Approved: October 27, 2017

Version 1.0
August 01, 2017

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

Congress Run – Mill Creek HUC-12 (05090203 01 04)

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Acknowledgements

Many thanks to Bruce Koehler of Ohio*Indiana*Kentucky Regional Council of Governments, Brian Wamsley of Hamilton County Planning + Development Department, Adam Lehmann of the Hamilton County Soil & Water Conservation District, and Dr. Michael Miller of the University of Cincinnati. They, in partnership with Chris Weidl, Jim Moyer and Emma Clohessy of the Mill Creek Watershed Council of Communities, co-authored this document and provided invaluable contributions of time, effort, data analysis, and review. All figures throughout this plan were produced by Kari Merrill with GIS data available from O*K*I or provided by Adam Lehmann unless otherwise noted.

Chapter 1: Introduction

The **Congress Run – Mill Creek HUC-12** (05090203 01 04) is located in the southeast portion of the Mill Creek HUC-10 in Hamilton county in southwestern Ohio. This HUC-12 is immediately downstream of both the Sharon Creek – Mill Creek HUC-12 (05090203 01 03) and the West Fork Mill Creek – Mill Creek HUC-12 (05090203 01 02). Drainage from the Mill Creek main stem in the Sharon Creek – Mill Creek HUC-12 and the West Fork Mill Creek in the West Fork Mill Creek – Mill Creek HUC-12 converge at the northern end of the **Congress Run – Mill Creek HUC -12**, and flows downstream through the **Congress Run-Mill Creek HUC-12** into the West Fork – Mill Creek HUC-12 (05090203 01 05). The **Congress Run – Mill Creek HUC-12** is 29.96 square miles in size. Located on the center of the Greater Cincinnati area, it encompasses many land uses, including high-density residential, low-density residential, commercial properties, industrial properties, and parks.

As State and Federal nonpoint source funding is now closely tied to strategic implementation-based planning that includes U.S. EPA's nine minimum elements of a watershed plan for impaired waters as they relate to each specific project or solution, the Mill Creek Watershed Council of Communities is collaborating with the Hamilton County Soil and Water Conservation District, Hamilton County Planning + Development department, and the Ohio*Kentucky*Indiana Regional Council of Governments to author this NPS-IS plan. Each of these organizations has a long history of collaboration and partnership with the groups and municipalities within the **Congress Run – Mill Creek HUC-12**. This NPS-IS is the second of five such plans slated for development in the Mill Creek watershed (05090203 01). The Sharon Creek – Mill Creek NPS-IS Plan was approved by US EPA Region V on February 24, 2017.

1.1 Report Background

In light of the new guidance from Ohio EPA to regarding the development of watershed plans for single HUC-12s, this NPS-IS was created to guide the prioritization and implementation of nonpoint source pollution reduction strategies and projects in the **Congress Run – Mill Creek HUC-12**. It complements two existing endorsed WAPs in the Mill Creek watershed (05090203 01), as well as one approved Nine Element NPS-IS Plan for the Sharon Creek – Mill Creek HUC-12. These plans, the *Upper Mill Creek Watershed Management Plan* (December 2005), the *Lower Mill Creek Watershed Action Plan (LMCWAP)* (July 2014), and the *Nine-Element Nonpoint Source Implementation Strategic Plan for the Sharon Creek – Mill Creek HUC-12 (05090203 01 03)* can be found on the Mill Creek Watershed Council of Communities' website.

According to the Ohio EPA 2016 Integrated Report, this assessment unit scores a 16.7 out of 100 in terms of watershed health. This score falls into the lowest (More Impaired) category and demonstrates a clear need for targeted action to improve the health of streams and tributaries within the **Congress Run – Mill Creek HUC-12.** Other organizations and entities are planning and working to tackle additional issues contributing to impairments in the **Congress Run – Mill Creek HUC-12** not addressed in this plan, such as CSO and SSO overflows and industrial impairment contributions of an unknown nature.

1.2 Watershed Profile & History

The **Congress Run – Mill Creek HUC-12** is an assessment unit within the Mill Creek HUC-10 Watershed (05090203 01). The Mill Creek Watershed covers 166.2 square miles and encompasses thirty-seven political jurisdictions. The watershed is located in the Interior Plateau and Eastern Corn Belt Plains US EPA Level 3 Ecoregions. The Mill Creek main stem flows 28.1 miles through southeastern Butler County and central Hamilton County to its confluence with the Ohio River. From its origin elevation of approximately 797' in Liberty Township, the stream falls an average of 11.8'/mile to an elevation of 466' at its confluence with the Ohio River in the City of Cincinnati. Within the **Congress Run – Mill Creek HUC-12,** the elevation of the Mill Creek main stem falls from 519' at the top of the assessment unit to 475' at the bottom of the assessment unit just south of Salway Park.

The Mill Creek Basin lies in the Till Plains geological region of Ohio and flows through a broad, flat-bottomed pre-glacial valley surrounded by steep slopes (Schiefer, 2002). The major tributaries of the Mill Creek include East Fork Mill Creek, Sharon Creek, Beaver Run, Town Run, Congress Run, Cooper Creek, Amberley Creek, West Fork Mill Creek, Bloody Run, Ross Run, and West Fork Creek. These tributaries have an average gradient of 51.8 feet per mile as they flow down through the steep hillsides surrounding the Mill Creek Valley (Ellwood, 2005, p. 2).

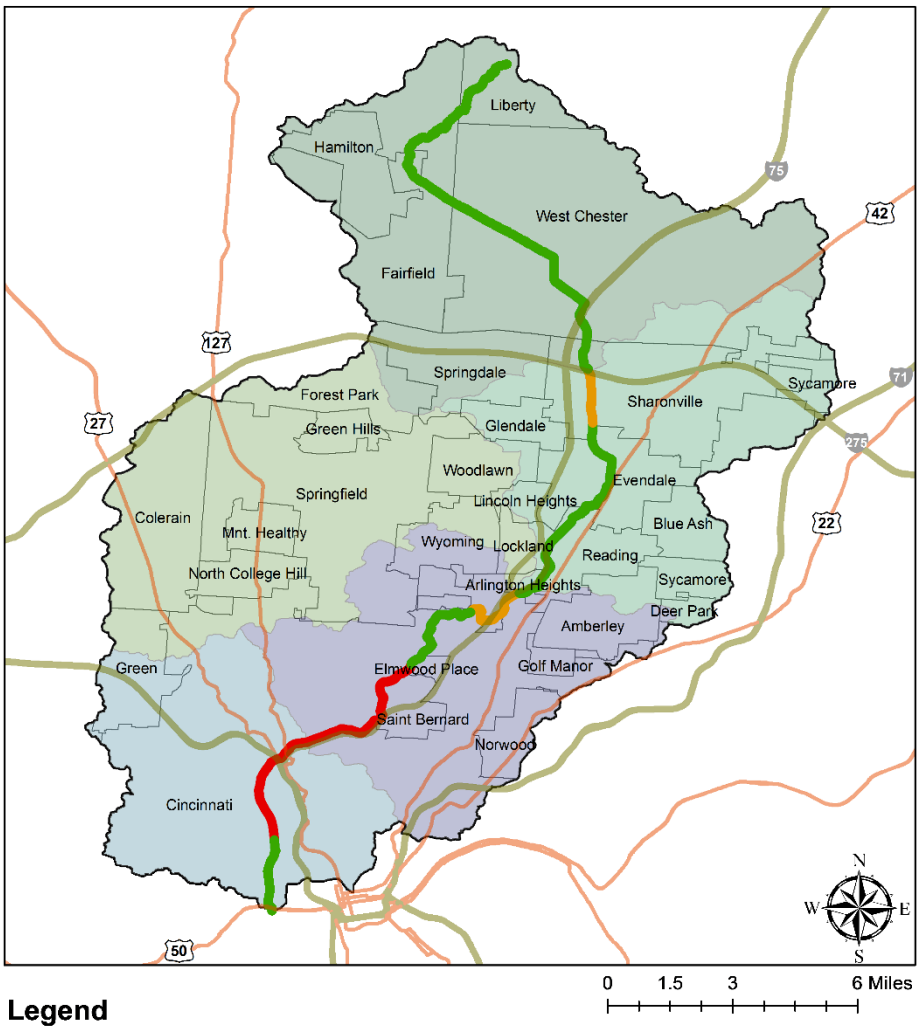
The geology of the Mill Creek Basin includes shales and limestones of the Upper Ordovician series. The main stem of the Mill Creek is underlain by 150 – 200 feet of buried valley deposits consisting of sand and gravel interbedded with till and clay (Schiefer, 2002). The tributaries are generally underlain by thinly inter-bedded shales and limestone bedrock, except for the lower reaches at their confluences with the Mill Creek (Ellwood, 2005, p. 2). The sand and gravel deposits produce large quantities of groundwater for industrial and municipal use. The dry-weather flows of Mill Creek are low, which may be partly caused by extensive pumping of groundwater.
Soils in the Mill Creek basin mostly developed from thin Illinoian glacial till. The principle soils are the moderately deep Eden ad the deep Pate, Switzerland, and Rossmoyne. These soils all have relatively low permeability. The soils of the valley are classified as Martinsville, Fox, and Genesee. They have good drainage and relatively high permeability, thus permitting recharge to groundwater bodies (Schiefer, 2002).

According to the Ohio EPA's page about the Mill Creek Watershed, "[t]he watershed is predominantly comprised of urban development with pockets of forest and a small amount of agricultural land in the northern portion of the watershed. Industry dominates the mid- to lower reaches of the watershed, and commercial and suburban uses are predominant in the upper watershed. The watershed also contains several CSOs and SSOs. Old industrial landfills line the banks of Mill Creek in some areas and several old hazardous waste sites have the potential to influence the stream" (Ohio Environmental Protection Agency, n.d.).

Aquatic life uses for the streams in the Mill Creek watershed reflect the high degree of urban and industrial development that has occurred within the watershed. The Mill Creek is currently designated Warm Water Habitat from its headwaters in Butler County to river mile (RM) 7.9 in Hamilton County, and Modified Warm Water Habitat (MWH) for the lower eight miles of the stream, where the U.S. Army Corps of Engineers has permanently modified the channel[1]. Starting on January 2, 2017, the WWH reach was extended to RM 7.3, which is about the halfway mark on the main stem in the **Congress Run – Mill Creek HUC-12.**

[1] For more information about channelization in the lower Mill Creek, see pages 206 through 210 of the *Lower Mill Creek Watershed Action Plan* (July 2014).

FIGURE 1: U.S. ARMY CORPS OF ENGINEERS (IN RED) AND OTHER CHANNELIZATION IN THE MILL CREEK WATERSHED



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1.3 Public Participation and Involvement

Many organizations, jurisdictions, and communities are working to restore the Mill Creek Watershed. The Mill Creek Watershed Council of Communities was founded in 1995 as a multi-jurisdictional 501(c) (3) nonprofit organization with the mission to build consensus among watershed stakeholders to drive improvements to the watershed. Since being listed by American Rivers in 1997 as "the most endangered urban river in North America," the Mill Creek has experienced a remarkable comeback through the combined and sustained restoration efforts of these stakeholders; however, there is still much work to be done to restore the stream to a true regional asset.

In addition to the Mill Creek Watershed Council of Communities, the Metropolitan Sewer District of Greater Cincinnati, the Ohio*Kentucky*Indiana Regional Council of Governments, Hamilton County Soil and Water Conservation District, Hamilton County Planning + Development Department, Butler County Storm Water District, ORSANCO and a variety of consultants have supported and implemented projects to improve the Mill Creek Watershed.

In 2015, the Mill Creek Watershed Council of Communities held a series of charrettes to solicit feedback from a wide variety of stakeholders throughout the watershed. This event garnered participation and feedback from over 250 people and close to 30 community representatives, industrial interests, consulting firms, and regional groups and governments about the issues they found most pressing on the Mill Creek and its tributaries. Many of the problems, concerns, and potential actions to mitigate those issues identified by Mill Creek stakeholders have been incorporated into this plan.

Based on the feedback from the Mill Creek charrettes, this watershed area is faced with major issues of riparian corridor encroachment, stormwater management, streambank erosion, and trash pollution. Suggestions for addressing these issues focused on the built urban environment and mitigating the impacts as close to source as possible. The Mill Creek could benefit from widespread adoption of policies and/or codes that encourage or mandate more comprehensive best management practices for stormwater.

Also from the charrettes, protecting and restoring the riparian corridor was considered to be a high priority. The Middle Mill Creek and Lower Mill Creek have limited visibility and recreational access which makes building a coalition for watershed awareness more difficult. To protect and restore the riparian corridor the best strategy is bringing more people closer to the stream thru projects that build multi-use walk and bike trails. In this way, trail building serves the dual purpose of riparian corridor expansion and protection, while bringing attention to the creek in a positive light.[2]

An opportunity to provide input and feedback on a draft version of this plan was open to members of communities, organizations, and governments in the **Congress Run– Mill Creek HUC-12** in July 2017. One public meeting was held at 1:30 P.M. on Monday, July 10th at Interact for Health in Norwood to obtain comments and discuss potential projects to be included in the plan. Invitations were sent to representatives of all jurisdictions within the boundaries of the **Congress Run – Mill Creek HUC-12**. Stakeholders who were not able to attend the meeting were provided a draft of the plan to allow them the opportunity to weigh in as well.

This plan was authored by the Mill Creek Watershed Council of Communities in partnership with the Hamilton County Planning + Development Department, Hamilton County Soil & Water Conservation District, and Ohio*Kentucky*Indiana Regional Council of Governments primarily utilizing *Biological and Water Quality Study of Mill Creek and Tributaries, 2011* (Technical Report MBI/2012-6-10), produced for the Metropolitan Sewer District of Greater Cincinnati (MSDGC) by the Midwest Biodiversity Institute (MBI). In addition, the *Ohio 2016 Integrated Water Quality Monitoring and Assessment Report* by Ohio EPA Division of Surface Water, the existing Lower Mill Creek Watershed Action Plan, and the Sharon Creek – Mill Creek NPS-IS Plan were used as references.

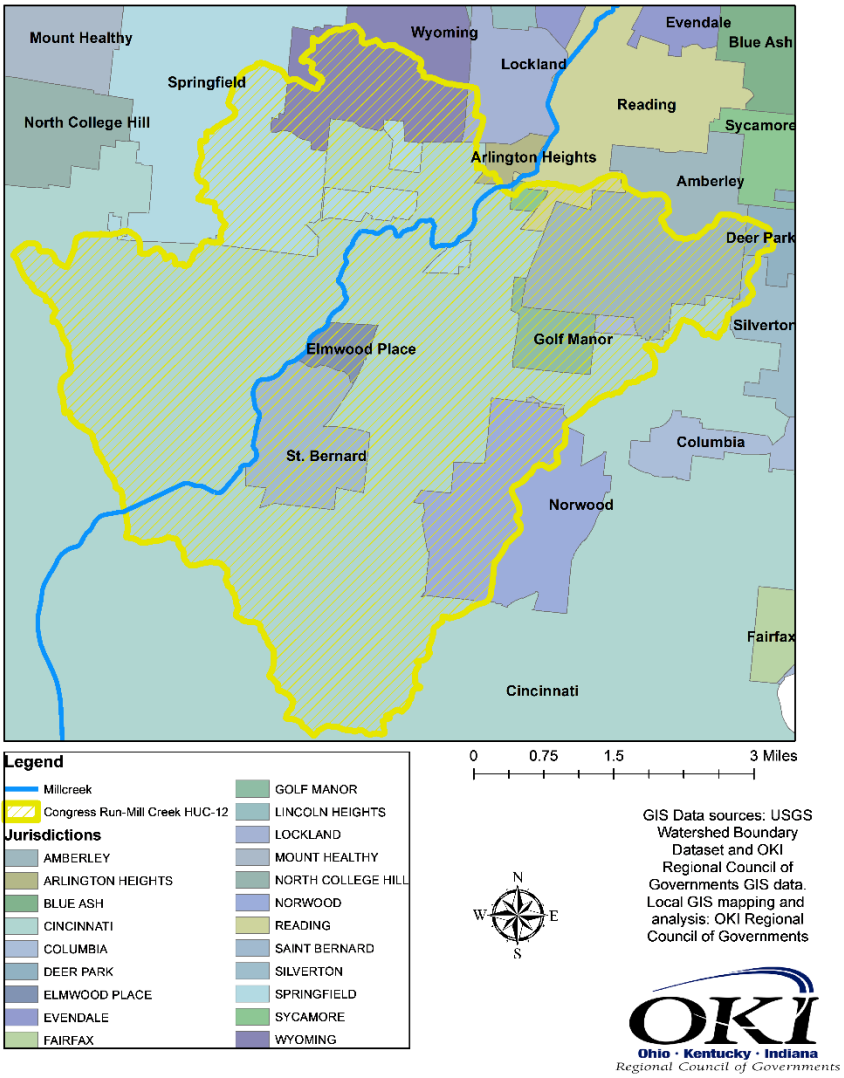
The majority of the characterization information in Chapter 2 was provided by Bruce Koehler of Ohio*Kentucky*Indiana Regional Council of Governments (O*K*I) using *Water Quality Management Plan for Butler, Clermont, Hamilton and Warren Counties in Ohio* (O*K*I Regional Council of Governments, November 2015 Update). Work on the O*K*I plan was financed

[2] This paragraph and the preceding paragraph were authored by Brian Wamsley of the Hamilton County Planning + Development Department.

through grants from Ohio EPA and U.S. EPA with funds from Section 604(b) of the Clean Water Act. Project information from Chapter 4 was prepared by Jim Moyer of the Mill Creek Watershed Council of Communities.

Chapter 2: Congress Run – Mill HUC-12 Watershed Characterization

FIGURE 2: BOUNDARY OF CONGRESS RUN - MILL CREEK HUC-12 WITH JURISDICTION OVERLAY



According to the Ohio EPA 2016 Integrated Report, the status of the **Congress Run – Mill Creek HUC-12** includes the following scores:

Assessment Unit	*Assessment Unit Name*	*Sq. Mi. in Ohio*	*Human Health*	*Recreation*	*Aquatic Life*	*PDW Supply*	*Priority Points*
05090203 01 04	Congress Run – Mill Creek	29.96	5h	3	5	0	3

For the Human Health section, a score of 5 indicates “Impaired; TMDL needed”, and the designation of “h” indicates that a score is based on historical data. For a complete overview of the Integrated Report Assessment Categories, please visit this Ohio EPA website.

