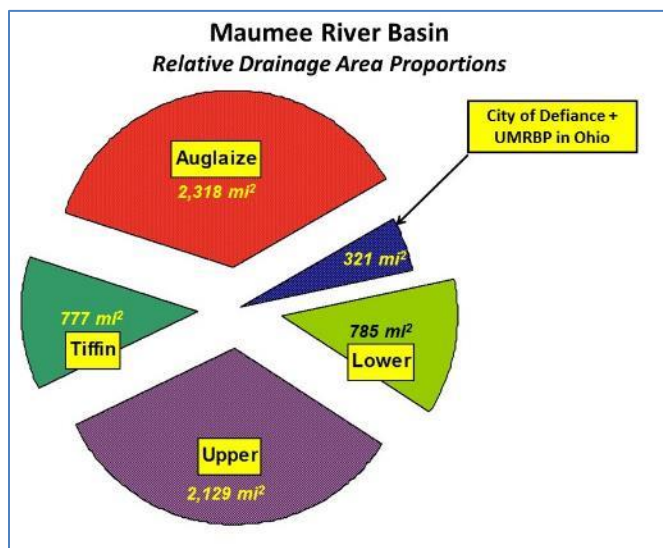


The NPS-IS is also designed to help guide strategic implementation of agricultural management practices. More than half the drainage area in the Preston Run – Maumee River watershed consists of cultivated crops and pasture. As a key player in the Upper Maumee Watershed Partnership (UMWP), the Defiance SWCD has led efforts in the County to pioneer innovative solutions to agricultural watershed management. This includes the installation of controlled drainage structures, planting of cover crops to reduce phosphorus loads and improve soil health, utilize wetlands to mitigate flooding / water quality problems, and explore the use of new techniques, such as saturated buffers (e.g., Powell Creek watershed).



***This strategic plan is also designed to help guide implementation of agricultural practices, as over half of the Preston Run – Maumee River watershed consists of cultivated crops and pasture.***

Finally, this NPS-IS can serve as a template for other HUC-12 watersheds in the Maumee Basin and in the WLEB. The land use mix in the Preston Run- Maumee River watershed (34 percent developed land, 55 percent agriculture, six percent forested) requires that the full range of available management measures be considered on identifying viable solutions to address water quality problems and concerns. These same practices are needed in other priority HUC-12 watersheds across the entire Maumee Basin and the WLEB; ones that will be incorporated into Domestic Action Plans being prepared to achieve phosphorus reduction targets recommended by the Great Lakes Water Quality Agreement (GLWQA) Annex 4 Task Team. In addition, Defiance is physically located at a key point within the overall Basin (a “linchpin” so to speak); nearly 85 percent of all land in the MRB drains water that passes through the City’s municipal boundaries.



***Defiance is physically located at a key point in the Basin; nearly 85 percent of all land in the Maumee drains water that passes through the City’s municipal boundaries on its way to western Lake Erie.***

## 1.2 Watershed Profile and History

The Preston Run – Maumee River watershed has a long history for local residents; one that dates back centuries. The Ottawa Chief Pontiac was born in 1712 along the banks of the Maumee at the location where a municipal park bears his name. The City itself is named after Fort Defiance, built by General “Mad” Anthony Wayne in 1794 at the confluence of the Auglaize and Maumee Rivers. In 1822, Defiance was established as a town. The town became the county seat in 1845, and was incorporated as a city in 1881.

The MRB has the largest watershed of any Great Lakes river, with 8,316 square miles. This area includes portions of Indiana and

Michigan. In addition to its source rivers (the St. Joseph and St. Marys), the Maumee's principal tributaries are the Auglaize River and the Tiffin River, which join it at Defiance from the south and north, respectively.

The Preston Run-Maumee River watershed (Figure 2), HUC-12 04100009 01 02, is located entirely within Defiance County and is the “headwaters” sub-watershed of the Lower Maumee HUC-8 0410009 (Figure 1) originating at and adjacent to the confluence of both the Tiffin and Auglaize Rivers.

Flowing in a north-easterly direction, the Maumee River originates in Ft. Wayne, Indiana and passes through Defiance on the way to Maumee Bay. Preston Run is a direct tributary to the Maumee River, originating in rural southeast Defiance County flowing northwest into the City of Defiance. The unincorporated area of Ayersville is near the headwaters of Preston Run, and the small unincorporated area of Independence is located on the Maumee River, just upstream from Independence Dam State Park.



***The Maumee River in this HUC-12 watershed has played a central role to life in the Defiance area; one that dates back centuries.***

The economy of Defiance area centers on manufacturing and agriculture. Being situated along US Highway 24 between Ft. Wayne, IN and Toledo, OH (Fort to Port); the City is also a hub for the shipping and receiving of goods. The 2010 Census has the City's population listed as 16,494, while the County's population is approximately 40,000. Defiance, like many cities, must maintain aging infrastructure, attract new investment and manage stormwater runoff that causes flooding, degrades water quality, and contributes to erosion and property damage.



***The Maumee is the largest of any Great Lakes river system. While most of the basin is located in Ohio, it also includes portions of Indiana and Michigan.***

In 1974, the Maumee River was designated as a scenic and recreational river by the Ohio Department of Natural Resources. In Defiance County, the Maumee flows along a broad floodplain and sharply meandering corridor; the riverbanks support a healthy forested corridor. As a state scenic river, the Maumee possesses a thriving aquatic community. More than 60 species of fish reside in the river including Walleye, White Bass, and Northern Pike prized by sport fishermen. The Maumee supports many species of birds, including large populations of Great Blue Herons and Bald Eagles. Numerous public facilities, including ones in the Preston Run – Maumee River, provide many recreational opportunities for local residents and visitors to enjoy the River.



In addition to its historic, cultural, economic, and recreational significance, the Maume River is part of the lifeblood for Defiance and the surrounding area. The Maume River serves as the primary drinking water supply for the City of Defiance. The importance of water quality to this valued resource became headline news in 2016 when harmful algal blooms occurred in the Maume River in Defiance County. As a result, a recreational public health advisory was issued by the Defiance County Health Department. This incident highlights the interconnection between the local interests of Defiance in water resources protection and the broader needs to reduce nutrient loads in the Western Lake Erie Basin (WLEB).



***Defiance has a vested interest in water quality management across the Maume Basin; the River serves as its primary drinking water supply and provides recreational opportunities to the community.***

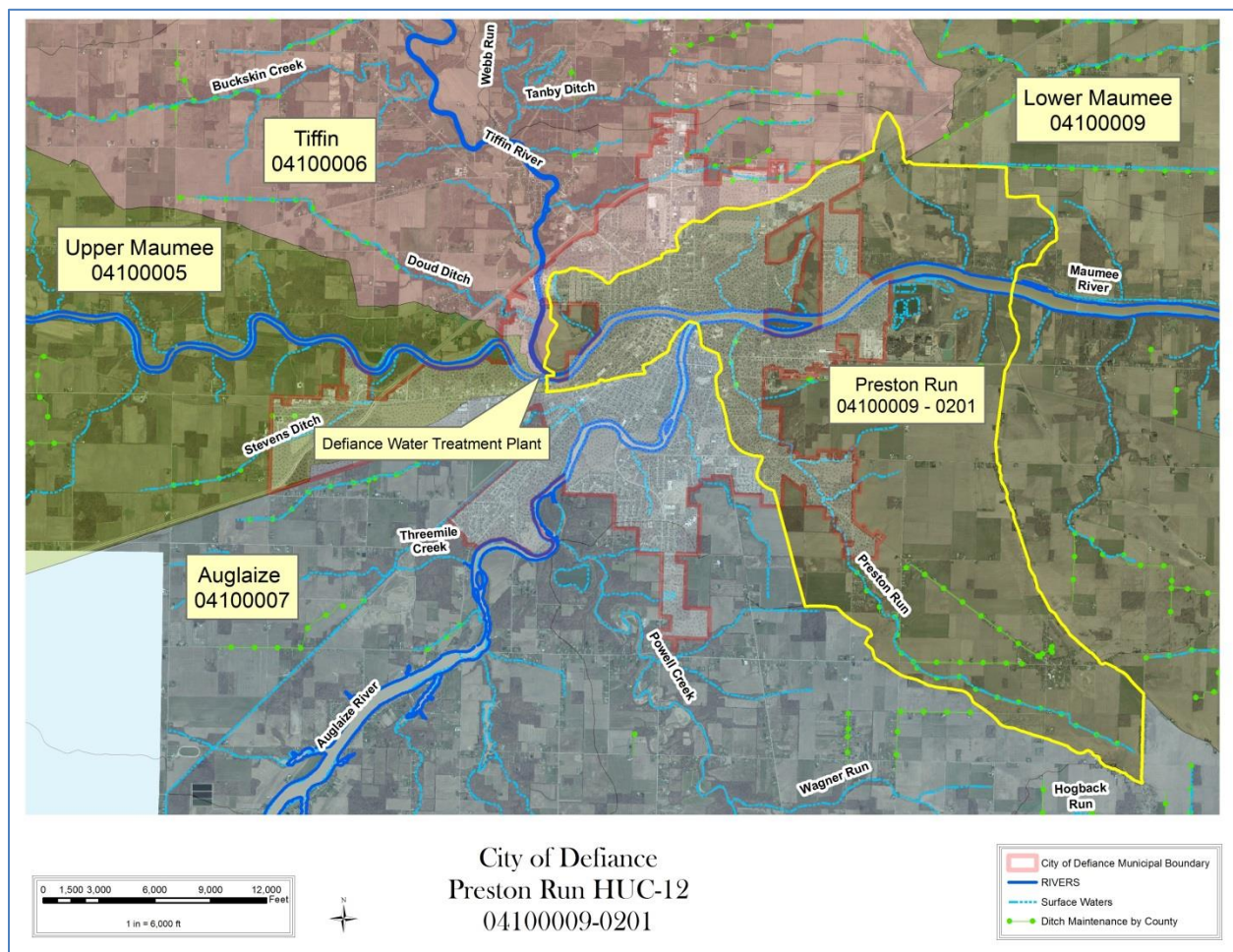


Figure 2. Preston Run – Maume River watershed relative to other Defiance watersheds

### 1.3 Public Participation and Involvement

The genesis of this plan stems, in part, from a “Community Revitalization” vision developed by the City of Defiance focused on four themes: 1) green infrastructure, 2) ecological restoration, 3) underutilized land, and 4) trails and connectivity. In addition, this NPS-IS builds on the efforts of local organizations who actively provide technical expertise, promote information and education (I&E), pursue funding opportunities, and conduct monitoring.

A starting point was to pull information compiled through development of the Upper Maumee River Watershed Management Plan. Defiance County SWCD individuals involved in preparing that plan, who were also involved with development of this document, include Jason Roehrig (District Administrator), Stephanie Singer (Watershed Coordinator/Education Specialist), and Kevin Hancock (Ditch Maintenance Supervisor).

The area addressed by the Upper Maumee River Watershed Management Plan exerts a significant effect on water quality in the Preston Run – Maumee River watershed. An outgrowth of that effort in Defiance County was to initiate the “Land-to-Lake” program. This public involvement effort provided another forum that resulted in additional input for this NPS-IS that reflects concerns expressed by local leaders and area residents. Activities sponsored by the “Land-to-Lake” program, which helped shaped development of this plan, include conferences, lunch-and-learn workshops, and public education events.



***This NPS-IS builds on the efforts of local organizations in the watershed who actively provide technical expertise, promote I&E, pursue funding opportunities, and conduct monitoring.***



***The “Land-to-Lake” program provided another forum that resulted in additional input for this NPS-IS that reflects concerns expressed by local leaders and area residents.***

Finally, a meeting was held on March 15<sup>th</sup> to present the initial plan to City department managers and explore program integration options. In addition to the Preston Run – Lower Maumee watershed, issues discussed for consideration in the plan were role of Defiance relative to the broader Maumee (specifically Annex 4 targets), the CSO Long-Term Control Plan, water supply issues (such as the 2016 Maumee HAB at the Defiance water treatment plant intake), and transportation planning. Key individuals involved included Jeff Leonard (City Administrator), Mark Lehnert (Water Pollution Control Superintendent), Melinda Warner (City Engineer), and Adam McDowell (Water Treatment Plant Superintendent).



## 2. Watershed Characterization and Assessment Summary

### 2.1 Watershed Characterization

#### 2.1.1 Physical and Natural Features

The Preston Run – Maumee River watershed (HUC-12 04100009-0201) covers 10,931 acres (17.1 square miles) of mixed urban and agricultural land in Defiance County. The watershed is immediately downstream of the Upper Maumee subbasin (HUC-8 04100005) and includes the confluence of the Maumee with two major tributaries: the Tiffin (HUC-8 04100006) and the Auglaize (HUC-8 04100007). Collectively, these three drainage systems join in the Preston Run – Maumee River watershed to form the Lower Maumee subbasin (HUC-8: 04100009). All four subbasins lie within the City of Defiance municipal boundary limits (Figure 2).



This watershed includes the impounded reach of the mainstem Maumee River from its confluence with the Tiffin at river mile (RM) 65.8 to just upstream from Independence Dam (RM 60.7). For this reason, its beneficial use designation for aquatic life is modified warmwater habitat – impounded (MWH-I). Preston Run flows into the Maumee River just downstream of the Auglaize, which is located at RM 64.

The Preston Run – Maumee River watershed is located entirely within the Huron – Erie Lake Plain (HELP) ecoregion. The majority the Upper and Lower Maumee River HUC-8 basins were historically the Great Black Swamp. The kidneys of the ecosystem, the Great Black Swamp (a forested wetland) has been drained and deforested for agricultural purposes. The Preston Run – Maumee River HUC-12 is completely contained within this boundary. Soils vary widely with floodplain areas on tributaries and the main stem of the Maumee River (Figure 3). The most predominant soil-type in the agricultural portion of the basin is Hoytville Clay – a hydric soil with a “D” drainage rating. The soil types adjacent to surface waters are widely varying throughout the more developed portion of the basin.



***The Preston Run – Maumee River watershed lies completely within the historic boundary of the Great Black Swamp, a forested wetland.***

Because the watershed consists of such poorly drained soils, an extensive tile drainage network is necessary to maintain crop production. As a result, portions of Preston Run and its tributaries have been channelized to support tile and drainage systems. Agriculture and associated physical habitat modifications due to channelization are the predominant sources of NPS pollution in the watershed (Ohio EPA 2015).



