# Community of Mechanicsville-Grand River
# HUC-12: 041100040603
# Nine-Element
# Nonpoint Source Implementation Strategy
# (NPS-IS)

**Version 1.0 Draft**

December 10, 2019

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**Acknowledgements**

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This report was prepared by the Lake County Soil and Water Conservation District using federal funds under award NA18NOS4190096 from the National Oceanic and Atmospheric Administration, U.S. Department of Commerce through the Ohio Department of Natural Resources, Office of Coastal Management. The statements, findings, conclusions, and recommendations are those of the author(s) and do not necessarily reflect the views of the National Oceanic and Atmospheric Administration, U.S. Department of Commerce, Ohio Department of Natural Resources, or the Office of Coastal Management.

## Chapter 1: Introduction

### 1.1 Report Background

The Community of Mechanicsville-Grand River Nonpoint Source Implementation Strategy (NPS-IS) brings Lake and Ashtabula County communities together to protect the Grand River, address water quality issues in the watershed and manage stormwater runoff. This plan was created to restore and maintain the physical and biological integrity of water bodies within the watershed and to access funding from USEPA, Ohio EPA and other granting entities for these purposes.

### 1.2 Watershed Profile & History

The Community of Mechanicsville-Grand River Watershed is located in southeastern Lake County and northwestern Ashtabula County (Figures 1 and 2). The 12-digit Hydrologic Unit Code (HUC) is 041100040603; the watershed drains approximately 16.6 square miles. It is located in within the 10-digit HUC known as the Lower Grand River Watershed. 85% of the watershed is in Ashtabula County and 15% is in Lake County. The Grand River, including both upper and lower, drains 705.5 square miles as it flows through portions of Ashtabula, Trumbull, Geauga, Portage and Lake Counties.

**Figure 1. Location of the Watershed**

The Community of Mechanicsville-Grand River Watershed contains 13 miles of the Grand River Mainstem in the Lower Grand Watershed, from approximately River Mile (RM) 23.8 to 36.8. It also collects water from parts of Madison Township in Lake County, and parts of Harpersfield and Austinburg Townships in Ashtabula County (Figure 3).

"*The lower Grand River watershed can be described as two distinct sections defined as upstream and downstream of the Harpersfield Dam at RM 34.43. The Harpersfield Dam also serves as a barrier to sea lamprey migration in the Grand River.*

*The Grand River upstream of the Harpersfield Dam flows through the lacustrine deposits of a former glacial lake. The river is a classic swamp-wetland type stream with low gradient (< 1 foot per mile), fine sediments (typically small gravels to clay), and few riffles. Large woody debris, rootwads, rootmats, undercut banks and deep pools characterize the habitat. The fish fauna in this reach resembles a swampstream association and commonly includes trout-perch, silver redhorse, sunfish and blackside darters. The wetland environment also provides spawning habitat for the Great Lakes muskellunge and northern pike. A native population of walleye also exists.*

*Downstream from the Harpersfield Dam, the gradient increases and the river flows in a series of pools, glides, runs, and riffles through a shale gorge. Long stretches of shallow bedrock alternate with aggregations of glacial till to form glides and riffles, and deeper pools exist where the river erodes former depositional areas. The shale gorge is characterized by steep bluffs and regular flooding in the floodplain. Large tributaries including Big Creek and Paine Creek discharge into the Grand between the Harpersfield Dam and Lake Erie. This portion of the watershed is also influenced by the Snow Belt of northeastern Ohio, which regularly sees annual snowfall totals of more than 100 inches.*

*Flow in the Grand River is fed primarily by rainfall and snow melt, with very little base flow sustained by ground water because of the river's glacial and bedrock geology. Consequently, discharge becomes quite small in the summer (relative to drainage area) resulting in the Grand River and its tributaries having limited assimilative capacity. The Grand River is sustained by the many coldwater tributaries that continually discharge ground water into the river. Those coldwater tributaries and other sources of base flow are essential to the overall health of the Grand River."* (Ohio EPA Total Maximum Daily Loads for the Grand River (Lower) Watershed. Final Report, January 31, 2012; p. 15.)

This reach of the Grand River had an unusually high number of uncommonly collected sensitive taxa and state listed species, which is an indication of the exceptional resource quality in the lower Grand River basin. The entire free-flowing Grand River mainstem sampled in this study from RM 44.0 to 6.1 was supporting exceptional macroinvertebrate communities. (Ohio EPA Biological and Water Quality Study of the Grand River Basin 2003-2004.) The three sites that the EPA sampled in 2004 were in Full Attainment of Exceptional Warmwater Habitat.

The most significant threat to the Grand River and its tributaries is changing land use through suburbanization. Research has documented that when the impervious area exceeds 5%,

streams begin to deteriorate and may fall below Clean Water Act goals. Once impervious cover exceeds 25%, irreparable damage occurs. Data from 2011 showed 8.45% of the watershed as developed and 1.45% imperviousness.

44.5% of the Watershed is covered by forest, an essential element for the high degree of biological and chemical integrity of the Grand River in this reach.

**Figure 2. Location in the Lower Grand Watershed**

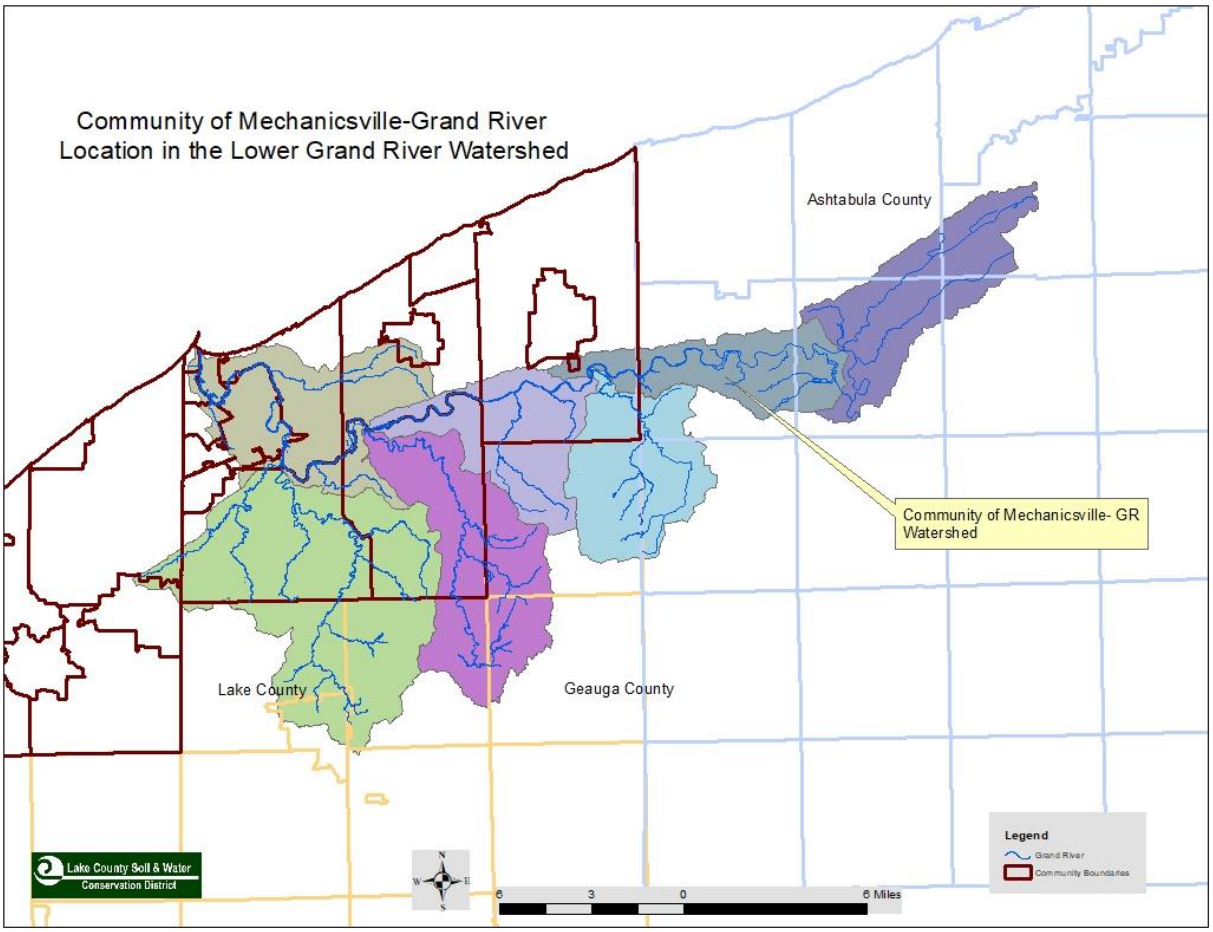
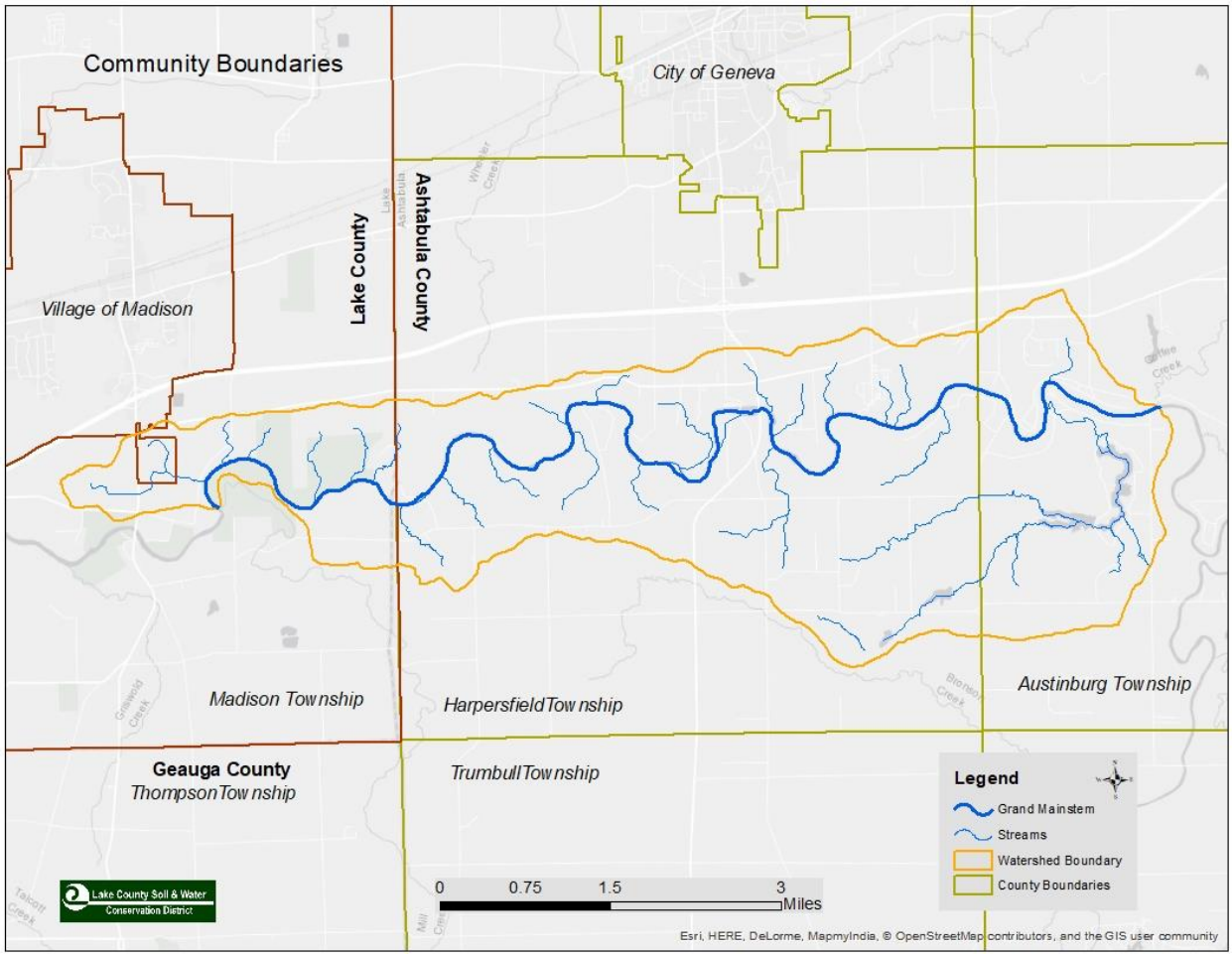


**Figure 3. Watershed Communities**




The Community of Mechanicsville-Grand River Watershed is bisected by the Grand River Mainstem, which is the only named watercourse in the watershed (Figure 3). The drainage is characterized by small, direct drainage areas of similar size, with the exception of a larger drainage area at the eastern end of the watershed.