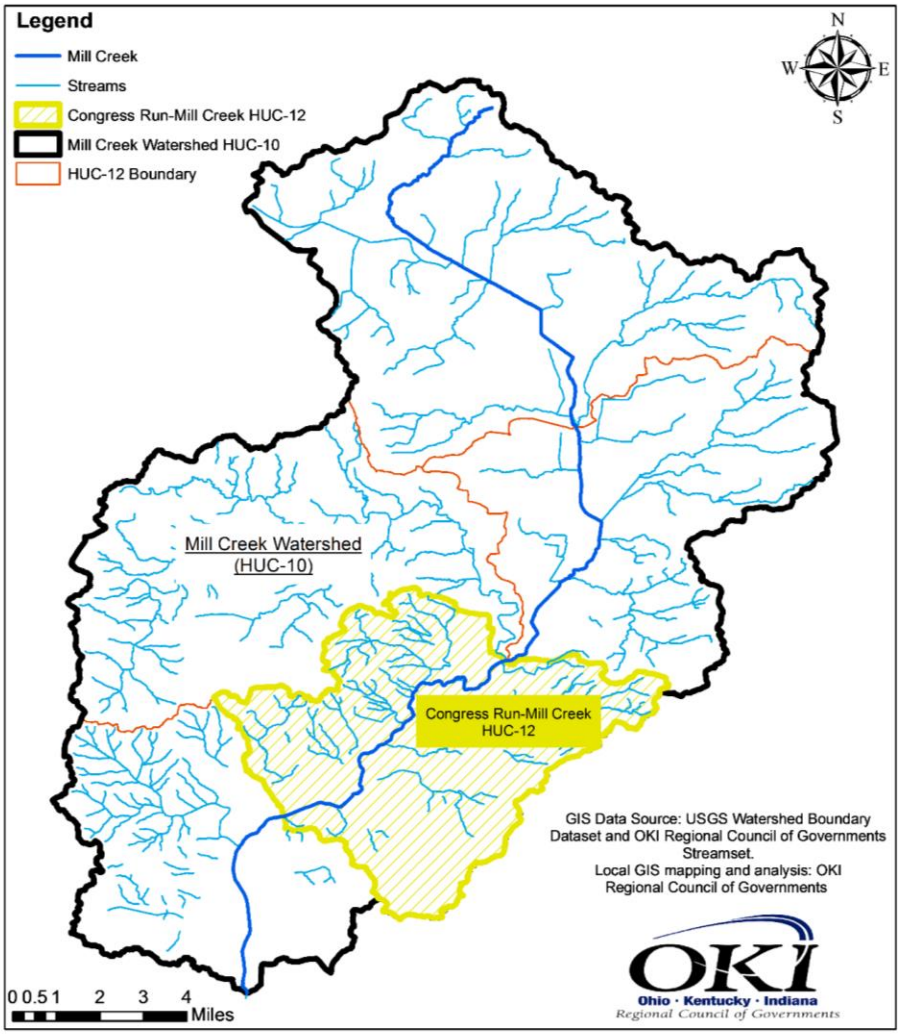
2.1 Summary Watershed Characterization for Congress Run – Mill Creek HUC-12

Section 2.1.1 was primarily authored by Bruce Koehler of O*K*I using information from the *Water Quality Management Plan for Butler, Clermont, Hamilton and Warren Counties in Southwest Ohio (November 2015 Update)*. The exception is the Soils section, which was authored by Adam Lehmann of Hamilton County Soil & Water Conservation District.

2.1.1 Physical and Natural Features

The **Congress Run – Mill Creek HUC-12** is the fourth of five HUC-12s located within the Mill Creek Watershed HUC-10, and lies in the lower third of the Mill Creek Watershed north to south on the southeastern side of the watershed.

FIGURE 3: LOCATION OF CONGRESS RUN - MILL CREEK HUC-12 WITHIN MILL CREEK WATERSHED



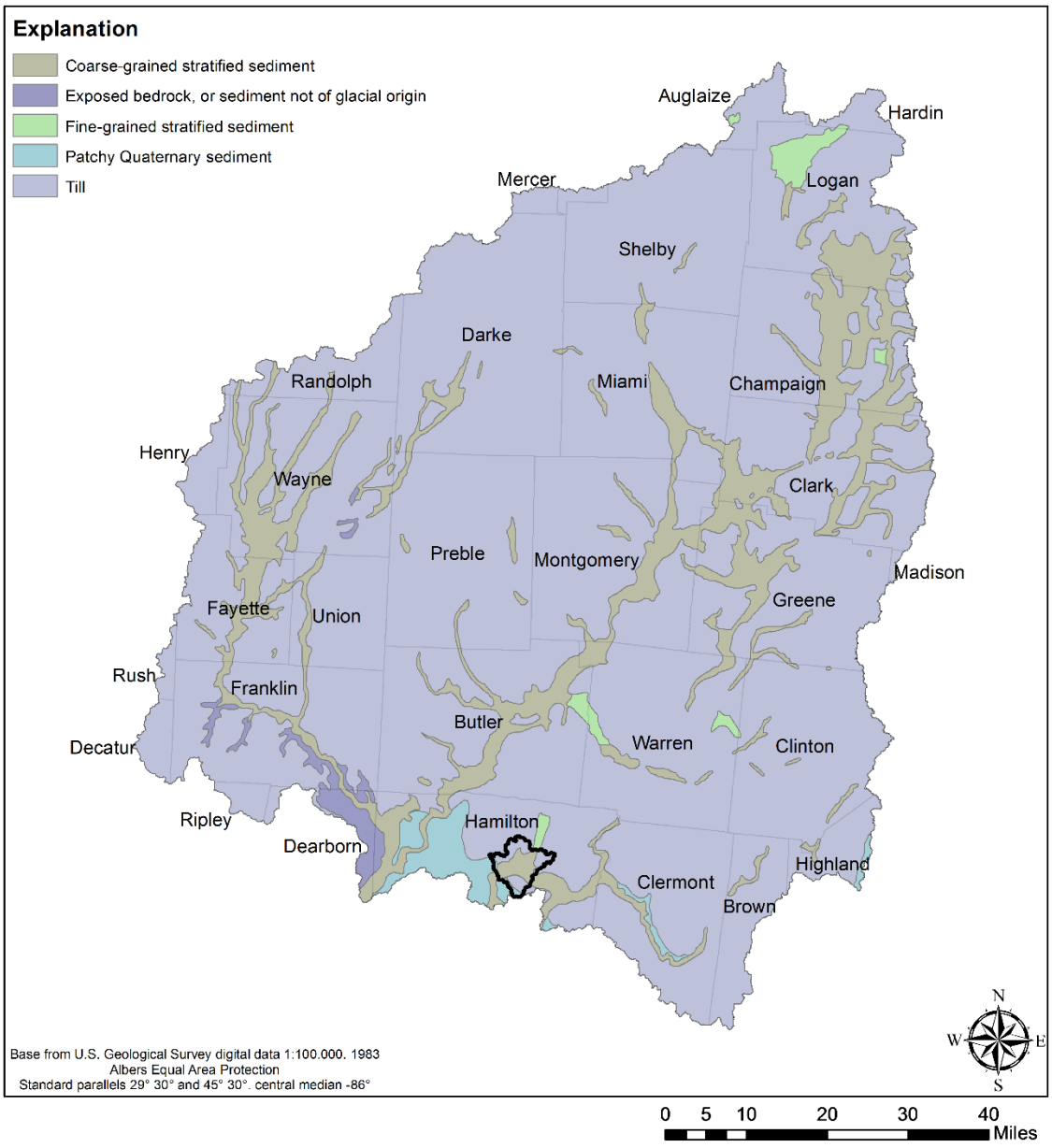
The **Congress Run – Mill Creek** assessment unit at the convergence of the Sharon Creek – Mill Creek HUC-12 and the West Fork Mill Creek – Mill Creek HUC-12. The Mill Creek main stem and West Fork Mill Creek converge at the boundary between the three HUC-12s. Congress Run joins the Mill Creek main stem near the top of the **Congress Run – Mill Creek HUC-12**. The main stem of the Mill Creek becomes channelized about halfway through the **Congress Run – Mill Creek HUC-12**, and drains into the West Fork – Mill Creek HUC-12, as distinct from the West Fork Mill Creek – Mill Creek HUC -12. (The Mill Creek watershed includes a West Fork Mill Creek, as well as a West Fork Creek.)

The **Congress Run – Mill Creek HUC-12** includes the following named streams and their tributaries:

STREAMS IN CONGRESS RUN – MILL CREEK HUC-12
Mill Creek
Amberley Creek
Bloody Run
Cilley Creek
Congress Run
Dan's Creek
Kings Run
Ludlow Run
Ross Run

Geology

FIGURE 4: MAP OF REGIONAL GEOLOGY IN CONGRESS RUN - MILL CREEK HUC-12



Five types of geology are present in the **Congress Run – Mill Creek HUC-12**. The assessment unit is predominated by till, with smaller amounts of coarse-grained stratified sediment, exposed bedroom or sediment not of glacial origin, fine-grained stratified sediment, and patchy Quaternary sediment. Till is unconsolidated glacial sediment consisting of an unsorted mixture of clay, silt, sand and gravel. Till was deposited by advancing glaciers or by melting stagnant ice. Fine-grained stratified sediments consisting of alternating well-sorted silt and clay layers. They were accumulated in lake environments formed in basins or valleys dammed by glacial ice. Coarse-grained outwash stratified sediment, consisting of well-sorted sand and gravel, was deposited by glacial meltwater. When the ice sheets melted, large volumes of meltwater flowed through stream valleys carved out by previous erosional events and filled them with well-sorted sand and gravel. Such outwash deposits are found beneath most major stream valleys in Butler, Clermont, Hamilton and Warren counties. Since the Pleistocene Epoch (Ice Age), these outwash deposits have been covered by recent alluvial deposits.

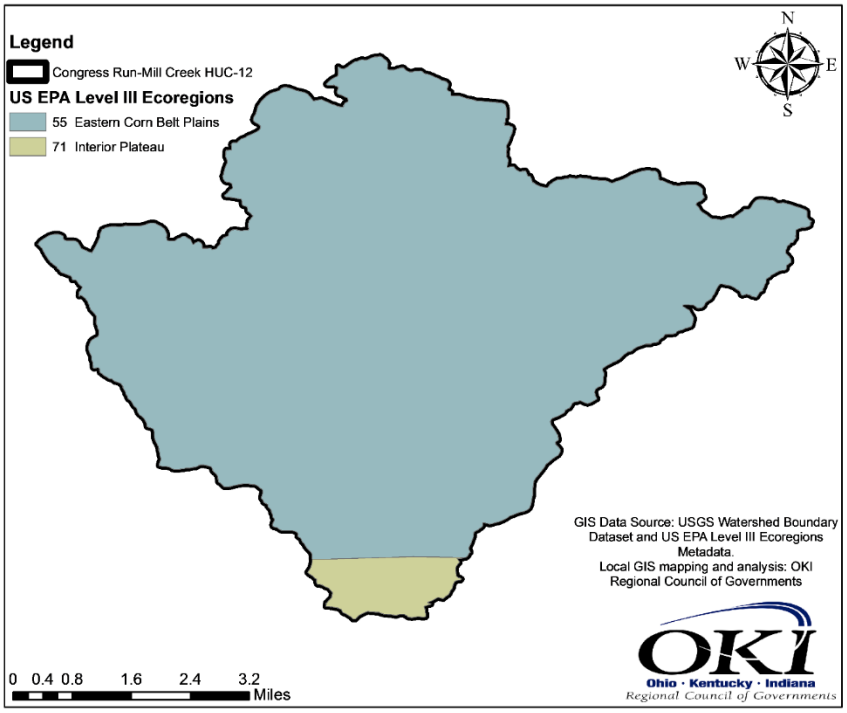
Ecoregions

Ohio EPA's *Guide to Developing Local Watershed Action Plans* states that "ecoregions are land-surface areas that are grouped based on similarities in land use, potential natural vegetation, land surface form and soils. These underlying factors determine the character of watersheds and have a profound influence on background water quality and the type and composition of the biological communities in a stream or river and the manner in which human impacts are exhibited." In Ohio, ecoregions are also significant to water resource assessments and regulations because Ohio EPA partly bases its water quality standards, especially biocriteria, on the five types of ecoregions. More specifically, ecoregions influence the criteria to be applied for Warm Water Habitat, which is the predominant aquatic life use designation for streams in Butler, Hamilton and Warren counties, including part of the **Congress Run – Mill Creek HUC-12**, the other part being designated Modified Warm Water Habitat.

When Ohio EPA assesses whether the region's streams attain their Warm Water Habitat potential, ecoregion influences the application of these biological indices:

- Index of biological integrity (IBI)
- Invertebrate health. community index (ICI)
- Modified index of well-being (MIwB).

FIGURE 5: US EPA LEVEL III ECOREGIONS IN CONGRESS RUN - MILL CREEK HUC-12



The **Congress Run-Mill Creek HUC-12** is almost entirely within the U.S. EPA Level III ecoregion titled Eastern Corn Belt Plains, which cover all of Butler and Warren counties and the eastern half of Hamilton County, except for the Ohio River corridor. This ecoregion is typified by gently rolling glacial till plains with moraines, kames and outwash features (Omernik and Gallant 1988, as cited in Ohio EPA 1997). Before settlement, the area had plentiful natural tree cover. Many of its soils are relatively loamy, rich and well-drained. Glacial deposits of Wisconsinan age are extensive. Areas with pre-Wisconsinan till are more dissected and leached. Originally, beech forests were common on the Wisconsinan soils while beech forests and elm-ash swamp forests dominated the wetter pre-Wisconsinan soils.

The very southern tip of the **Congress Run – Mill Creek HUC-12** falls into the U.S. EPA Level III Interior Plateau Ecoregion, but no stream sampling locations fall within this portion of the assessment unit, and it therefore does not have a bearing on the application of the biological indices.

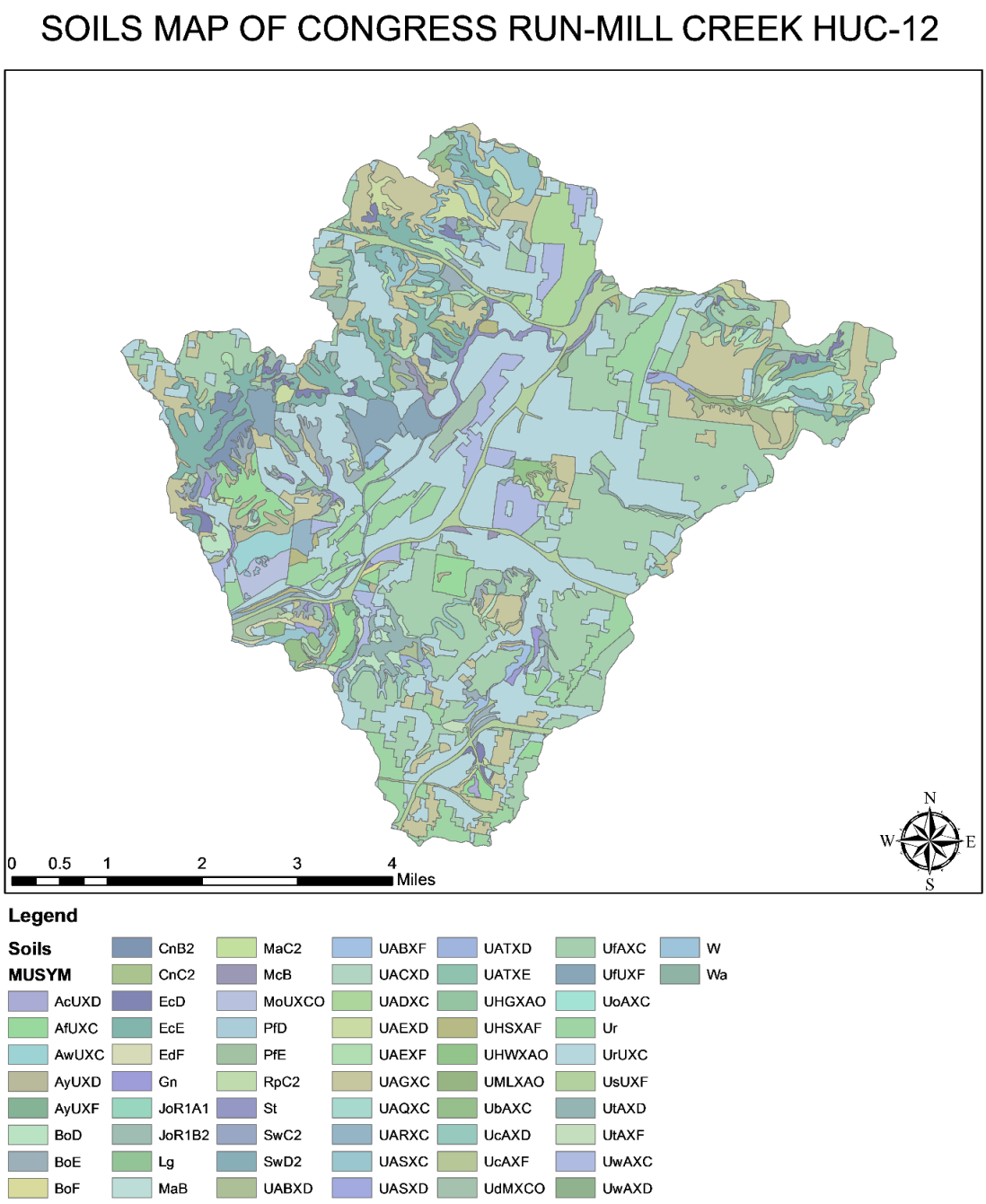
Physiography

1. The **Congress Run – Mill Creek HUC-12** is within the Till Plains of the Central Lowland physiographic province. The province is characterized by Pleistocene glaciations. Advance and retreat of the glacial ice sheets produced a flat to gently rolling land surface that is cut by steep-walled river valleys of low to moderate relief. Towards the south, glacial deposits are thin or absent, and erosion of less-resistant shale has produced a dissected hilly terrain of higher stream density. The general topographic gradient is from north to south. The **Congress Run – Mill Creek HUC-12** is located south of the southern terminus of the Wisconsinan glacial boundary.

2. The Till Plains of the Central Lowland divide into three Ohio subunits and one Indiana subunit. Topographic variations in each Ohio subunit depend largely on the bedrock geology and glacial history of the region. The **Congress Run-Mill Creek HUC-12** falls into the Illinoian Till Plan subunit. This Ohio physiographic subunit is characterized by rolling ground moraines of older till and numerous buried valleys. Its streams typically flow over exposed Ordovician shale and limestone.Soils

Soils

FIGURE 6: SOILS MAP OF CONGRESS RUN - MILL CREEK HUC-12



According to the Soil Survey Geographic (SSERGO) database maintained by the Natural Resource Conservation Service (NRCS), there are 60 mapped soil types in the **Congress Run-Mill Creek HUC-12**. As is typical of soil survey results for urban areas, because of the common occurrence of fill material and paved surfaces in developed areas, much of the soil types identified within the **Congress Run-Mill Creek HUC-12** are unclassified with respect to several key factors influencing local hydrology. The classification distribution of some of these key hydrologic factors is displayed in Table 1 below.

TABLE 1: SOIL CLASSIFICATIONS IN CONGRESS RUN - MILL CREEK HUC-12

Soil Classification Systems	Acres	Percent Coverage
Drainage Class* - Well drained	5,579.4	29.1%
Drainage Class* - Moderately well drained	4,594.9	24.0%
Drainage Class* - Somewhat poorly drained	1,936.2	10.1%
Drainage Class* - Not classified	7,064.0	36.8%
Hydrologic Soil Group** - A	102.0	0.5%
Hydrologic Soil Group** - B	112.4	0.6%
Hydrologic Soil Group** - C	1,054.5	5.5%
Hydrologic Soil Group** - D	2,926.6	15.3%
Hydrologic Soil Group** - Not classified	14,979.0	78.1%
Soil Erodibility*** - Low	102.0	0.5%
Soil Erodibility*** - Moderate	1,828.4	9.5%
Soil Erodibility*** - High	1,326.4	6.9%
Soil Erodibility*** - Unclassified	15,917.8	83.0%

* Drainage Classifications range from "Well drained" to "Poorly drained".