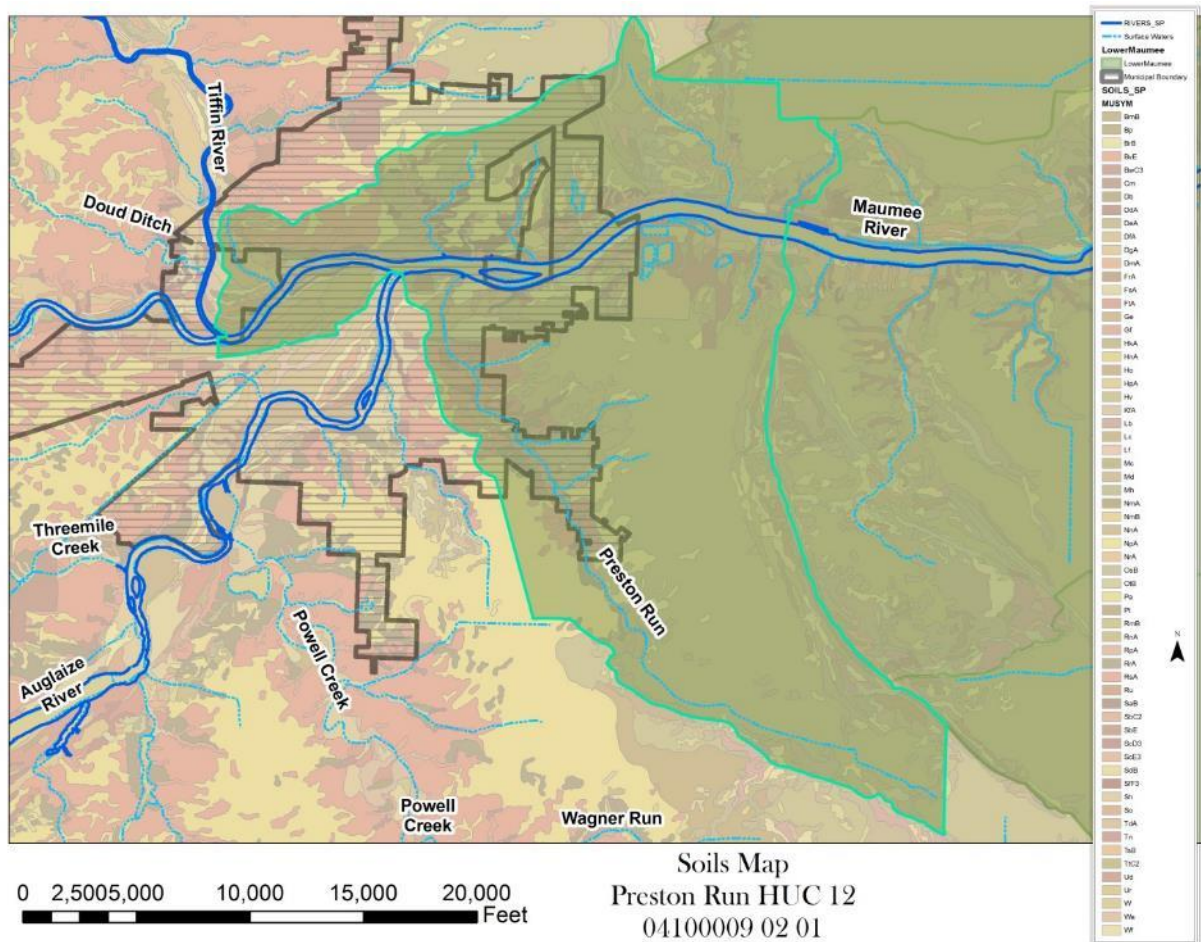


Figure 3. Preston Run – Maumee River watershed soils

According to a U.S. Army Corps of Engineers report, significant flood risks exist in the Lower Maumee subbasin due to the relative flatness of the watershed, particularly in the cities of Defiance and Napoleon (USACE, 2009). Because of this inherent risk the City of Defiance has codified ordinances that prohibit building in the floodplain (Figure 4); these ordinances also help protect water quality. The USACE report also notes that sediment and erosion problems are prevalent due to the presence of rural drainage systems and the lack of riparian habitat / protection in certain areas.

Sediments from rural and urban areas are deposited in various drainage and stream channels that must be cleaned out to function properly and there is also an effect of sedimentation on water quality. Wetlands areas that had served to filter runoff and trap sediment, nutrients and pesticides have been drained and/or filled. Restoration of natural hydrology and flow characteristics has been a consistent identified need by multiple agencies within the watershed. Removal of all impediments to flow, protection of floodplains and wetlands, as well as sediment loading reduction programs need to take place in order for this to be achieved. Sediment loading and stream channel modifications increase flood peaks and downstream flooding as well as transport sediment in Lake Erie. Increased vegetative buffers and floodplain protection in areas where possible is needed to prevent this. (USACE, 2009).

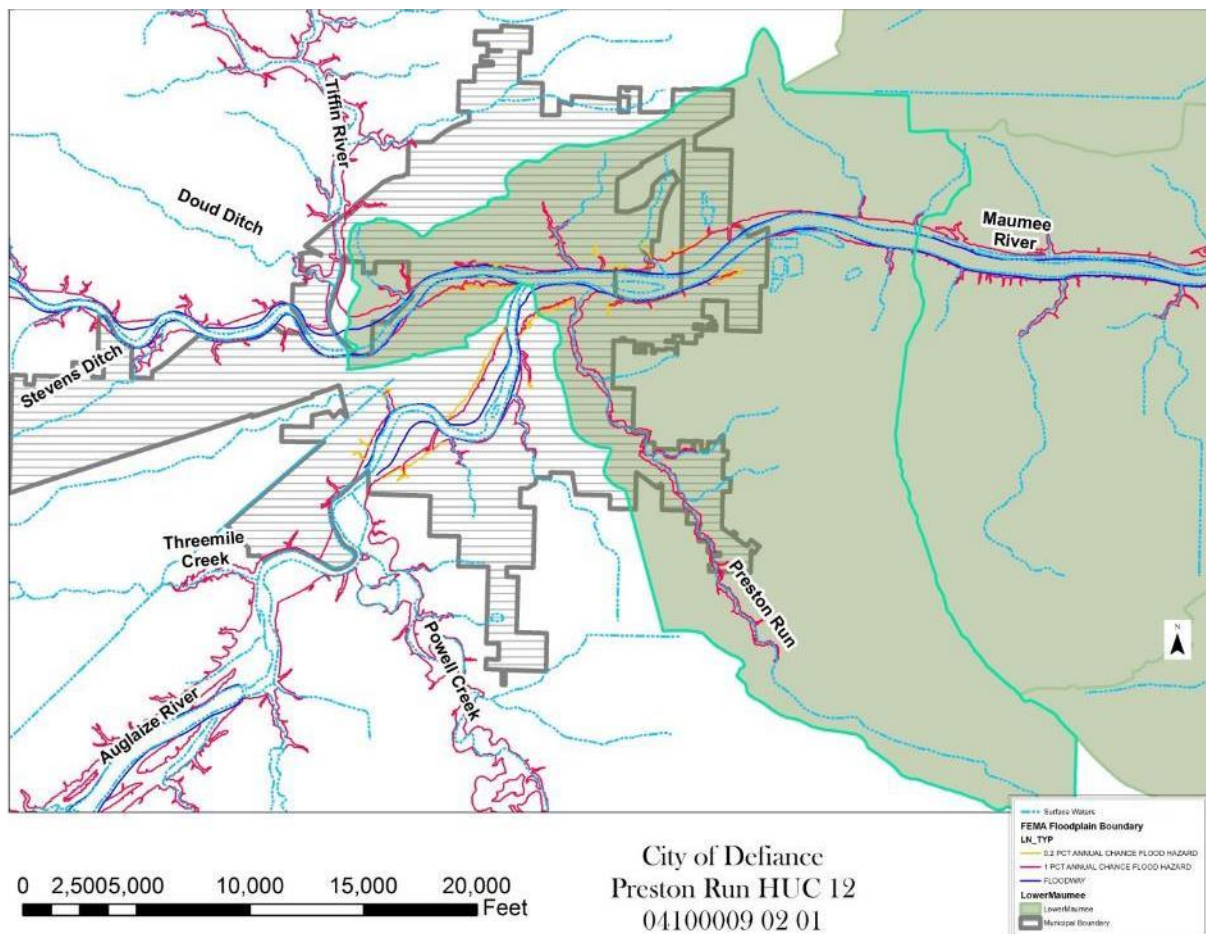


Figure 4. City of Defiance municipal boundary and floodplain areas

Specific landmarks and features in this watershed that relate to this NPS-IS plan are the north-central part of Defiance and the downtown core are on the north side of the Maumee River, including Eagle Rock Golf Course, Johns-Manville and Defiance College – all of which are in close proximity to each other. An area north of the Maumee River known as “Sulfur Hollow”, a direct tributary to the Maumee River mainstem between East High Street and Maywinn Drive, Johns-Manville and Defiance College. Eagle Rock Golf Course also has a direct (unnamed) tributary that flows into the Maumee River on the north side of the watershed. The Defiance County offices, including the Defiance County Courthouse, Defiance County Commissioners Building, the Defiance County East Complex, the Sherriff’s Offices and Maumee Valley Planning Organization are all located in the central and east portion of the City on the south side of the Maumee River.

The City of Defiance WWTP is located in the Preston Run – Maumee River watershed. The facility has a design flow of 6 mgd and serves an estimated population of 21,600 people. Outfall 001 discharges to the Maumee River at RM 62.05. The Defiance WWTP collection system serves the City of Defiance, the Village of Ayersville, and portions of Defiance County. The collection system consists of both separate (80%) and combined (20%) sewers. In 2010, the City entered into a consent decree with Ohio EPA that includes a revised long-term control plan (LTCP) and CSO abatement schedule. Home sewage treatment systems (HSTS) are prohibited by codified ordinance within the City; however there are many rural areas of this HUC 12 that are unsewered although the impacts are not quantifiable.

### 2.1.2 Land Use and Protection

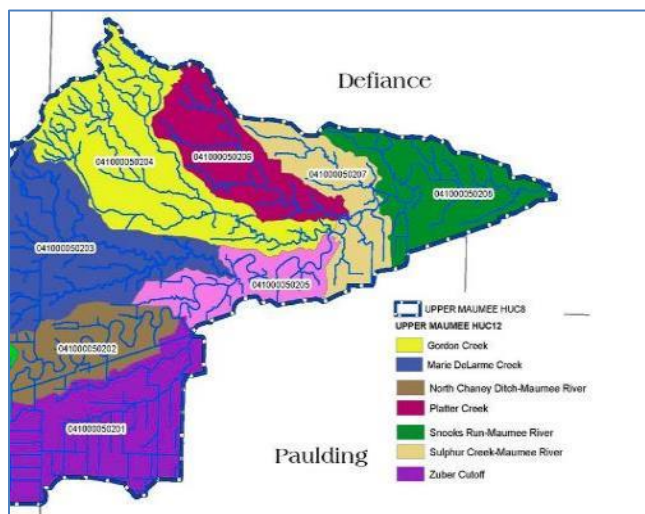
Stream habitat and aquatic biology in the **Preston Run – Maumee River HUC-12** reflect an extremely unique situation. Conditions are driven by land use within the watershed itself, *and* by land use in the large drainage area above Defiance that supplies inputs into the **Preston Run – Maumee River HUC-12**.

The Preston Run-Maumee River HUC-12 watershed itself has a diverse mix of land use and includes developed, urban, rural, industrial, commercial, forested and agricultural lands (Table 1, Figure 5). While over half of the watershed is cultivated crops, consistent with the agricultural nature of northwest Ohio, more than 30 percent of the Preston Run-Maumee River HUC-12 is developed land; a disproportionate amount compared not only to adjacent subwatersheds but also to the entire WLEB (Figure 6). The predominant reason is that the majority of downtown Defiance is located in the HUC 12; one of only two incorporated municipalities in Defiance County.

Both the City and the Defiance County SWCD participated in development of the Upper Maumee River Watershed Management Plan (UMRWMP). Land use in the area addressed by this plan exerts a significant effect on the biology and water quality of the Preston Run-Maumee River HUC-12.

Table 1. Preston Run / Maumee River watershed land use

Land Use	(acres)	(percent)
Developed, Open Space	1,498	14%
Developed, Low Intensity	1,347	12%
Developed, Medium Intensity	534	5%
Developed, High Intensity	350	3%
Forest	665	6%
Cultivated Crops	5,738	52%
Grassland	190	2%
Pasture/Hay	48	0.4%
Wetlands	88	1%
Water	470	4%
Bare Ground	1	0.01%
<b>TOTAL</b>	<b>10,931</b>	



***The area addressed by the Upper Maumee River Watershed Management Plan exerts a significant effect on the Preston Run – Maumee River.***

Management strategies intended to address documented problems in the reach of the Maumee River located within this HUC-12 must also consider flows and pollutant loads that originate in the Upper Maumee; a reason why implementation of practices that will improve the Preston Run-Maumee River HUC-12 will also *contribute to the 40 percent* load reduction goals for Lake Erie.

Protected lands in the Preston Run-Maumee River HUC-12 include a number of City Parks (Figure 7), as well as several locally protected areas that are directly adjacent to the Maumee River, such as Independence Dam State Park located 4 miles east of downtown Defiance, located at the eastern boundary of the Preston Run – Maumee River HUC 12.