### 1.3 Public Participation and Involvement

A stakeholder meeting was held on May 24, 2019 in Thompson in Geauga County to solicit the input of members of the community, local officials and state and local agencies. Those invited to participate included Ashtabula County Park District, Harpersfield Trumbull and Austinburg Township Trustees, Ashtabula County Auditor, Ashtabula SWCD, Ashtabula Planning & Community Services, Ashtabula County Engineer, Geauga County SWCD, Geauga Park District, Geauga Planning Commission, Thompson Montville and Hambden Township Trustees, Lake County Metroparks, Madison Leroy and Perry Township Trustees, Lake County Planning and Community Development, Lake County General Health District, Cleveland Museum of Natural History, The Nature Conservancy, ODNR Division of Forestry, ODNR Division of State Parks & Watercraft- Scenic Rivers Program, Chagrin River Watershed Partners, the Natural Resources Conservation Service and Western Reserve Land

Conservancy. The stakeholder meeting was a facilitated process to engage the attendees in a discussion of issues in the watershed.
Attendees included:

The Nature Conservancy
Ashtabula County Metroparks
Natural Resources Conservation Service
Chagrin River Watershed Partners
Ashtabula County Soil & Water Conservation District
Lake Metroparks
Lake County Planning and Community Development
Ashtabula County Auditor
Thompson Township Trustee

## Chapter 2: HUC-12 Watershed Characterization and Assessment Summary

### 2.1 Summary of HUC-12 Watershed Characterization

#### 2.1.1 Physical and Natural Features

**Topography**
The Community of Mechanicsville-Grand River Watershed's elevation ranges from 760 feet at the upstream to 692 feet at the bottom of the reach, an elevation change of 68 feet over 13 miles (Figure 5).

The watershed is located in the Allegheny Plateau physiographic region, which is characterized by mid-elevation hills separated by numerous narrow stream-cut valleys, and an abundance of rivers and streams. The watershed is at the northernmost extent of the Allegheny Plateau and was glaciated. The tributaries are deeply incised as they drain to the mainstem, and the cliffs become higher at the lower end of the reach. (Figure 4).

**Figure 4. Steep Banks & Incised Tributary**

**Figure 5. Topography**

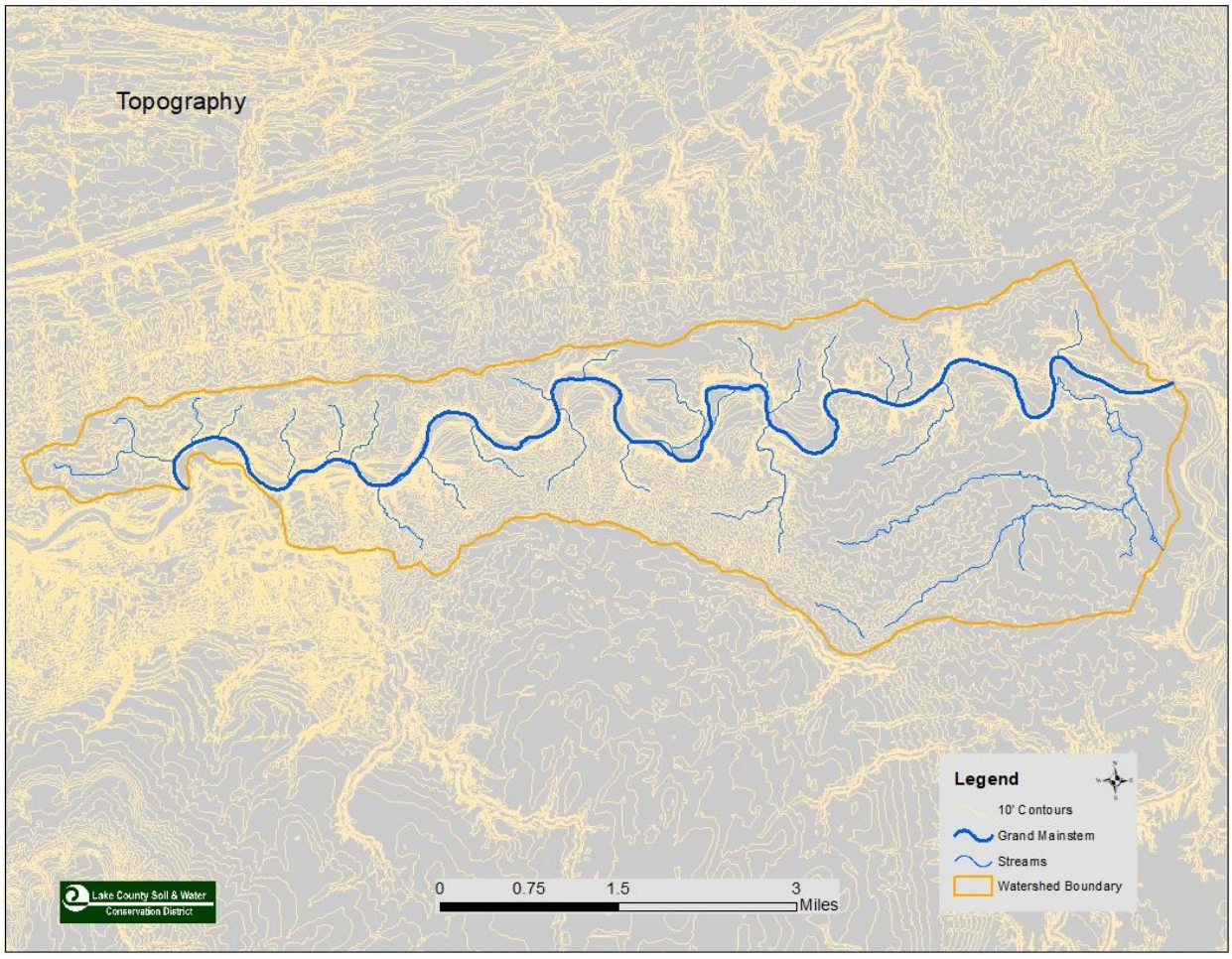
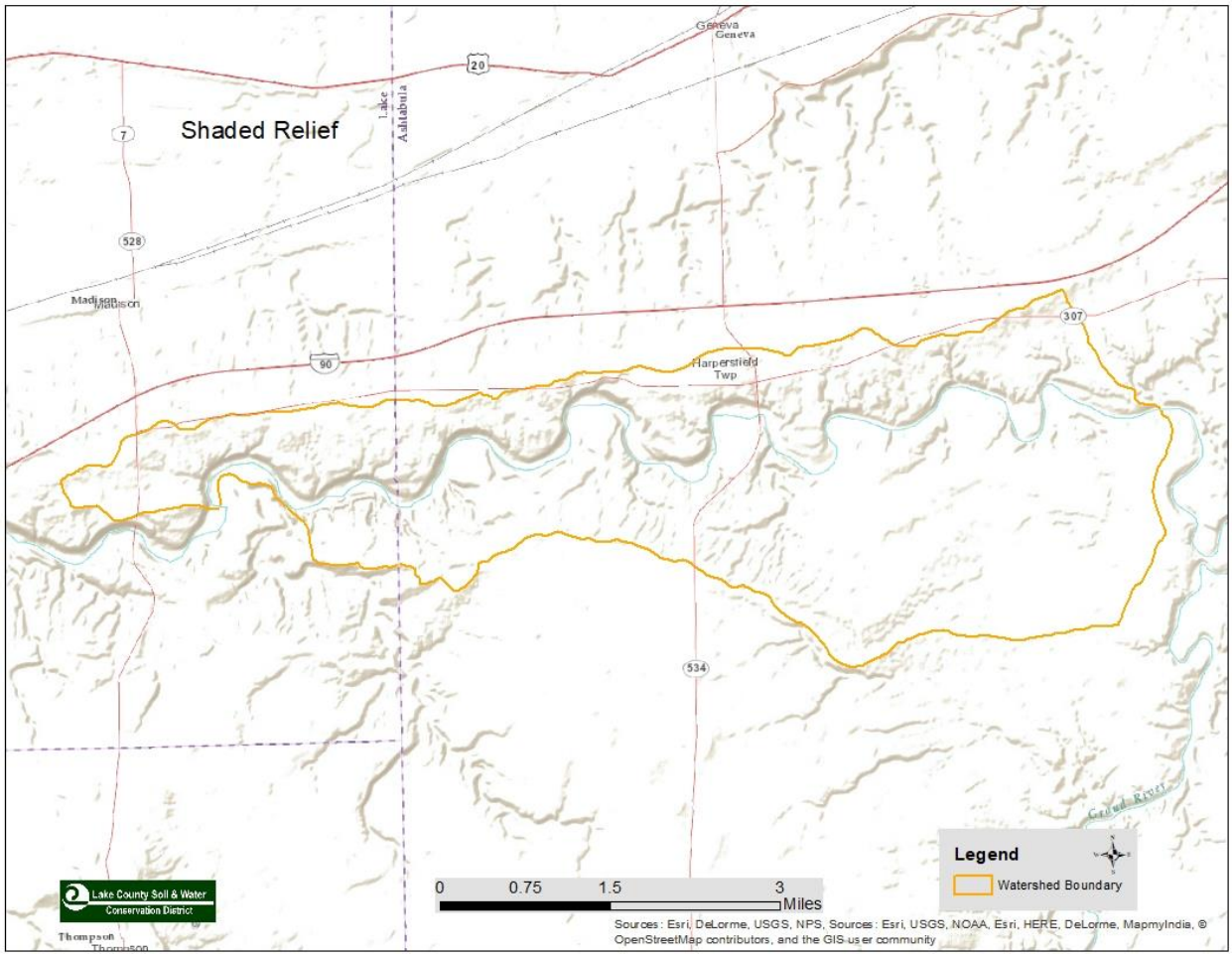


**Figure 6. Topography- Shaded Relief View**




## Geology & Glacial History

Five glacial features are found in the watershed (Figure 7):

1. End moraine
2. Ground moraine
3. Alluvium and Alluvial terraces
4. Outwash
5. Lacustrine clay

Most of the watershed area is end moraine, which occurs as hummocky ridges higher than the adjacent terrain. Alluvium and Alluvial terraces and Lacustrine clay features are in the present and former floodplain of the Grand River mainstem. The transition is notable from ground moraine just south of the watershed boundary to the end moraine within the watershed to the lake plain with former beach ridges north of the watershed.