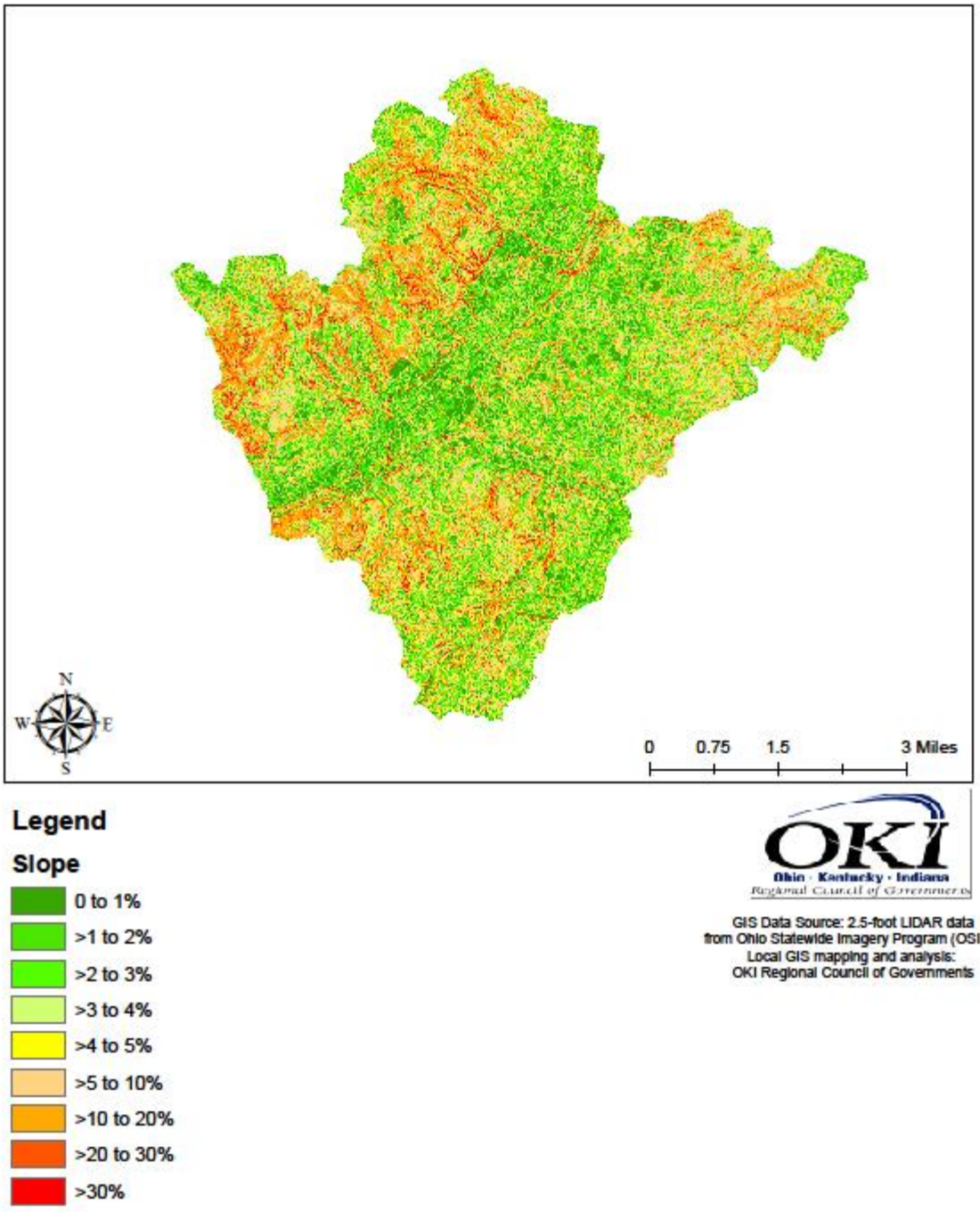
** Hydrologic Soil Groups are classifications based on minimum infiltration rates with "A" representing relatively high infiltration rates and "D" representing relatively low infiltration rates.

*** Soil Erodibility was based on a classification for K-factor from the Universal Soil Loss Equation: "Low" representing K-factor < 0.23; "Moderate" representing K-factor ≥ 0.23 and < 0.4; and "High" representing K-factor ≥ 0.4.

Of the 19,175-acres of soils mapped within the **Congress Run-Mill Creek HUC-12**, none of the mapped soils types are classified as "hydric" (or wetland soil) on the NRCS's 2015 Hydric Soils List. Only 2.2% of mapped soils were designated as "Prime Farm Land".

Slope

FIGURE 7: SLOPE CLASSIFICATION IN THE CONGRESS RUN - MILL CREEK HUC-12



The topography of the **Congress Run-Mill Creek HUC-12** is variable with relatively flat areas in the Mill Creek floodplain and in the central-eastern portion of the watershed. Relatively steep hillslopes rise above the Mill Creek floodplain and are drained by high gradient headwater streams (many exceeding 30% slopes). Topography has played a limiting role for development historically leaving the steeper hillsides along the periphery of the **Congress Run-Mill Creek HUC-12**, less densely developed than its flatter center.

Species

According to a preliminary report run using the U.S. Fish & Wildlife Service Information for Planning and Conservation, the **Congress Run – Mill Creek HUC-12** potentially encompasses habitat of 8 endangered species and 24 species of migratory birds; however, based on the extensive development within the assessment unit and impairments to the Mill Creek, Congress Run, and tributaries, it is unlikely that any of the listed endangered species are actually present, with the possible exception of the Indiana Bat (*Myotis sodalist*). There are no known overwintering sites for the Indiana Bat within the **Congress Run – Mill Creek HUC-12**, or, for that matter, within the Mill Creek Watershed HUC-10. However, there are stands of hardwood which could provide summer roosting habitat. Although the **Congress Run – Mill Creek HUC-12** is within the range of running buffalo clover, no documented populations exist within the watershed. There are no critical habitats located within the assessment unit.

Invasive species present in the **Congress Run – Mill Creek HUC-12** include the Emerald Ash Borer (*Agrilus Planipennis*) and honeysuckle (*Lonicera maackii* and *Lonicera japonica*). Many of the top invasive species listed by Ohio Department of Natural Resources are also found in the Mill Creek Watershed and are likely present in the assessment unit.

Wetlands

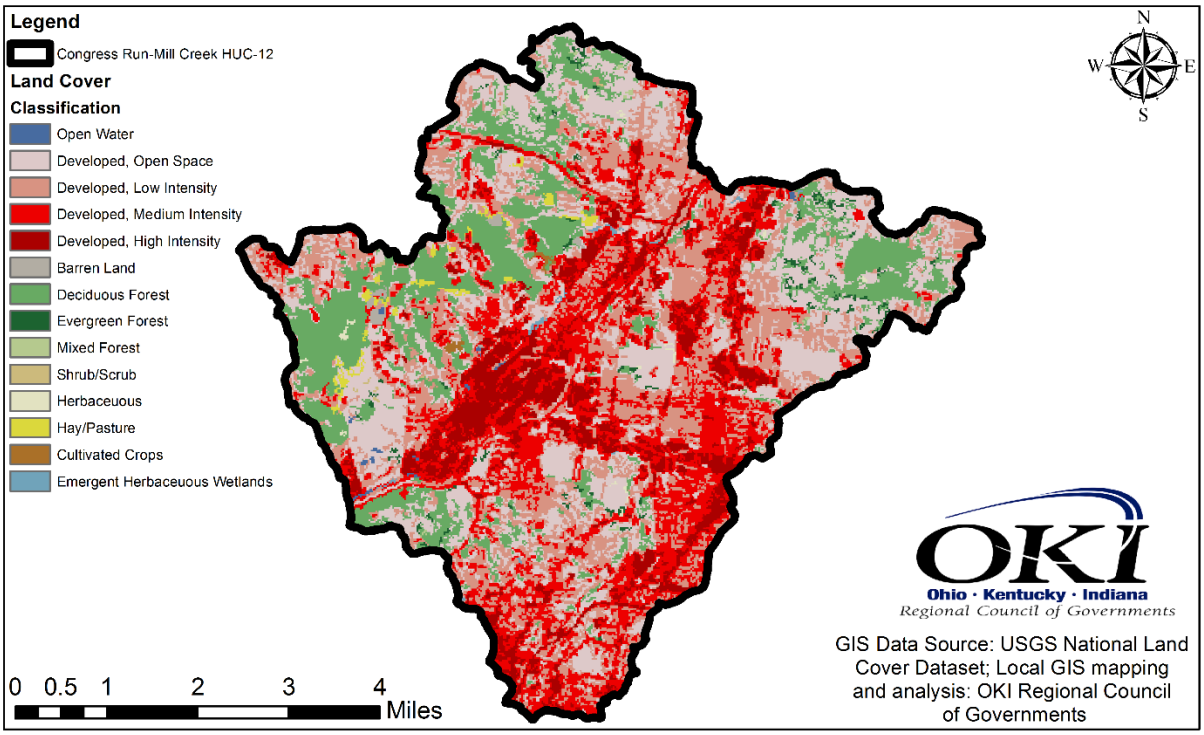
Historically, the **Congress Run – Mill Creek HUC-12** had a wetland area of 2.52%; this amount has decreased to its present 0.02% (Ohio Environmental Protection Agency, Division of Surface Water, 2016, p. (I1 Supplemental) 59).

2.1.2 Land Use and Protection

In the **Congress Run – Mill Creek HUC-12,** stream habitat quality tracks closely with the surrounding land use. According to the Ohio EPA 2016 Integrated Report, 79.40% of the assessment unit is Developed, 17.80% is Forest, 2.30% is Grass/Pasture, and 0.40% is Other. The assessment unit currently has an Aquatic Life Use Assessment Watershed Score of 16.7 out of 100, which places it in the More Impaired category—the most severe level of impairment (Ohio Environmental Protection Agency, 2016).

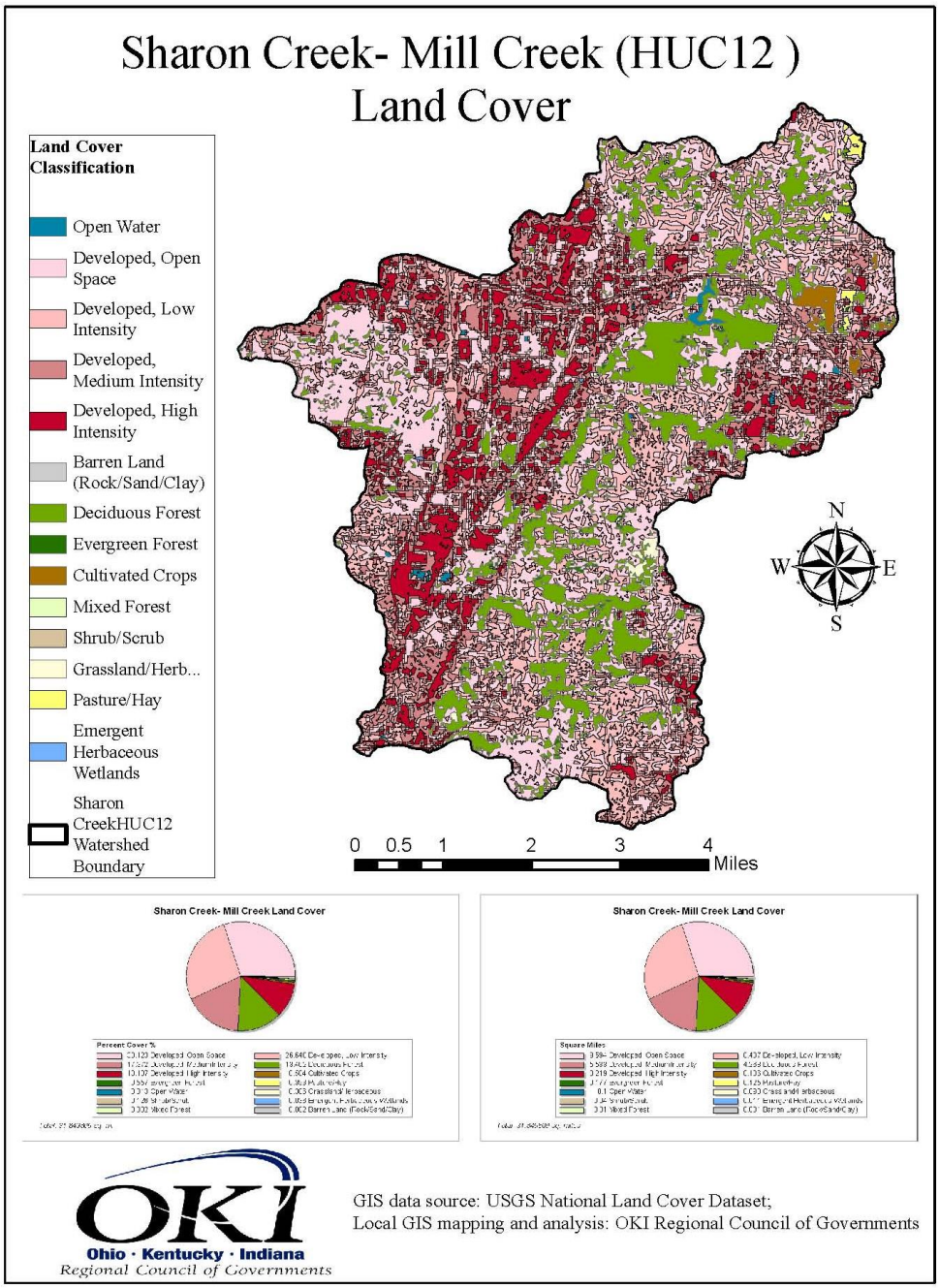
Two assessment units are located immediately upstream of the **Congress Run – Mill Creek HUC-12** (the drainages from these two assessment units converge at the top of the assessment unit). The first, the Sharon Creek – Mill Creek HUC-12, has a similar land use breakdown as the **Congress Run – Mill Creek HUC-12**, with high percentages of developed land and relatively limited areas of other land uses. The breakdown in the Sharon Creek – Mill Creek HUC-12 is: 84.50% Developed, 14.00% Forest, 0.70% Grass/Pasture, 0.60% Row Crops, and 0.20% Other.

FIGURE 8: LAND USE IN CONGRESS RUN – MILL CREEK HUC -12



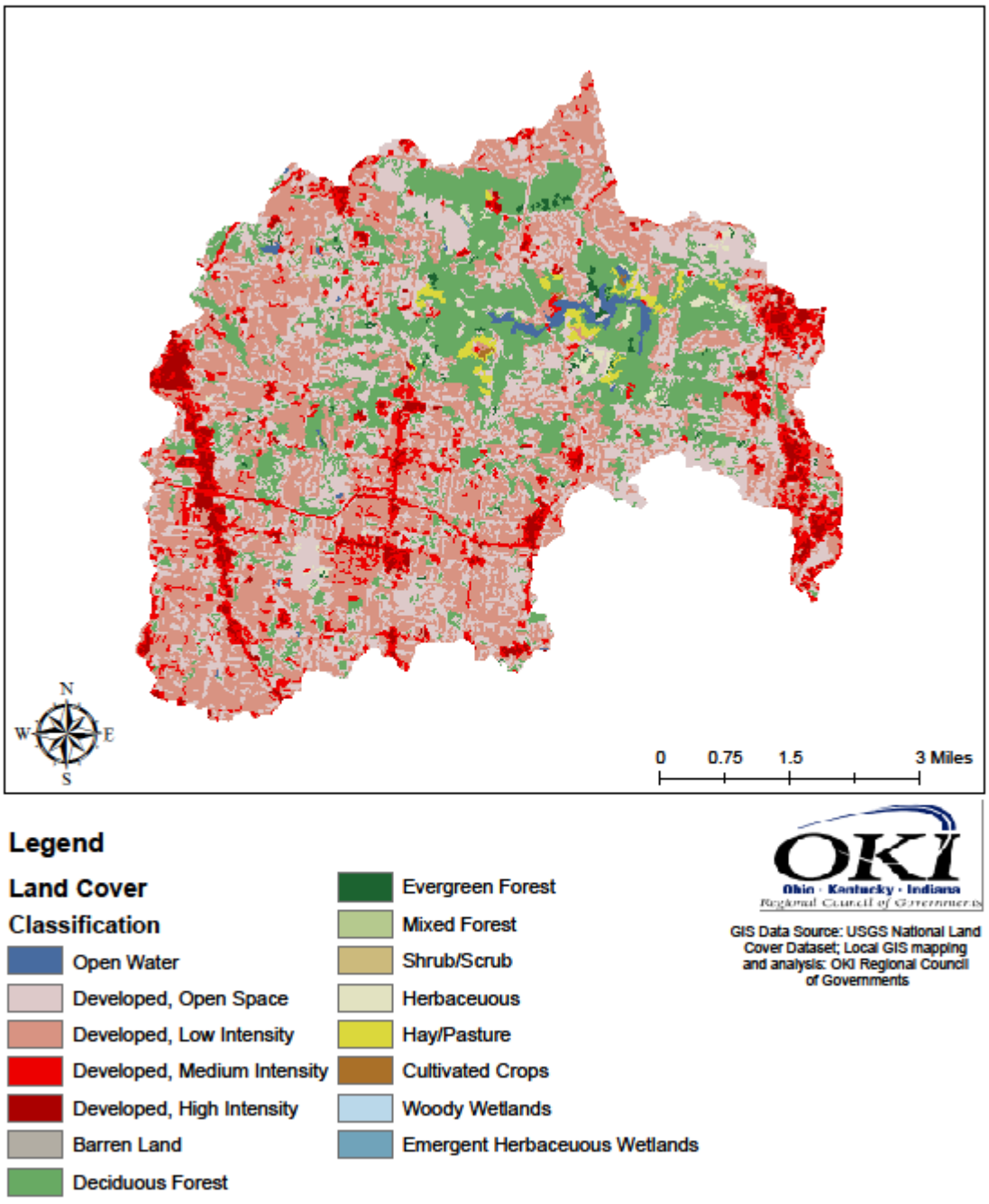
The developed areas in the **Congress Run – Mill Creek HUC-12** include highly developed industrial and commercial properties along the main stem of the Mill Creek, and high density commercial and residential areas in the southeast portion of the subwatershed. Medium and low density residential areas expand outward from the high density areas. A moderately sized park (French Park in Amberley Village) is included in the low density residential area on the eastern side of the HUC-12. Slightly to the northwest of French Park is Amberley Green, a former golf course currently preserved in the form of green space with walking trails, but possibly slated for development of residential properties. The assessment unit includes a stretch of Interstate 75 alongside the Mill Creek main stem from the top of the **Congress Run – Mill Creek HUC-12** to the bottom. State Route 126 and State Route 562 traverse the assessment unit from west to east in the northern and southern portions, respectively.

FIGURE 9: LAND COVER IN SHARON CREEK - MILL CREEK HUC-12



The second, the West Fork Mill Creek – Mill Creek HUC-12, is also highly developed, but has more forested area. The breakdown in the West Fork Mill Creek – Mill Creek HUC-12 is: 74.50% Developed, 22.40% Forest, 2.80% Grass/Pasture, and 0.20% Other.

FIGURE 10: LAND COVER IN WEST FORK MILL CREEK - MILL CREEK HUC-12



Land use in these HUC-12s is likely affecting stream health in the **Congress Run – Mill Creek HUC-12**. Tables 2 and 3 below list more detailed Land Use Classification data for each HUC-12.