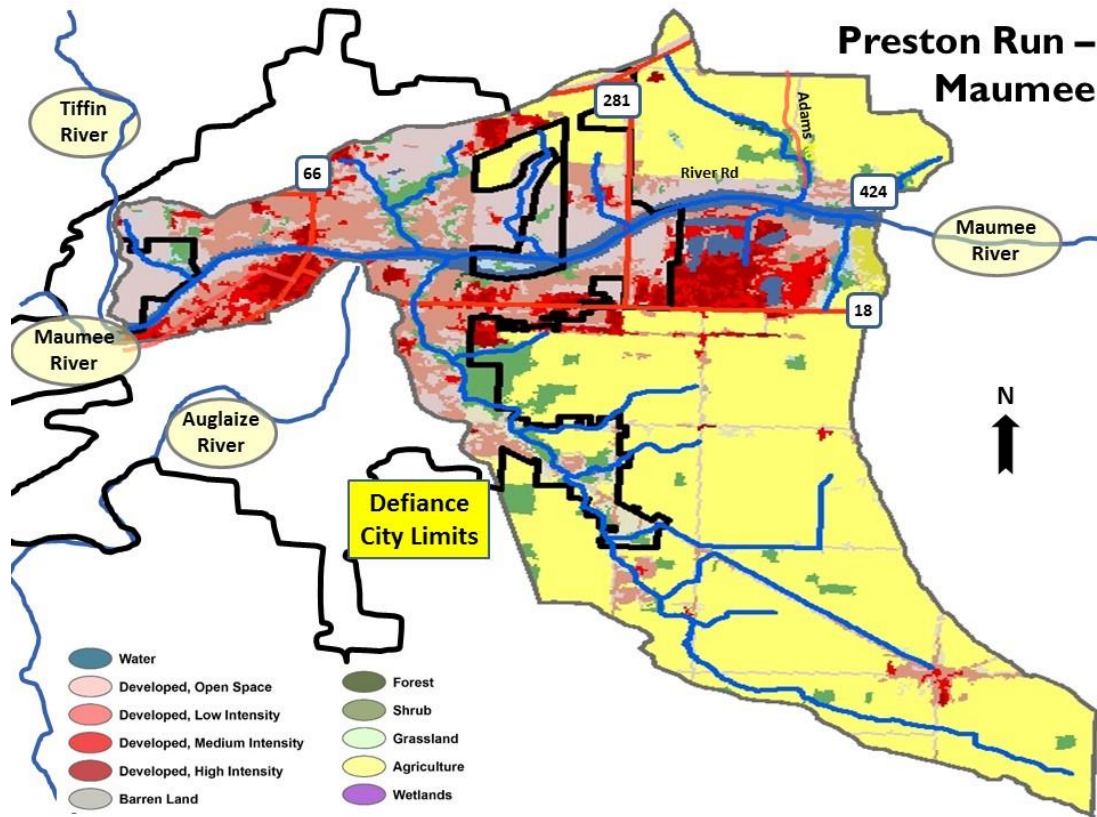


Figure 5. Preston Run – Maume River watershed land use

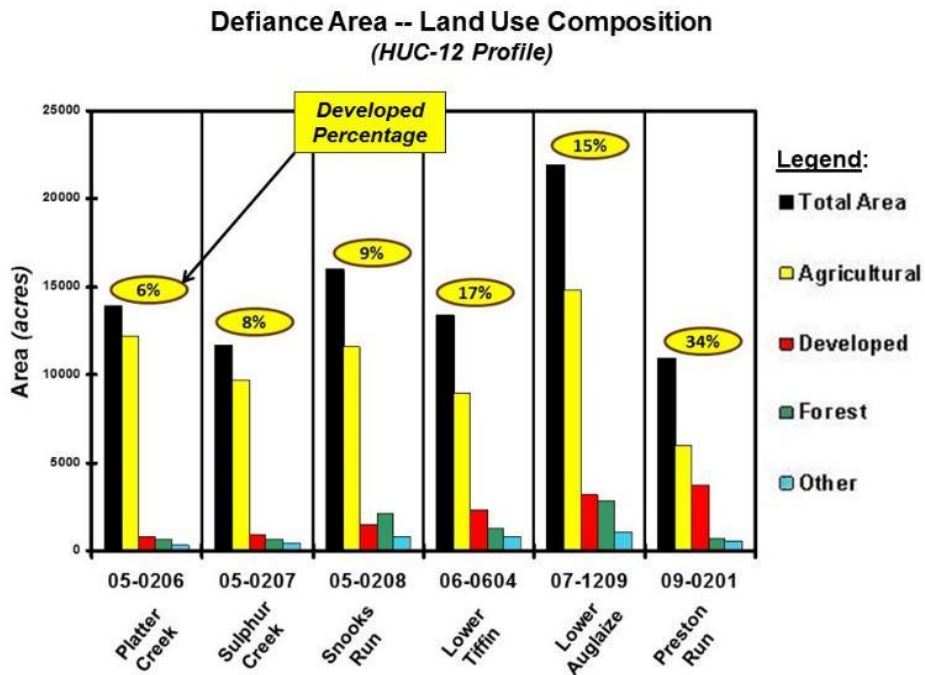


Figure 6. Upper Maume / Defiance area land use composition

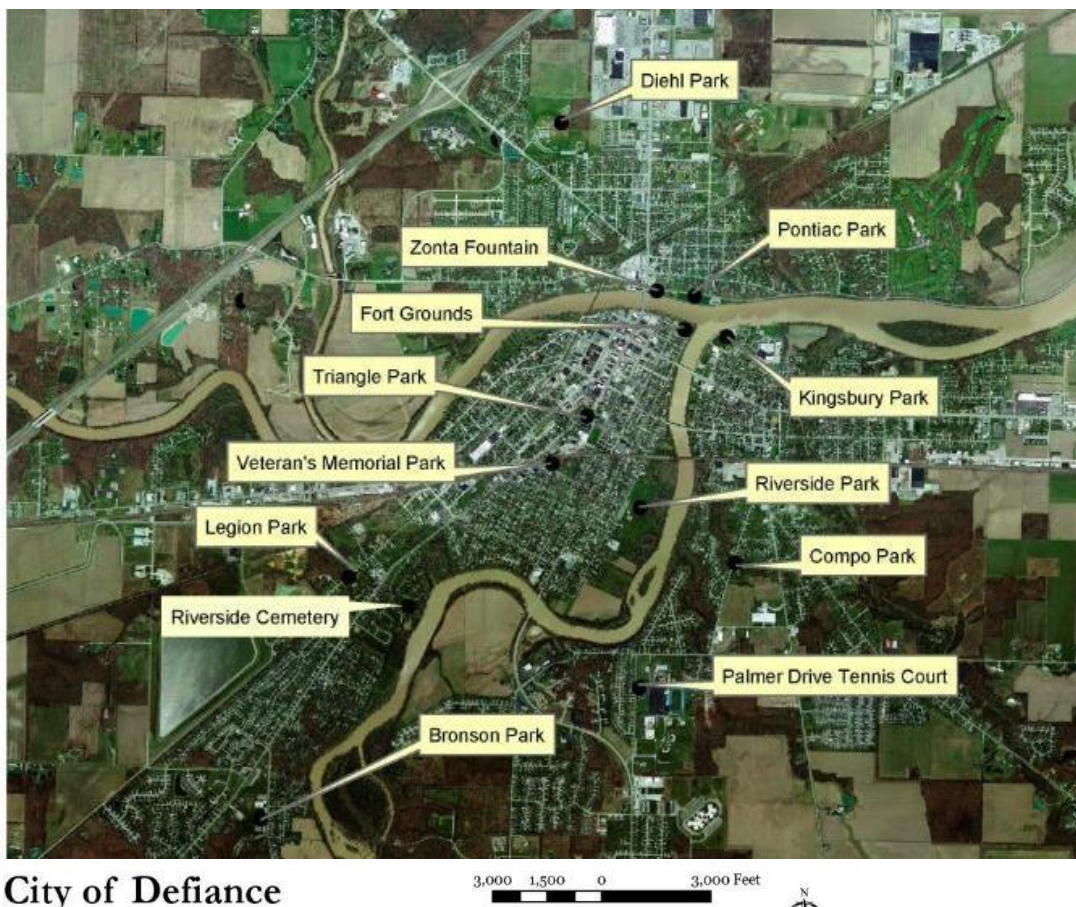


Figure 7. City of Defiance Municipal Parks

Girl Scout Camp Libbey and Boy Scouts Camp Lakota are also in close proximity to the City of Defiance, all of which are in a HUC 12 that is adjacent to Preston Run. Below is a list of some notable activities that have been implemented on public lands:

- Diehl Park
  - Ohio EPA Surface Water Improvement Funds of \$150,000 to implement Bioretention
  - First Project in the City of Defiance to use Green Infrastructure for CSO removal
  - First Project in the City of Defiance to use Silva Cell Technology for Urban Forestry
- City of Defiance Municipal Court and City Hall Annex Building
  - Funding from Maumee River Basin Partnership for Local Governments (MRBPLG) for one each Rain Garden and Bioretention Area
- Kingsbury Park
  - FEMA Floodplain Mitigation Property acquisition
  - Approximately 20 Structures Demolished for Restoration of Floodplain
- Pontiac Park
  - Ohio EPA/GLRI Project Funding of \$400,000 to implement Streambank Stabilization
  - City/County Partnership to Implement and Maintain





Figure 8. Preliminary Design Concept for the GLRI Streambank Stabilization Project

- Independence Dam State Park
  - Re-opening of Campground in 2017
  - Full Time ODNR Staff Located at the Park in 2017
  - City/County Partnership to Build 4-mile Bike/Ped Pathway from Defiance
  - ODOT Funding: \$1.8 million of Transportation Alternatives Program
- Riverfront Development in Downtown Defiance
  - Conceptual plans have been developed for a long-term, comprehensive development of the Riverfront Areas owned by the City of Defiance
- Riparian Management Plan
  - A comprehensive plan for management of riparian corridors is currently being funded by the City of Defiance as part of the pre-planning for the Riverfront Development.
- Buckeye Trail
  - City of Defiance Designation as a Trail Town in 2017
  - Promotion of Trail Development and Campsite Location
  - Enhancement to Independence Dam State Park Trail

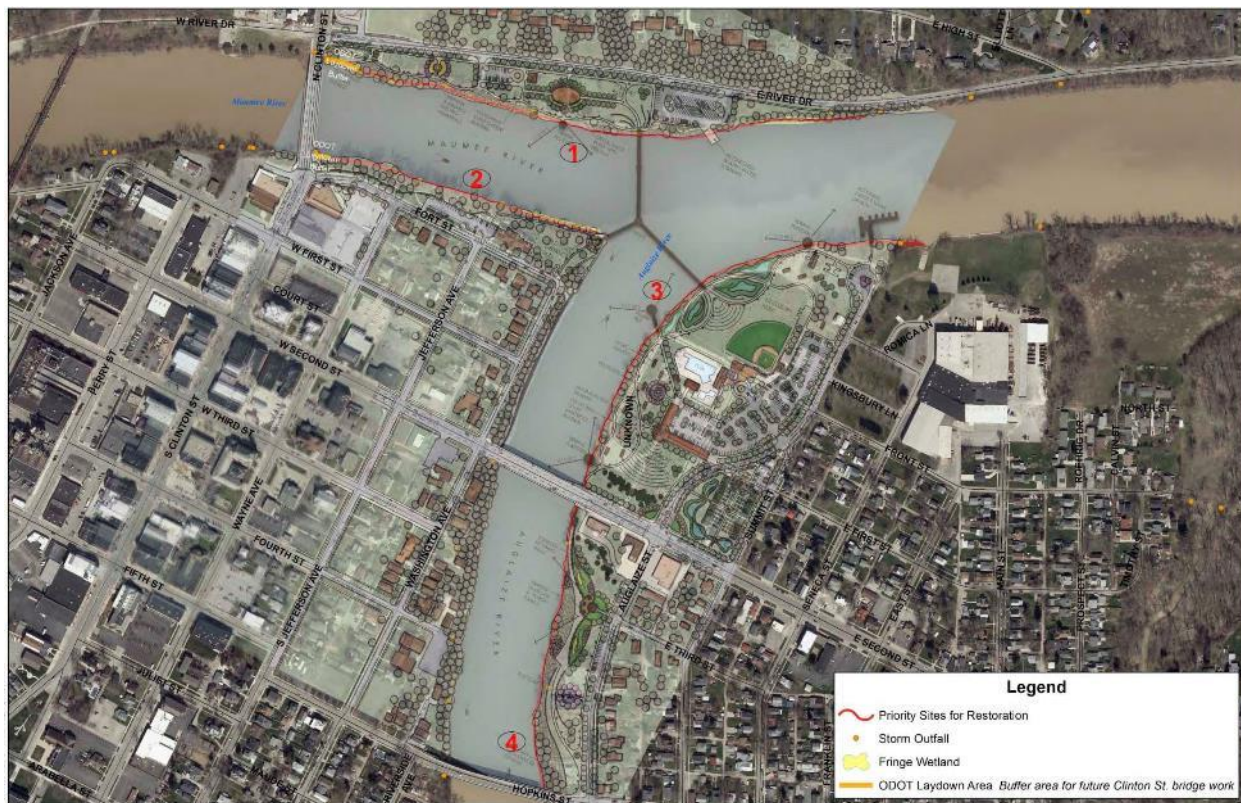


Figure 9. Riverfront Development Concept Plans for Downtown Defiance

## 2.2 Biological Conditions

In 2012 and 2013, Ohio EPA sampled the mainstem Maumee River from the Indiana border to Toledo near its mouth at Lake Erie. In 2014, the agency released *Biological and Water Quality Study of the Maumee River and Auglaize River 2012-2013, Ohio EPA Technical Report EAS/2014-05-03*. This report was used for development of this *Preston Run – Maumee River HUC-12 NPS-IS Plan*. In 2015, Ohio EPA sampled Preston Run as part of a larger Maumee River tributaries monitoring effort. Data from this survey was also used for preparation of this NPS-IS plan.



**Biological conditions were evaluated at one location (site #8) in the Preston Run – Maumee watershed during the Ohio EPA 2012 survey.**

The Maumee River in this HUC-12 is designated as MWH-I for aquatic life use. Preston Run is designated as WWH for aquatic life use. For purposes of Ohio EPA’s reporting aquatic life use, the Maumee mainstem in this HUC-12 is located in the Large River Assessment Unit (LRAU) 04000009 90 01. This LRAU includes 34.5 miles of the Maumee from the Tiffin River to Beaver Creek (RM 65.8 to RM 31.5).



A summary of the sample locations and their biological status is provided in Table 2. Several other sites are included because of the connectivity of the Preston Run – Maumee River HUC-12 with other watersheds immediately upstream and downstream, notably the Upper Maumee, the Tiffin, the Auglaize, and the Lower Maumee above Independence Dam.

Table 2. Biological indices scores summary: Preston Run – Maumee River watershed and vicinity

River Mile (Drainage Area in mi <sup>2</sup> )	IBI (MIwb)	ICI	Status	QHEI	Location (HUC-12)
<b>Maumee River (LRAU 04100005-9001) WWH</b>					
69.2 (2,311)	40 (9.47)	42	Full	70.5	west of Defiance near Dowe Road (04100005-0208)
<b>Maumee River (LRAU 04100009-9001) MWH-I</b>					
62.3 (5,540)	36 (9.22)	22 <sup>a</sup>	Full	46.0	near Defiance at SR 281 (04100009-0201)
60.0 (5,543)	35 (9.04)	10 <sup>a</sup>	Full	49.0	above Independence Dam (04100009-0203)
<b>Tiffin River (LRAU 04100006-9001) Recommended MWH-I</b>					
0.9 (775)	35 (8.41)	18 <sup>a</sup>	Full	49.7	near Defiance at Dey Road (04100006-0604)
<b>Auglaize River (LRAU 04100007-9001) WWH</b>					
3.2 (2,428)	35 (8.87)	36	Full	65.0	near Defiance below Powell Creek (04100007-0201)
<b>Preston Run (WAU 04100009-0201) WWH</b>					
2.45 (7.6)	28	MG <sup>b</sup>	Full	59.5	at Standley Road (04100009-0201)
<b>Notes:</b> <sup>a</sup> Impounded site designated Modified Warmwater Habitat - Impounded (MWH-I). Attainment status is based exclusively on fish assemblage results (IBI and MIwb). <sup>b</sup> MG: marginally good based on a qualitative evaluation of the macroinvertebrate community.					

**Fish.** One site in the Preston Run – Maumee River HUC-12 was evaluated for fish assemblages during the 2012 survey using the Index of Biological Integrity (IBI) and Modified Index of Well Being (MIwb). The station, located at State Route (SR) 281, is in the impounded reach behind Independence Dam. The most common species collected were Orange-spotted Sunfish and Gizzard Shad. Although the IBI score (36) was above the criteria (22 for headwater MWH-I rivers in the HELP Ecoregion), the survey indicated a declining trend as the Maumee transitioned from a free-flowing reach above the Tiffin to the impounded section in Defiance. Also, the criteria do not distinguish between other impounded reaches in other parts of Ohio from state-designated scenic and recreational rivers.

The fish community in Preston Run was evaluated at one location (Standley Road) by Ohio EPA in 2015. The IBI score (28), while low, did not significantly depart from the criteria (28 for headwater WWH streams in the HELP Ecoregion).

**Macroinvertebrates.** The site at SR 281 was the only location where the macroinvertebrate community was evaluated in the Preston Run – Maumee River HUC-12 during the 2012 survey. Macroinvertebrate biocriteria have not been developed for impounded river reaches; so a narrative evaluation based on community diversity and structure was used to assess this site.

**Habitat.** The 2012 biological assessment of the Maumee evaluated habitat at one location in the Preston Run – Maumee River HUC-12 using Ohio EPA’s Qualitative Habitat Evaluation Index (QHEI). Habitat at this location was at the low end of the fair range (45-59). Several high influence negative habitat attributes were present at this location including poor channel development, silt/muck

substrates, no sinuosity, and sparse riparian cover. Habitat in Preston Run was evaluated at one location (Standley Road) by Ohio EPA in 2015 and was determined to be marginally good.