**Figure 7. Glacial Geology**

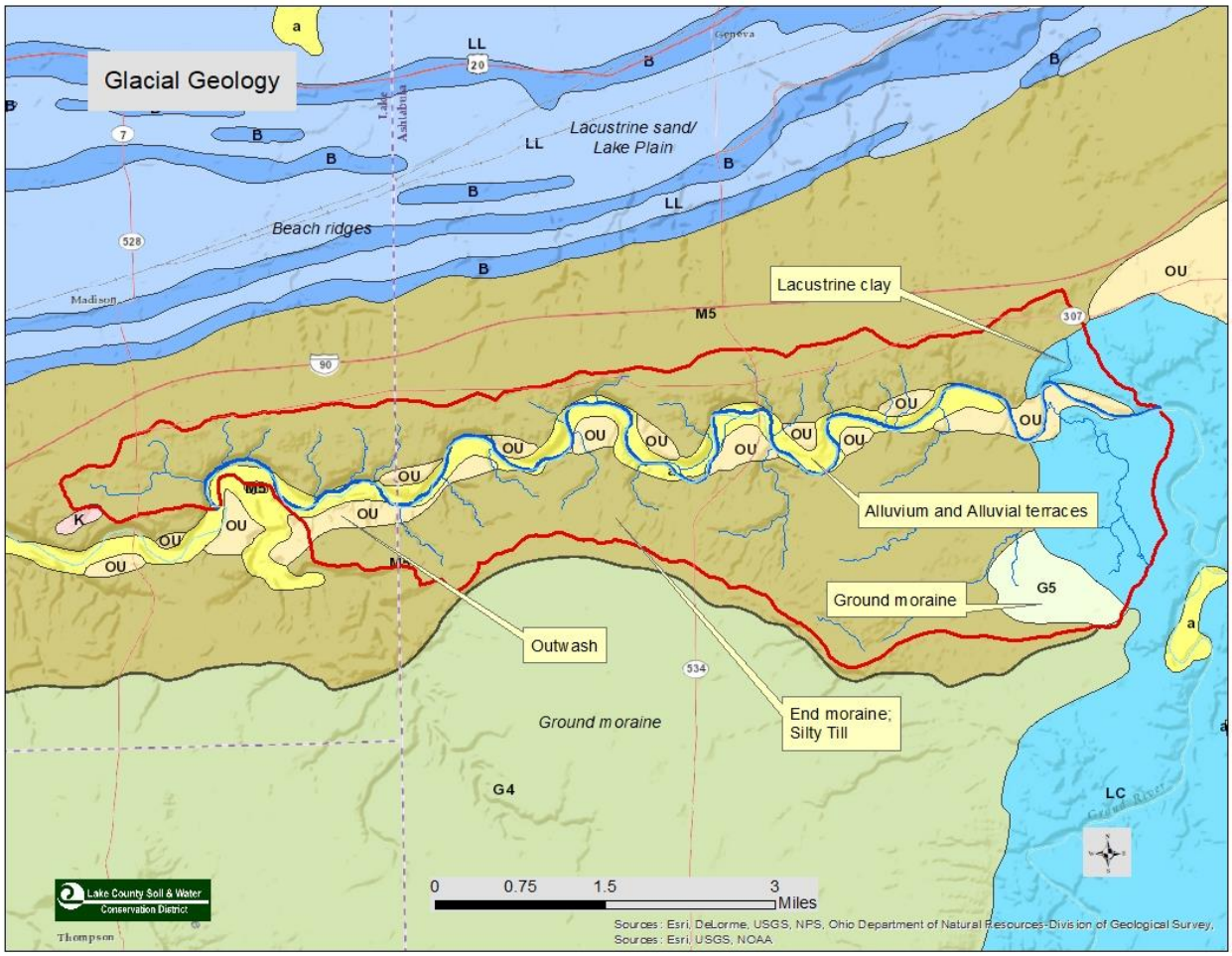



**Figure 8. Soil Drainage Characteristics**

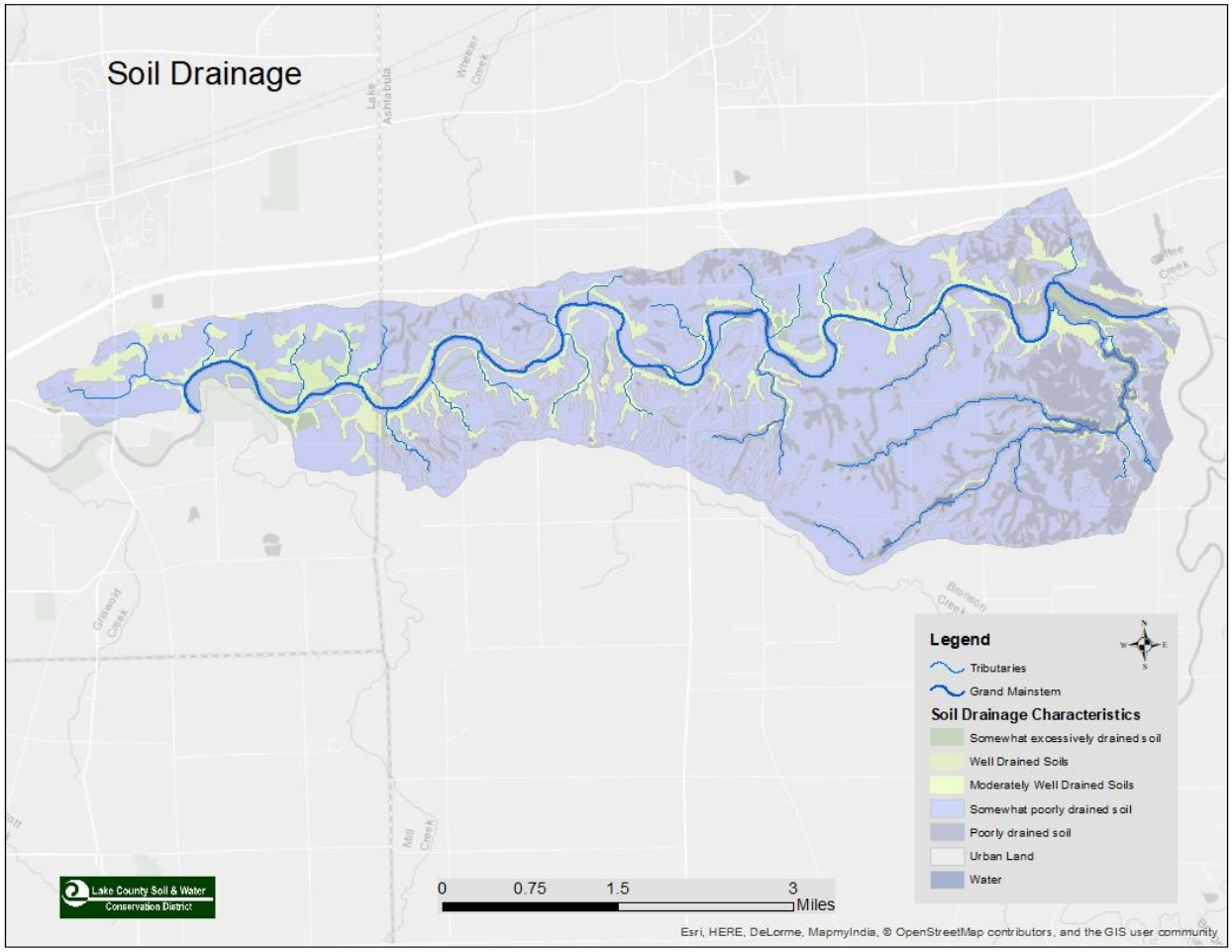
| Drainage Characteristic | Acreage | % |
|---|---|---|
| Somewhat excessively well drained | 86 | 0.8 |
| Well drained | 6 | 0.05 |
| Moderately well drained | 1380 | 13 |
| Somewhat poorly drained | 7219 | 67.7 |
| Poorly drained | 1645.8 | 15.4 |
| Water | 3 | 3 |

83% of the soils are poorly or somewhat poorly drained (Figure 8). These soils are associated with the glacial end moraine (Figure 7). Many of the well and moderately well drained soils are associated with the drainageways.

Soil drainage characteristics information is essential for siting Best Management Practices (BMPs) so that they will work properly. BMPs such as rain gardens and pervious pavers that are based on infiltration are best suited for well drained soils (in shades of green, Figure 9), whereas wetlands and on-site storage BMPs should be utilized in hydric soils (in shades of blue, Figure 9).

Refer to the Soil Surveys of Ashtabula and Lake County for more information about the soils and their properties.

**Figure 9. Soil Drainage Characteristics**



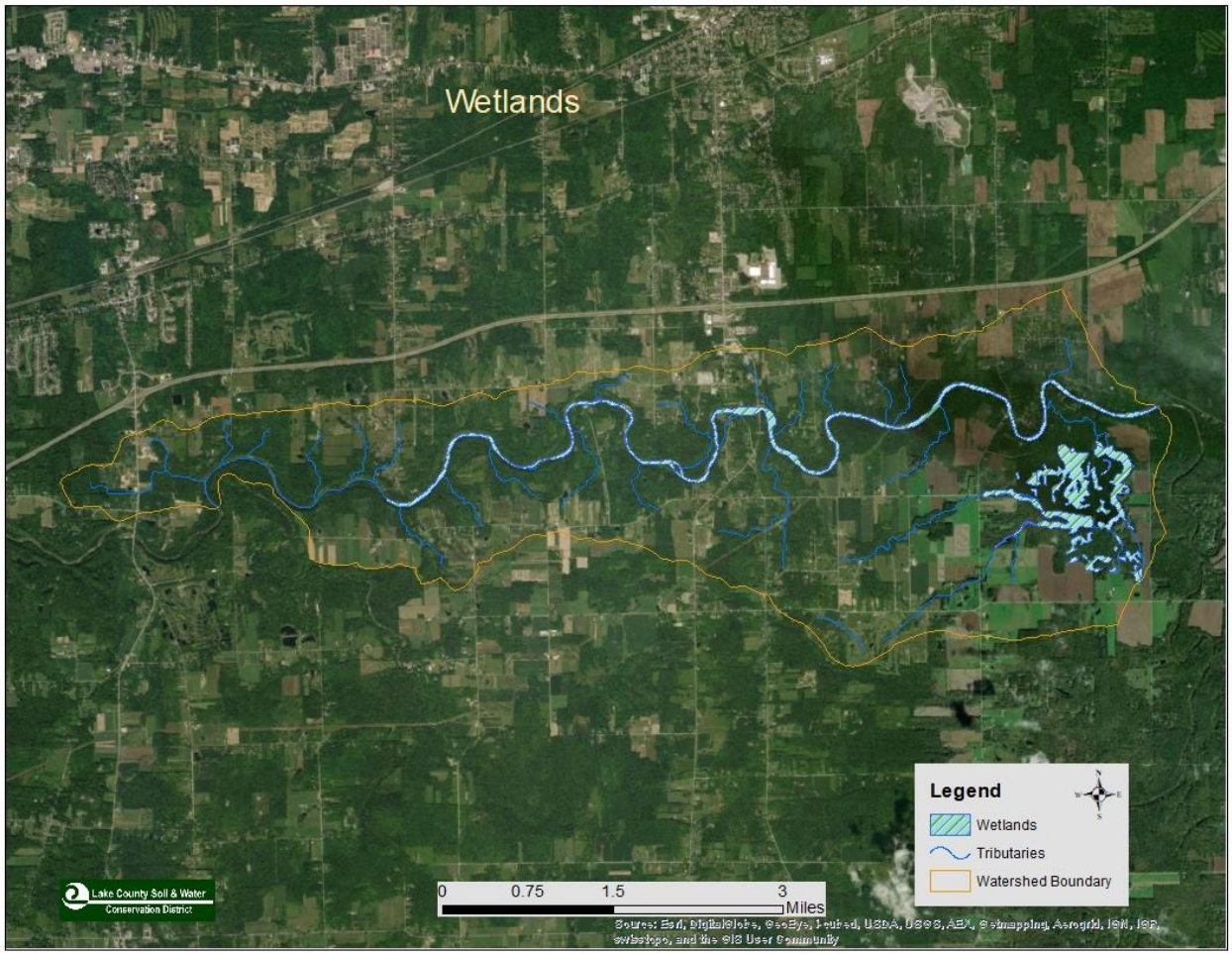

**Wetlands**

4% of the land in the watershed is covered by water and wetlands (Figure 10). (Federal Geographic Data Committee Wetland Mapping Standard for the conterminous United States (CONUS)). The majority is riverine, associated with the Grand River Mainstem. Forested wetlands are in the southeast section of the watershed. Wetlands provide valuable ecosystem services. They are reservoirs of biodiversity, they provide flood control, replenish groundwater, purify surface waters of nutrients and sediments and act as a carbon sink.