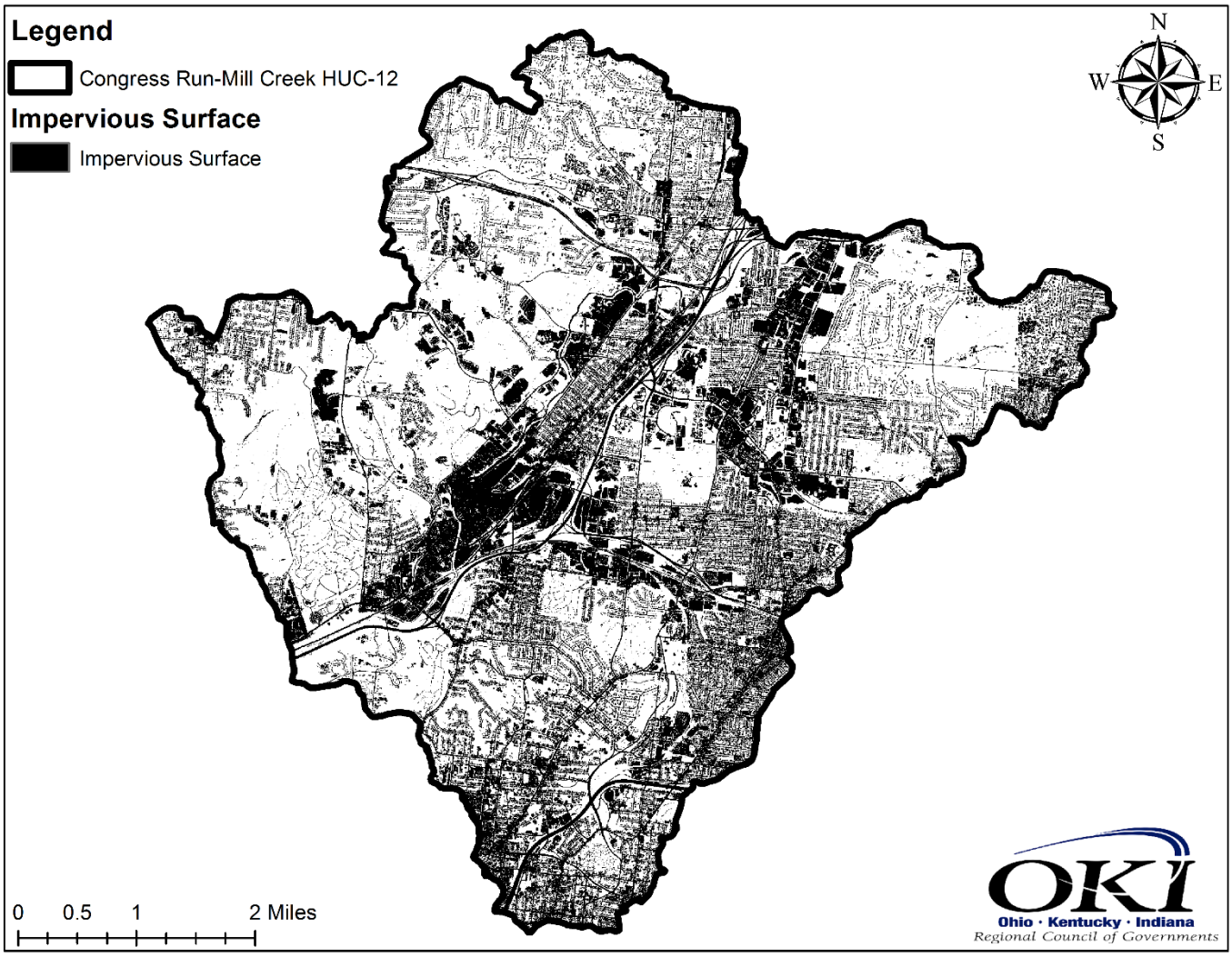
TABLE 2: LAND USE CLASSIFICATIONS FOR CONGRESS RUN - MILL CREEK HUC-12 (O*K*I, 2017)

Cover Classification	% Watershed Area	Area (mi^2)
Congress Run – Mill Creek *(05090203 01 04)*		
Open Water	0.20%	0.05
Developed, Open Space	24.3%	7.28
Developed, Low Intensity	25.7%	7.69
Developed, Medium Intensity	21.9%	6.58
Developed, High Intensity	9.8%	2.93
Barren Land (Rock/Sand/Clay)	0.30%	0.08
Deciduous Forest	15.9%	4.77
Evergreen Forest	0.8%	0.25
Mixed Forest	0.10%	0.03
Shrub/Scrub	0.10%	0.02
Grassland/Herbaceous	0.20%	0.05
Pasture/Hay	0.60%	0.18
Cultivated Crops	0.10%	0.038
Emergent Herbaceous Wetlands	0.20%	0.05
Total	100.00%	29.9

TABLE 3: LAND USE CLASSIFICATIONS FOR OTHER SELECTED MILL CREEK WATERSHEDS (O*K*I, 2017)

Cover Classification	% Watershed Area	Area (mi^2)	Cover Classification	% Watershed Area	Area (mi^2)
Sharon Creek – Mill Creek *(05090203 01 03)*			***West Fork Mill Creek – Mill Creek*** *(05090203 01 02)*		
Open Water	0.31%	0.10	**Open Water**	0.9%	0.33
Developed, Open Space	30.12%	9.59	**Developed, Open Space**	28.6%	10.37
Developed, Low Intensity	26.65%	8.49	**Developed, Low Intensity**	35.1%	12.72
Developed, Medium Intensity	17.37%	5.53	**Developed, Medium Intensity**	9.0%	3.25
Developed, High Intensity	10.11%	3.22	**Developed, High Intensity**	3.2%	1.16
Barren Land (Rock/Sand/Clay)	<0.01%	<0.01	**Barren Land (Rock/Sand/Clay)**	0.0%	<0.01
Deciduous Forest	13.40%	4.27	**Deciduous Forest**	20.8%	7.55
Evergreen Forest	0.56%	0.18	**Evergreen Forest**	0.5%	0.18
Mixed Forest	0.03%	0.01	**Shrub/Scrub**	0.1%	<0.01
Shrub/Scrub	0.13%	0.04	**Grassland/Herbaceous**	0.8%	0.28
Grassland/Herbaceous	0.31%	0.10	**Pasture/Hay**	0.9%	0.33
Pasture/Hay	0.39%	0.13	**Cultivated Crops**	0.1%	0.03
Cultivated Crops	0.58%	0.19	**Emergent Herbaceous Wetlands**	0.0%	<0.01
Emergent Herbaceous Wetlands	0.04%	0.01		0.0%	<0.01
Total	100.00%	31.85	**Total**	100.00%	36.25

FIGURE 11: IMPERVIOUS SURFACE IN CONGRESS RUN - MILL CREEK HUC-12



Large areas of impervious surface line much of the Mill Creek corridor, and impervious surface is apparent throughout most of the **Congress Run – Mill Creek HUC**-12, with the notable exceptions of Amberley Park in the northeast, and Spring Grove Cemetery on the western side of the assessment unit. The assessment unit includes 27.6 miles of interstate highways and ramps, 12 miles of U.S. highways, 19.9 miles of state routes, and 42.8 miles of county roads. According to the Ohio*Indiana*Kentucky Regional Council of Governments, 7.98% of the assessment unit is comprised of highly erodible soils, 4.64% is made up of not highly erodible soils, and 10.54% of the assessment unit consists of potentially erodible soils.

As high runoff quantities often correlate to erosion issues, these numbers track with the fact that combined erosion and sedimentation within the watershed is a significant nonpoint pollutant issue that impacts both the assessment unit and the larger Mill Creek Watershed. Actively eroding stream banks due to altered hydrology and urban runoff within the assessment unit contribute heavily to sedimentation. Restoration of natural hydrology and flow regime have been identified as needed restorations/improvements within the entire watershed, and especially in Congress Run and the highly industrialized main stem of the Mill Creek in the **Congress Run – Mill Creek HUC-12.**

Approximately 56.05% of **Congress Run – Mill Creek HUC-12** is served by combined sewer, with the remainder served by sanitary sewer and septic systems. During wet weather events, stormwater can enter the sanitary and combined sewer systems and can result in overflows from these sewer systems into streams, tributaries, or storm sewers where the sewer

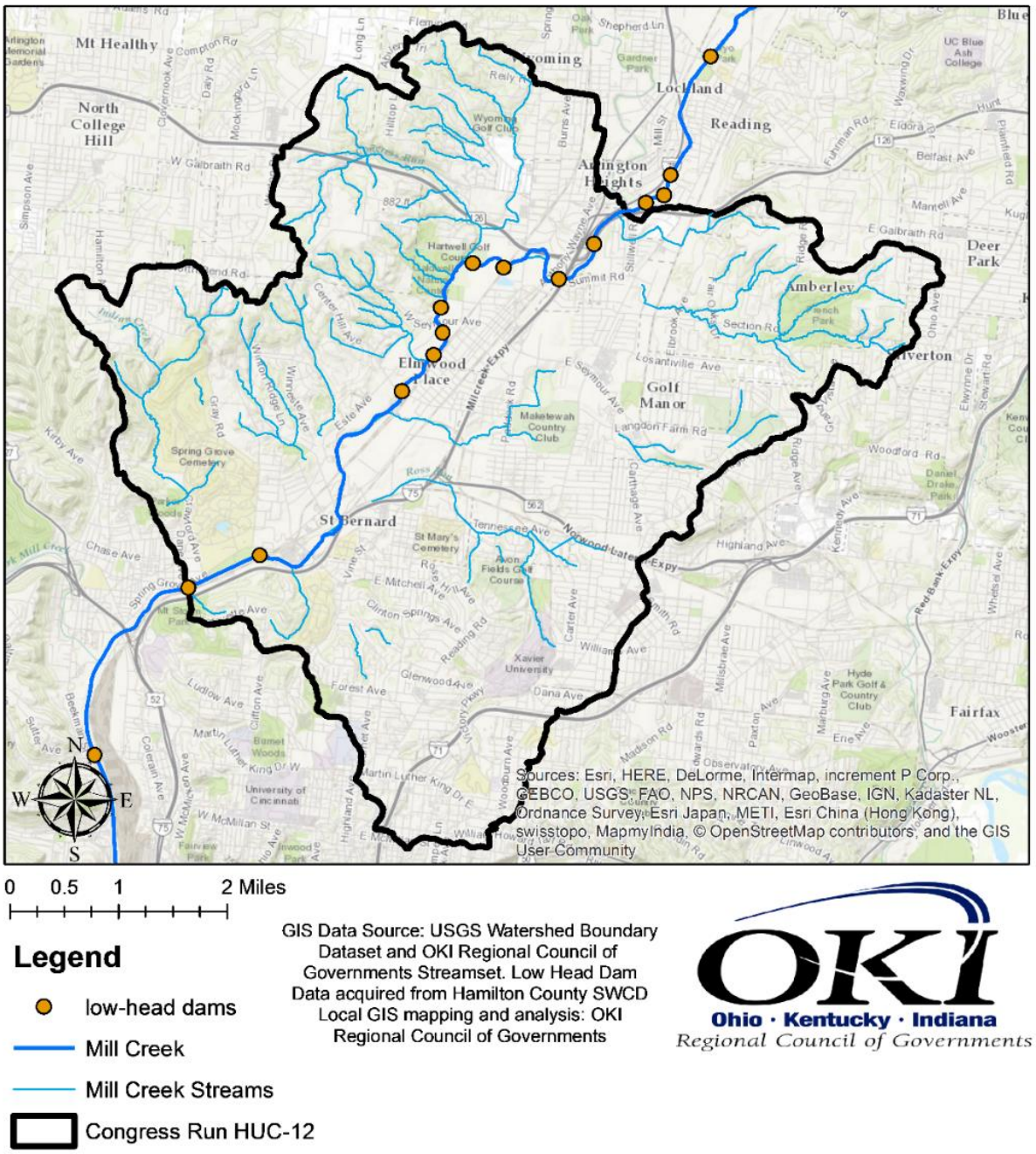
overflow comingles with stormwater runoff. At least 41 combined sewer overflows (CSOs) are located throughout this HUC-12, with several additional CSOs clustered on the Mill Creek main stem immediately upstream. These sewer overflows are sources of such pollutants as fecal bacteria, nutrients, and total suspended solids and thereby contribute to stream impairment. Stormwater runoff throughout this highly urbanized assessment unit contributes significantly to impairment as well, both due to the quality and the quantity of runoff.

Protected land within the **Congress Run – Mill Creek HUC-12** includes French Park in Amberley Village, a Cincinnati City Park, as well as Caldwell Nature Center (also owned by the Cincinnati Park Board).

Specific features within the **Congress Run – Mill Creek HUC-12** include:

- Hartwell Golf Course
- Spring Grove Cemetery
- French Park
- Caldwell Nature Center
- Industrial corridor along the Mill Creek main stem including manufacturing, trucking, and storage
- Railroads
- One major interstate and two major state routes
- Substantial residential development
- Landfills, both active and closed
- Interbasin groundwater transfer activity via pipeline and Mill Creek discharge
- Numerous SSOs and more than 40 CSOs
- Two public water systems with drinking water source protection areas
- Low-head dams

FIGURE 12: LOW HEAD DAM LOCATIONS ON THE MILL CREEK MAIN STEM IN CONGRESS RUN - MILL CREEK HUC-12



2.2 Summary of Biological Trends for Congress Run – Mill Creek HUC-12

In 2011, Level 3 biologists from Midwest Biodiversity Institute sampled twelve sites within the **Congress Run – Mill Creek HUC-12.** The data included in the tables in this section of this plan is taken exclusively from the *Biological and Water Quality Study of Mill Creek and Tributaries, 2011* (Technical Report MBI/2012-6-10). A thirteenth site, MC99, is included in the MBI report, but biological sampling was not conducted at that site, so it has been omitted from the tables which follow.

FIGURE 13: MBI SAMPLING LOCATIONS & ATTAINMENT IN THE CONGRESS RUN – MILL CREEK HUC-12

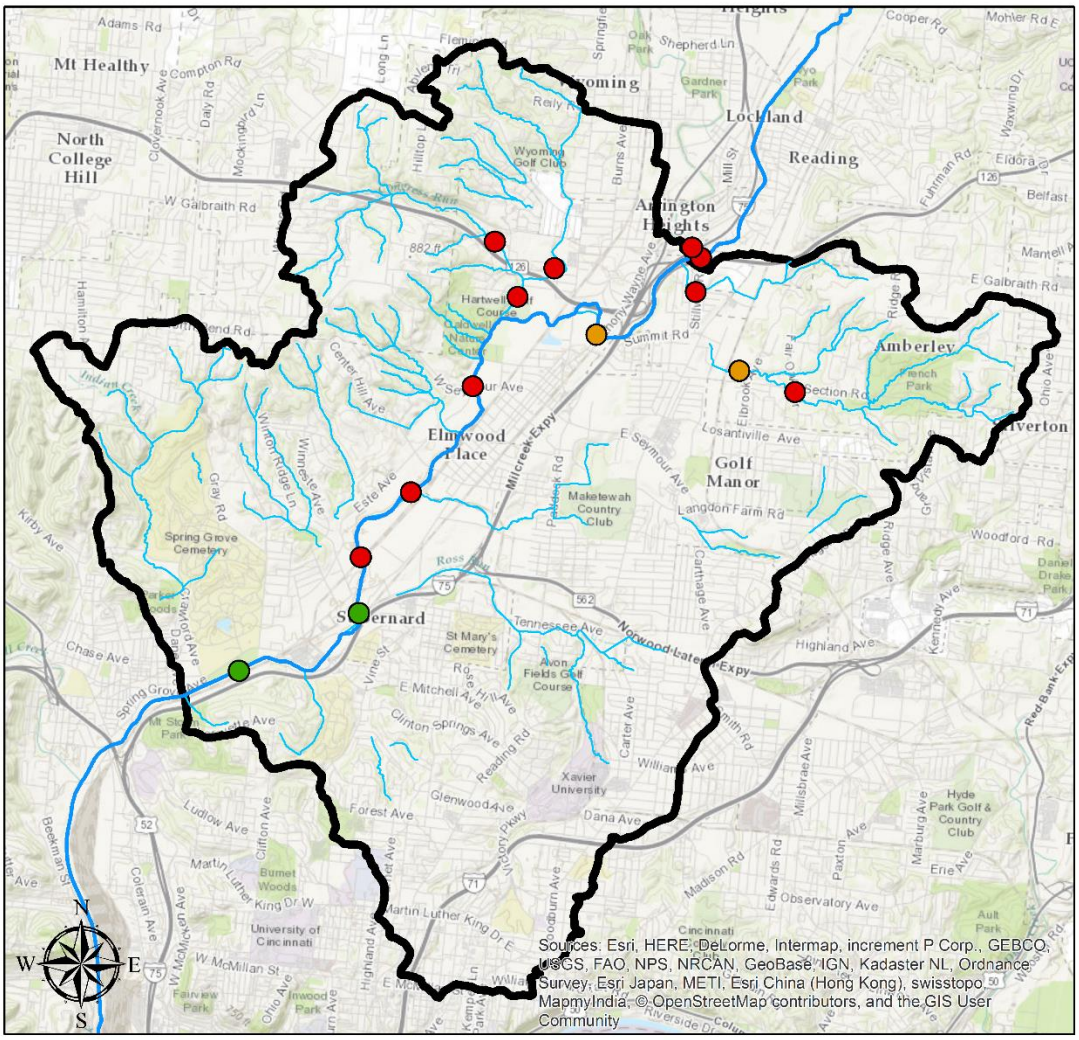


TABLE 4: SUMMARY OF THE BIOLOGICAL STATUS OF STREAMS IN CONGRESS RUN - MILL CREEK HUC-12 (MBI, 2012)

Stream	No. of Sites	D.A. (mi^2)	Habitat Evaluation	Fish Evaluation	Macroinv. Evaluation	Existing ALU (2011)	Recommended ALU*
Mill Creek	7	136	Very Poor - Good	Very Poor-Fair	Fair – Good	MWH/WWH	MWH/WWH
Congress Run	2	1.7-3.8	Poor-Fair	Poor	Poor – Marg. Good	None	WWH*
Unnamed Trib to Congress Run at RM 0.37	1	1.7	Poor	Poor	Very Poor	None	WWH*
Unnamed Trib to Mill Creek at RM 10.8	2	1.8	Fair - Good	Poor - Fair	Fair – Good	None	WWH*
Unnamed Trib to Mill Creek at RM 11.51	1	3.7	Fair	Poor	Marg. Good	None	WWH*

*Recommendations from MBI, 2012

The Mill Creek main stem within the **Congress Run – Mill Creek HUC-12** has an assessment of existing aquatic life use (ALU) designation of Warm Water Habitat (WWH) from the top of the assessment unit until RM 7.3, at which point the Mill Creek main stem has been designated as Modified Warm Water Habitat (MWH) for the remainder of its length until it empties into the Ohio River. All tributaries in this assessment unit did not, at the time of the MBI 2011 report, have ALU designations, but MBI made recommendations that all tributaries be evaluated as WWH based on the results of their 2011 sampling. A detailed description of these recommendations by stream is available on pages 13 and 14 of the 2011 MBI Report.

Habitat

QHEI scores in the streams within the assessment unit ranged from Very Poor to Good (27 – 64.5). According to MBI, "Five of the six tributary sites sampled had natural channels, but most had moderate-high embeddedness and poor-fair riffle pool development related to the urban nature of the subwatershed. The location and degree of encroachment had a strong effect on habitat quality in the tributaries with habitat ranging from poor (3 high influence negative attributes, QHEI=38 at MC92) to good (no high influence negative attributes, QHEI=64.5 at MC88)." (Yoder, 2012, p. 101).