**Summary.** The TSD indicates that this watershed is in full attainment with aquatic life uses. However, Ohio’s NPS Management Plan Update recognizes that restoring impaired waters accomplishes little if it is done at the expense of allowing high quality waters to decline (Ohio EPA, 2014). Rivers that are currently designated under provisions of Chapter 1517 of the Ohio Revised Code as state scenic or recreational, such as the Maumee, are identified as priority high quality watersheds for the sake of NPS Program funding and project assistance. For this reason, the overall goal for the Preston Run – Maumee River NPS-IS Plan is to improve IBI, MIwb, and QHEI scores so that the full benefit of this valuable resource as a state-designated scenic and recreational river can be realized.

### 2.3 Pollution Causes and Associated Sources

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As listed in the 2016 Integrated Water Quality Monitoring and Assessment Report, Ohio EPA has determined that the primary cause of aquatic life use impairments is nutrients, flow alteration, and direct habitat alteration. The associated nonpoint sources include non-irrigated crop production, channelization, urban stormwater, and home sewage treatment systems (HSTS).

These are common causes and sources in Northwest Ohio and throughout the state. Much of the channelization in the Upper Maumee that flows into the Preston Run – Maumee River HUC-12 is related to agriculture land use. Based on the information provided in Table 3 it should be noted that another nonpoint source of impairment is *hydro-modification* (a surrogate of channelization). Likewise, the source *non-irrigated cropland* is a surrogate of hydro-modification.

Table 3. Causes and sources summary for Preston Run - Maumee River watershed

Assessment Unit	Size (mi <sup>2</sup> )	Cause(s)	Sources
04100009 02 01 Preston Run – Maumee River	17.1	- Nutrients - Flow Alteration - Direct Habitat Alterations	- Non-irrigated crop production - Channelization - agriculture - Urban stormwater - Home Sewage Treatment Systems - Combined Sewer Overflows (CSOs)

### 2.4 Critical Areas and Implementation Strategies

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There are several organizations and agencies that work in and around the Preston Run – Maumee River HUC-12 to improve habitat and water quality. Implementation of structural or non-structural Best Management Practices (BMPs) to improve water quality will necessarily depend on collaborative planning efforts with both government and non-profit agencies alike. The most active groups in this area include the City of Defiance and the Defiance County SWCD. Recently the Nature Conservancy of Ohio has located their WLEB Agricultural Program office in downtown Defiance and has expanded their staff level to include two members.

The City and Defiance SWC D are active partners for implementation of a wide variety of existing projects – from the Land to Lake Program providing public outreach and participation, to the Defiance

County Natural Hazard Mitigation Plan demonstrating an extremely effective partnership on many fronts. The City MS4 Coordinator’s efforts to extend our reach beyond the County have been very successful – including membership on the Board of Directors of the Tri-State Watershed Alliance in Ft. Wayne, IN; an active partnership with the Restoration Ecology Program at the University of Toledo, regular support from the Ohio Department of Natural Resources (ODNR) Regional Urban Forester and Ohio State University (OSU) Extension and Master Gardener Program. Less active, but yet vital partnerships and relationships exist as well with Defiance College Restoration Ecology Program, the Black Swamp Conservancy, American Rivers and many other like-minded groups. The City has also taken a lead role in facilitating the Maumee River Basin Partnership for Local Governments (MRBPLG) watershed group to maintain a focus on municipal issues related to water quality.

The City of Defiance MS4 Program has a tracking system for drainage complaints that allows the City staff to respond consistently to public concerns, and prioritize problem areas on private and public land. This map shows the municipal boundary, major tributaries and highlights the Preston Run – Maumee River HUC-12 boundary while indicating the three categories of drainage complaints listed here.

This process is one of many ways that the City has adopted a more integrated approach to planning and executing Capital Improvement Projects than in the past. By tracking and understanding any repetitive problem areas within the City these critical areas can be assessed at the time of complaint and potentially resolved at the time a project is being planned for implementation.

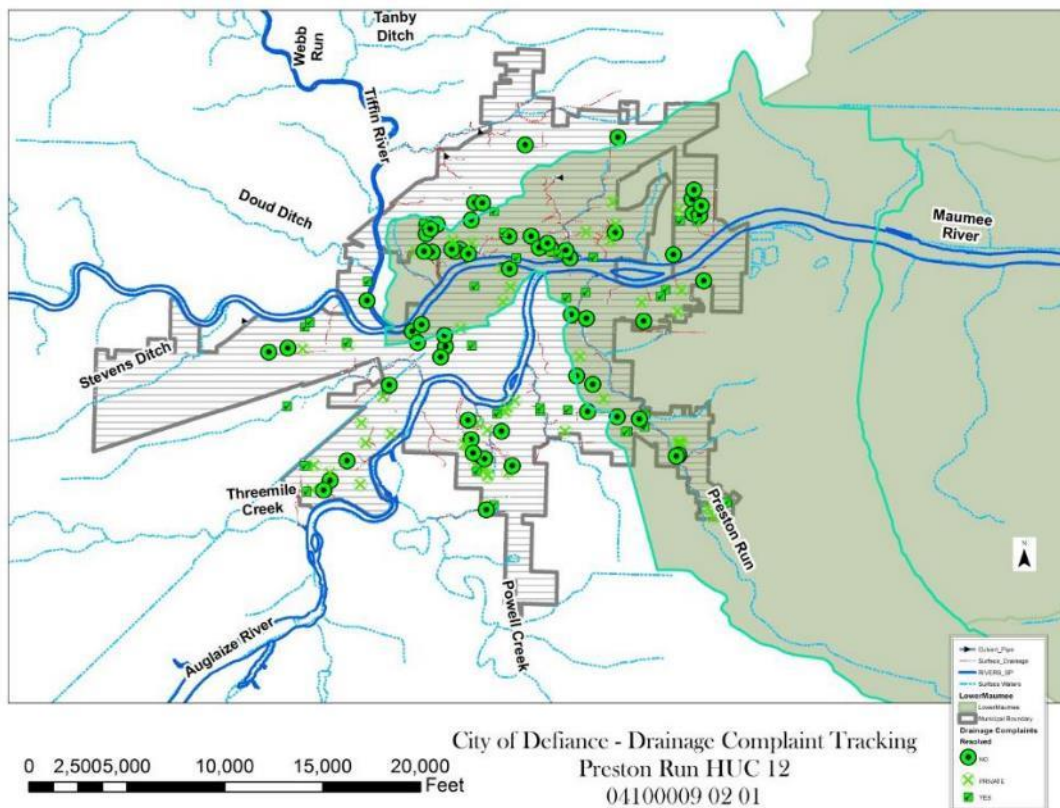


Figure 10. City of Defiance drainage complaint tracking



### 3. Critical Area Conditions and Restoration Strategies

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An important aspect of addressing water quality problems and concerns is to ensure that management plans recognize two key parts for successful implementation: stewardship and critical areas. In urban portions of the Preston Run – Maumee River watershed, stewardship is reflected through the commitment by the City of Defiance in taking a proactive role to solve water quality problems through a focused and coordinated approach. In rural areas, stewardship involves agricultural producers, retailers, service providers, and other certified professionals adopting proven BMPs in a comprehensive manner through conservation systems.



Critical areas represent those locations where management measures are needed to achieve watershed plan goals and objectives. The Preston Run – Maumee River NPS-IS Plan is designed to take broad look at the full array of issues and concerns that affect water quality in the watershed. In this way, projects are identified, prioritized, and scheduled for implementation in an integrated fashion, improving the overall cost-effectiveness of relevant programs that lead to documented positive results.

#### 3.1 Overview of Critical Areas

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Critical areas in the Preston Run – Maumee River watershed, shown in Figure 11, cover a wide range of nonpoint source issues and concerns. Each critical area identified aligns with one of four strategies identified in Ohio’s latest Nonpoint Source Management Plan update, namely:

- Urban sediment and nutrient reduction
- Altered stream and habitat restoration
- Nonpoint source reduction
- High quality waters protection

Each strategy plays a key role in determining the potential management tools needed to address location specific problems. This plan combines monitoring data and inventory information with load analyses to develop refined critical area evaluations. General ratings were identified for each critical area based on impairment information, field observations (including drainage complaints), land use composition, and water quality data (Table 4).

Based on available information, the Preston Run – Maumee River NPS-IS Plan includes all known critical areas in the summary table. Some critical areas have implementation projects associated with specific locations, while others simply have conceptual ideas intended to address problems and concerns. Consistent with the comprehensive approach in developing this plan, this chapter provides an overview of all critical areas in the watershed (e.g., characteristics, conditions, goals, and objectives).

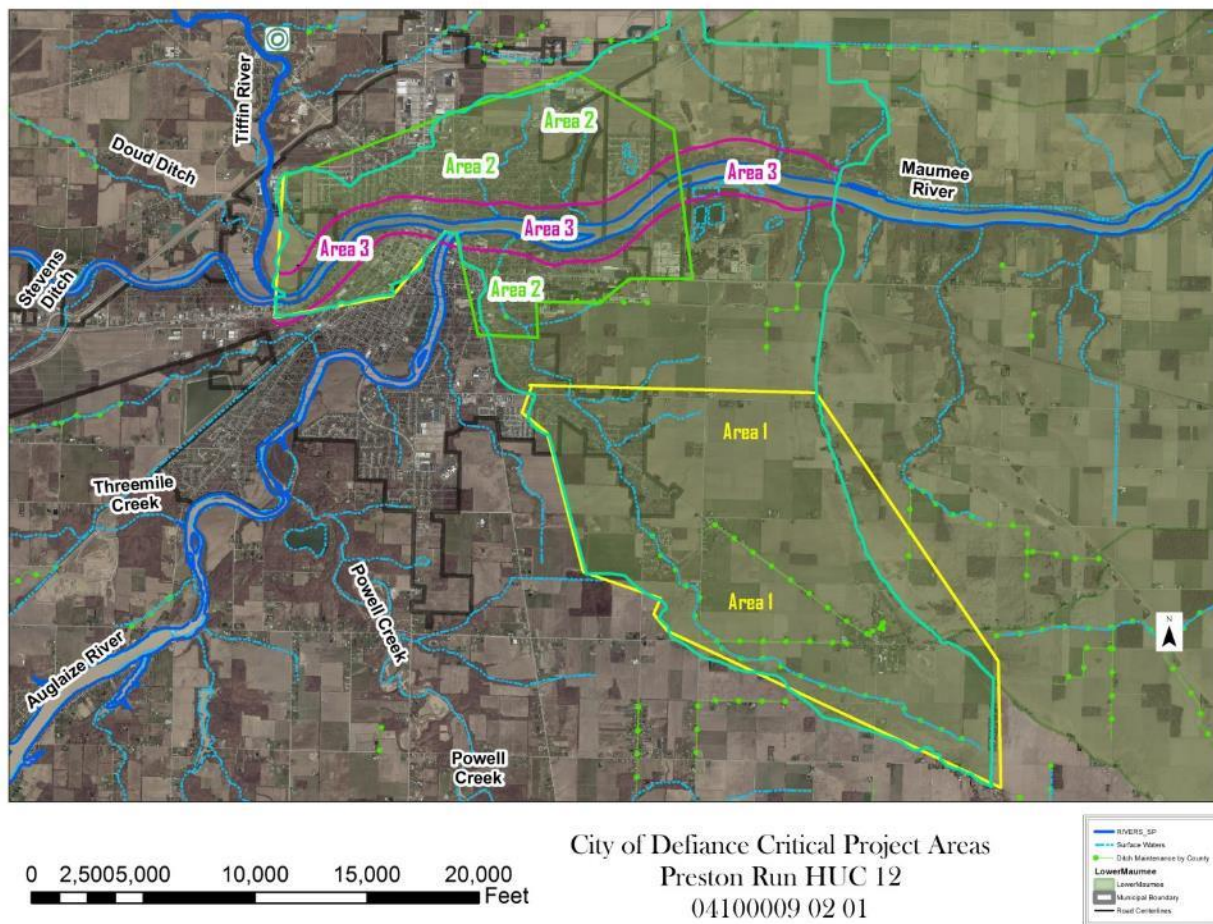


Figure 11. Critical area locations in the Preston Run – Maumee River watershed

These 3 critical areas have been identified as three distinct locations, generally classified as follows:

- 1) Agricultural, 2) Urban and 3) Riparian

### Critical Area #1

*Critical Area 1* corresponds with the direct drainage into Preston Run, upstream of the Ohio EPA sampling point at Standley Road. This area includes predominantly agricultural fields as well as the small unincorporated area of Ayersville. Several of the direct tributaries are roadside ditches that are part of the Defiance County Ditch Maintenance Program in conjunction with the Defiance SWCD. For agricultural parts of the watershed, the plan recognizes that the success of the NPS reduction strategy depends on voluntary participation of the producers, particularly those farming in critical areas. Expanding the use of whole farm conservation planning and installing conservation systems in the project area represents the foundation of this strategy. Not only does this approach ensure that agricultural conservation practices are located where they will provide the most benefit; it is consistent with the goal of promoting sustainable agriculture and farm profitability. Three distinct project areas are identified; two address erosion/flooding problem areas and one has potential for habitat restoration.

### **Critical Area #2**

*Critical Area 2* is the urban stormwater area, or portions of the HUC 12 that have sanitary, storm and combined sewer infrastructure systems and are either regulated by the Municipal Separate Storm Sewer System (MS4) or City's Long Term Control Plan (LTCP) for addressing the problem of Combined Sewer Overflows (CSOs). This *Critical Area 2* is where the City of Defiance has financially invested the most over the last 10-15 years, as the implementation of the LTCP is a distinct priority for the health, welfare and safety of City residents and the surrounding region. Impervious surface cover has continued to increase as development is expanding; this problem is compounded by the desire of City Administration to actively promote a growth strategy for the City in order to promote economic development and sustainability for the community and region. Without voluntary incentives such as a stormwater utility fee for developers to be motivated to implement low-impact development (LID) practices the alternative is to require some of these conservation-type protections in the zoning code. *Critical Area 2* is also a priority of the City moving forward with implementation of Capital Improvement Projects; with an integrated planning approach, the City will continue to incorporate Green Infrastructure (GI) projects into public works projects. East High Street (Project G-58) is a very good example of this – incorporating water line replacement, combined sewer overflow relief, improvements to safety by correcting traffic patterns at the intersection and coordination between essential utilities and urban forestry by replanting street trees as a part of the project. There are 11 projects listed in Table 4 below; some of these have been specifically chosen to address a flooding/erosion complaint or other residential concerns or to correlate with a planned Capital Improvement Project (CIP) or both. Two of these would make use of City Parks to manage stormwater using Green Infrastructure, similar to the project at Diehl Park described on p. 12. *Critical Area 2* is the focus of City efforts, in part due to the MS4 program requirements for Good Housekeeping and Pollution Prevention for municipal buildings and management of parks and open space. One of the City's best investments is in public outreach and education with a goal to foster stewardship and active public involvement in the region's water resources. Using the Land to Lake Program as an outreach mechanism, the City can be a resource for citizens who want to make responsible choices with regard to pet waste, lawn fertilization, auto care and repair, and proper disposal of hazardous products. Business and industry may be regulated as permitted facilities; however, there are many ways to incentivize responsible business practices and sensible development.