The breakdown of wetland type is as follows:

- Riverine 47%
- Forested/shrub wetland 34%
- Emergent wetland 0.3%
- Pond 0.5%

**Figure 10. Wetlands**




## 2.1.2 Land Use and Protection

**Figure 11. Land Use Data**

| | |
|---|---|
| Open Water | 4.36% |
| Developed, Open Space | 5.71% |
| Developed, Low Intensity | 2.40% |
| Developed, Medium Intensity | 0.24% |
| Developed, High Intensity | 0.08% |
| Deciduous Forest | 40.79% |
| Evergreen Forest | 0.65% |
| Mixed Forest | 0.07% |
| Shrub/Scrub | 1.35% |
| Herbaceous | 4.86% |
| Hay/Pasture | 9.38% |
| Cultivated Crops | 29.19% |
| Woody Wetlands | 0.93% |
| Emergent Herbaceous Wetlands | 0.02% |

The National Land Cover Database (NLCD 2011) delineated 38.5% of the land use as agricultural, 47.7% of the land use as forest and 8.4% of the land use as urban (Figure 11).

**Figure 12. Land Use**

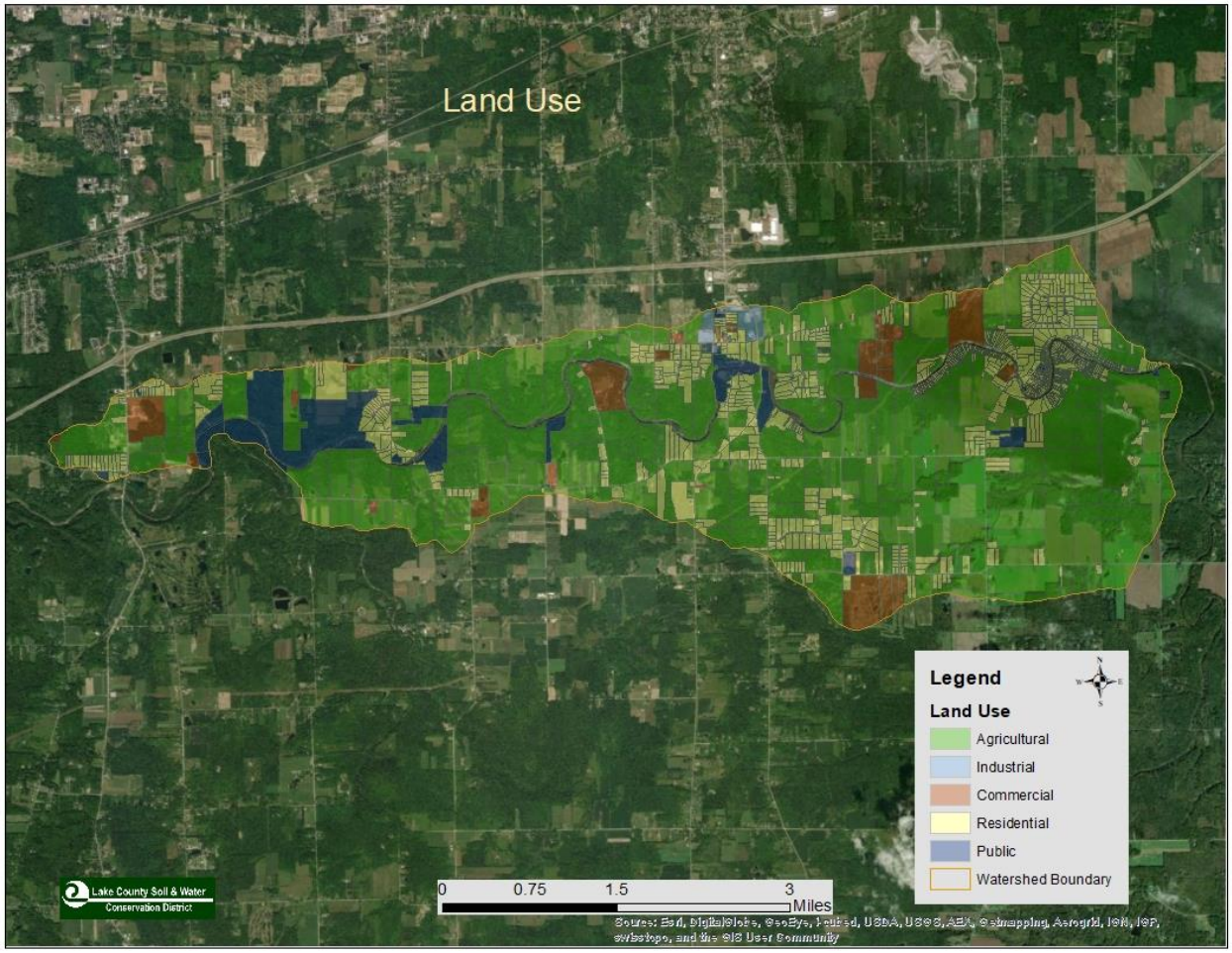



**Figure 13. Land Use from Parcel Data**

| Land Use | Acreage in Lake | % | Acreage in Ashtabula | % | Total % |
|---|---|---|---|---|---|
| Agriculture | 788.4 | 7.5 | 6238.4 | 59.7 | 67.3 |
| Industrial | | | 65.2 | 0.6 | 0.6 |
| Commercial | 106.4 | 1.0 | 479.3 | 4.6 | 5.6 |
| Residential | 271.3 | 2.6 | 1840.2 | 17.6 | 20.2 |
| Public | 416.3 | 4 | 237.3 | 2.3 | 6.3 |
| **Totals** | **1582.4** | | **8795.2** | | **100** |

Land Use data is taken from the 2019 Lake County parcel data and 2015 Ashtabula parcel data (Figure 13). The data from each county is shown separately and as a whole since the largest portion of the watershed is in Ashtabula County. Ashtabula has the highest percentage of land in agricultural and residential uses and Lake has a higher percentage of public land (Figures 12 and 13). The Community of Mechanicsville has the densest residential land use,

located around the Grand River Mainstem in the northeast corner of the watershed (Figures 12 and 14). Lake Metroparks has protected a large segment of land in Lake County around the Grand River Mainstem. A large number of nurseries and vineyards (Figure 15) are located in the watershed because of unique climate conditions associated with Lake Erie and the Grand River gorge.

**Figure 14. Community of Mechanicsville**

**Figure 15. Vineyard Lands**

The following land use information was written by David Radachy, Director of the Lake County Planning and Community Development office.

The development potential for lots in Mechanicsville Creek watershed is limited, but is greater than the other HUC-12s in the upper Lower Grand River. However, the economics of building in areas with large lot sizes, large frontages, no sanitary sewer or central water make developing very difficult with thin profit margins.

The majority of the watershed is not served by central sanitary sewer and most of the homes and businesses need to be served by on- site systems. Only properties in Madison Village have access to sanitary sewer. The area around State Route 528 and Interstate 90 has limited sanitary sewer service available but it has the potential to develop with changes in service. Additional sanitary sewer capacity could be created if Madison Village closes its plant and connects to the Lake County treatment plant in North Madison. Even with expansion of the sanitary sewer, the service would be limited areas of the watershed near SR 528.

Section 519 of the Ohio Revised Code allows townships to regulate land use through zoning. It does not allow the townships to prohibit agriculture, but they may limit it. Agriculture is by right, so it can be done in the entire watershed. One of the most profitable agricultural businesses is wineries. The Community of Mechanicsville-Grand River Watershed is part of the Grand River Micro Climate, making it ideal to grow grapes and make wine. This watershed is very close to I-90, making it very easy for the public to access the wineries in the watershed. There are six wineries in the watershed and another six adjacent to the watershed. These wineries, some with food preparation, are operating in residential districts because of the agriculture exemption.

**Zoning:**
92.3% of the Community of Mechanicsville-Grand River Watershed is zoned residential. 78.3% of the watershed has a minimum lot size of two acres or 0.50 of a unit per acre, but that lot size can be reduced to 1 acre if there is sanitary sewer present. 6.3% of the watershed has a minimum lot size of 17,500 to 20,000 square feet, but sanitary sewer is not very accessible in these areas, making developing them at the smaller size difficult. These areas are located in Madison Township and Madison Village. 7.7% of the watershed is zoned S-1 protected area in Madison Township. This is a residential district with additional setbacks for protection of the Grand River.

7.7% of the watershed is zoned for commercial and industrial uses. Most of the uses are the standard industrial and commercial uses of retail, manufacturing, offices and hotels, but there is a commercial recreation zone in watershed. This zoning classification includes commercial campgrounds, canoe liveries, gun and rod clubs, golf courses, and fields and facilities for soccer, football, baseball and archery.

| | |
|---|---|
| Single Family 2 Acre | 78.3% |
| S-1 Green Area | 7.7% |
| Single Family 1/3 to 1/2 Acre | 6.3% |
| Recreation Commercial | 4.3% |
| Commercial | 1.9% |
| Industrial | 1.5% |

Imperviousness of a watershed has an effect on the physical and biological characteristics of a stream. Increases in impervious cover cause decreases in conditions. Channel instability will occur when the impervious area is greater than 10%. Sharp declines in macroinvertebrate diversity occur when imperviousness is greater than 8%. According to the Center for Watershed Protection's Watershed Vulnerability Analysis report (Center for Watershed Protection, 2002), "…certain zones of stream quality exist, most notably at about 10% impervious cover, where the most sensitive stream elements are lost from the system. A second threshold appears to exist at around 25 to 30% impervious cover, where most indicators of stream quality consistently shift to a poor condition (e.g., diminished aquatic diversity, water quality and habitat scores)."

U.S. Geological Survey StreamStats data shows the imperviousness in the Watershed (Figure 16):

**Figure 16. Imperviousness**

| Percent Forested | Percent Developed | Percent Impervious |
|---|---|---|
| 44.5 | 8.45 | 1.45 |

As a watershed develops, increased impervious areas will decrease the physical, chemical and biological characteristics of the creeks. "A non-structural method to counter increased impervious surfaces is riparian setbacks. As the amount and velocity of stormwater runoff increases in the watershed the stream banks will begin to erode. If setbacks are put in place then the tree roots will help to protect the streambanks. In areas where tree roots are not capable of maintaining channel stability the setback will allow room for the stream to meander without causing undue problems with nearby structures." (Edgar. 2004.)

As with adjacent HUC-12s in the upper Lower Grand, the high percentages of forested land and the low percentages of developed and impervious land have helped to maintain the water quality in this watershed.

**2.2 Summary of HUC-12 Biological Trends**

Ohio EPA uses biological assessments to support the use attainability in the state, basing the relationship between biology, habitat and the potential for water quality improvement. OEPA has made two Aquatic Life Use designations in the watershed: Exceptional Warmwater Habitat (EWH) and Seasonal Salmonid Habitat (SSH). 13 miles are designated as EWH and 7.5 as SSH.

EWH use designation is reserved for waters which support "unusual and exceptional" assemblages of aquatic organisms which are characterized by a high diversity of species, particularly those which are highly intolerant and/or rare, threatened, endangered or special status (i.e. declining species); this designation represents a protection goal for water resource management efforts dealing with Ohio's best water resources. The SSH attributes are that they support lake run steelhead trout fisheries. (Ohio EPA Biological and Water Quality Study of the Grand River Basin 2003-2004; Ohio EPA Division of Surface Water, November 1, 2006; p. xi-xii.)