Fish

The aquatic community of the **Congress Run – Mill Creek HUC-12** was and is predominated by macroinvertebrate and fish species that tolerate high levels of pollution. IBI scores in the **Congress Run – Mill Creek HUC-12** ranged from Poor to Fair (18 to 34). During the 2011 sampling by MBI, no sites attained the IBI biocriteria for WWH, while two of three sites attained the biocriteria for MWH. All tributary sites lacked sensitive fish species. Up to four sensitive species were collected at site MC77 in the Mill Creek main stem in the **Congress Run – Mill Creek HUC-12**. This site was evaluated as MWH in 2011, but has since been included in the adjusted WWH reach of the Mill Creek main stem through this assessment unit. According to MBI, "headwater fish assemblages are dominated by tolerant species (mean=78.5%, range 57-91%)" (Yoder, 2012, p. 107).

Macroinvertebrates

In the **Congress Run – Mill Creek HUC-12**, Mill Creek is designated as WWH from RM 11.3 to RM 7.3, where the designation changes to MWH down to the mouth. According to MBI, "[t]he sites where the modified channel is most evident is at RMs 6.9 and 6.35 where the channel is completely encased in concrete with high walls a concrete bottom with a six foot wide by three feet deep trench within which the water flows under normal summer-fall flows. The remaining sections of the MWH reach consist of a mix of concrete walls and soft bottom with sand/silt embedded riffles within which some recovery is evident. The

ICI scores and narrative ratings from RM 11.3 to 7.45 were marginally good to very good and in attainment or non-significant departure of WWH biocriterion. The ICI scores and narrative rating at RMs 6.9, 6.35, and 5.1 were fair, 32 (marginally good) and 22 (fair), respectively, all of which attained the MWH biocriterion.
"The uppermost site on Congress Run at RM 0.8 had 5 EPT taxa with caddisflies predominating. The MC 92 tributary that enters Congress Run at RM 0.37 was evaluated as very poor with 0 EPT taxa and the subsequent downstream site on Congress Run at RM 0.2 was evaluated as poor with only 1 EPT taxa. The MC 92 site had the least number of taxa collected at any site in the study area yielding only turbellarians and Physella sp. The other three tributaries in the [**Congress Run – Mill Creek HUC-12**] at MC 88, MC 83, and MC 89 were evaluated as fair to good." (Yoder, 2012, pp. 108-109)

2.3 Summary of NPS Pollution Causes and Associated Sources for Congress Run – Mill Creek HUC-12

Understanding the abundance, diversity, and stressor tolerance of existing fish and macroinvertebrate species found at these sampling locations, in the context of habitat assessment information, informed MBI's determination of causes and sources of impairment. As listed in the MBI 2011 report, the biological impairments in the **Congress Run – Mill Creek HUC-12** are from a wide range of causes, including sedimentation, nutrients, habitat alterations, chlorides, PAH (polycyclic aromatic hydrocarbons), D.O. (dissolved oxygen) and ammonia. The nonpoint sources identified by the report include hydromodification, altered hydrology, and urban runoff.

The **Congress Run – Mill Creek HUC-12** has 2 locations in full attainment for MWH standards, and 1 in non-attainment for MWH. Of the ten sites designated WWH, none are in full attainment, 2 are in partial attainment, and 8 are in non-attainment. According to MBI's evaluation, partial and non-attainment locations are all associated with the cause of sedimentation. Nutrients, chlorides, and habitat alteration impact the majority of sites. On the source side, altered hydrology and urban runoff were listed as a source at every site in partial or non-attainment, and hydromodification was listed for almost all sites as a source of impairment.

2.4 Additional Information for Determining Critical Areas and Developing Implementation Strategies

2.4.1 Midwest Biological Institute Five-Year Study on Behalf of MSDGC

The Midwest Biological Institute's *Biological and Water Quality Study of Mill Creek and Tributaries, 2011* was utilized as the primary resource for determining critical areas and developing implementation strategies, as the site-by-site cause and source identifications made within the report allowed for a more precise and logical delineation of critical areas by cause and source of impairments, as well as land use. A similar study was completed in 2016 by MBI, although the results of that study are not yet available at the time of this plan's authoring. Furthermore, the study in 2016 did not include as many sampling locations as the 2011 effort, so while it will be excellent supplemental data going forward, it cannot be considered a one-for-one replacement of all data in the 2011 study.

Chapter 3: Critical Area Conditions & Restoration Strategies

3.1 Overview of Critical Areas

On a HUC-12 level, the overwhelming majority of MBI locations in the **Congress Run – Mill Creek HUC-12** are in either Partial Attainment or Non-Attainment for the expected aquatic life uses.

As is often the case in highly urbanized watersheds, a variety of causes and sources of impairment are negatively impacting every part of the assessment unit. However, land use and slope, coupled with available data from sampling location, indicates three Critical Areas.

In Version 1.0 of this **Congress Run – Mill Creek HUC-12 NPS-IS Plan**, Conditions, Goals & Objectives will be outlined for these three Critical Areas as the currently identified projects within the assessment unit are contained within those Critical Areas. Additional Critical Areas may be identified in the future as areas in which to focus efforts to address the nonpoint source pollution issues causing the impaired state as new projects are developed, and as new biological monitoring data becomes available.

A 150-foot riparian zone (75 feet on either side of the bank full mark) along the following waterways and drainage ditches in the Critical Areas are targeted for restoration work*:

Congress Run – Mill Creek HUC-12
Mill Creek
Congress Run
Dan's Creek
Bloody Run
Amberley Creek
Ross Run
Unnamed Tributary to Congress Run at RM 0.37 (Cilley Creek)
Unnamed Tributary to Mill Creek at RM 11.51
Unnamed Tributary to Mill Creek at RM 10.8

*In the lower portion of the Mill Creek main stem in the **Congress Run – Mill Creek HUC-12,** the potential for streamside or in-stream restoration work is limited by the concrete channelization of the Mill Creek. Therefore, especially in that portion of the assessment unit but also throughout the highly industrialized and impervious **Congress Run – Mill Creek HUC-12**, projects implemented to control the rate and amount of stormwater discharged into the streams in the Critical Areas from areas not immediately adjacent to the streams would also be expected to confer potentially significant water quality benefits.

As most of the causes and sources throughout the **Congress Run – Mill Creek HUC-12** are consistent, these Critical Areas were delineated according to land use and slope, as those factors are likely to influence the types of potential projects possible to implement in a given reach. The map of critical areas and a chart indicating the logic behind their delineation is included below. This information is being included in the plan to prevent duplication of effort on the part of organizations or individuals who submit revisions to this plan and the critical areas it contains in the future.

TABLE 5: CRITICAL AREAS (CURRENT & PROPOSED FUTURE) IN CONGRESS RUN – MILL CREEK HUC-12

CRITICAL AREA	LAND USE/ SLOPE	CAUSES	SOURCES
1	Medium Density Residential (Partially Un-sewered)/ High Slope	**Sedimentation, Habitat Alteration, Nutrients, D.O., Ammonia**	**Hydromodification, Altered Hydrology, Urban Runoff**
2	High Density Commercial & Industrial (Floodplain)/ Low Slope	**Sedimentation, Habitat Alteration, Nutrients, Chlorides, PAH, D.O.**	**Hydromodification, Altered Hydrology, Urban Runoff**
3	Low Density Residential and Park/ High Slope	**Sedimentation, Chlorides**	**Altered Hydrology, Urban Runoff**

FIGURE 14: MAP OF CRITICAL AREAS IN CONGRESS RUN – MILL CREEK HUC-12

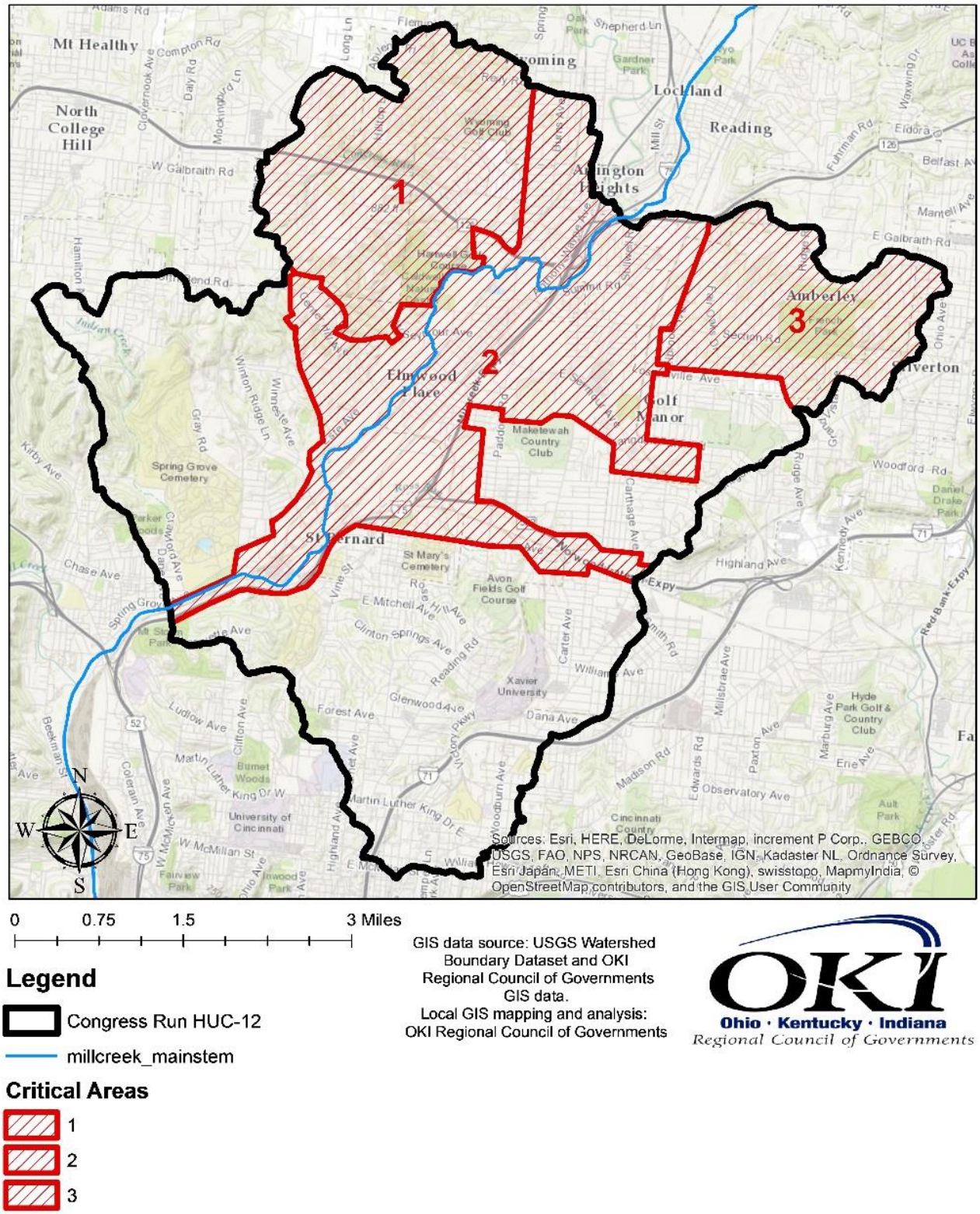
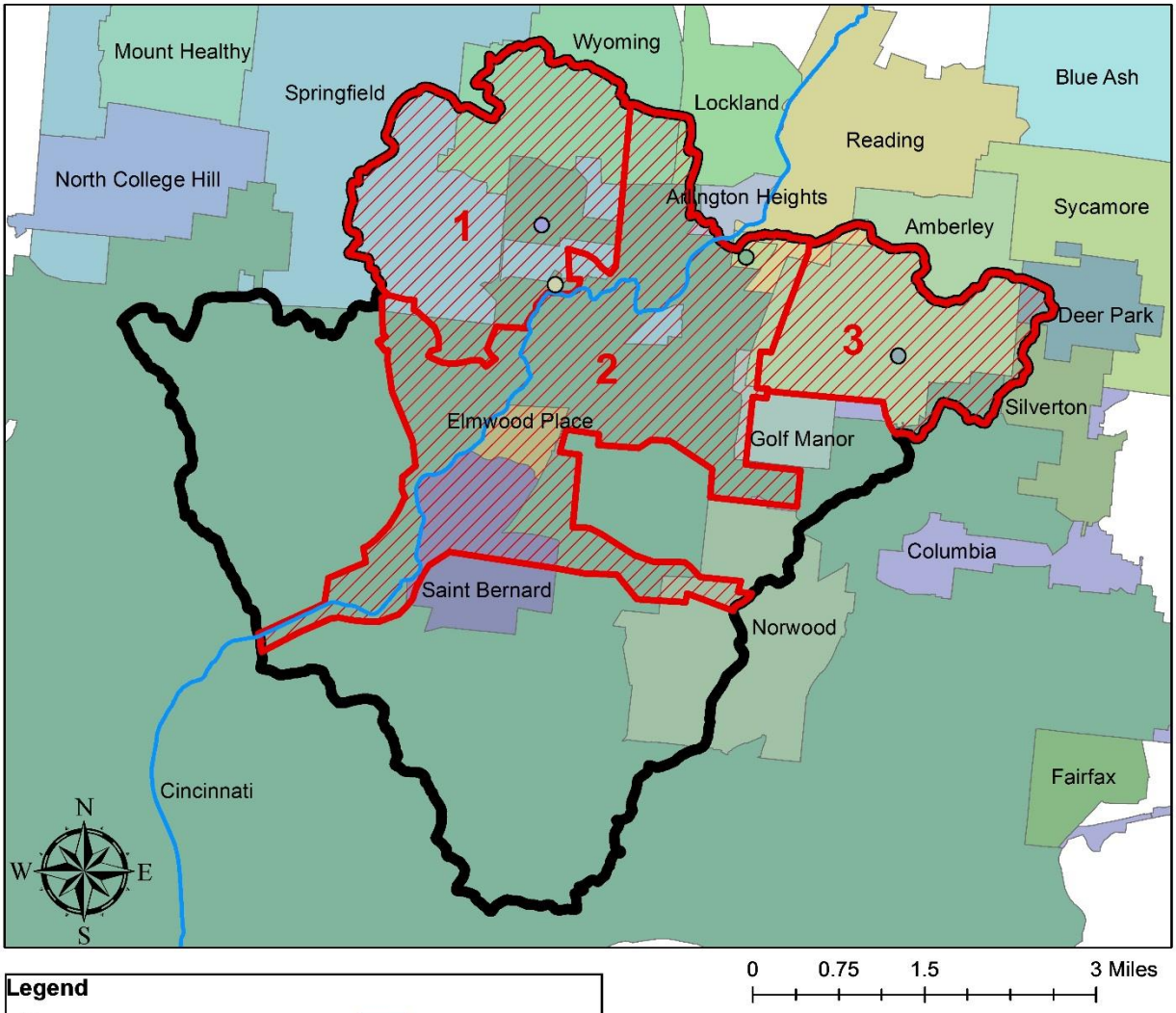


FIGURE 15: MAP OF CRITICAL AREAS 1, 2 & 3 WITH JURISDICTION OVERLAY



GIS data source: USGS Watershed Boundary Dataset and OKI Regional Council of Governments GIS data.
Local GIS mapping and analysis: OKI Regional Council of Governments

OKI
Ohio · Kentucky · Indiana
Regional Council of Governments

3.2 Critical Area 1: Conditions, Goals & Objectives

3.2.1 Detailed Characterization

Critical Area 1 covers 2878.9 acres, includes 62 known septic systems, and has 101,657 linear feet of stream. It includes three MBI sampling locations. The land use within Critical Area 1 is primarily developed, with 35% developed open space, 20% developed at low intensity, and 8% developed at medium intensity. It also includes a section deciduous forest (33% by area). A 150-foot riparian zone (75 feet on either side of the bank full mark) along the following waterways, their tributaries, and drainage ditches in Critical Area 1 is a significant target for restoration work:

WATERWAYS IN CRITICAL AREA 1
Congress Run
Dan's Creek
Unnamed Tributary to Congress Run at RM 0.37 (Cilley Creek)

Furthermore, due to the cluster of septic systems in this Critical Area, measures taken throughout the Critical Area would be expected to positively impact the chloride and nutrient levels at sampling locations. It is estimated that Critical Area 1 includes approximately 19.25 miles of stream length, including both the main stem of the Mill Creek and its tributaries. Assuming riparian zones of 75' either side of bank-full, this equates to approximately 350 acres of riparian zone targeted for improvement projects. As mentioned above, projects throughout the area of Critical Area 1, not just stream-adjacent sites, should be considered as potential pieces of the solution to urban runoff, altered hydrology and hydromodification in the Critical Area in particular.

Table 5 below outlines the attainment status and scores in the biological and habitat indices for the sampling locations within Critical Area 1. It is noted that Critical Area 1 is the only Critical Area identified in this plan which is in full non-attainment at all sampling locations within the Critical Area.

TABLE 6: CRITICAL AREA 1 OVERALL BIOLOGICAL INDICES SCORES (MBI, 2012)

Stream (Site)	Fish/Invert. RM	D.A. (mi^2)	ALU Designation	Attainment	IBI/MIwB[a]	ICI[b]	QHEI/HHEI
Congress Run – Mill Creek HUC-12 (05090203 01 04)							
Congress Run (MC82)	$0.3/0.3^{H}$	3.8	$WWH^{U/R}$	Non	26/NA	P*	44.5
Congress Run (MC91)	$0.8/0.8^{H}$	1.7	$WWH^{U/R}$	Non	26/NA	MG^{ns}	47.3/77
Unnamed Trib to Congress Run at RM 0.37 – Cilley Creek (MC92)	$0.3/0.3^{H}$	0.8	$WWH^{U/R}$	Non	18*/NA	VP*	34.0/76

U/R: Undesignated/Recommended by MBI

[a] - MIwb is not applicable to headwater streams with drainage areas < 20 $mi.^2$.

[b] - An evaluation of the qualitative sample based on attributes such as EPT taxa richness, number of sensitive taxa, and community composition was used when quantitative data was not available or considered unreliable due to slow or no current velocities. VP=Very Poor, P=Poor, LF=Low Fair, F=Fair, MG=Marginally Good, G=Good, VG=Very Good, E=Exceptional.

H – Headwater Site Type: sites draining areas <20 $mi.^2$.

W - Wadeable Site Type: sites draining areas >20 $mi.^2$ sampled with wading equipment.

B - Boat Site Type: sampled with boat or raft mounted electrofishing.

ns - Non-significant departure from the biocriteria (<4 IBI or ICI units or <0.5 MIwb units).

* - Significant departure from the biocriteria (>4 IBI or ICI units or >0.5 MIwb units).

¥ - PHWH categories do not have use attainment criteria.

3.2.2 Detailed Biological Conditions

Table 7 below summarizes the fish community data at the sampling locations in Critical Area 1. Within the IP ecoregion, the WWH biocriteria for IBI is a score of 40 for wading/headwater sites. None of the sampling locations within Critical Area 1 met the WWH standard. IBI scores were well below attainment scores, with the most significant departure in Cilley Creek (in the MBI report, Cilley Creek is referred to as "Unnamed Tributary to Congress Run at RM 0.37). With respect to physical habitat for fish, low QHEI scores are also found in Congress Run, with an even lower score at the site on Cilley Creek. Congress Run and its tributaries are known to experience intense flashiness of runoff volumes and rates, so these QHEI scores track with expectations at this time.