### **Critical Area #3**

*Critical Area 3* is the riparian corridor of the mainstem of the Maumee River, which is designated as a scenic corridor by ODNR. Numerous benefits will be realized from a stabilization of erosive banks, reforestation of riparian zones and potentially construction of wetlands in strategic locations for the interception of sediment and nutrients entering directly into the mainstem. One of the project locations identified here is on private property at a golf course directly adjacent to the river, which will require collaborative planning with the owners, who are very receptive to water quality improvements. Three of these projects include the development of a wetland for the purposes of nutrient reduction and the highest priority, although still a medium-term project would be a linear project extending along the same project boundary as the improvements planned for East River Drive, to create a safer pedestrian/bicycling experience from Pontiac Park in Defiance to Independence Dam State Park with the use of enhanced shoulders extending the entire 4 mile length between parks. The City is also currently implementing a Streambank Stabilization project in Pontiac Park, on the north bank of the Maumee River and potentially extending to the Fort Street area on the south bank of the Maumee River. Our proposed project priority for this area would be an extension of that project, as shown in Figure 8.

Table 4. Preston Run / Maumee River critical areas and implementation strategy focus

Critical Area / Catchment ID [Project #(s)]	Name (water quality concern)	Implementation Strategy Rating				
		Urban Reduction	Habitat Restoration	NPS Reduction	High Quality Protection	
#1	A-01a (1-1) (1-2) (1-3)	Woodlawn (small channel/ditch erosion/ nutrient reduction)	○	●●	●●●	○
	A-01b	Edgewood (severe bank erosion)	○	●●●	●●●	○
	A-01d	Manville Draw (natural area)	○	●●●	●●	●●
#2	A-01c (2-4)	Logan (severe bank erosion/flooding)	●●●	●●●	●●	○
	A-01e	Columbus/Greenler (severe bank erosion/flooding)	●●●	●●●	●●	●●
	A-01f	St. Paul (CSO: MH-1115)	●●●	●●	●●	●●●
	B-05 (2-5)	Biede (urban stormwater/small channel erosion)	●●●	●●	○	●●
	B-04	Wildwood (urban stormwater/ small channel erosion)	●●●	●●	○	●●
	B-45	Maumee Dr. (urban stormwater/ small channel erosion)	●●●	●●	○	●●
	E-57 (2-2)	College Place (urban stormwater)	●●●	○	●●	●●
	<b>G-58 (2-1)</b>	<b>East River (CSO: NE-3)</b>	●●●	●●	○	●●●
	G-59	Clinton (CSO: NE-1)	●●●	●●	○	●●●
	G-60	Ralston (CSO: MH-1587, MH-1639)	●●●	●●	○	●●●
H-29 (2-3)	Holgate (urban stormwater)	●●●	○	○	●●	
#3	C-47	WPC Drive (nutrient reduction)	○	●●	●●	●●
	D-00 (3-1)	East River Drive	○	●●●	●●	●●●
	D-54	Kettering Hills (nutrient reduction)	○	●●	●●	●●●
	D-56	Golf Course Creek	○	●●	●●	●●
	F-64 (3-2)	West High (nutrient reduction)	○	●●	●●	●●●

**Notes:** ●●● High priority strategy    ●● Medium priority strategy    ○ General benefit

**Yellow shading denotes that critical area is high priority for project implementation (see Chapter 4)**



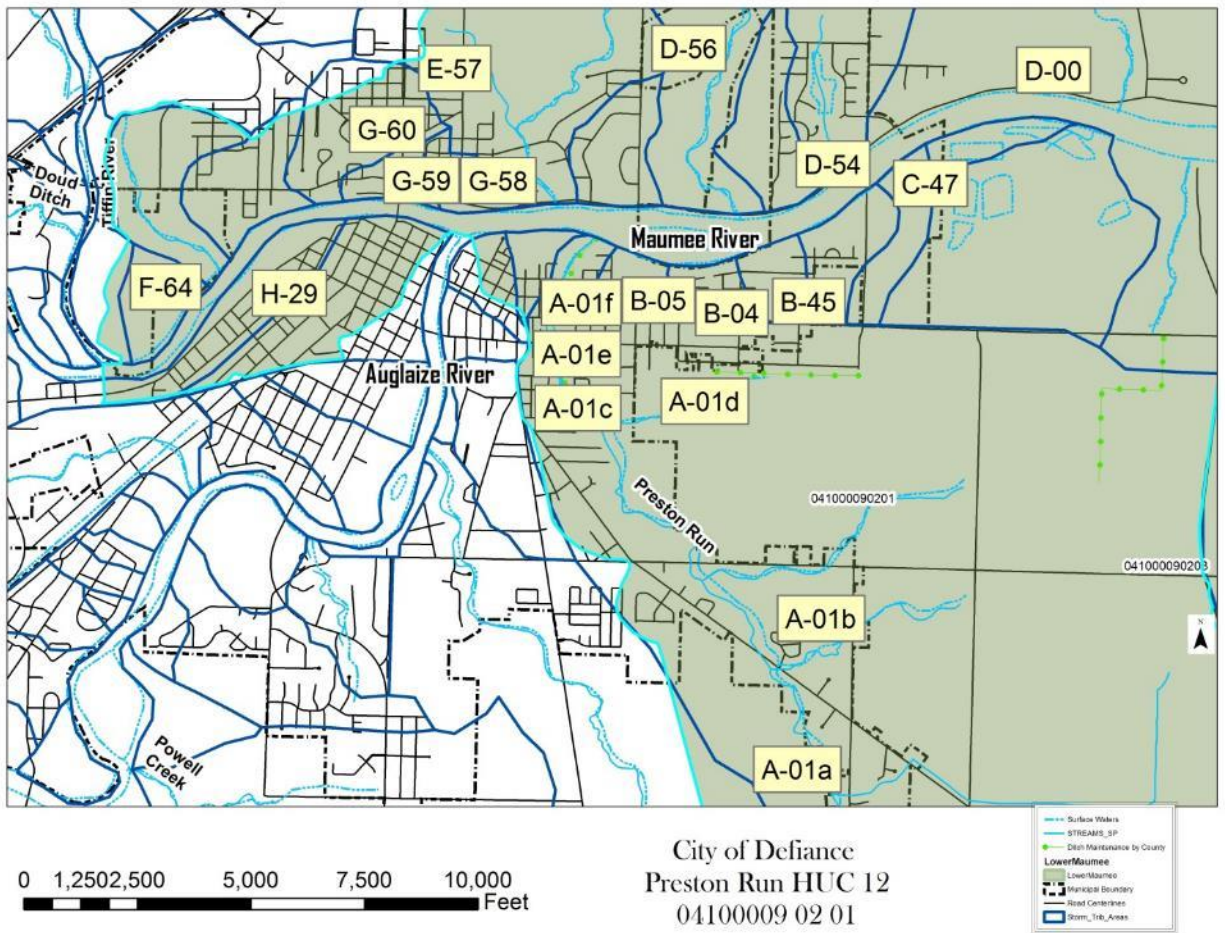


Figure 12. Project locations in the Preston Run – Maumee River watershed

### 3.2 Critical Area #1: Conditions, Goals, & Objectives

#### 3.2.1 Critical Area #1: Characterization

The Preston Run sampling site is located at Standley Road (RM 2.45) where the stream appears to be in *Full Attainment* of the Warmwater Habitat ALU designation based on the 2015 survey data. This site is significantly influenced by the entire watershed, which contributes runoff and pollutant loads to Preston Run (and ultimately the Maumee). *Critical Area 1* is predominantly row crop agriculture (Table 5) on D soils, suggesting that many fields are directly or indirectly connected to Preston Run through tile drains. The headwaters of *Critical Area 1* includes the community of Ayersville, while the downstream portion is located within the Defiance city limits. In addition, the riparian area (75 feet each side of Preston Run, tributary channels, and ditches) affects water quality at the Standley Road sampling site.



#### 3.2.2 Critical Area #1: Conditions

Results of the fish community evaluation conducted by Ohio EPA in 2015 for the Preston Run *Critical Area 1* are summarized in Table 6. The abundance, diversity, and pollution tolerance of existing fish species found at this sampling location related to QHEI scores can help inform watershed planners about the causes and sources of impairment. The Preston Run at Standley Road sampling location is just barely meeting the WWH standard for headwater sites in the HELP Ecoregion (28, goal is 28). Over 70 percent of the fish sampled were pollution tolerant species.

Table 5. Land use summary -- Critical Area #1

Land Use	(acres)	(percent)
Low Density Residential	428	9%
High Density Residential	31	1%
Commercial	8	0.2%
Agricultural	4,051	83%
Grass / Pasture	136	3%
Forest	200	4%
Other	5	0.1%
<b>TOTAL</b>	<b>4,858</b>	

A qualitative ICI evaluation of macroinvertebrate was also conducted at the Standley Road site. Results show that benthic community is marginally good with 18 pollution tolerant taxa, as opposed to only one sensitive taxon. While the QHEI score indicates the Standley Road site meets Ohio EPA’s target for headwater streams (59.5, good is 55-69), severe bank erosion problems have been documented by the City of Defiance at Ayersville Avenue and Edgewood Drive (less than one mile upstream from Standley Road). In addition, chemistry sampling by Ohio EPA show that median total phosphorus concentration is slightly elevated (82 µg/L, goal is 80 µg/L for WWH headwater streams).

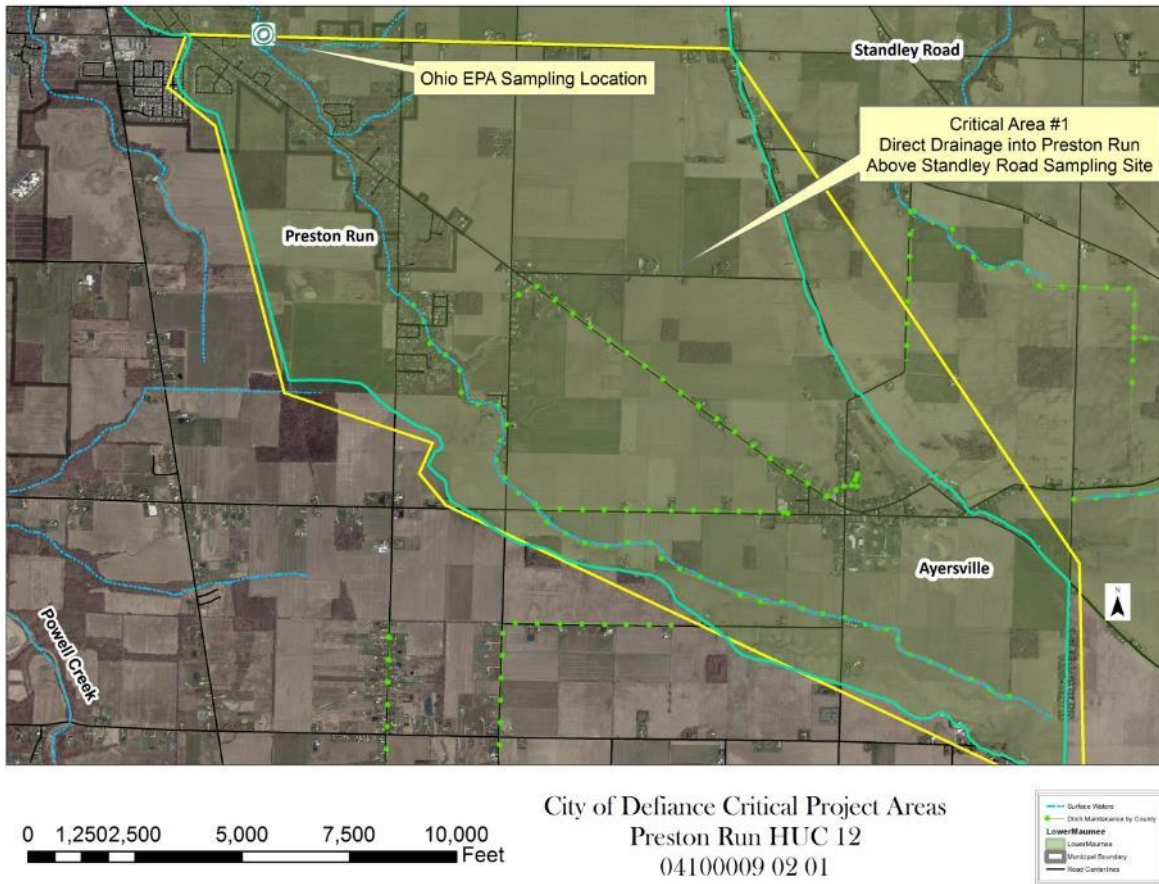


Figure 13. Preston Run Critical Area #1 – Direct Drainage into Preston Run

Table 6. Critical area #1 fish community and habitat data

River Mile (Drainage Area in mi <sup>2</sup> )	QHEI	IBI	Total Species (No. of Sensitive )	Predominant Species (percent of catch)	Narrative Evaluation
<b>Preston Run (WAU 04100009-0201) WWH (Full Attainment)</b>					
2.45 (7.6)	59.5	28	15 (1)	Bluntnose minnow (26%), Creek chub (24%), White sucker (13%)	Fair





Figure 14. Preston Run bank erosion problems

### 3.2.3 Critical Area #1: Causes and Associated Sources

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Preston Run marginally meets the IBI goal for WWH headwater streams in the HELP Ecoregion. Although the QHEI score shows good habitat, there is cause for concern based on upstream conditions as shown in Figure 14. These problems are consistent with several moderate influence attributes noted at Standley Road including:

- Heavy / moderate silt cover
- Fair / poor channel development
- Intermittent / poor pools
- High / moderate embeddedness
- High / moderate riffle embeddedness

Projects that address the above described habitat-related attributes (e.g., silt cover, embeddedness) will have a positive effect in the QHEI scoring index. As the habitat (assessed through QHEI) becomes better, it is expected that the IBI and ICI scores will also improve. In addition, reduced nutrient loads will also benefit the biological community in Preston Run.

### 3.2.4 Critical Area #1: Goals & Objectives

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Although *Critical Area 1* is marginally in attainment, there is room to improve the biological conditions in Preston Run based on the presence of several moderate influence habitat attributes and the evidence of severe bank erosion at several upstream locations. These concerns are due to a combination of channelization and altered flow regimes throughout the **Preston Run – Maumee River HUC-12**. In addition, nutrient loads in the watershed could contribute to lower bioassessment scores in Preston Run as well as downstream concerns documented in the Maumee River. Management measures/project types that address the hydro-modification and nutrient sources will also address the silt and sediment cause of concern. Almost all of *Critical Area 1* is artificially drained. In the absence of edge-of-field conservation practices, this extensively drained row crop landscape contributes high sediment and nutrient loading during runoff and drainage events. Conversely, in the absence of infiltration and water retention, there will be an absence of base flow, which can further exacerbate the in-channel conditions. In addition, most adverse effects to *Critical Area 1* are being transported downstream from the upstream drainages associated with agricultural land use. In order to address both altered flow regimes and nutrient loads, *Critical Area 1* was defined as both agricultural fields and the riparian areas (75' on either side) along Preston Run, tributary channels, and ditches in this portion of the **Preston Run – Maumee River HUC-12**.