The OEPA sampled 3 sites in 2004 (Figures 17 and 18) for aquatic life use attainment, updating the data found in the Biological and Water Quality Study of the Grand River Basin 2003-2004. All were in Full Attainment of their Exceptional Warmwater Habitat Aquatic Life Use designations. No causes and sources of impairments were listed. https://oepa.maps.arcgis.com/apps/webappviewer/index.html?id=af9b57fe031d4eea8937f474c00f97f3)

Characterizations of the biological attributes of the Watershed by the EPA include the following:

- An unusually high number of uncommonly collected sensitive taxa and state listed species was collected by the EPA, which is an indication of the exceptional resource quality in the lower Grand River basin. A high diversity of sensitive taxa existed throughout this reach.
- Fish communities in the Grand River have an exceptionally high degree of biological integrity. This is obvious in the consistently high IBI scores along the length of the mainstem and between sampling years, and is also evident in the unusually high percent composition of pollution intolerant species making up electrofishing samples.
- The Grand River is one of the few rivers in Ohio that has a full suite of endemic, naturally reproducing and self-sustaining top carnivores including walleye, northern pike and muskellunge.
- The watershed provides habitat for many species considered rare by the Ohio EPA or listed as threatened or endangered by Ohio Department of Natural Resources.
- The character and physical habitat of the Grand River changes abruptly near Mechanicsville (*at the Harpersfield Dam- Figures 19 and 20*) where the river makes its westward turn toward Lake County and its eventual union with Lake Erie. Upstream from Mechanicsville, the river flows through the lacustrine deposits of a former glacial lake. There, the river is a classic swamp-wetland type stream with low gradient (< 1 ft/mi), fine sediments and few riffles; large woody debris, root wads, root mats, undercut banks and deep pools characterize the habitat. In short, the habitat in this reach of the Grand River supports one of the few intact type-locality faunal assemblages found anywhere in Ohio.
- Downstream from Mechanicsville, the gradient increases and the river flows in a series of pools, glides, runs, and riffles through a shale gorge. Long stretches of shallow bedrock alternate with aggregations of glacial till to form glides and riffles, and deeper pools exist where the river erodes former depositional areas. Water quality in the river is fortuitously protected by the shale gorge that the river flows through and the scouring flows that formed it, as the steep bluffs and regular flooding generally preclude development within the floodplain. Habitat quality in this reach of the river is among the best anywhere in Ohio.
- The surface waters in the lower Grand River unit possess, with few exceptions, good to excellent chemical integrity. It cannot be overstated that much of the riparian lands and adjacent slopes running to the uplands are protected and forested which is largely responsible for the high degree of chemical integrity.

(Ohio Environmental Protection Agency. 2014. *Water Quality: Assessment Unit Summary*. Ohio EPA, Division of Surface Water, Columbus, Ohio.)

**Figure 17. 2004 Sampling Data**

| Location Number | Location | IBI/Rating | MIwb* | ICI/Rating | QHEI/ Rating | Aquatic Life Use Desig. | Attainment Status |
|---|---|---|---|---|---|---|---|
| 1 | Grand River @ Brandt Rd | 51/ Exceptional | Good | 54/ Exceptional | 81.5 | EWH | FULL |
| 2 | Grand River @ Sexton Rd | 56/Exceptional | 9.7/ Exceptional | 52/ Exceptional | 75 | EWH | FULL |
| 3 | Grand River @ Tote Rd | 50/Exceptional | Marginally good | - | 57.5 | EWH | FULL |

*MIwb (Modified Index of well-being for fish): not applicable to drainage areas with headwater streams <20 mi2.

The Ohio EPA Division of Surface Water's Biological and Water Quality Study of the Grand River Basin 2003-2004 further discusses the physical characteristics of the watershed:

- The Harpersfield Dam (Figures 19 and 20) which divides the lower Grand River into two distinct sections also serves as a barrier to sea lamprey migration in the Grand River.
- Downstream from the Harpersfield Dam the watershed is influenced by the Snow Belt of northeastern Ohio, which regularly sees annual snowfall totals of more than 100 inches.
- Flow in the Grand River is fed primarily by rainfall and snow melt, with very little base flow sustained by ground water because of the river's glacial and bedrock geology. Consequently, discharge becomes quite small in the summer (relative to drainage area) resulting in the Grand River and its tributaries having limited assimilative capacity. The Grand River is sustained by the many coldwater tributaries that continually discharge ground water into the river. Those coldwater tributaries and other sources of base flow are essential to the overall health of the Grand River.
- Vegetated riparian corridors are a critical component of aquatic ecosystems and local hydrologic cycles. Stream bank vegetation provides habitat to many terrestrial and aquatic species.
- The impacts of development include the removal of riparian vegetation, degradation of floodplains and wetlands through filling, encroachment, water table recession and invasion of nonnative plant and animal species.
- Major sources of impairment associated with agriculture include habitat alteration, nutrient enrichment, and flow alteration. In general, BMPs used by farmers can make significant positive improvements on the impacts typically caused by agriculture.
- Proper management of wastewater and storm water is needed to prevent negative water quality impacts.

**Figure 18. Attainment and 2004 Sampling Locations**

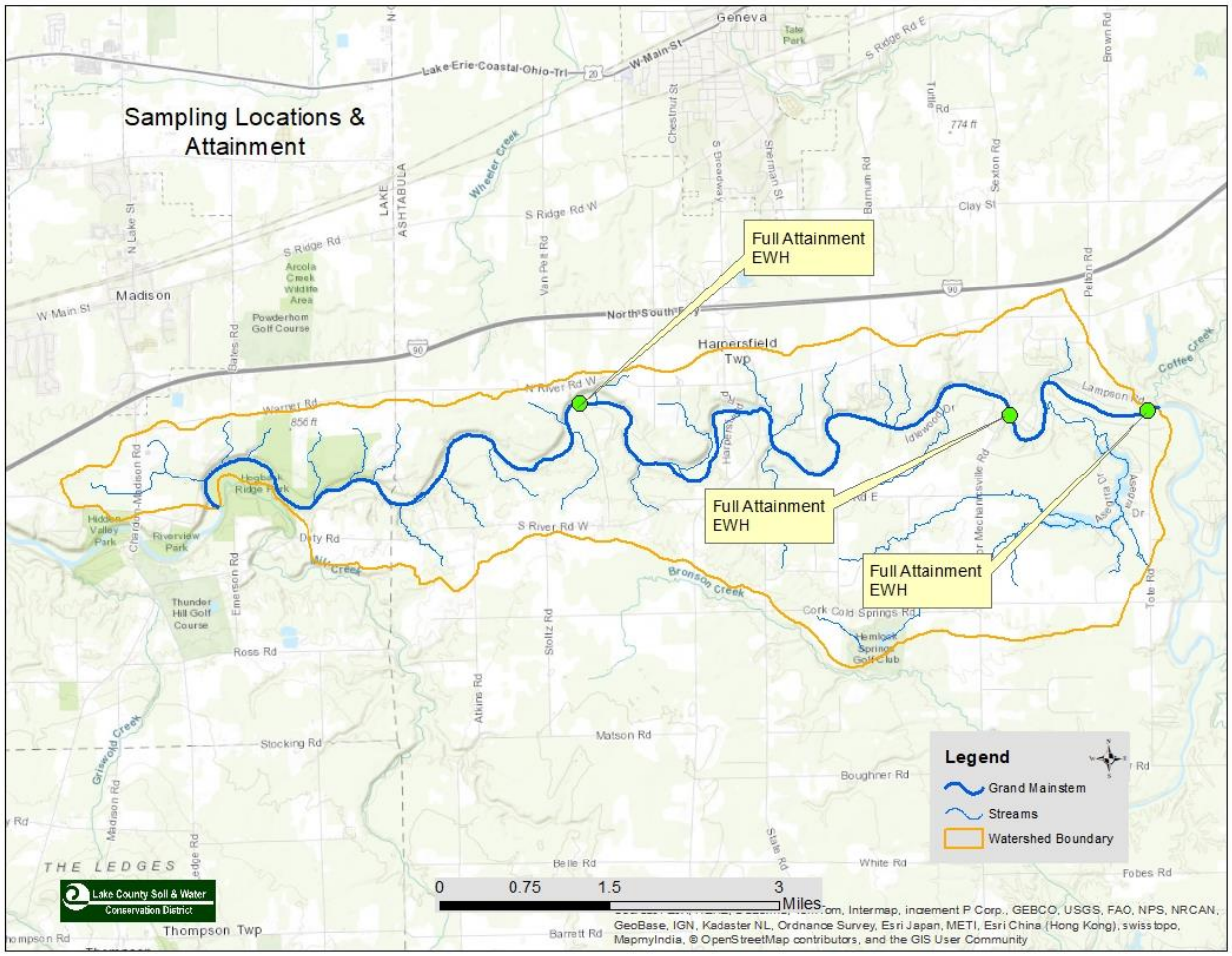
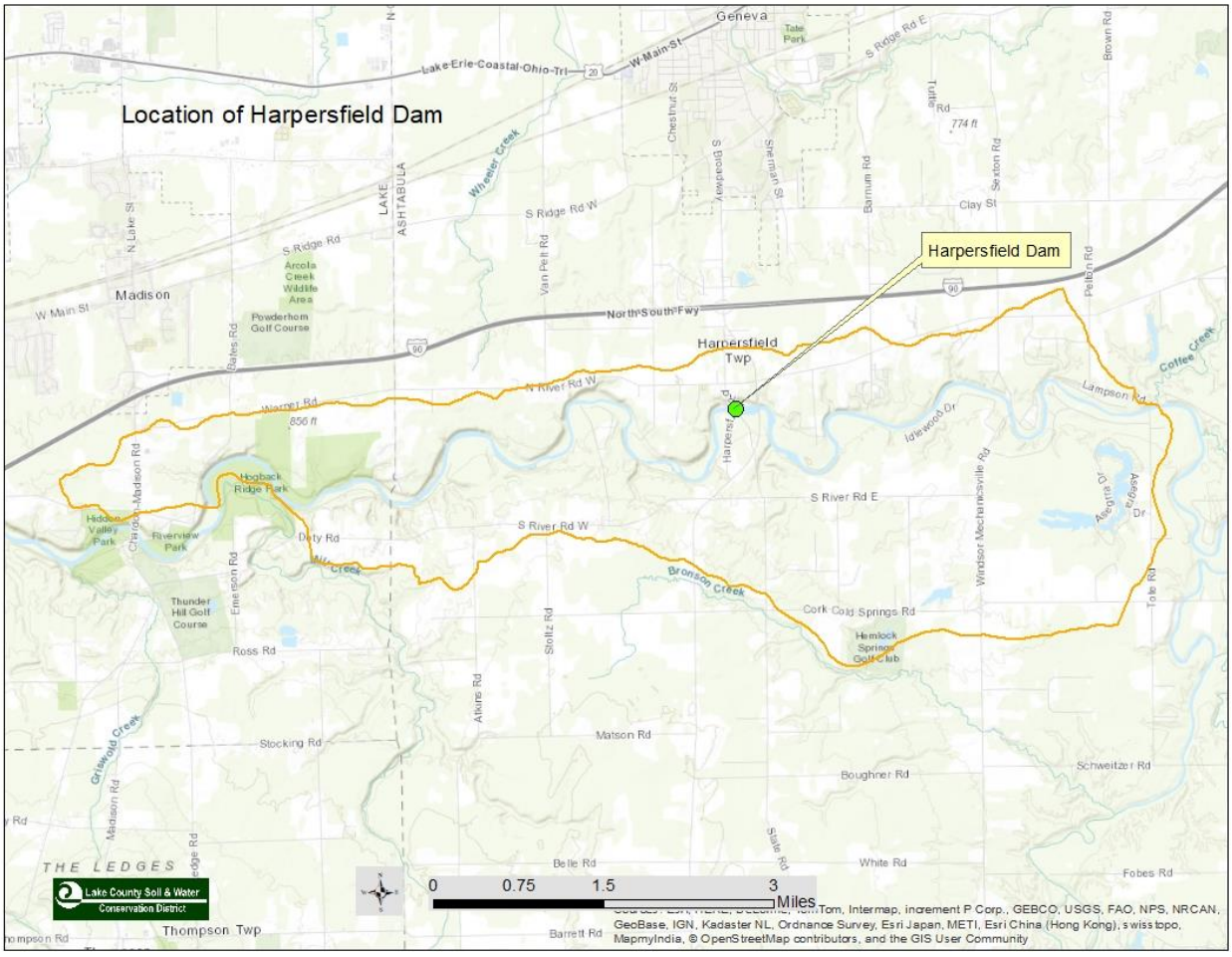


**Figure 19. Harpersfield Dam and Covered Bridge**

**Figure 20. Harpersfield Dam Location**



The Harpersfield Dam is being replaced because of the loss of integrity of the existing dam. It serves as a barrier to the invasive sea lamprey, so it cannot simply be removed. The sea lamprey affects the sport fishing industry in Lake Erie, so the Grand River is treated every three years with a lampricide to control the sea lamprey population. The treatment is controversial because it kills non-target fish and amphibians in the Grand River. If the Harpersfield Dam were to be completely taken out, lampricide treatment would have to extend farther upstream in the Grand River Mainstem as well as in the smaller tributaries. The cost to the fauna would be even more detrimental with a larger treatment area.