TABLE 7: CRITICAL AREA 1 FISH AND HABITAT DATA (MBI, 2012)

Fish/Invert. RM	D.A. (mi^2)	Total Species	Sensitive Species	Headwater Species	% Tolerant	QHEI/HHEI	MIwB	IBI
Congress Run *(WWH) (Non-Attainment)*								
0.3/0.3^H	3.8	8.0	0	1	64.1	44.5	N/A	26*
0.8/0.8^H	1.7	3.0	0	1	90.3	47.25	N/A	26*
Unnamed Tributary to Congress Run at RM 0.37 *(Recommended WWH) (Non-Attainment)*								
0.3/0.3^H	0.8	3.0	0	1	87	34.0	N/A	18*

[a] - MIwb is not applicable to headwater streams with drainage areas < 20 $mi.^2$.
[b] - An evaluation of the qualitative sample based on attributes such as EPT taxa richness, number of sensitive taxa, and community composition was used when quantitative data was not available or considered unreliable due to slow or no current velocities. VP=Very Poor, P=Poor, LF=Low Fair, F=Fair, MG=Marginally Good, G=Good, VG=Very Good, E=Exceptional.
H – Headwater Site Type: sites draining areas <20 $mi.^2$.
W - Wadeable Site Type: sites draining areas >20 $mi.^2$ sampled with wading equipment.
B - Boat Site Type: sampled with boat or raft mounted electrofishing.
[ns] - Non-significant departure from the biocriteria (<4 IBI or ICI units or <0.5 MIwb units).
[*] - Significant departure from the biocriteria (>4 IBI or ICI units or >0.5 MIwb units).
[¥] - PHWH categories do not have use attainment criteria.

Table 8 below summarizes the aquatic macroinvertebrate community data at the sampling locations in Critical Area 1. Within the IP ecoregion, the WWH biocriteria for ICI is 30. Since none of the tributaries to the Mill Creek, including Congress Run and Cilley Creek, were designated WWH at the time of the 2011 MBI report, but were recommended to be designated WWH in the future, narrative evaluations of macroinvertebrate communities take the place of ICI scores in the three sites in Critical Area 1. These narrative evaluations range from Very Poor at the site in Cilley Creek, to Poor in Congress Run, and to Marginally Good with nonsignificant departure at one location in Congress Run.

The low ICI and IBI scores at sampling sites within Critical Area 1, coupled with similarly low QHEI scores speaks to the severe impact this Critical Area is experiencing due to hydromodification, urban runoff and altered hydrology.

TABLE 8: CRITICAL AREA 1 MACROINVERTEBRATE COMMUNITY DATA (MBI, 2012)

Fish/Invert. RM	D.A. (mi^2)	ICI
Congress Run *(WWH) (Non-Attainment)*		
0.3/0.3^H	3.8	P*
0.8/0.8^H	1.7	MG [ns]
Unnamed Tributary to Congress Run at RM 0.37 *(Recommended WWH) (Non-Attainment)*		
0.3/0.3^H	0.8	VP*

3.2.3 Detailed Causes and Associated Sources

The sampling locations in Critical Area 1, listed below in Table 8, are all in Non-Attainment for the existing or recommended WWH ALU designations. The associated causes in Congress Run include sedimentation, nutrients, chlorides, dissolved oxygen, and habitat alteration. The site in Cilley Creek has associated causes of habitat alternation, sedimentation, dissolved oxygen and ammonia. In both streams, sources include altered hydrology, urban runoff, and hydromodification.

TABLE 9: CRITICAL AREA 1 CAUSES AND SOURCES BY SAMPLING LOCATION (MBI, 2012)

Fish/Invert. RM	D.A. (mi^2)	Causes	Sources
Congress Run *(WWH) (Non-Attainment)*			
0.3/0.3[H]	3.8	Habitat Alteration; Sedimentation; D.O.; Nutrients	Hydromodification; Altered Hydrology; Urban Runoff
0.8/0.8[H]	1.7	Habitat Alteration; Sedimentation; Nutrients	Hydromodification; Altered Hydrology; Urban Runoff
Unnamed Tributary to Congress Run at RM 0.37 *(Recommended WWH) (Non-Attainment)*			
0.3/0.3[H]	0.8	Habitat Alteration; Sedimentation; D.O.; Ammonia	Hydromodification; Altered Hydrology; Urban Runoff

[a] - MIwb is not applicable to headwater streams with drainage areas < 20 $mi.^2$.
[b] - An evaluation of the qualitative sample based on attributes such as EPT taxa richness, number of sensitive taxa, and community composit
was used when quantitative data was not available or considered unreliable due to slow or no current velocities. VP=Very Poor,
P=Poor, LF=Low Fair, F=Fair, MG=Marginally Good, G=Good, VG=Very Good, E=Exceptional.
H – Headwater Site Type: sites draining areas <20 $mi.^2$.
W - Wadeable Site Type: sites draining areas >20 $mi.^2$ sampled with wading equipment.
B - Boat Site Type: sampled with boat or raft mounted electrofishing.
[ns] - Non-significant departure from the biocriteria (<4 IBI or ICI units or <0.5 MIwb units).
[*] - Significant departure from the biocriteria (>4 IBI or ICI units or >0.5 MIwb units).
[ǂ]- PHWH categories do not have use attainment criteria.

Contributing attributes of the streams and tributaries in Critical Area 1 of the **Congress Run – Mill Creek HUC-12** include:

- Channelization
- Absence of Sinuosity
- Sparse or absent canopy cover
- Absence of or shallow (<40 cm) pool depth
- Heavy or moderate silt cover
- Powerful pulse flows
- Culverting
- Embeddedness or absence of riffles
- Absence of riparian buffer

Projects that address the above described habitat-related attributes will have a positive effect in the QHEI scoring index for the sampling locations within Critical Area 1. As habitat scores improve, it is expected that the IBI, MIwB, and ICI indices scoring will also improve.

3.2.4 Goals and Objectives for the Critical Area 1

As shown in detail above, Critical Area 1 is impaired based upon sedimentation/siltation, nutrients, chlorides, dissolved oxygen, ammonia and habitat alteration due to hydromodification, altered hydrology, and urban runoff. The sources and causes in this Critical Area are closely interrelated, and management measures and project types will necessarily need to address multiple issues to effectively reduce impairment in Critical Area 1.

Almost all of the critical area is artificially drained. As a result, urban runoff contributes to a very flashy hydrograph, which in turn causes erosion and sedimentation issues throughout the assessment unit. A lack of riparian buffer or similar filtration for stormwater runoff also contributes to nutrient and chloride transport. Finally, habitat alterations compound the issues caused by the sedimentation, nutrients and chlorides for biota in the streams within Critical Area 1. Powerful pulse flows within the Critical Area are be contributing to the low QHEI, IBI and ICI scores throughout the Critical Area and are certainly responsible for significant habitat alterations within the streams and tributaries.

Goals

The overall nonpoint source restoration goals of any NPS-IS plan include improving IBI, MIwB, ICI and QHEI scores so that streams in Partial or Non-Attainment status can achieve Full Attainment of the designated ALU for that waterbody. QHEI, IBI, MIwB, and ICI scores in Critical Area 1 are all under the standard for attainment throughout the critical area. Therefore, specific goals for Critical Area 1 include:

Goal 1. Achieve an IBI score of 40 at the wadeable and headwater sampling locations in Critical Area 1.

- NOT ACHIEVED: Two sites have scores of 26 and one site has a score of 18.

Goal 2. Achieve an ICI narrative evaluation of "Good" or "Very Good" at those sampling locations in Critical Area 1 where an ICI numeric assessment is not possible.

- NOT ACHIEVED: All three sites have narrative evaluations of ranging from "Very Poor" to "Marginally Good".

Goal 3. Achieve a QHEI score of 60 at all sampling locations in Critical Area 1.

- NOT ACHIEVED: All three sites are significantly below the threshold of a QHEI score of 60 (34.0 – 47.25).

Objectives

In order to achieve the overall nonpoint source restoration goal of Full Attainment in the **Congress Run – Mill Creek HUC-12**, the following objectives that address altered hydrology, hydromodification and urban runoff sources need to be achieved within Critical Area 1. These objectives are the prioritized management measures and practices in Critical Area 1 and will be the primary objectives as projects are conceptualized and developed to reduce NPS impacts in this critical area. The objectives have been listed under sub-headings indicating into which category from the Ohio EPA Nonpoint Source Management Plan Update (Ohio EPA, 2013) each strategy falls. These objectives are by no means an exhaustive list of the types of approaches and projects that would contribute to the improvement of conditions in the **Congress Run – Mill Creek HUC-12** and it is expected that the Objectives outlined in this plan could include any number of the recommended strategies in the *Nonpoint Source Management Plan Update* released by the Ohio EPA in 2013.

Urban Sediment and Nutrient Reduction Strategies

Objective 1. Protect and restore effective riparian buffers.

Reduce the rate and amount of stormwater runoff entering Congress Run, Cilley Creek and their tributaries in Critical Area through the restoration of effective riparian buffers.

→ Implement streamside forest and native vegetation restoration projects in approximately (35 acres) or 10% of the identified riparian acreage (350 acres) in Critical Area 1.

Objective 2. Encourage the installation of green stormwater management systems to capture, slow and infiltrate more storm water during moderate and large rain events in Critical Area 1.

→ Implement three (3) low-impact development stormwater retention or infiltration projects such as rain gardens, bioswales, infiltration trenches, bio-detention ponds, vernal pools and other stormwater retention practices to mitigate the harmful effects of flashy runoff flows in Critical Area 1.

Altered Stream and Habitat Restoration Strategies

Objective 3. Restore several reaches of stream using natural channel design methods, including re-establishment of in-channel riffles and pools, installation of flood prone benches, and redirecting over-widened channel flow into a more natural thalweg using vanes, root wads, and similar methods.

→ Implement approximately 3 miles (15,840 linear feet) of natural stream restoration instream and/or along the banks of the waterways Critical Area 1. (15,840 linear feet represents 15.6% of the total stream bank length in Critical Area 1.)

Objective 4. Daylight stream channels that now flow through storm sewers, pipes, culverts, tunnels and similar underground infrastructure in order to reduce the distance sediments and nutrients are transported, slow the flow of water downstream during rain events, and reintroduce biotic processes to allow the streams to self-regulate better.

→ Daylight 1500 linear feet of stream channel that now flows through storm sewers, pipes, culverts, tunnels and similar underground infrastructure in Critical Area 1. 1500 linear feet represents approximately 21% of the suspected 7000 linear feet of buried streams in this Critical Area, as determined by measuring the gaps in stream lengths per the most recently available GIS data for this assessment unit. The actual figure for length of buried stream may be much higher.

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 committee will reference the Ohio EPA Nonpoint Source Management Plan Update (Ohio EPA, 2013), 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 Detailed Characterization

Critical Area 2 includes nine MBI sampling locations. In addition, one upstream sampling location has been included in this characterization as land use and conditions in the West Fork Mill Creek – Mill Creek HUC-12 immediately upstream of Critical Area 2 are likely impacting impairment. Critical Area 2 covers 5282.6 acres, includes ten low-head dams (four currently in remediation), six landfills, and three NPDES outfalls. The land use within Critical Area 2 is primarily developed commercial/industrial with 25% developed high density, 33% medium density, 25% developed low density, and 12% developed open space. The remaining 3% of the critical area is deciduous forest. A 150-foot riparian zone (75 feet on either side of the bank full mark) along the following waterways, their tributaries, and drainage ditches in Critical Area 2 is a significant target for restoration work:

Waterways in Critical Area 2
Mill Creek
West Fork Mill Creek *(Upstream)*
Unnamed Tributary to Mill Creek at RM 10.8 (Amberley Creek)
Unnamed Tributary to Mill Creek at RM 11.51
Bloody Run
Dan's Creek
Ross Run

That being said, in the highly industrialized and impervious Critical Area 2, projects implemented to control the rate and amount of stormwater discharged into the streams from areas not immediately adjacent to the streams would also be expected to confer potentially significant water quality benefits.

It is estimated that Critical Area 2 includes approximately 16.5 miles of stream length, including both the main stem of the Mill Creek and its tributaries. Assuming riparian zones of 75' either side of bank-full, this equates to approximately 300 acres of riparian zone targeted for improvement projects. However, as previously mentioned in this plan, the Mill Creek main stem is channelized into a large concrete trapezoidal channel for the last three miles or so in this assessment unit, so for the purposes of calculating the stream length and riparian area in terms of goals addressed later in the section, the stream length can be estimated at 13.5 miles, and the associated area at 250 acres. As mentioned above, projects throughout the area of Critical Area 2, not just stream-adjacent sites, should be considered as potential pieces of the solution.

Table 10 below outlines the attainment status and scores in the biological and habitat indices for the sampling locations within Critical Area 2, and one location immediately upstream of Critical Area 2.

TABLE 10: CRITICAL AREA 2 OVERALL BIOLOGICAL INDICES (MBI, 2012)

Stream (Site)	Fish/Invert. RM	D.A. (mi^2)	ALU Designation	Attainment	IBI/MIwB[a]	ICI[b]	QHEI/HHEI
Congress Run – Mill Creek HUC-12 (05090203 01 04)							
Mill Creek (MC07)	6.4/6.35[w]	135	MWH-C	Full	30*/6.1	22	27
Mill Creek (MC09)	6.9/6.8[w]	127	MWH-C	Non	20*/4.0*	F*	27
Mill Creek (MC75)	5.1/5.1[w]	136	MWH-C	Full	30/6.8	22	40.75
Mill Creek (MC77)	7.65/7.55[W]	130	WWH	Non	27*/6.5*	28 [ns]	57.5
Mill Creek (MC79)	8.75/8.65[W]	124	WWH	Non	25*/4.3*	36	62
Mill Creek (MC80)	10.45/10.45[W]	115	*WWH*	Partial	29*/6.2	MG [ns]	50.25

Unnamed Tributary to Mill Creek at RM 11.51 (MC83)	0.4/0.4[H]	3.7	*WWH*	Non	24*/NA	MG [ns]	50.00/-
Unnamed Tributary to Mill Creek at RM 10.8 (MC88)	0.95/0.95[H]	2.5	*WWH*	Partial	34*/NA	G	64.5/-
Mill Creek (MC01)	11.6/-[W]	73.9	WWH	Non	31*/6.2	-	62.5
West Fork Mill Creek – Mill Creek HUC-12 (05090203 01 02)							
West Fork Mill Creek (MC45)	0.15/0.20[W]	36.4	WWH	Non	24*/7.0*	MG [ns]	60.75

U/R: Undesignated/Recommended by MBI

[a] - MIwb is not applicable to headwater streams with drainage areas < 20 mi.^{2}.

[b] - An evaluation of the qualitative sample based on attributes such as EPT taxa richness, number of sensitive taxa, and community composition was used when quantitative data was not available or considered unreliable due to slow or no current velocities. VP=Very Poor, P=Poor, LF=Low Fair, F=Fair, MG=Marginally Good, G=Good, VG=Very Good, E=Exceptional.

H – Headwater Site Type: sites draining areas <20 mi.^{2}.

W - Wadeable Site Type: sites draining areas >20 mi.^{2} sampled with wading equipment.

B - Boat Site Type: sampled with boat or raft mounted electrofishing.

[ns] - Non-significant departure from the biocriteria (<4 IBI or ICI units or <0.5 MIwb units).

[*] - Significant departure from the biocriteria (>4 IBI or ICI units or >0.5 MIwb units).

[¥] - PHWH categories do not have use attainment criteria.

3.3.2 Detailed Biological Conditions

Table 11 below summarizes the fish community data at the sampling locations in Critical Area 2. Within the IP ecoregion, the WWH biocriteria for IBI is a score of 40 for wading/headwater sites, and MIwB is a score of 8.1 for wading. The MWH biocriteria for IBI is a score of 24, and for MIwB a score of 6.2 for wading sites. Of the three sampling locations designated MWH (at RM 6.4, 6.9, and 5.1—the first three lines in the table), two achieved attaining scores for both IBI and MIwB, with the third (at RM 6.9) in significantly below attaining scores for both. Of the other seven sampling locations, designated WWH, none achieve the IBI or MIwB biocriteria scores, including the upstream location in the West Fork Mill Creek.

TABLE 11: CRITICAL AREA 2 FISH AND HABITAT DATA (MBI, 2012)

Fish/Invert. RM	D.A. (mi^2)	Total Species	Sensitive Species	Headwater Species	% Tolerant	QHEI/HHEI	MIwB	IBI
Mill Creek *(WWH) (Full, Partial and Non-Attainment)*								
6.4/6.35^{W}	135	6/12	1/2	0/0	6.2/15.7	27.0	6.1	30
6.9/6.8^{W}	127	7/3	1/0	0/0	13.3/12.5	27.0	4.0*	20*
5.1/5.1^{W}	136	12/18	2/3	0/0	49.4/29.6	68.25	6.8	30
7.65/7.55^{W}	130	14/17	2/4	0/0	50.3/60.2	47.75	6.5*	27*
8.75/8.65^{W}	124	9/13	2/2	0/0	80/75.1	60.25	4.3*	25*
10.45/10.45^{W}	115	9/8	2/2	1/0	37.7/12.4	42.3/64	6.2	29*
11.6/-^{W}	73.9	10/16	1/1	1/2	51.6/62.3	62.5	6.2	31*/
West Fork Mill Creek *(WWH) (Non-Attainment)*								
0.15/0.20^{W} Upstream	36.4	9/12	1/1	0/1	47.8/56.6	60.75	7.0*	24*
Unnamed Tributary to Mill Creek at RM 11.51 *(Recommended WWH) (Non-Attainment)*								
0.4/0.4^{H}	3.7	8	0	0	88.4	38.25	N/A	24*
Unnamed Tributary to Mill Creek at RM 10.8 *(Recommended WWH) (Partial-Attainment)*								
0.95/0.95^{H}	2.5	5	0	1	56.5	38.5	N/A	34*

[a] - MIwb is not applicable to headwater streams with drainage areas < 20 $mi.^2$.
[b] - An evaluation of the qualitative sample based on attributes such as EPT taxa richness, number of sensitive taxa, and community composition was used when quantitative data was not available or considered unreliable due to slow or no current velocities. VP=Very Poor, P=Poor, LF=Low Fair, F=Fair, MG=Marginally Good, G=Good, VG=Very Good, E=Exceptional.
H – Headwater Site Type: sites draining areas <20 $mi.^2$.
W - Wadeable Site Type: sites draining areas >20 $mi.^2$ sampled with wading equipment.
B - Boat Site Type: sampled with boat or raft mounted electrofishing.
[ns] - Non-significant departure from the biocriteria (<4 IBI or ICI units or <0.5 MIwb units).
[*] - Significant departure from the biocriteria (>4 IBI or ICI units or >0.5 MIwb units).
[¥]- PHWH categories do not have use attainment criteria.

Table 12 below summarizes the aquatic macroinvertebrate community data at the sampling locations in Critical Area 2. Within the IP ecoregion, the WWH biocriteria for ICI is 30, and the MWH-C is 22. Scores were generated for four of the ten sites; narrative evaluations of macroinvertebrate communities in were generated at five site, and no score, numeric or narrative, was generally for one site. Of those sites with scores, both MWH-C sites achieved attaining scores, while the two WWH sites achieved attaining scores (one full, one a non-significant departure).

Of the WWH sites scored narratively, one site was evaluated as Good and the other three as Marginally Good with non-significant departure. The one MWH-C site evaluated narratively rated only Fair. The relatively low IBI and MIwB scores coupled with good ICI scores and a range of QHEI scores indicates that the fish barriers prevalent in this Critical Area may be suppressing recovery of fish species but affecting QHEI and ICI scores to a lesser extent.