#### Goals

The overall nonpoint source restoration goals any NPS-IS plan is to improve IBI, ICI, and QHEI scores so that the *full attainment* status of the designated ALU for Preston Run can be strengthened and maintained. Preston Run marginally meets the IBI goal for WWH headwater streams in the HELP Ecoregion. Although the QHEI score shows good habitat, there is cause for concern based on upstream conditions including silt cover, channel development, substrate embeddedness, and elevated nutrient concentrations. Therefore, the goals for *Critical Area 1* of the **Preston Run - Maumee River HUC-12** are to improve IBI, ICI, and QHEI scores at the Standley Road sampling site (RM 2.45). Specifically, these goals include:

- Goal 1. Achieve IBI score of 36 at Standley Road sampling site on Preston Run (RM 2.45)
  - NOT ACHIEVED: Site currently has a score of 28
- Goal 2. Achieve qualitative ICI score of “Good” at Standley Road sampling site on Preston Run (RM 2.45)
  - NOT ACHIEVED: Site currently has a score of 28
- Goal 3. Achieve QHEI score of 65 at Standley Road sampling site on Preston Run (RM 2.45)
  - NOT ACHIEVED: Site currently has a score of 59.5

#### Objectives

In order to achieve the overall nonpoint source management goal of maintaining the Full Attainment status and improving biological conditions in the **Preston Run – Maumee River HUC-12**, the following objectives that address channelization, hydro-modification, and agricultural sources need to be achieved within *Critical Area 1*. These objectives are the prioritized management measures/practices in *Critical Area 1* and will be the primary objectives as projects are sought out and/or developed to improve the NPS impacts in this Critical Area.

- Objective 1. Install cover crops to reduce nutrient loss from agricultural fields and reduce excess runoff volumes through improved soil health and increased infiltration.
- Enroll 400 acres of cultivated land into cover crop cost-share program.
- Objective 2. Install 2-stage ditches to increase access of high flow runoff waters to functional floodplain bench.
- Install 1,000 feet of 2-stage ditches in *Critical Area 1*. 1,000 feet represents approximately two percent total ditch length in *Critical Area 1* (about 10 miles).
- Objective 3. Reduce impacts from tile drainage waters and improve base flow conditions through the installation of drainage water management systems.
- Implement drainage water management (including drainage water management structures and/or saturated buffers) on 15 acres of row crop land that contributes drainage waters through and beneath the identified riparian areas in *Critical Area 1*.
  - Install five controlled drainage structures as part of drainage water management system approach in *Critical Area 1*.
  - Include saturated buffer component on one of the new or retrofitted drainage water management systems *Critical Area 1*.

As these objectives are implemented, water quality monitoring (both project related and regularly scheduled monitoring) will be conducted to determine progress toward meeting the identified goals (i.e., water quality standards). These objectives will be reevaluated and modified if determined to be necessary. For instance; many agricultural BMPs can be “stacked” (a systems approach) that will also incrementally improve the quality and quantity of runoff and drainage waters and in-stream water quality.

When reevaluating, the Ohio EPA Nonpoint Source Management Plan Update (Ohio EPA, 2013) will be referenced, which has a complete 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

#### 3.3.1 Critical Area #2: Characterization

The Maumee River sampling site is located at SR 281 below the most urbanized portions of Defiance. While the Maumee in this HUC-12 watershed appears to be in *full attainment* based on the 2012 Ohio EPA survey data, this is a state-designated scenic and recreational river. The density of urban development in this critical area coupled with drainage complaints and known CSO concerns indicate that stormwater discharges threaten the high quality afforded for this reach of the Maumee and the public benefit this valued resource provides to the State of Ohio.



***Critical Area 2 is predominantly developed land and associated impervious surfaces located within the municipal boundaries of Defiance.***

*Critical Area 2* is predominantly developed land located within the municipal boundaries of Defiance. As part of the City’s Stormwater Management Plan (SWMP) development, catchments were delineated to identify tributary areas associated with the various outfalls and to help prioritize implementation activities. For purposes of the Preston Run – Maumee River HUC-12 NPS-IS, these catchments have been grouped to provide a systematic method to characterize *Critical Area 2* and enable load reduction estimates associated with projects (Table 7, Figure 15).

Table 7. Land use summary -- Critical Area #2

Land Use	Catchment Group (acres)					Critical Area #2 Total	
	A	B	E	G	H	(acres)	(percent)
Low Density Residential	248	124	393	183	160	1,108	52%
High Density Residential	56	48	25	23	100	252	12%
Commercial	33	24	13	13	91	174	8%
Agricultural	230	-	19	-	-	249	12%
Grass / Pasture	9	-	-	-	-	9	0.4%
Forest	190	15	90	4	-	299	14%
Other	2	5	20	6	6	39	2%
<b>TOTAL</b>	<b>768</b>	<b>217</b>	<b>559</b>	<b>229</b>	<b>358</b>	<b>2,130</b>	

The common characteristic of each catchment group within *Critical Area 2* is high amount of impervious cover relative to other parts of the **Preston Run – Maumee River HUC-12** watershed.

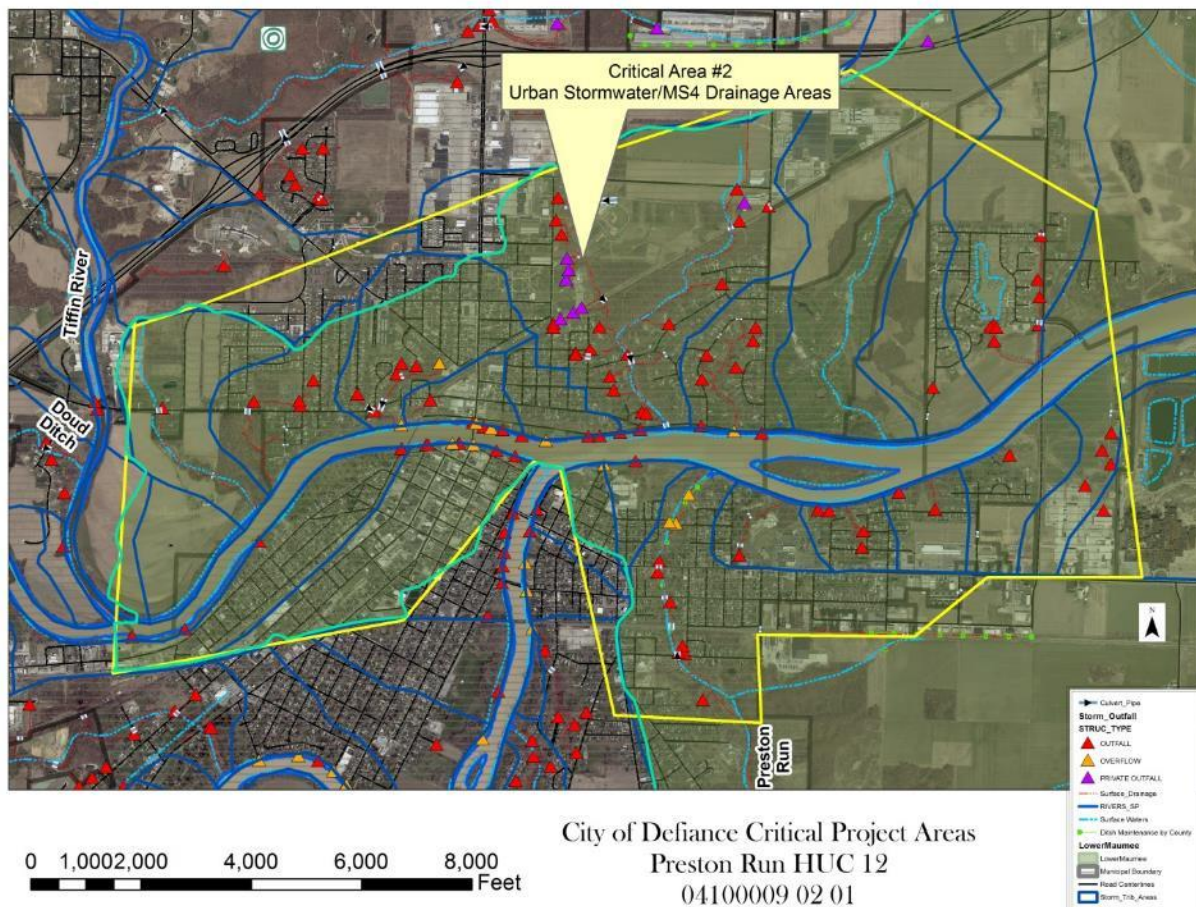


Figure 15. Preston Run – Maumee River Critical Area #2

### 3.3.2 Critical Area #2: Conditions

Results of the fish community evaluation conducted by Ohio EPA in 2012 for the Maumee River *Critical Area 2* are summarized in Table 8. Understanding the abundance, diversity, and pollution tolerance of existing fish species found by Ohio EPA at these sampling locations, then relating that information to QHEI scores helps to inform Ohio EPA of causes and sources of impairment. The Maumee River at SR 281 sampling location is just over the WWH standard for boat sites in the HELP Ecoregion (36, goal is 34). Technically, this portion of the river is considered MWH-I for assessment purposes due to its location relative to Independence Dam. However, the Maumee River in this HUC-12 watershed is a state-designated scenic and recreational river, which indicates the need for a greater level of protection under Ohio EPA’s NPS Management Plan.

The QHEI score indicates that the SR 281 site is barely in Ohio EPA’s range as fair for rivers and large streams (46, fair is 45-59). Ohio EPA reported that this reach of the Maumee has less development and rocky substrates than the free-flowing sections. This river reach also had more silt, less sinuosity, and less instream cover than the WWH sections of the Maumee. Severe bank erosion problems have also been documented by the City of Defiance. In addition, chemistry sampling by the USGS in this portion of the Maumee show that the total phosphorus spring flow-weighted mean concentration exceeds the Annex 4 target at Waterville (475 µg/L, goal is 230 µg/L).

Table 8. Critical area #2 fish community and habitat data

River Mile (Drainage Area in mi <sup>2</sup> )	QHEI	IBI (MIwb)	Total Species (No. of Sensitive )	Predominant Species (percent of catch)	Narrative Evaluation
<b>Maumee River (LRAU 04100009-9001) MWH-I (Full Attainment)</b>					
62.3 (5,540)	46.0	36 (9.22)	24 (2)	Orangespotted Sunfish (33%), Gizzard Shad (28%), Bluntnose Minnow (7%)	Marginally Good
60.0 (5,543)	49.0	35 (9.04)	26 (2)	Orangespotted Sunfish (30%), Gizzard Shad (29%), Bluntnose Minnow (11%)	Marginally Good
<b>Notes:</b> c Impounded site designated Modified Warmwater Habitat - Impounded (MWH-I). Attainment status is based exclusively on fish assemblage results (IBI and MIwb).					



### 3.3.3 Critical Area #2: Causes and Associated Sources

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The Maumee River in this watershed meets the IBI goal for MWH-I large rivers in the HELP Ecoregion. However, this reach of the Maumee is a state-designated Scenic and Recreational River. Consistent with Ohio EPA’s High Quality Waters Protection Strategy, there are greater expectations from the public regarding the conditions that should exist on the valuable natural resource.



The QHEI score shows cause for concern based on riparian conditions and the effect of urban runoff through direct discharges (as shown in the adjacent photo) as well as sediment loads attributed to small channel erosion from tributaries that traverse through the Maumee River floodplain. These problems are consistent with several high and moderate influence attributes noted at SR 281 including:

- Heavy / moderate silt cover
- Fair / poor channel development
- Sparse riparian cover
- High / moderate embeddedness

Discharge of stormwater to the Maumee occurs through a number of outfalls, either directly to the river or indirectly to riparian areas adjacent to the floodplain. Projects that reduce these stormwater discharges will also address the above described habitat-related attributes (e.g., silt cover) and have a positive effect in the QHEI scoring index. As the habitat (assessed through QHEI) becomes better, it is expected that the IBI scores will also improve. In addition, reduced sediment and nutrient loads will also benefit the biological community in the Maumee River.

### 3.3.4 Critical Area #2: Goals & Objectives

Although *Critical Area 2* is in *full attainment*, biological conditions in the state-designated Scenic and Recreational Maumee River can be improved. In particular, there is room to raise the IBI score in this critical area by increasing the fish community diversity through pollutant load reductions that encourage more sensitive taxa in this reach.

The QHEI score shows cause for concern based on the presence of several high and moderate influence habitat attributes. This includes evidence of severe bank erosion along the Maumee River and small channel erosion in tributary streams that traverse the riparian floodplain. These concerns are due to a combination of urban stormwater and altered flow regimes throughout the **Preston Run – Maumee River HUC-12**. In addition, nutrient loads in the watershed could



***Urban stormwater discharges contribute to degraded habitat in the Maumee River through processes such as small channel erosion in tributary streams that traverse the riparian floodplain.***

contribute to lower bioassessment scores as well as downstream concerns documented in the Maumee River, Maumee Bay, and the Western Lake Erie Basin.

Management measures/project types that address the urban sediment and nutrient sources will also address the Maumee River silt and embeddedness causes of concern. The overall goal of NPS implementation efforts in *Critical Area 2* is to ensure that the City of Defiance minimizes the effect of stormwater discharges on the Maumee. This goal addresses two key parts of Ohio EPA’s NPS Management Plan: 1) the urban sediment and nutrient reduction strategy, and 2) the high quality waters protection strategy based on the Maumee’s designation as a state Scenic and Recreational River. The overarching need for *Critical Area 2* is to reduce the rate and amount of stormwater runoff from connected impervious surfaces in the **Preston Run – Maumee River HUC-12**.

Because of technical challenges associated with measuring the cumulative stormwater volume generated by connected impervious surfaces that are delivered to the Maumee River, the goals and objectives for these critical areas employ the green infrastructure area concept. Green infrastructure area defines the amount of connected impervious cover that needs to be managed using urban stormwater BMPs in order to reduce flooding, threats to infrastructure, and loss of property, as well as achieve water quality standards (WQS) and protect biological communities. The emphasis on impervious cover is consistent with stormwater management methods used across the country. Urban BMPs that can be applied at specific locations typically focus on the amount and type of impervious area that can be directed to a stormwater facility (for either flow control or water quality treatment).

#### **Goals**

The overall nonpoint source restoration goals any NPS-IS plan is to improve IBI and QHEI scores so that the *full attainment* status of the designated ALU for the Maumee River can be strengthened and maintained. The Maumee River marginally meets the IBI goal for WWH headwater streams in the HELP

Ecoregion. This reach of the Maumee is a state-designated Scenic and Recreational River, which implies greater expectations from the public regarding the conditions that should exist on the valuable natural resource. The QHEI score also shows cause for concern based on upstream conditions including silt cover, poor channel development, and substrate embeddedness. Therefore, the goals for *Critical Area 2* of the **Preston Run - Maumee River HUC-12** are to improve IBI and QHEI scores, as well as to maintain the current MIwb score at the SR 281 sampling site (RM 62.3). Specifically, these goals include:

- Goal 1. Achieve IBI score of 40 at the SR 281 sampling site on the Maumee River (RM 62.3)
  - NOT ACHIEVED: Site currently has a score of 36
- Goal 2. Maintain MIwb score of 9.2 at the SR 281 sampling site on the Maumee River (RM 62.3)
  - ACHIEVED: Site currently has a score of 9.22
- Goal 3. Achieve QHEI score of 50 at the SR 281 sampling site on the Maumee River (RM 62.3)
  - NOT ACHIEVED: Site currently has a score of 46

**Objectives**

In order to achieve the overall nonpoint source management goal of maintaining the *full attainment* status and improving biological conditions in the **Preston Run – Maumee River HUC-12**, the following objectives that address urban stormwater and altered hydrology sources need to be achieved within *Critical Area 2*. These objectives are the prioritized management measures/practices in *Critical Area 2* and will be the primary objectives as projects are sought out and/or developed to improve the NPS impacts in this Critical Area.