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

On the Ohio EPA Division of Surface Water's website, the Water Quality: Assessment Unit Summaries (2014) listed *no causes and sources of impairment*.

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

#### 2.4.1 Lake County Soil & Water Conservation District (SWCD)

Lake SWCD was formed in 1946 to provide leadership and technical expertise to guide the protection and conservation of the unique soil and water resources of Lake County.

The District was honored in 2009 with the Ohio Federation of Soil and Water Conservation Districts President's Award "For Distinctive Leadership and Visionary Governance Fostering the Development and Implementation of the Headwater Habitat Evaluation Index". In 2003, District staff began using the EPA's Headwater Habitat Evaluation Index (HHEI) in the central and eastern watersheds to assign aquatic life use designations to unclassified streams in order to gather data to assist with their protection and conservation.

Over a ten-year period, staff collected data throughout Lake County and compiled a unique database of HHEI and QHEI (Qualitative Habitat Evaluation Index) information on local watersheds. The District utilized this data to assist communities in Lake County in establishing riparian setback ordinances and monitoring erosion and sediment control programs that would meet the goals of the USEPA Phase 2 and Lake Stormwater Management Department programs. The data was also used to evaluate and prioritize resource values for conservation easements, and to develop baseline and monitoring information for restoration assessments.

#### 2.4.2 Lake County Stormwater Management District

Lake County's Stormwater Management District (SMD) provides treatment of stormwater and addresses the National Pollution Discharge Elimination System (NPDES) for Phase II mandated member communities. The SMD can assist with funding to improve the stormwater infrastructure and is a good source for match for grants for member communities. Leroy Township is not a Phase II mandated community and is not a member of the SMD. Geauga County does not have a stormwater utility, and funding/match for stormwater management projects can come from the local community, and private landowners.

### 2.4.3 Biological and Water Quality Survey of the lower Grand River Basin, 2003-2004; Ohio EPA

The main objectives of the survey (as they apply to the Community of Mechanicsville-Grand River Watershed) were to:

1. Assess the overall quality of surface waters within the hydrologic units
2. Monitor for trends or changes in biological or water quality
3. Assign aquatic life uses to unassessed waters
4. Provide information for completion of a Total Maximum Daily Load Study

The results of the survey showed that the Grand River and its tributaries "continue to harbor a rich and diverse biological assemblage containing many rare and threatened species, and several state endangered species. This exceptional biological richness is the direct result of the fact that the physical habitat of the Grand River and most of its tributaries has, by dint of isolation from the surrounding uplands, been minimally altered and therefore remains largely intact. Also, land preservation through park land acquisition and conservation easements, and the numerous woodlots dotting the watershed, has maintained forest cover along much of the riparian zone, the adjacent valley slopes, and in the uplands; consequently, the water resource is, with few exceptions, very good and approaches pristine in a few cases."

### 2.4.4 Total Maximum Daily Loads for the Grand River (lower) Watershed; Ohio EPA, January 31, 2012.

In 2003 and 2004, the Ohio EPA collected data related to water, sediment quality, aquatic biological communities and habitat in the lower Grand River Watershed to determine if quality criteria for designated beneficial uses were being met.

The report concluded that watersheds that retain relatively large areas of forest are better able to mitigate the impacts of increasing imperviousness associated with development than those with little forest cover. Procuring conservation easements and establishing parks and nature preserves can help to retain some of the forest cover. Land preservation alone is not likely to mitigate the impacts of development, but can augment other measures such as green infrastructure and on-site stormwater management.

Protecting streams from degradation due to land use changes will be critical to ensure that unimpaired streams are protected. Stormwater management, infiltration, wastewater management, using better site design practices and agricultural Best Management Practices are all applicable and recommended.

### 2.4.5 Grand River Riparian Corridor Protection Plan (Davey Resource Group, March 1998)

Initiated by the Grand River Partnership, a consortium of public agencies and private organizations in Ashtabula, Geauga, Lake and Trumbull Counties, the protection plan identified three targeted "critical areas" for acquisition of conservation easements in the riparian corridor of the Grand River.

The goals of the project were to:

1. Protect the water quality and aquatic habitat, wetlands and associated forest communities of the Grand River watershed
2. Provide education for landowners on the ecological and economic benefits of riparian buffers, wetlands, floodplains and steep slopes
3. Assist elected officials, public servants, decision makers and concerned citizens in making the right choices for watershed protection

Twenty benefits of riparian buffers were listed as very beneficial to the Grand River:

1. Reduces watershed imperviousness by 5 percent
2. Distances areas of impervious cover from the stream
3. Reduces small drainage problems and complaints
4. Stream "right-of-way" allows for lateral movement
5. Effective flood control
6. Protects from streambank erosion
7. Increases property values
8. Increases pollutant removal
9. Foundation for present or future greenways
10. Provides food and habitat for wildlife
11. Mitigates stream warming
12. Protects associated wetlands
13. Prevents disturbance to steep slopes
14. Preserves important terrestrial habitat
15. Corridors for conservation
16. Essential habitat for amphibians
17. Fewer barriers to fish migration
18. Discourages excessive storm drain enclosures/channel hardening
19. Provides space for stormwater ponds
20. Allows for future restoration

### 2.4.6 Grand River Watershed Riparian Corridor Protection Guide (prepared by Davey Resource Group for Grand River Partners, Inc.; 1999)

This publication was financed in part by a grant through the Ohio EPA 319 program and in part by funds from the James P. Storer Foundation, with assistance from the Western Reserve Resource Conservation and Development Council and Grand River Partners, Inc. It describes the natural wealth of the Grand River, lists the many benefits of riparian corridors and states that the destruction of the riparian corridor is often the first step in the death of a river.
The benefits that riparian areas provide include:

- Absorbing and removing pollutants from runoff
- Reducing temperature extremes of waters
- Supplying organic matter to provide carbon nutrients (the most basic link in the food chain of a river ecosystem)

Preserving or restoring riparian areas along the Grand River and its tributaries was stated as key objectives for protecting the watershed. The guide enumerated ways to "save a river" as follows:

- Regulatory efforts for monitoring industrial and wastewater treatment facilities
- Community planning and tools to manage development in a sustainable manner and provide legal defenses to preserve the landscape
    - Comprehensive planning and natural resource analysis
    - Zoning and subdivision regulations
    - Growth Management
    - Easements and acquisition
    - Land trust efforts

### 2.4.7 Harpersfield Township Zoning Resolution

Harpersfield Township does not have any riparian or wetland setbacks.

### 2.4.8 Austinburg Township Zoning Resolution

Austinburg Township does not have any riparian or wetland setbacks.

## Chapter 3: Critical Area Conditions & Restoration Strategies

### 3.1 Overview of Critical Area

The Critical Area Community of Mechanicsville-Grand River Watershed is the upper headwaters area as shown in Figure 21. Two locations in the Critical Area are in Full attainment of their EWH aquatic life use. Maintaining that status is the paramount strategy of this plan, and the strategies in this NPS-IS are designed to achieve that outcome. The Ohio EPA Total Maximum Daily Loads for the Grand River (Lower) Watershed. Final Report, January 31, 2012 made the following applicable conclusions:

- Watersheds that retain relatively large areas of forest are better able to mitigate the impacts of increasing imperviousness associated with development than those with little forest cover
- Procuring conservation easements and establishing parks and nature preserves can help to retain some of the forest cover
- Protecting streams from degradation due to land use changes will be critical to ensure that unimpaired streams are protected
- Land preservation alone is not likely to mitigate the impacts of development, but can augment other measures such as green infrastructure and on-site stormwater management
- Stormwater management, infiltration, wastewater management, using better site design practices and agricultural Best Management Practices are all applicable and recommended

Protecting wooded and riparian wetlands and buffers in the critical area, and achieving proper forest management are also essential elements for the health of the warmwater biology of the entire watershed.

The critical area is defined by the Harpersfield Dam, which divides the watershed into two physiological sections. It contains the greatest concentration of residential and agricultural land uses in the watershed. It is the widest portion of the watershed and has longer stream sections

and flatter topography, with more opportunities to implement strategies to maintain the EWH attainment.

Conservation Development should be encouraged to help keep the EWH attainments status from declining. Conservation Developments allow developers to have smaller lots in exchange for land being preserved. This method of development usually is created though a planned unit development (PUD) and the developments are normally served by sanitary sewer and central water. Lot sizes for this type of development can be as small as ¼ of an acre. Conservation development can also work in areas where there is no sanitary sewer or central water, but lot sizes this small would not be able to contain a septic system and/or water well.

A conservation development could utilize lot sizes that are 50% or 33% of normal lot size in exchange for conservation of land so long as the lot size would have space for a septic system and/or water well. A one- or 1.5-acre lot with the right soil conditions could handle a septic system and/or well. In area of 3 acre lots, a community could approve lots that are 2 acres, 1.5 acres or 1 acre in exchange for preserved land.

### 3.2.1 Critical Area: Detailed Characterization

The Critical Area (Figure 21) drains 9.7 square miles in Harpersfield and Austinburg Townships in Ashtabula County. Neither Harpersfield nor Austinburg Townships have riparian or wetland setbacks.

The predominant land use is agricultural land, at 68.4%. 23.3% of the critical area is in residential land use (Figures 22 and 23). Most of the riparian corridors run through wooded agricultural land. There is very little industrial or commercial land use and imperviousness in the watershed is minimal. 56% of the commercial land use is mobile home property, located in the north-central portion of the critical area, along the Grand River. There are currently large undeveloped areas by the Grand River on these commercial properties, providing a wide wooded riparian buffer along the River.