TABLE 12: CRITICAL AREA 2 MACROINVERTEBRATE COMMUNITY DATA (MBI, 2012)

Fish/Invert. RM	D.A. (mi^2)	ICI
Mill Creek *(WWH) (Partial and Non-Attainment)*		
6.4/6.35^{W}	135	22
6.9/6.8^{W}	127	F*
5.1/5.1^{W}	136	22
7.65/7.55^{W}	130	28 ^{ns}
8.75/8.65^{W}	124	36
10.45/10.45^{W}	115	MG ^{ns}
11.6/-^{W}	73.9	-
West Fork Mill Creek *(WWH) (Non-Attainment)*		
0.15/0.20^{W} Upstream	36.4	MG ^{ns}
Unnamed Tributary to Mill Creek at RM 11.51 *(Recommended WWH) (Non-Attainment)*		
0.4/0.4^{H}	3.7	MG ^{ns}
Unnamed Tributary to Mill Creek at RM 10.8 *(Recommended WWH) (Partial-Attainment)*		
0.95/0.95^{H}	2.5	G

[a] - MIwb is not applicable to headwater streams with drainage areas < 20 $mi.^2$.
[b] - An evaluation of the qualitative sample based on attributes such as EPT taxa richness, number of sensitive taxa, and community composition was used when quantitative data was not available or considered unreliable due to slow or no current velocities. VP=Very Poor, P=Poor, LF=Low Fair, F=Fair, MG=Marginally Good, G=Good, VG=Very Good, E=Exceptional.
H – Headwater Site Type: sites draining areas <20 $mi.^2$.
W - Wadeable Site Type: sites draining areas >20 $mi.^2$ sampled with wading equipment.
B - Boat Site Type: sampled with boat or raft mounted electrofishing.
[ns] - Non-significant departure from the biocriteria (<4 IBI or ICI units or <0.5 MIwb units).
[*] - Significant departure from the biocriteria (>4 IBI or ICI units or >0.5 MIwb units).
[¥]- PHWH categories do not have use attainment criteria.

3.3.3 Detailed Causes and Associated Sources

The sampling locations in Critical Area 2, listed below in Table 13, are in Partial Attainment or Non-Attainment for the existing or recommended WWH ALU designation. Two of the three sites designated MWH are in full attainment, with the third in non-attainment.

The associated causes include habitat alteration, sedimentation, nutrients, chlorides, PAH, metals and D.O. Sources include altered hydrology, urban runoff, and hydromodification.

TABLE 13: CRITICAL AREA 2 CAUSES AND SOURCES BY SAMPLING LOCATION (MBI, 2012)

Fish/Invert. RM	D.A. (mi^2)	Causes	Sources
Mill Creek *(WWH) (Partial and Non-Attainment)*			
6.4/6.35[W]	135	Habitat Alteration; Sedimentation; Nutrients	Hydromodification; Altered Hydrology; Urban Runoff
6.9/6.8[W]	127	Habitat Alteration; Sedimentation; Nutrients	Hydromodification; Altered Hydrology; Urban Runoff
5.1/5.1[W]	136	Habitat Alteration; Sedimentation; Nutrients	Hydromodification; Altered Hydrology; Urban Runoff
7.65/7.55[W]	130	Habitat Alteration; Sedimentation; PAH; Nutrients; Chlorides	Hydromodification; Altered Hydrology; Urban Runoff
8.75/8.65[W]	124	Habitat Alteration; Sedimentation; Nutrients; Chlorides	Hydromodification; Altered Hydrology; Urban Runoff
10.45/10.45[W]	115	Habitat Alteration; Sedimentation; PAH; Nutrients; Chlorides	Hydromodification; Altered Hydrology; Urban Runoff
11.6/-[W] Upstream	73.9	Habitat Alteration; Sedimentation; Nutrients; Chlorides	Hydromodification; Altered Hydrology; Urban Runoff
West Fork Mill Creek *(WWH) (Non-Attainment)*			
0.15/0.20[W] Upstream	36.4	Sedimentation; D.O.; Nutrients; Metals: PAH	Altered Hydrology; CSOs, Urban Runoff
Unnamed Tributary to Mill Creek at RM 11.51 *(Recommended WWH) (Non-Attainment)*			
0.4/0.4[H]	3.7	Sedimentation; D.O.; Nutrients	Altered Hydrology; Urban Runoff
Unnamed Tributary to Mill Creek at RM 10.8 *(Recommended WWH) (Partial-Attainment)*			
0.95/0.95[H]	2.5	Sedimentation; Chlorides	Altered Hydrology; Urban Runoff

[a] - MIwb is not applicable to headwater streams with drainage areas < 20 $mi.^2$.
[b] - An evaluation of the qualitative sample based on attributes such as EPT taxa richness, number of sensitive taxa, and community composition was used when quantitative data was not available or considered unreliable due to slow or no current velocities. VP=Very Poor, P=Poor, LF=Low Fair, F=Fair, MG=Marginally Good, G=Good, VG=Very Good, E=Exceptional.
H – Headwater Site Type: sites draining areas <20 $mi.^2$.
W - Wadeable Site Type: sites draining areas >20 $mi.^2$ sampled with wading equipment.
B - Boat Site Type: sampled with boat or raft mounted electrofishing.
[ns] - Non-significant departure from the biocriteria (<4 IBI or ICI units or <0.5 MIwb units).
[*] - Significant departure from the biocriteria (>4 IBI or ICI units or >0.5 MIwb units).
[¥]- PHWH categories do not have use attainment criteria.

Contributing attributes of the streams and tributaries in Critical Area 2 of the **Congress Run – Mill Creek HUC-12** and areas immediately upstream in the West Fork Mill Creek – Mill Creek HUC-12 and Sharon Creek – Mill Creek HUC-12 include:

- Channelization (especially the U.S. ACE large concrete trapezoidal channel in the lower three miles of the Mill Creek main stem in the assessment unit)
- Fish barriers (lowhead dams and utility crossings)

- Absence of Sinuosity
- Sparse or absent canopy cover
- Absence of or shallow (<40 cm) pool depth
- Heavy or moderate silt cover
- Slow, wide current
- Embeddedness or absence of riffles
- Absence of riparian buffer
- Legacy pollution from landfills and industry

Projects that address the above described habitat-related attributes will have a positive effect in the QHEI scoring index for the sampling locations within Critical Area 2. As habitat scores improve, it is expected that the IBI, MIwB, and ICI indices scoring will also improve.

3.3.4 Goals and Objectives for the Critical Area 2

As shown in detail above, Critical Area 2 is impaired based upon sedimentation/siltation, nutrients, chlorides, and habitat alteration due to hydromodification, altered hydrology, and urban runoff. The sources and causes in this Critical Area are closely interrelated, and management measures and project types will necessarily need to address multiple issues to effectively reduce impairment in Critical Area 2.

Almost all of the critical area is artificially drained. As a result, urban runoff contributes to a very flashy hydrograph, which in turn causes erosion and sedimentation issues throughout the assessment unit. A lack of riparian buffer or similar filtration for stormwater runoff also contributes to nutrient and chloride transport. Finally, habitat alterations compound the issues caused by the sedimentation, nutrients and chlorides for biota in the streams within Critical Area 2. Low-head dams and other fish barriers within the Critical Area may be contributing to the low IBI and MIwB scores throughout the Critical Area and are certainly significant habitat alterations within the stream and tributaries.

Goals

The overall nonpoint source restoration goals of any NPS-IS plan include improving IBI, MIwB, ICI and QHEI scores so that streams in Partial or Non-Attainment status can achieve Full Attainment of the designated ALU for that waterbody. QHEI, IBI, MIwB, and ICI scores in Critical Area 1 are all under the standard for attainment throughout the critical area. Therefore, specific goals for Critical Area 1 include:

Goal 1. Achieve an IBI score of 40 and a MIwB is a score of 8.1 at the wadeable and headwater WWH sampling locations in Critical Area 2.

- NOT ACHEIVED: No WWH sites achieving attainment for either IBI or MIwB.

Goal 2. Achieve an IBI score of at the wadeable MWH-C sampling locations in Critical Area 2.

- PARTIALLY ACHIEVED: Two of the three sampling locations are in attainment.

Goal 3. Achieve an ICI score of 30 for WWH sampling locations in Critical Area 2.

- ACHIEVED: One site scored 30, and the other 28, a non-significant departure.

Goal 4. Achieve an ICI narrative evaluation of “Good” or “Very Good” at those sampling locations in Critical Area 2 where an ICI numeric assessment is not possible.

- PARTIALLY ACHIEVED: One site rated Good, three others Marginally Good with non-significant departure, and only one (the MWH-C site) rated Fair.

Goal 5. Achieve a QHEI score of 60 at all sampling locations in Critical Area 2.

- PARTIALLY ACHIEVED: Four of ten sampling locations score 60 or higher.

Objectives

In order to achieve the overall nonpoint source restoration goal of Full Attainment in the **Congress Run – Mill Creek HUC-12**, the following objectives that address altered hydrology, hydromodification and urban runoff sources need to be achieved within Critical Area 2. These objectives are the prioritized management measures and practices in Critical Area 2 and will be the primary objectives as projects are conceptualized and developed to reduce NPS impacts in this critical area. The objectives have been listed under sub-headings indicating into which category from the Ohio EPA Nonpoint Source Management Plan Update (Ohio EPA, 2013) each strategy falls. These objectives are by no means an exhaustive list of the types of approaches and projects that would contribute to the improvement of conditions in the **Congress Run – Mill Creek HUC-12** and it is expected that the Objectives outlined in this plan could include any number of the recommended strategies in the *Nonpoint Source Management Plan Update* released by the Ohio EPA in 2013.

Urban Sediment and Nutrient Reduction Strategies

Objective 1. Protect and restore effective riparian buffers.

Reduce the rate and amount of stormwater runoff entering the Mill Creek and tributaries in Critical Area 2 through the restoration of effective riparian buffers.

→ Implement streamside forest and native vegetation restoration projects in approximately (25 acres) or 10% of the identified riparian acreage (250 acres) in Critical Area 2.

Objective 2. Encourage the installation of green stormwater management systems to capture, slow and infiltrate more storm water from highly impervious areas during moderate and large rain events in Critical Area 2.

→ Implement three (3) low-impact development stormwater retention or infiltration projects such as rain gardens, bioswales, infiltration trenches, bio-detention ponds, vernal pools and other stormwater retention practices to mitigate the harmful effects of flashy runoff flows in Critical Area 2.

Altered Stream and Habitat Restoration Strategies

Objective 3. Improve fish passage and increase IBI scores by removing or mitigating in place fish barriers while also implementing strategies to oxygenate stream water and restore habitat for aquatic life.

→ Remove or mitigate 5 of the 10 fish migration barriers (50%) present in Critical Area 2.

Objective 4. Restore several reaches of stream using natural channel design methods, including re-establishment of in-channel riffles and pools, installation of flood prone benches, and redirecting over-widened channel flow into a more natural thalweg using vanes, root wads, and similar methods.

→ Implement approximately 1.5 miles (~8000 linear feet) of natural stream restoration instream and/or along the banks of the waterways Critical Area 2. (8,000 linear feet represents 5.6% of the total stream bank length in Critical Area 2, accounting for streambank on both sides of the streams.)

Objective 5. Daylight stream channels that now flow through storm sewers, pipes, culverts, tunnels and similar underground infrastructure in order to reduce the distance sediments and nutrients are transported, slow the flow of water downstream during rain events, and reintroduce biotic processes to allow the streams to self-regulate better.

→ Daylight 1600 linear feet of stream channel that now flows through storm sewers, pipes, culverts, tunnels and similar underground infrastructure in Critical Area 2. 1600 linear feet represents approximately 20% of the suspected 8000 linear feet of buried streams in this Critical Area, as determined by measuring the gaps in stream lengths per the most recently available GIS data for this assessment unit. The actual figure for length of buried stream may be much higher.

Objective 6. Experimentally enhance a reach of stream in the concrete-channelized Mill Creek main stem to improve habitat while mitigating some impacts of hard armoring along severely channelized segments of the Mill Creek.

→ Enhance 1200 linear feet of concretized stream channel in the Mill Creek main stem in Critical Area 2. 1200 linear feet of stream represents ~7.8% of the channelized hard armored stream channel in the lower portion of Critical Area 2.

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 committee will reference the Ohio EPA Nonpoint Source Management Plan Update (Ohio EPA, 2013), 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 Detailed Characterization

Critical Area 3 includes one MBI sampling location. Critical Area 3 covers 1,798.4 acres, includes 5 known septic systems, and is relatively lightly developed as this assessment unit goes. Land use is primarily residential and park space. Developed open space accounts for 44% of the area, with an additional 19% low intensity development, and only 2% medium intensity development. The remaining 36% is considered forested. A 150-foot riparian zone (75 feet on either side of the bank full mark) along the following waterways, their tributaries and drainage ditches in Critical Area 3 is a significant target for restoration work:

Waterways in Critical Area 3
Unnamed Tributary to Mill Creek at RM 10.8 (Amberley Creek)
Unnamed Tributary to Mill Creek at RM 11.51

It is estimated that Critical Area 3 includes approximately 9.5 miles of stream length. Assuming riparian zones of 75' either side of bank-full, this equates to approximately 170 acres of riparian zone targeted for improvement projects.

Table 14 below outlines the attainment status and scores in the biological and habitat indices for the sampling location within Critical Area 3.

TABLE 14: CRITICAL AREA 3 OVERALL BIOLOGICAL INDICES SCORES (MBI, 2012)

Stream (Site)	Fish/Invert. RM	D.A. (mi^2)	ALU Designation	Attainment	IBI/MIwB	ICI[b]	QHEI/HHEI
Congress Run – Mill Creek HUC-12 (05090203 01 04)							
Unnamed Tributary to Mill Creek at RM 10.8 (MC89)	1.65/1.75[H]	1.8	*WWH*[U/R]	Partial	28*/NA	F*	53.5

U/R: Undesignated/Recommended by MBI

[a] - MIwb is not applicable to headwater streams with drainage areas < 20 $mi.^2$.

[b] - An evaluation of the qualitative sample based on attributes such as EPT taxa richness, number of sensitive taxa, and community composition was used when quantitative data was not available or considered unreliable due to slow or no current velocities. VP=Very Poor, P=Poor, LF=Low Fair, F=Fair, MG=Marginally Good, G=Good, VG=Very Good, E=Exceptional.

H – Headwater Site Type: sites draining areas <20 $mi.^2$.

W - Wadeable Site Type: sites draining areas >20 $mi.^2$ sampled with wading equipment.

B - Boat Site Type: sampled with boat or raft mounted electrofishing.

[ns] - Non-significant departure from the biocriteria (<4 IBI or ICI units or <0.5 MIwb units).

[*] - Significant departure from the biocriteria (>4 IBI or ICI units or >0.5 MIwb units).

[¥] - PHWH categories do not have use attainment criteria.

3.4.2 Detailed Biological Conditions

Table 15 below summarizes the fish community data at the sampling location in Critical Area 3. Within the IP ecoregion, the WWH biocriteria for IBI is a score of 40 for wading/headwater sites. The sampling location in Critical Area 3 did not meet the IBI WWH standard. The IBI score of 28 represents a significant departure from the attainment score. The QHEI score is moderately high.

TABLE 15: CRITICAL AREA 3 FISH AND HABITAT DATA (MBI, 2012)

Fish/Invert. RM	D.A. (mi^2)	Total Species	Sensitive Species	Headwater Species	% Tolerant	QHEI/HHEI	MIwB	IBI
Unnamed Tributary to Mill Creek at RM 10.8 *(Recommended WWH) (Non-Attainment)*								
1.65/1.75[H]	1.8	6	0	1	84.4	53.5	N/A	28*

[a] - MIwb is not applicable to headwater streams with drainage areas < 20 $mi.^2$.
[b] - An evaluation of the qualitative sample based on attributes such as EPT taxa richness, number of sensitive taxa, and community composition was used when quantitative data was not available or considered unreliable due to slow or no current velocities. VP=Very Poor, P=Poor, LF=Low Fair, F=Fair, MG=Marginally Good, G=Good, VG=Very Good, E=Exceptional.
H – Headwater Site Type: sites draining areas <20 $mi.^2$.
W - Wadeable Site Type: sites draining areas >20 $mi.^2$ sampled with wading equipment.
B - Boat Site Type: sampled with boat or raft mounted electrofishing.
[ns] - Non-significant departure from the biocriteria (<4 IBI or ICI units or <0.5 MIwb units).
[*] - Significant departure from the biocriteria (>4 IBI or ICI units or >0.5 MIwb units).
[¥]- PHWH categories do not have use attainment criteria.

Table 16 below summarizes the aquatic macroinvertebrate community data at the sampling location in Critical Area 3. Within the IP ecoregion, the WWH biocriteria for ICI is 30. An ICI scores was not generated for this sampling location, but a narrative evaluation of Fair was assessed for the macroinvertebrate communities at the sampling location. The low ICI and IBI scores coupled with a moderate QHEI score suggests that chlorides are contributing significantly to the lower scores in this Critical Area.

TABLE 16: CRITICAL AREA 3 MACROINVERTEBRATE COMMUNITY DATA (MBI, 2012)

Fish/Invert. RM	D.A. (mi^2)	ICI
Unnamed Tributary to Mill Creek at RM 10.8 *(Recommended WWH) (Non-Attainment)*		
1.65/1.75[H]	1.8	F*

[a] - MIwb is not applicable to headwater streams with drainage areas < 20 $mi.^2$.
[b] - An evaluation of the qualitative sample based on attributes such as EPT taxa richness, number of sensitive taxa, and community composition was used when quantitative data was not available or considered unreliable due to slow or no current velocities. VP=Very Poor, P=Poor, LF=Low Fair, F=Fair, MG=Marginally Good, G=Good, VG=Very Good, E=Exceptional.
H – Headwater Site Type: sites draining areas <20 $mi.^2$.
W - Wadeable Site Type: sites draining areas >20 $mi.^2$ sampled with wading equipment.
B - Boat Site Type: sampled with boat or raft mounted electrofishing.
[ns] - Non-significant departure from the biocriteria (<4 IBI or ICI units or <0.5 MIwb units).
[*] - Significant departure from the biocriteria (>4 IBI or ICI units or >0.5 MIwb units).
[¥]- PHWH categories do not have use attainment criteria.

3.4.3 DETAILED CAUSES AND ASSOCIATED SOURCES

The sampling location in Critical Area 3 is in Non-Attainment for the recommended WWH ALU designation. The associated causes include sedimentation and chlorides, and sources include altered hydrology and urban runoff.

TABLE 17: CRITICAL AREA 3 CAUSES AND SOURCES BY SAMPLING LOCATION (MBI, 2012)

Fish/Invert. RM	D.A. (mi^2)	Causes	Sources
Unnamed Tributary to Mill Creek at RM 10.8 *(Recommended WWH) (Non-Attainment)*			
1.65/1.75[H]	1.8	Sedimentation; Chlorides	Altered Hydrology; Urban Runoff

Contributing attributes of the streams and tributaries in Critical Area 3 of the **Congress Run – Mill Creek HUC-12** include:

- Channelization
- Silt and Muck Substrates
- Absence of Sinuosity
- Embeddedness or absence of riffles
- Absence of riparian buffer or invasive vegetation dominating
- Culverted sections of stream

Projects that address the above described habitat-related attributes will have a positive effect in the QHEI scoring index for the sampling locations within Critical Area 3. As habitat scores improve, it is expected that the IBI, MIwB, and ICI indices scoring will also improve. In addition, passive treatment of stormwater runoff in this Critical Area may help with the reduction of chlorides.

3.4.4 Goals and Objectives for the Critical Area 3

As shown in detail above, Critical Area 3 is impaired based upon sedimentation and chlorides due to altered hydrology and urban runoff. The sources and causes in this Critical Area are closely interrelated, and management measures and project types will necessarily need to address multiple issues to effectively reduce impairment in Critical Area 3.