Objective 1. Reduce the rate and amount of stormwater runoff entering the Maumee River and Preston Run by installing green stormwater management systems at key locations using the phased approach described below.

Location	Parameter or Metric	Implementation Phase <sup>a</sup>	Objective Target
E-57	Stormwater Volume	Phase 1	- Reduce stormwater volume from E-57 by 4 percent
		Phase 2	- “ “ “ “ “ “ 8 percent
		Phase 3	- “ “ “ “ “ “ 15 percent
	Green Infrastructure Area	Phase 1	- Convert 4 acres of E-57 to green infrastructure practices <sup>b</sup>
		Phase 2	- “ 8 acres “ “ “ “ “ “
		Phase 3	- “ 12 acres “ “ “ “ “ “
G-58	Stormwater Volume	Phase 1	- Reduce stormwater volume from G-58 by 6 percent
		Phase 2	- “ “ “ “ “ “ 12 percent
		Phase 3	- “ “ “ “ “ “ 20 percent
	Green Infrastructure Area	Phase 1	- Convert 2 acres of G-58 to green infrastructure practices <sup>b</sup>
		Phase 2	- “ 4 acres “ “ “ “ “ “
		Phase 3	- “ 8 acres “ “ “ “ “ “
<p><b>Notes:</b> <sup>a</sup> Phase 1 (2017-20); Phase 2 (2021-26); Phase 3 (2027-36)</p> <p><sup>b</sup> Green infrastructure practices in the City of Defiance include constructed BMPs, as well as stormwater volume reductions achieved through use of vacant land and/or the City’s urban forestry program.</p>			



Objective 2. Passively treat stormwater runoff through the use of stormwater wetland treatment systems.

- Install 2 acre stormwater wetland treatment system in Compo Park to address flooding problems at location A-01c (Logan) using infiltration practices similar to the bioretention system built at Diehl Park.

Objective 3. Restore the natural flow in lower Preston Run and small tributaries traversing the Maumee River floodplain by installing streamside retention/controlled discharge systems (see Ohio EPA 2014c, pages 23 and 30) in *Critical Area 2*.

- Install streamside retention/controlled discharge system in small tributary at location B-05 adjacent to County Health Department / Sheriff's Office north of SR-18 / East 2<sup>nd</sup> Street.

As these objectives are implemented, water quality monitoring (both project related and regularly scheduled monitoring) will be conducted to determine progress toward meeting the identified goals (i.e., water quality standards). These objectives will be reevaluated and modified if determined to be necessary. For instance; many agricultural BMPs can be “stacked” (a systems approach) that will also incrementally improve the quality and quantity of runoff and drainage waters and in-stream water quality.

When reevaluating, the Ohio EPA Nonpoint Source Management Plan Update (Ohio EPA, 2013) will be referenced, which has a complete 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

### 3.4 Critical Area #3: Conditions, Goals, & Objectives

#### 3.4.1 Critical Area #3: Characterization

*Critical Area 3* is the riparian corridor of the mainstem of the Maumee River, which is designated as a scenic corridor by ODNR. Numerous benefits will be realized from a stabilization of erosive banks, reforestation of riparian zones and potentially construction of wetlands in strategic locations for the interception of sediment and nutrients entering directly into the mainstem.

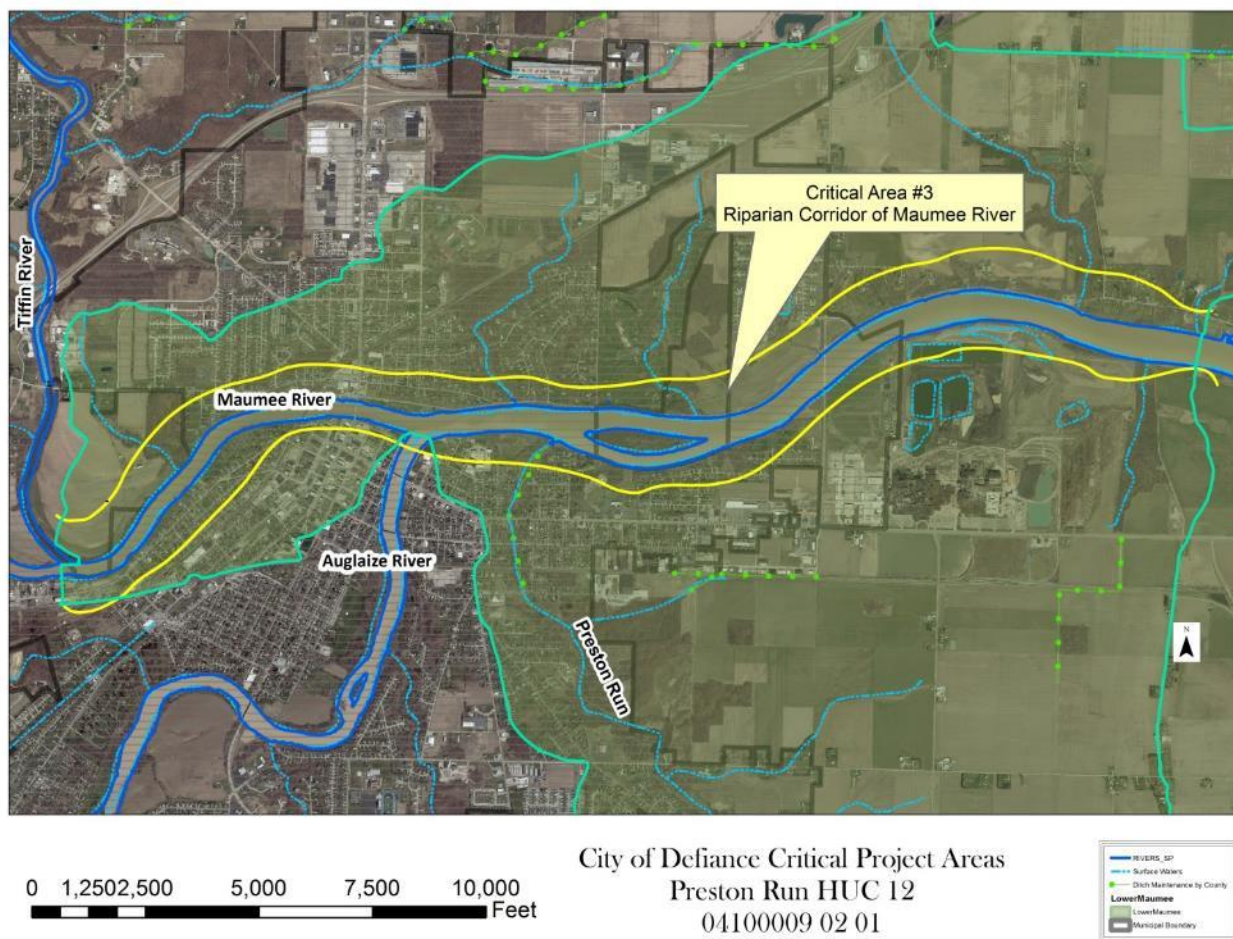


Figure 16. Preston Run – Maumee River Critical Area #3 – Riparian Corridor of Maumee River

#### 3.4.2 Critical Area #3: Conditions

Results of the fish community evaluation conducted by Ohio EPA in 2012 for the Maumee River *Critical Area 3* are summarized in Table 9. Understanding the abundance, diversity, and pollution tolerance of existing fish species found by Ohio EPA at these sampling locations, and then relating that information to QHEI scores helps to inform Ohio EPA of causes and sources of impairment. The Maumee River at SR 281 sampling location is just over the WWH standard for boat sites in the HELP Ecoregion (36, goal is 34). Technically, this portion of the river is considered MWH-I for assessment purposes due to its location relative to Independence Dam. However, the Maumee River in this HUC-12 watershed is a

state-designated scenic and recreational river, which indicates the need for a greater level of protection under Ohio EPA’s NPS Management Plan. The QHEI score indicates that the SR 281 site (RM 62.3) is barely in Ohio EPA’s range as fair for rivers and large streams (46, fair is 45-59). Ohio EPA reported that this reach of the Maumee has less development and rocky substrates than the free-flowing sections. This river reach also had more silt, less sinuosity, and less instream cover than the WWH sections of the Maumee. Severe bank erosion problems have also been documented by the City of Defiance.

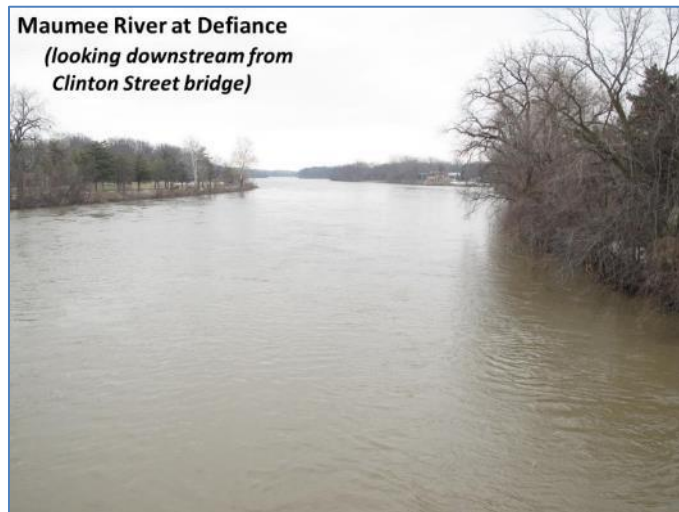


Table 9. Critical area #3 fish community and habitat data

River Mile <i>(Drainage Area in mi<sup>2</sup>)</i>	QHEI	IBI <i>(MIwb)</i>	Total Species <i>(No. of Sensitive )</i>	Predominant Species <i>(percent of catch)</i>	Narrative Evaluation
<b>Maumee River (LRAU 04100009-9001) MWH-I (Full Attainment)</b>					
62.3 (5,540)	46.0	36 (9.22)	24 (2)	Orangespotted Sunfish (33%), Gizzard Shad (28%), Bluntnose Minnow (7%)	Marginally Good
60.0 (5,543)	49.0	35 (9.04)	26 (2)	Orangespotted Sunfish (30%), Gizzard Shad (29%), Bluntnose Minnow (11%)	Marginally Good
<b>Notes:</b> c Impounded site designated Modified Warmwater Habitat - Impounded (MWH-I). Attainment status is based exclusively on fish assemblage results (IBI and MIwb).					

### 3.4.3 Critical Area #3: Causes and Associated Sources

The Maumee River in this watershed meets the IBI goal for MWH-I large rivers in the HELP Ecoregion. Again, this reach of the Maumee is a state-designated Scenic and Recreational River. Consistent with Ohio EPA’s High Quality Waters Protection Strategy, there are greater expectations from the public regarding the conditions that should exist on the valuable natural resource. Channelization and altered habitat through this reach of the Maumee River limit the ability of the fish community to achieve its full potential.

The QHEI score shows cause for concern based on riparian conditions and unstable stream banks along the mainstem Maumee River. These problems are consistent with several high and moderate influence attributes noted at SR 281 including:

- Heavy / moderate silt cover
- Fair / poor channel development
- Sparse riparian cover
- High / moderate embeddedness



### 3.4.4 Critical Area #3: Goals & Objectives

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Although *Critical Area 3* is in *full attainment*, there is room to improve the biological conditions in the state-designated Scenic and Recreational Maumee River based on the presence of several high and moderate influence habitat attributes. This includes evidence of severe bank erosion along the Maumee River. These concerns are due to a combination of altered habitat and flow regimes throughout the **Preston Run – Maumee River HUC-12**. In addition, nutrient loads delivered from major tributaries outside the watershed (e.g., Upper Maumee, Auglaize, Tiffin) could contribute to lower bioassessment scores as well as downstream concerns documented in the Maumee River.

Management measures/project types that stabilize seriously eroding streambanks and reconnect the floodplain will also address altered habitat concerns on Maumee River. The overall goal of NPS implementation efforts in *Critical Area 3* is to restore altered aquatic/riparian habitats, reconnect key portions of the channel to the floodplain, and stabilize severely eroding streambanks along the mainstem Maumee River. This goal addresses two key parts of Ohio EPA's NPS Management Plan: 1) the altered stream and habitat restoration strategy, and 2) the high quality waters protection strategy based on the Maumee's designation as a state Scenic and Recreational River. The overarching need for *Critical Area 3* is to improve riparian, stream and habitat conditions in the **Preston Run – Maumee River HUC-12**, which will also make positive contributions to the overall water quality conditions in Lake Erie.

#### Goals

The overall nonpoint source restoration goals any NPS-IS plan is to improve IBI and QHEI scores so that the *full attainment* status of the designated ALU for the Maumee River can be strengthened and maintained. The Maumee River marginally meets the IBI goal for WWH headwater streams in the HELP Ecoregion. This reach of the Maumee is a state-designated Scenic and Recreational River, which implies greater expectations from the public regarding the conditions that should exist on the valuable natural resource. The QHEI score also shows cause for concern based on upstream conditions including silt cover, poor channel development, and substrate embeddedness. Therefore, the goals for *Critical Area 3* of the **Preston Run - Maumee River HUC-12** are to improve IBI and QHEI scores, as well as to maintain the current MIwb score at the SR 281 sampling site (RM 62.3). Specifically, these goals include:

- Goal 1. Achieve IBI score of 40 at the SR 281 sampling site on the Maumee River (RM 62.3)
  - NOT ACHIEVED: Site currently has a score of 36
  
- Goal 2. Maintain MIwb score of 9.2 at the SR 281 sampling site on the Maumee River (RM 62.3)
  - ACHIEVED: Site currently has a score of 9.22
  
- Goal 3. Achieve QHEI score of 50 at the SR 281 sampling site on the Maumee River (RM 62.3)
  - NOT ACHIEVED: Site currently has a score of 46

#### Objectives

In order to achieve the overall nonpoint source management goal of maintaining the *full attainment* status and improving biological conditions in the **Preston Run – Maumee River HUC-12**, the following objectives that address altered stream and habitat conditions need to be achieved within *Critical Area 3*. These objectives are the prioritized management measures/practices in *Critical Area 3* and will be the primary objectives as projects are sought out and/or developed to improve the NPS impacts in this Critical Area.

Objective 1. Restore the riparian corridor along the north bank of the mainstem Maumee River at key locations using the phased approach described below.

Location	Parameter or Metric	Implementation Phase <sup>a</sup>	Objective Target
Mainstem Maumee River (north bank)	Stormwater Volume	Phase 1 <sup>b</sup>	- Stabilize and restore 3,500 feet of eroding bank
		Phase 2	- “ “ “ 7,000 feet “ “ “
		Phase 3	- “ “ “ 14,000 feet “ “ “
<p><b>Notes:</b> <sup>a</sup> Phase 1 (2017-20); Phase 2 (2021-26); Phase 3 (2027-36)  <sup>b</sup> Initial part of Phase 1 funded under GLRI for Pontiac Park.</p>			

Objective 2. Reconnect portions of the mainstem to restore floodplain functions that will allow the Maumee River to assimilate and process NPS pollution generated within the **Preston Run – Maumee River HUC-12** and from upstream sources that transport loads to the Defiance reach.