**Figure 21. Critical Area**

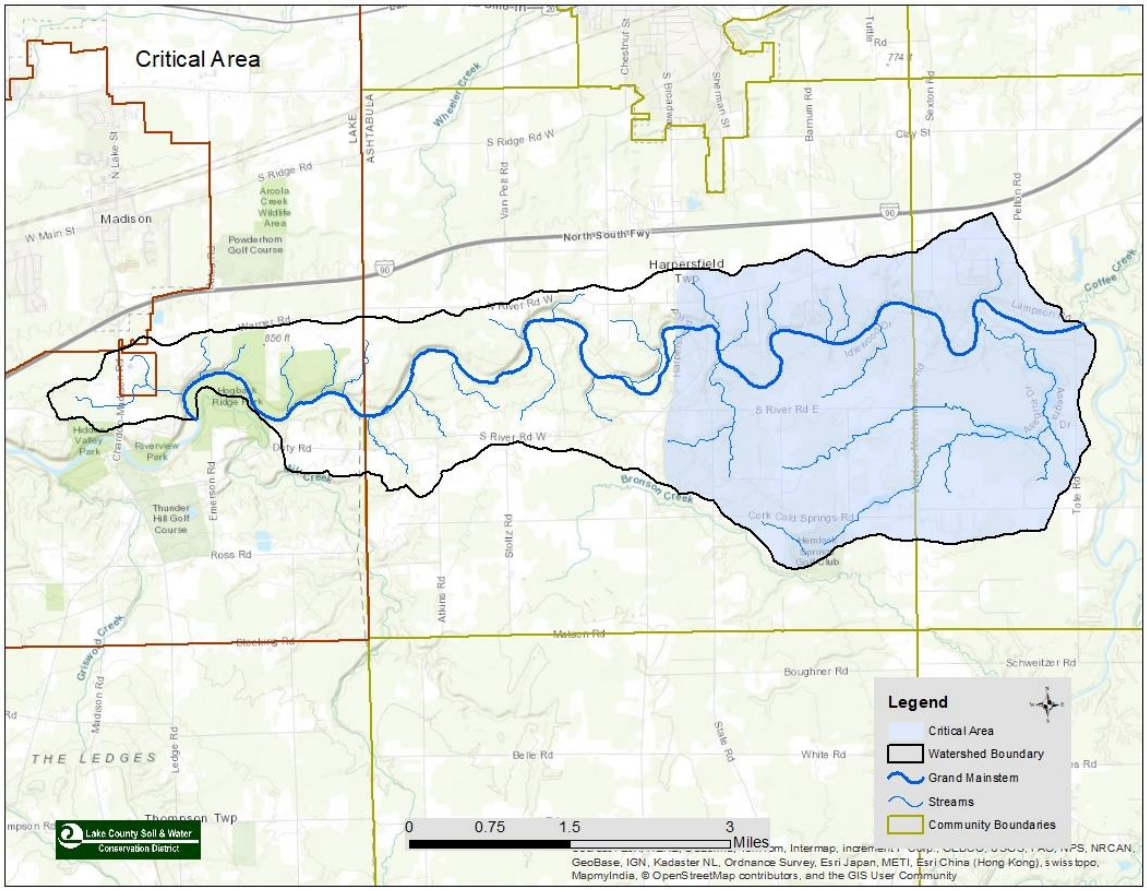



**Figure 22. Critical Area Land Use Data**

| Land Use | Acres | % |
|---|---|---|
| Agricultural (green) | 4171.3 | 68.4 |
| Industrial (blue) | 38.7 | 0.6 |
| Commercial (red) | 342 | 5.6 |
| Residential (yellow) | 1418.8 | 23.3 |
| Public (navy) | 127.2 | 2.1 |

**Figure 23. Critical Area Land Use**

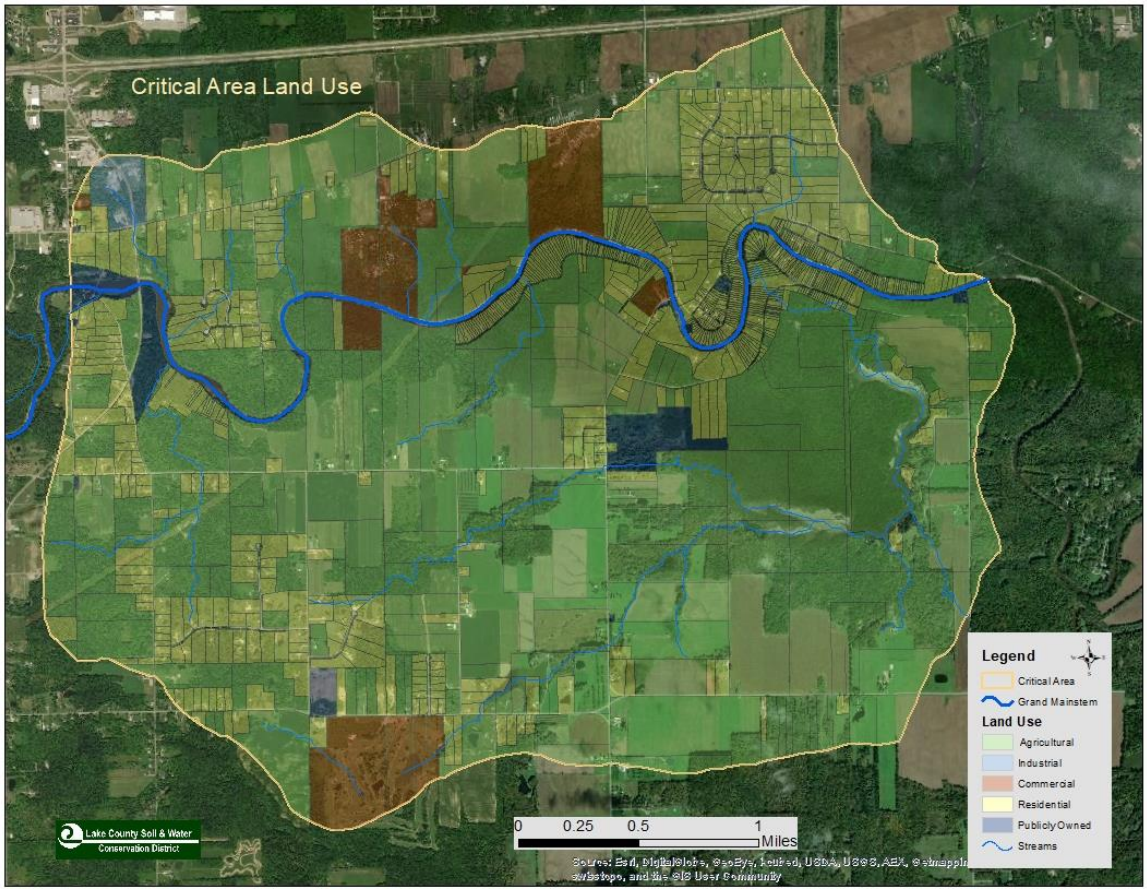
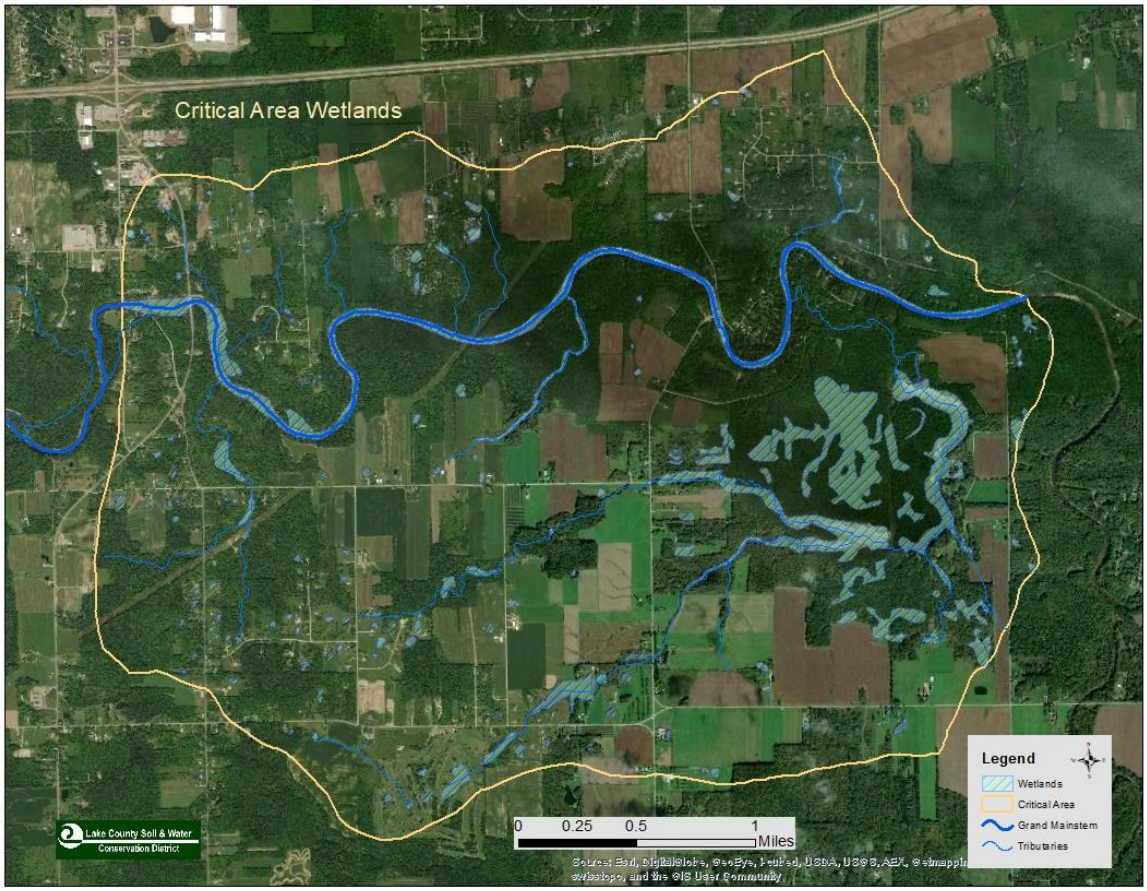


**Figure 24. Wetlands**



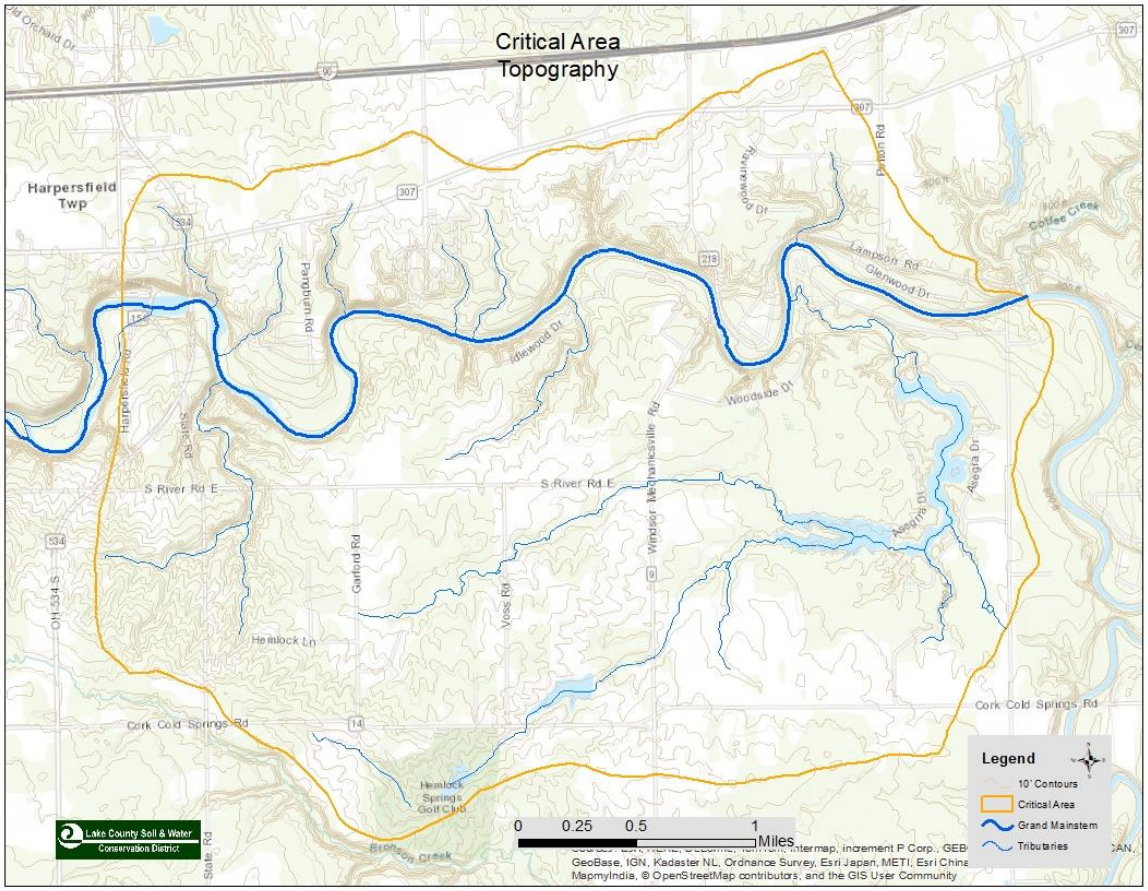

7.3% of the critical area is wetland (Figure 24). Most of the wetlands in the critical area are located in the eastern portion of the watershed. 40% of the wetlands are forested/shrub wetlands and 25.4% are Riverine, located in the Grand River floodplain.