A lack of riparian buffer or similar filtration for stormwater runoff in some parts of the Critical Area also contribute to nutrient and chloride transport.

Goals

The overall nonpoint source restoration goals of any NPS-IS plan include improving IBI, MIwB, ICI and QHEI scores so that streams in Partial or Non-Attainment status can achieve Full Attainment of the designated ALU for that waterbody. QHEI, IBI, and MIwB scores in Critical Area 1 are all under the standard for attainment throughout the critical area. ICI scores are at or above attainment levels along the Mill Creek main stem, but fall short of the standard in the tributaries. Therefore, specific goals for Critical Area 1 include:

Goal 1. Achieve an IBI score of 40 at the sampling location in Critical Area 3.

- NOT ACHIEVED: The sampling location has a score of 28.

Goal 2. Achieve an ICI narrative evaluation of “Good” or “Very Good” at the sampling location in Critical Area 3.

- NOT ACHIEVED: The sampling located was evaluated Fair during the last round of monitoring.

Goal 3. Achieve a QHEI score of 60 at the sampling location in Critical Area 3.

- NOT ACHIEVED: The sampling location currently has a score of 53.5.

Objectives

In order to achieve the overall nonpoint source restoration goal of Full Attainment in the **Congress Run – Mill Creek HUC-12**, the following objectives that address altered hydrology and urban runoff sources need to be achieved within Critical Area 3. These objectives are the prioritized management measures and practices in Critical Area 3 and will be the primary objectives as projects are conceptualized and developed to reduce NPS impacts in this critical area. The objectives have been listed under sub-headings indicating into which category from the Ohio EPA Nonpoint Source Management Plan Update (Ohio EPA, 2013) each strategy falls. These objectives are by no means an exhaustive list of the types of approaches and projects that would contribute to the improvement of conditions in the **Congress Run – Mill Creek HUC-12** and it is expected that the

Objectives outlined in this plan could include any number of the recommended strategies in the *Nonpoint Source Management Plan Update* released by the Ohio EPA in 2013.

Urban Sediment and Nutrient Reduction Strategies

Objective 1. Protect and restore effective riparian buffers.

Reduce the rate and amount of stormwater runoff entering the Mill Creek and tributaries in Critical Area 3 through the restoration of effective riparian buffers.

→ Implement streamside forest and native vegetation restoration projects in approximately (17 acres) or 10% of the identified riparian acreage (170 acres) in Critical Area 3.

Altered Stream and Habitat Restoration Strategies

Objective 2. Restore several reaches of stream using natural channel design methods, including re-establishment of in-channel riffles and pools, and preventing stream downcutting through the installation of grade control structures.

→ Implement approximately 1 mile (~5500 linear feet) of natural stream restoration instream and/or along the banks of the waterways Critical Area 2. (5500 linear feet represents ~9.1% of the total in-stream length in Critical Area 3.)

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 committee will reference the Ohio EPA Nonpoint Source Management Plan Update (Ohio EPA, 2013), 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

Chapter 4: Projects and Implementation Strategy

4.1 Projects and Implementation Strategy Overview Table for Critical Areas

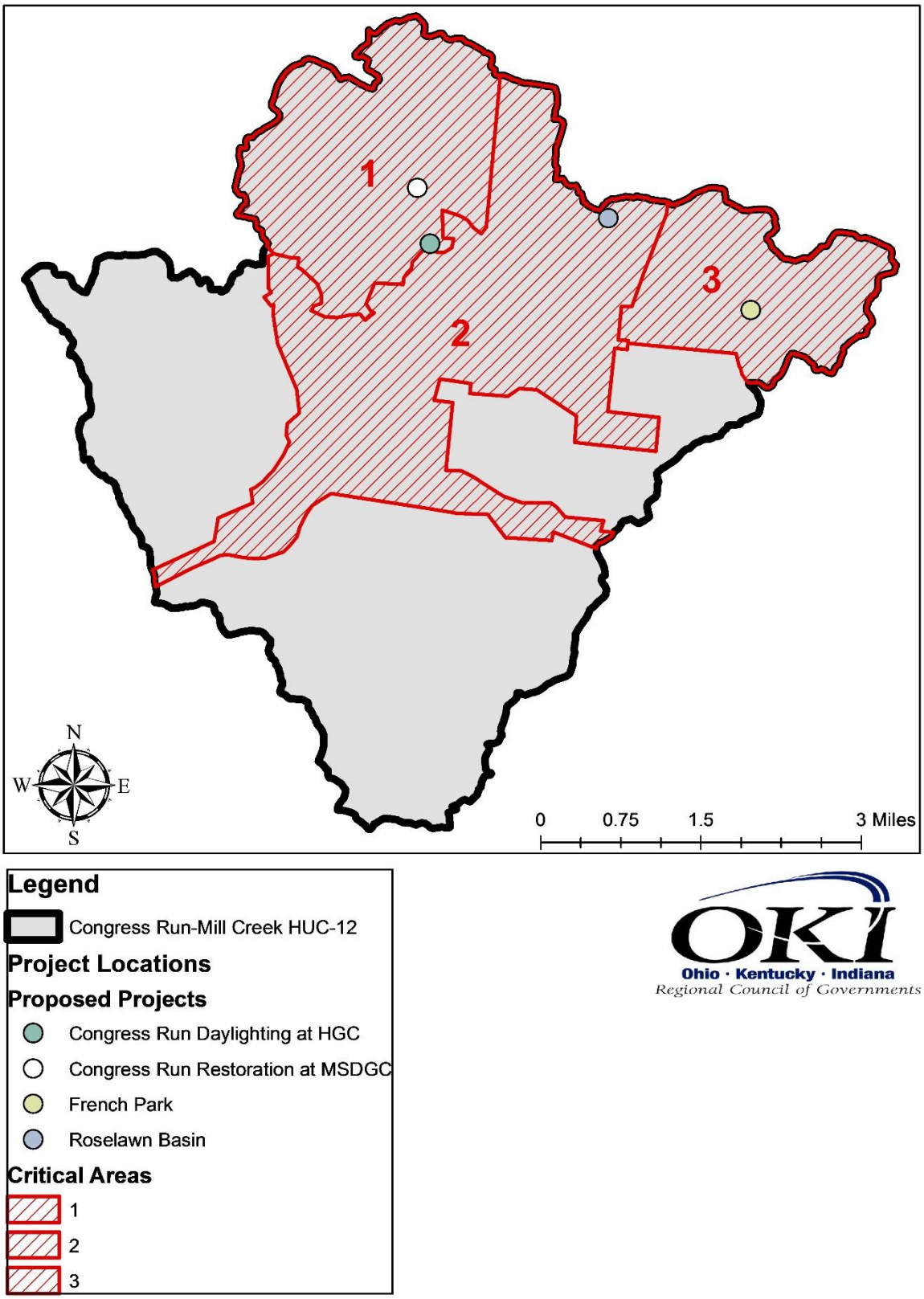
Below are the projects and evaluation needs believed to be necessary to remove the impairments to the **Congress Run – Mill Creek HUC-12** as a result of the identified cause and associated sources of nonpoint source pollution. Because the attainment status is based on biological conditions, it will be necessary to periodically re-evaluate the status of the critical area to determine if the implemented projects are sufficient to achieve restoration. 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, years) to show recovery. There may also be reasons other than nonpoint source pollution for the impairment. Those issues will need to be addressed under different initiatives, authorities or programs which may or may not be accomplished by the same implementers addressing the nonpoint source pollution issues.

For the **Congress Run – Mill Creek HUC-12** there is one *Project and Implementation Strategy Overview Table* (subsection 4.2.1). Critical Area 3 has multiple and inter-related causes and associated sources of nonpoint source impairment. If another nonpoint source impairment is identified for one of the Critical Areas, it will be explained and added to that Critical Area's table. If a new or existing impairment is determined to have a different Critical Area, a new table will be created for the 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 of the listed Objectives for the Critical Area.
Priority 2	Projects where there is land-owner willingness to engage in projects that are designed to address the cause(s) and source(s) of impairment, or where there is an expectation that such potential projects will improve water quality in the **Congress Run – Mill Creek HUC-12.**
Priority 3	In an effort to generate interest in projects, an information and education campaign will be developed and delivered. Such outreach will engage citizens to spark interest by stakeholders to participate and implement projects like those mentioned in Priority 1 and Priority 2.

The Project Summary Sheet (PSS) is included in section 4.2.2. This PSS provides the essential nine elements for the short-term project in the **Congress Run – Mill Creek HUC-12** that is in development and in need of funding. Figure 16 below shows the location of this proposed project.

FIGURE 16: PROPOSED PROJECT LOCATIONS IN CONGRESS RUN - MILL CREEK HUC-12



As projects are implemented and new projects developed these sheets will be updated. Any newly created PSS will be submitted to the State of Ohio for funding eligibility verification (i.e., all nine elements are included).

4.2 Critical Area 3: Overview Table and Project Sheet

The information included in the *Critical Area 3 Overview Table* is a condensed overview of the currently identified projects needed for nonpoint source restoration of the **Congress Run – Mill Creek HUC-12** Critical Area 3. A Project Summary Sheet is included for the identified project seeking funding in the near future. It is anticipated that additional projects within Critical Area 3 will be developed.

4.2.1. Critical Area 3: Project and Implementation Strategy Overview Table

Critical Area 1: Project Overview Table for *Sharon Creek – Mill Creek HUC-12* (05090203 01 03)								
Applicable Critical Area	**Goal**	**Objective**	**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)*
Urban Sediment and Nutrient Reduction Strategies*								
Altered Stream and Habitat Restoration Strategies*								
3	1,2,3	1,2	1	French Park Stream Restoration	Amberley Village	Short	$250,000	Ohio EPA Water Resource Restoration Sponsorship - Ohio Public Works Commission Clean Ohio Program
Agricultural Nonpoint Source Reduction Strategies*								
High Quality Waters Protection Strategies*								
Other NPS Causes and Associated Sources of Impairment								

4.2.2. Critical Area 3: Project Summary Sheet

Nine Element Criteria	Information needed	Explanation
n/a	**Title**	French Park Stream Restoration
criteria d	**Project Lead Organization & Partners**	Amberley Village; Cincinnati Park Board; Mill Creek Watershed Council of Communities
criteria c	**HUC-12 and Critical Area**	Congress Run – Mill Creek (50902030104) Critical area 3
criteria c	**Location of Project**	3012 Section Rd Cincinnati, OH 45237
n/a	**Which strategy is being addressed by this project?**	Restore streams using natural channel design methods
criteria f	**Time Frame**	Short term (1-3 years)
criteria g	**Short Description**	The majority of Amberley Creek's upper stream length is stable, with bedrock and cobble substrate and excellent riparian habitat. However, a reach of the stream through French Park is experiencing bank erosion and has poor habitat in comparison with other reaches of the stream. This project proposes restoration of this reach through bank treatments, in-stream structures and the establishment of a riparian buffer populated with native vegetation.
criteria g	**Project Narrative**	Amberley Creek in French Park represents one of the highest quality streams in the middle Mill Creek Watershed. Draining primarily low density residential neighborhoods and forested park land, the stream does not experience the same hydrological pressure of other Mill Creek streams. In some reaches, however, the stream shows signs of historic modification and bank erosion caused by poor riparian management and lack of bank structure. Restoration of these locations and improved connections throughout the stream will improve access to upstream reaches for aquatic wildlife, decrease sediment loading in the downstream reaches, and improved aquatic habitat at the restored reach. Important aspects of this project include addition of in-stream structure in an entrenched stream segment, removal of a concrete apron at the downstream end of a culvert and replacement with a rock riffle and vanes, rock toe and bioengineering stabilization of eroding banks and the creation of a riparian buffer. The approximately 800 LF that will be stabilized through restoration will connect high quality upstream and downstream habitat through a location that is frequented by residents seeking outdoor recreation activities. The project provides a highly visible location to restore a high quality stream.
criteria d	**Estimated Total cost**	Match will be provided through personnel and fringe costs of approximately $5,000. Additional match and grant funded expenses will be limited to sub-contractual items such as design and construction services. Total cost of design and construction services will be approximately $250,000.

criteria d	**Possible Funding Source**	Ohio EPA Water Resource Restoration Sponsorship Ohio Public Works Commission Clean Ohio Program
criteria a	**Identified Causes and Sources**	The project will address sedimentation, as reduction in stream bank erosion will decrease sediment loading in the stream
criteria b & h	**Part 1: How much improvement is needed to remove the NPS impairment for the whole Critical Area?**	With improvement needed in all indices (IBI, ICI, MIwB, and QHEI) throughout the Critical Area 3, 5500 linear feet of stream restoration with natural channel design methods and streamside forest and native vegetation restoration over 17 acres, are proposed in Critical Area 3.
	Part 2: How much of the needed improvement for the whole Critical Area is *estimated* to be accomplished by this project?	At 800 linear feet of proposed project length, 14.5% of the natural channel design objectives will be met. Approximately 1.5 acres will be stabilized and replanted with native vegetation, which is 8.8% of the streamside forest and native vegetation restoration objective. 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 3, the main driver is QHEI. Current data shows that the sampling point at RM 10.8, approximately 0.7 miles downstream of the proposed project location (RM 11.5), is at 53.5, which is 6.5 points below the attainment index score of 60. It is expected that this project will cause an incremental increase in the QHEI scoring by at least 3.25 points, or 50% progress toward the QHEI goal. Since the IBI and MIwB scores are relatively lower, 100% progress is not necessarily expected toward those goals, but significant progress is expected for those index scores.
	Part 3: Load Reduced?	Estimated 200 tons sediment/year, 302 #P/year, 650 #N/year
criteria i	**How will the effectiveness of this project in addressing the NPS impairment be measured?**	Ohio EPA staff will conduct pre- and post-construction IBI and ICI scores The MCWCC will collect pre- and post-construction QHEI scores The MCWCC will collect pre- and post- construction water quality data at a downstream location MSDGC will collect additional QHEI, IBI and ICI data as a part of its ongoing watershed health monitoring. A sample location is located downstream of the project.
criteria e	**Information and Education**	As a part of MSDGC's ongoing efforts to improve water quality throughout the region, the project provides ample opportunity to showcase urban stream restoration techniques. 2 site tours and a fact sheet describing the project's outcomes will be developed in association with the project. The project will be designed to encourage interaction with the stream in a way that maintains stable banks. Educational signage will provide a before and after comparison of the restored stream.

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Appendix A: Acronyms, Abbreviations and Definitions

Where are US EPA's Nine Elements found in Ohio's NPS-IS?

Criteria	US EPA Definition	Location in the Ohio NPS-IS Template
a	Identify the causes and sources of pollution that need to be controlled	3.2.3, 3.3.3 ... etc. 4.2
b	Determine load reductions needed	3.2.4, 3.2.4 ... etc. 4.2
c	Describe management measures to achieve improvements in targeted critical areas	3.2.4, 3.2.4 ... etc. 4.2
d	Identify technical and financial assistance and authorities needed to implement the plan	4.1, 4.2
e	Develop an information/ education component	4.2
f	Develop implementation schedule	4.1, 4.2
g	Describe the interim, measureable milestones	4.2
h	Identify indicators to measure progress	4.2
i	Develop monitoring component.	4.2

Acronyms

IBI – Index of Biotic Integrity
ICI – Invertebrate Community Index
MIwB – Modified Index of Well Being
QHEI – Qualitative Habitat Evaluation Index
TSD – Technical Support Document
TMDL – Total Maximum Daily Load
WAP – Watershed Action Plan
WBP – Watershed Based Plan
WC – Watershed Characterization
WQS – Water Quality Standards
WRAS – Watershed Restoration Action Strategy

Critical Areas Defined

In Ohio, Critical Areas are defined as:

→ An impaired HUC 12 or an area where Ohio EPA monitoring shows a nonpoint source related cause of impairment; especially those areas with identified high magnitude causes such as habitat alteration, hydromodification, silt/sediment, or nutrient enrichment; **OR**

→ An area identified as having healthy waters that need protected from degradation by nonpoint source pollutants such as nutrients and sediment; especially those areas seriously threatened by the rapid conversion of countryside to developments.

Ranking of Projects *(used in Chapter 4)*

PRIORITY: The PRIORITY designation indicates the importance of immediate action and should be used for the most important short term projects. Immediate action may be needed due to issues such as:

- Highly threatened by development pressures or loss of full attainment status;
- Would achieve a high reduction in the loading percentage of nitrogen, phosphorus and/or fecal coliform/e. coli; and
- A publicly owned or accessible area in most need of protection.

Time Frame for Implementation *(used in Chapter 4)*

Short term: These projects should be/are expected to be implemented in Year 1-3
Medium term: These projects should be/are expected to be implemented in Years 3-7
Long term: These projects should be/are expected to be implemented in Year 7 and beyond

Definitions

Goals: A measured parameter such as sediment or nutrients (i.e. Reduce Sedimentation Rates)

Objectives: What can be done to restore the impaired measured parameter (i.e. Increase bank stabilization?)

Sources of Impairment: 1) The most prominent origins of the "agents" deemed responsible for the observed aquatic life use impairment.
(*Ohio EPA Integrated Report 2014* Glossary, Ohio EPA website: http://wwwapp.epa.ohio.gov/gis/mapportal/IR2014Glossary.html)
2) The activities, facilities or conditions that generate the pollutants including: municipal sewage treatment plants, factories, storm sewers, modifications of hydrology, agricultural runoff, etc.)
(*2002 National Assessment Database: Assessing Water Quality Q&A*, US EPA web site: http://www.epa.gov/waters/305b/assessing_quality.html)

Cause(s) of Impairment: 1) The most prominent "agents" deemed responsible for the observed aquatic life use impairment and should be the initial focus of restoration activities or TMDL development within the watershed.
(*Ohio EPA Integrated Report 2014* Glossary, Ohio EPA website: http://wwwapp.epa.ohio.gov/gis/mapportal/IR2014Glossary.html)
2) What is keeping the waters from meeting the criteria adopted to protect the designated uses including: chemical contaminants (i.e. PCBs, metals, etc.), physical conditions (i.e. temperature, excess siltation, alterations of habitat, etc.), and biological contaminants (i.e. bacteria, noxious aquatic weeds).
(*2002 National Assessment Database: Assessing Water Quality Q&A*, US EPA web site: http://www.epa.gov/waters/305b/assessing_quality.html)

Explanation of Ohio's Nonpoint Source Management Plan Update (FY2014-FY2018) Strategies

[NOTES: ALL NPS projects that are eligible for funding under Ohio EPA's §319 NPS program must be based upon the strategies outlined in the Ohio Nonpoint Source Management Plan Update (FY2014-FY2018)*. These strategies explain the types of projects that Ohio EPA can fund to restore the NPS impairments that are resulting in a Critical Area's inability to attain Ohio's WQS. This document should be used as a reference when writing a NPS-IS.]*

- **Urban Sediment and Nutrient Reduction Strategies**
  These strategies address the causes and associated sources related to Urban Sediment and Nutrient impairments (i.e. storm water runoff, LID).
- **Altered Stream and Habitat Restoration Strategies**
  These strategies address the causes and associated sources related to Altered Stream and Habitat impairments (i.e. stream restoration, riparian habitat, flow restoration).
- **Agricultural Nonpoint Source Reduction Strategies**
  These strategies address the causes and associated sources related to Agricultural Nonpoint Source impairments (i.e. upland mgmt., livestock mgmt., drainage mgmt.).
- **High Quality Waters Protection Strategies**
  These strategies address the protection of High Quality Waters (i.e. restore and protect high quality in-stream habitat, manage invasive species).

Appendix B: Index of Figures and Tables

Figures

Tables