- Create 240 acres of off-channel wetlands to address nutrient problems contributing to fish community problems in the **Preston Run – Maumee River HUC-12**, as well as HABs observed in the WLEB.

As these objectives are implemented, water quality monitoring (both project related and regularly scheduled monitoring) will be conducted to determine progress toward meeting the identified goals (i.e., water quality standards). These objectives will be reevaluated and modified if determined to be necessary. For instance; many agricultural BMPs can be “stacked” (a systems approach) that will also incrementally improve the quality and quantity of runoff and drainage waters and in-stream water quality.

When reevaluating, the Ohio EPA Nonpoint Source Management Plan Update (Ohio EPA, 2013) will be referenced, which has a complete 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

## 4. Implementation Strategy and Projects

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### 4.1 Implementation Strategy Overview

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Below are the projects and evaluation needs believed to be necessary to maintain water quality and prevent impairments in the **Preston Run – Maumee River HUC-12** as a result of identified NPS pollution causes and associated sources. Because the attainment status is based on biological conditions, it will be necessary to periodically re-evaluate the status of all critical areas to determine if the implemented projects are sufficient to document improvements. Time is an important factor to consider when measuring project success and overall status. Biological systems in some cases can show response fairly quickly (i.e., one season); others system may take longer (i.e., several seasons or years) to show recovery. There are also reasons other than NPS pollution that threaten water quality, which could lead to future impairments. These issues have been identified in this plan. Some (e.g., CSOs) are being addressed through different programs; others will be considered under other authorities or initiatives that may or may not be accomplished by those working to solve the NPS pollution problems.

For the **Preston Run – Maumee River HUC-12** there are three *Project and Implementation Strategy Overview Tables* (subsections 4.2.1, 4.3.1, and 4.4.1), one table for each critical area. Each critical area only has one primary cause and associated source of NPS impairment. If another NPS impairment is identified for existing critical areas, it will be explained and added to the appropriate critical area table. If a new impairment is determined that has a different critical area, another table will be created for that new critical area. The projects described in the *Overview Tables* have been prioritized using the following three-step prioritization method:

- Priority 1     Projects that specifically address one (or more) listed *Objective(s)* for the Critical Area.
  
- Priority 2     Projects where there is landowner willingness to engage in projects designed to address the causes and sources of concern or where there is an expectation that such potential projects will improve water quality in the Preston Run – Maumee River HUC-12.
  
- Priority 3     In an effort to generate interest in projects, an information and education strategy will be developed and delivered in concert with the *Land-to-Lake* Initiative. 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 4.3.2. These PSS 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 PPS created will be submitted to the state of Ohio for funding eligibility verification (i.e., all nine elements are included)



## 4.2 Critical Area #1: Overview Table and Project Sheets

The information included in the *Critical Area 1 Overview Table* is a condensed overview of all identified projects needed for NPS restoration of the **Preston Run – Maumee River HUC-12 Critical Area 1**. Project Summary Sheets will be prepared for any project that is considering seeking funding in the near future recognizing that only those projects with complete Project Summary Sheets will be considered for state and federal NPS program funding.

### 4.2.1 Critical Area #1: Project and Implementation Strategy Overview Table

The **Preston Run – Maumee River HUC-12 Critical Area 1** is based on improving water quality in order to maintain the *full attainment* status of the ALU designation in Preston Run at Standley Road (RM 2.45). The *Critical Area 1 Overview Table* provides a quick summary of what needs to be done, where, and what problem (cause/source) will be addressed and includes projects at all levels of development (i.e. concept, need funding, in progress). This Overview Table is intended to show a prioritized path toward the restoration of the **Preston Run – Maumee River HUC-12**.

<b>Critical Area 1: Project Overview Table for Preston Run – Maumee River HUC-12 (04110009 02 01)</b>							
Goal(s)	Objective(s)	Project #	Project Title (EPA Criteria g)	Lead Organization (criteria d)	Time Frame (EPA Criteria f)	Estimated Cost (EPA Criteria d)	Potential/Actual Funding Source (EPA Criteria d)
<b>Urban Sediment and Nutrient Reduction Strategies</b>							
<b>Altered Stream and Habitat Restoration Strategies</b>							
<b>Agricultural Nonpoint Source Reduction Strategies</b>							
1,2,3	1	1-1	Cover crops to reduce nutrient loss	TBD	1-3 years	\$20,000	Ohio EPA §319, SWIF, GLRI
1,2,3	2	1-2	2-stage ditch on Preston Run and/or other tribs	TBD	1-3 years	\$100,000	Ohio EPA §319, SWIF, GLRI
1,2,3	3	1-3	Drainage water management including saturated buffer	TBD	1-3 years	\$75,000	Ohio EPA §319, SWIF, GLRI
<b>High Quality Waters Protection Strategies</b>							
<b>Other NPS Causes and Associated Sources of Impairment</b>							

### 4.3 Critical Area #2: Overview Table and Project Sheets

The information included in the *Critical Area 2 Overview Table* is a condensed overview of all identified projects needed to improve water quality in the **Preston Run – Maumee River HUC-12 Critical Area 2**. Project Summary Sheets are included for short term projects or any project that is considering seeking funding in the near future. Only projects with complete Project Summary Sheets will be considered for state and federal NPS program funding.



#### 4.3.1 Critical Area #2: Project and Implementation Strategy Overview Table

The **Preston Run – Maumee River HUC-12 Critical Area 2** is based on improving water quality in order to maintain the *full attainment* status of the ALU designation in the Maumee River at SR 281 (RM 62.3). The *Critical Area 2 Overview Table* provides a quick summary of what needs to be done, where, and what problem (cause/source) will be addressed and includes projects at all levels of development (i.e. concept, need funding, in progress). This Overview Table is intended to show a prioritized path toward the restoration of the **Preston Run – Maumee River HUC-12**.

<b>Critical Area 2: Project Overview Table for Preston Run – Maumee River HUC-12 (04110009 02 01)</b>							
Goal(s)	Objective(s)	Project #	Project Title (EPA Criteria g)	Lead Organization (criteria d)	Time Frame (EPA Criteria f)	Estimated Cost (EPA Criteria d)	Potential/Actual Funding Source (EPA Criteria d)
<b>Urban Sediment and Nutrient Reduction Strategies</b>							
1,2,3	1	2-1	East River Drive & East High Street	City of Defiance	Short	\$170,000	Ohio EPA §319, SWIF, GLRI
1,2,3	1	2-2	College Place	City of Defiance	Medium	\$240,000	§319,SWIF,GLRI
1,2,3	1	2-3	Holgate Park	City of Defiance	Medium	\$80,000	§319,SWIF,GLRI
1,2,3	2	2-4	Compo Park/Eastside Revitalization	City of Defiance	Medium	\$1,500,000	§319,SWIF,GLRI, CDBG Funds, City Funding
1,2,3	3	2-5	Defiance Co. Health Dept./Sherriff's Office	TBD	Medium	TBD	§319,SWIF,GLRI
<b>Altered Stream and Habitat Restoration Strategies</b>							
<b>Agricultural Nonpoint Source Reduction Strategies</b>							
<b>High Quality Waters Protection Strategies</b>							
<b>Other NPS Causes and Associated Sources of Impairment</b>							

4.3.2 Critical Area #2: Project Summary Sheets

The Project Summary Sheets provided below were developed based on the actions or activities needed to improve water quality and maintain the *full attainment* status of the ALU designation in the Maumee River at SR 281 (RM 62.3). These projects are considered next step or priority/short term projects. Medium and longer term projects will mostly like not have a Project Summary Sheet or will not have a complete Project Summary Sheet, as these projects are not ready for implementation. The Project Summary Sheets will be mostly the priority or short term project that are ready to implement, or at least those projects have been more thoroughly planned.

Critical Area 2: Project 1		
Nine Element Criteria	Information Needed	Explanation
<i>n/a</i>	Title	East River Drive & East High Street
<i>criteria d</i>	Project Lead Organization & Partners	City of Defiance
<i>criteria c</i>	HUC-12 and Critical Area	Preston Run – Maumee River (HUC 04100009 02 01) Critical Area #2 (Catchment G-58)
<i>criteria c</i>	Location of Project	Terminus of project is at the intersection of East River Drive and East High Street in the City of Defiance, Defiance County, Ohio, on the north bank of the Maumee River, approximately two blocks east of Pontiac Park. Project extent shown in Figure 15 (Section 3.3.1).
<i>n/a</i>	Which strategy is being addressed by this project?	Urban Sediment and Nutrient Reduction Strategy Altered Stream and Habitat Restoration Strategy High Quality Waters Protection Strategy
<i>criteria f</i>	Time Frame	Short (1-3 years)
<i>criteria g</i>	Short Description	Comprehensive Capital Improvement Project including replacement of water lines, reduction of combined sewer overflows, reconfiguration of traffic patterns, reconstruction of pavement and stormwater inflow reduction with the use of a combination of urban forestry, bioretention and other green infrastructure practices that will reduce impervious surface and increase infiltration.



Critical Area 2: Project 1		
Nine Element Criteria	Information Needed	Explanation
<i>criteria g</i>	Project Narrative	<p>The City of Defiance is planning to reconfigure the intersection at East River Drive and East High Street as a safety improvement to the corridor. At the same time this work is being completed, the water lines will be replaced and the stormwater inflow reduction project identified in the City’s North Basin Inflow Reduction Report will be implemented. While this report provides cost estimates for stormwater inflow reduction, it does not require the use of green infrastructure, therefore allowing this project to be eligible for 319 funding. The City has conducted a feasibility assessment of various proposed projects, including this one for the cost effectiveness of incorporating green infrastructure into the project. Green Infrastructure design options for stormwater inflow reduction will be presented to the public for review and feedback, with two alternatives under consideration – one option will have very low maintenance, that the City would maintain and another option for homeowners to get more involved in the maintenance of a rain garden-style infiltration practice that would include more diverse landscaping.</p> <p>Once constructed, the project will reduce urban stormwater runoff, improve riparian habitat, and decrease erosion and reduce sediment and phosphorus loads into the Maumee River main stem in Project Area G-58.</p>
<i>criteria d</i>	Estimated Total cost	Green Infrastructure: \$170,000
<i>criteria d</i>	Possible Funding Source	Ohio EPA §319, GLRI, SWIF
<i>criteria a</i>	Identified Causes and Sources	Causes: Sedimentation, flow alteration, organic enrichment, nutrient enrichment Sources: Urban stormwater runoff, CSOs
<i>criteria b &amp; h</i>	Part 1: How much improvement is needed to remove the NPS impairment for the whole Critical Area?	<p>With the goal being: to increase IBI score to 40 (currently 36) and raise QHEI score to 50 (currently 46) in the Maumee River at the SR 281 sampling site (RM 62.3).</p> <p>One reasonable objective includes increasing the amount of green infrastructure area used to manage stormwater runoff from connected impervious surfaces in <i>Critical Area #2</i> to 30 acres. The amount of green infrastructure area needed for Catchment G-58 in Phase 1 (2017-20) is 2 acres.</p>
	Part 2: How much of the needed improvement for the whole Critical Area is <i>estimated</i> to be accomplished by this project?	<p>This project will add one acre of green infrastructure area to Catchment G-58 (approximately 50 percent of the amount needed for Phase 1).</p> <p>Goals: There is recognition that there is lag time associated with nonpoint source-related projects and measured stream response. With respect to goals in Critical Area 2, the main driver is QHEI. Current data shows that the sampling point at SR 281 (RM 62.3), approximately 2 miles downstream of the proposed project location, is at 46, which is 4 points below the target index score of 50. It is expected that this project will cause an incremental increase in the QHEI scoring by at least 0.4 points, or 10% progress toward the QHEI goal. Since the IBI score is relatively lower, 10% progress is not necessarily expected toward those goals, but significant progress is expected for those index scores.</p>
	Part 3: Load Reduced	Estimated: 0.5 tons TSS/year, 5 pounds TP/year
<i>criteria i</i>	How will the effectiveness of this project in addressing the NPS impairment be measured?	Pre-project scores for the IBI, ICI, MIwb and QHEI are already available from Ohio EPA for Critical Area 2. Additional monitoring and scoring by Ohio EPA will be used as the post-project monitoring data to evaluate progress in the Critical Area toward the overall plan goals and attainment of Ohio’s WQS.

Critical Area 2: Project 1		
Nine Element Criteria	Information Needed	Explanation
<i>criteria e</i>	Information and Education	The City of Defiance in conjunction with Defiance SWCD will continue to use the Land to Lake program to communicate with the public by way of a semi-annual printed magazine, a fully functional website with details of public projects that are designed to enhance water quality and increase public participation (Public Boat/Canoe Rides, Green Infrastructure, Rain Garden/Rain Barrel Initiative, etc). We will hold one public meeting to gain input on this project during the design phase and provide (2-4) interpretive signs along the multi-use pathway for pedestrians and bikers. In addition, we will hold 2 project “walking tours” that will be targeted at “local leaders” in the community to include elected officials, as well as business and community leaders.

#### 4.4 Critical Area #3: Overview Table and Project Sheets

The information included in the *Critical Area 3 Overview Table* is a condensed overview of all identified projects needed for NPS restoration of the **Preston Run – Maumee River HUC-12 Critical Area 3**. Project Summary Sheets are included for short term projects or any project that is considering seeking funding in the near future. Only those projects with complete Project Summary Sheets will be considered for state and federal NPS program funding.

##### 4.4.1 Critical Area #3: Project and Implementation Strategy Overview Table

The **Preston Run – Maumee River HUC-12 Critical Area 3** is based on improving water quality in order to maintain the *full attainment* status of the ALU designation in the Maumee River at SR 281 (RM 62.3). The *Critical Area 3 Overview Table* provides a quick summary of what needs to be done, where, and what problem (cause/source) will be addressed and includes projects at all levels of development (i.e. concept, need funding, in progress). This Overview Table is intended to show a prioritized path toward the restoration of the **Preston Run – Maumee River HUC-12**.

<b>Critical Area 3: Project Overview Table for Preston Run – Maumee River HUC-12 (04110009 02 01)</b>							
Goal(s)	Objective(s)	Project #	Project Title (EPA Criteria g)	Lead Organization (criteria d)	Time Frame (EPA Criteria f)	Estimated Cost (EPA Criteria d)	Potential/Actual Funding Source (EPA Criteria d)
<b>Urban Sediment and Nutrient Reduction Strategies</b>							
<b>Altered Stream and Habitat Restoration Strategies</b>							
1,2,3	1	3-1	Maumee River Riparian Restoration	City of Defiance	Medium	\$2,500,000 in multiple phases	Ohio EPA 319, SWIF, GLRI, ODNR Clean Ohio Funds, Natureworks, Private Funding
<b>Agricultural Nonpoint Source Reduction Strategies</b>							
<b>High Quality Waters Protection Strategies</b>							
<b>Other NPS Causes and Associated Sources of Impairment</b>							



## 5. References

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