Deforestation of the wetlands can lead to increased erosion and sedimentation, warmer water temperatures and a decrease in water quality and aquatic use habitat. Wetlands Best Management Practices should be used to supplement upland forestry best management practices to reduce the potential adverse impacts of forest management activities on wetlands. (Forested Wetlands; Functions, Benefits and the Use of Best Management Practices. USDA # NA-PR-01-95)

The breakdown of wetland type is as follows:

- Forested/shrub wetland 40.0%
- Emergent wetland 2.8%
- Pond 15%
- Lake 17%
- Riverine 25.4%

**Figure 25. Topography**




The topography is steeper in the southwestern quarter. Most of the topography south of the Mainstem falls to the east in a more gradual slope and flattens out in the eastern quadrant (Figure 25).

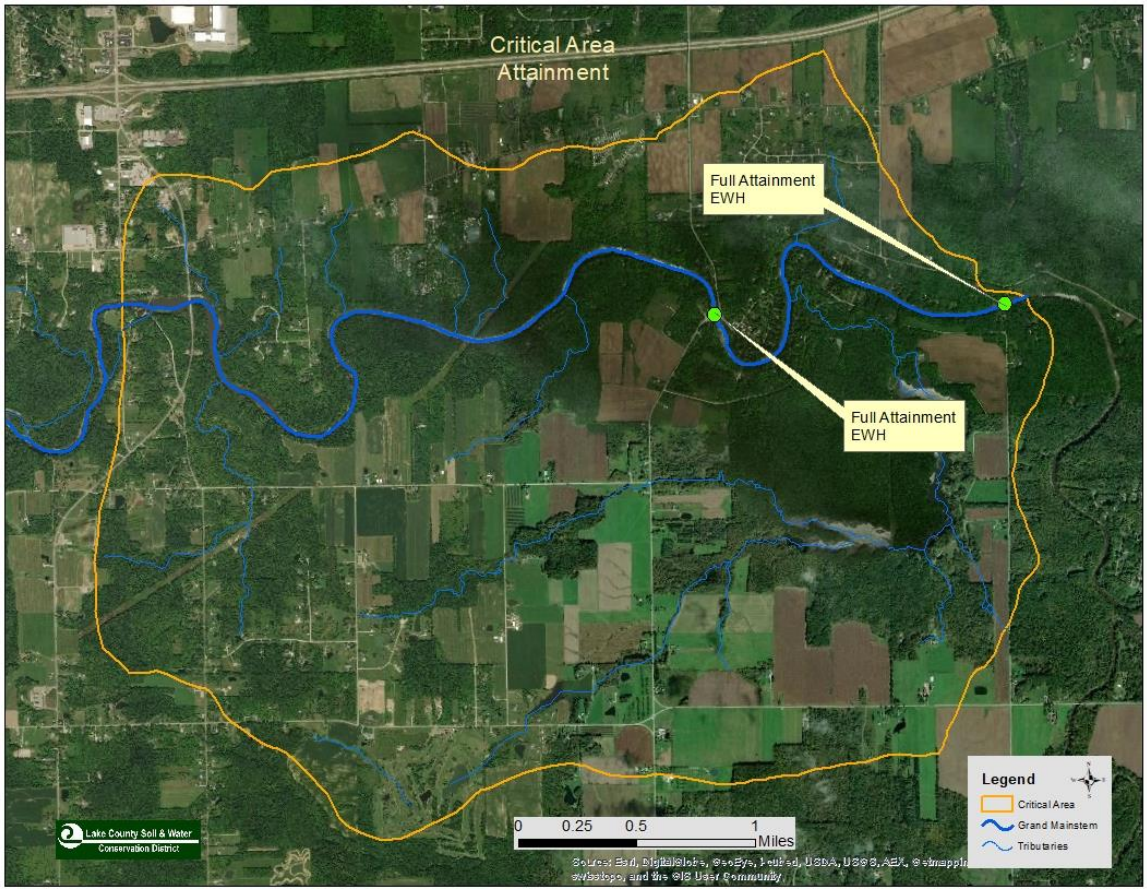
### 3.2.2 Detailed Biological Conditions

Two locations were sampled by the OEPA in 2004 in the critical area: at Sexton Road and at Tote Road (Figure 27). Both were in Full Attainment of Exceptional Warmwater Habitat Aquatic Life Use (Figure 26).

**Figure 26. EPA 2004 Sampling Data**

| Sampling Location | Macro-invertebrates | IBI/Narrative | ICI/ Narrative | QHEI/Status | Attainment Status |
|---|---|---|---|---|---|
| Sexton Rd. | - | 56/Exceptional | 52/ Exceptional | 75.5 | Full |
| Tote Rd. | - | 50/Exceptional | - | 57.5 | Full |

**Figure 27. Attainment Status**




### 3.2.3 Detailed Causes and Associated Sources

The causes and sources of impairment in Critical Area are listed in the Ohio EPA online Water Quality Assessment Unit Summaries (2004) for the HUC-12 watershed.

| Cause | Source |
|---|---|
| None listed | None listed |

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

**Goals**

The nonpoint source goal is to maintain the FULL Attainment of the Coldwater Aquatic Life Use designations. This will be accomplished by protecting the riparian, wetland and forest resources. In addition, the HHEI data will be updated.

Lake County SWCD conducted over 1200 assessments on primary headwater streams in northeast Ohio from 2000-08 in an attempt to better understand ways to protect these vital resources. As part of a small pilot study in 2018 and 2019 the Lake SWCD undertook a new effort to assess changes and trends in over 100 headwater habitats in the East Branch of the Chagrin River and the Grand River watersheds. This effort followed the same methodology and was conducted in the same locations as the original assessment effort.

The Headwater Habitat Evaluation Index (HHEI) developed by the Ohio Environmental Protection Agency described in detail in the "Field Evaluation Manual for Ohio's Primary Headwater Habitat Streams" was used to complete an extensive baseline inventory of the biological integrity of headwater streams throughout Lake County. Primary headwater stream habitats are defined as having less than 1 mi2 (2.59 km2) of drainage area and pools <40cm. HHEI assessments are ranked into five designations based on their physical, biological and chemical measurements. Important information like flooding potential, riparian corridors and chemistry is collected with reference to the amount of development, wetlands, and proximity to structures.

The original inventory unveiled the wide distribution of several obligate salamander and macroinvertebrate species which could be used to monitor long term trends in water quality impairment. The original study showed that statewide predictions for the amount of coldwater primary headwater streams within individual watersheds may be underestimated in some cases as the Grand River watershed contains twice the statewide predicted amount of coldwater streams in its watershed. Obligate salamanders of the Plethodontidae family have proven to be good predictors of habitat quality in urban, suburban and rural watersheds. Data collected from this study also provided useful information on key dragonfly larvae and salamander habitats.

Statistical analysis of the data updated in 2018 and 2019 is ongoing to determine trends and significant departures from initial data. However, early analysis suggests that stream designations (ie. Class III, Class II, Class I, etc.) have not changed significantly. Physical scoring metrics like substrate types, stream width and stream depth have predominately stayed the same. This trend stays the same for chemical parameters of temperature, conductivity, pH and salinity. Biological indicator species like salamander and dragonfly larvae ranges appear to stable. The majority of streams with previously recorded populations maintained those populations. However, abundance of individuals in each stream appears to have decreased. The most notable changes between the 2000-2008 effort and the 2018-2019 effort was the change in the flow regime in certain streams. While discharge was not physically measured in the original assessments, a notation is

made during baseflow as to each individual stream's flow regime. The following regime choices are available for selection: 1. Perennial/Flowing, 2. Interstitial/Subsurface flow with isolated pools, 3. Intermittent/Moist channel with isolated pools (no flow) and 4. Ephemeral/Dry channel with no water. Approximately 22% of the streams had a reduction in the flow regime ranking. For example, a reduction in flow regime would be changing from Interstitial flow to Intermittent flow. Additional streams should be assessed to determine if this departure is significant across the entire data set. However, an early hypothesis is that the amount of groundwater infiltration feeding baseflow in these streams has been reduced. This reduction is the result of more intense, but infrequent, storm events; changes in soil texture from non-native earthworm activity; and lastly changes in evapotranspiration rates correlating to forest composition.

HHEI data supports many programs such as:

- TMDL development
- 401/404 water quality permits
- Acquisition of conservation easements
- Strengthening local planning commission and zoning board riparian setback resolutions.

Conservation of primary headwater streams and the surrounding natural areas that contain these unique habitats is essential to maintaining the function and value of downstream water quality.

**Goal 1.** Maintain or increase the QHEI score of 75.5 at Sexton Road and 57.5 at Tote Road.

- ACHIEVED: Sites currently have QHEI scores of 75.5 and 57.5, respectively.

**Objectives**

Objective 1. Protect the riparian corridor

- Stabilize the streambank and restore 1050 feet of the riparian zone below the Harpersfield Dam.
- Implement CRWP model ordinances and regulations in Harpersfield Township to protect 10.8 stream miles
- Implement CRWP model ordinances and regulations in Austinburg Township to protect 9.7 stream miles

Objective 2. Protect wetlands

- Permanently protect 75 acres of wetlands

Objective 3. Protect Core Forest Blocks

- Permanently protect 100 acres of forested land through land acquisition or conservation easements

Objective 4. Update HHEI data

- Re-assess 27 HHEIs in the Lake County portion of the HUC-12

As the objectives are implemented, water quality monitoring will be conducted (both project related and regularly scheduled monitoring) to determine progress toward meeting the identified water quality goals. These objectives will be reevaluated and modified or added to if determined to be necessary. Reevaluation will utilize the Ohio EPA Nonpoint Source Management Plan Update (Ohio EPA, 2013) which lists all the eligible NPS management strategies to address:

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

## Chapter 4. Projects and Implementation Strategy

### 4.1 Projects and Implementation Strategy Overview Table

The projects and evaluation needs that are believed to be appropriate to remove the impairments to the Community of Mechanicsville-Grand River HUC-12 are listed below. They were determined by evaluating the identified causes and associated sources of nonpoint source pollution. Because the attainment status is based upon biological conditions, it will be necessary to periodically re-evaluate whether or not the implemented projects are sufficient to achieve attainment. The response of biological systems may take some time following project implementation. If issues other than nonpoint source pollution are causing impairments, they will need to be addressed under different initiatives, authorities or programs.

The Project and Implementation Strategy Overview Table addresses the goals and objectives for the Critical Area. The Critical Area goals aim to address the sources of impairment, including loss of riparian habitat, urban runoff, channelization and agriculture through increased infiltration of stormwater runoff and restoration of natural flow conditions and habitat.

The projects described in the Overview Table have been prioritized using the following three step prioritization method:

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

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

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 as stakeholders to participate and implement projects like those mentioned in Priority 1 and 2.

Project Summary Sheets (PSS) are in subsection 4.2. These PSS provide the essential nine elements for short-term and/or next step projects that are in development and/or in need of funding. As projects are implemented and new projects developed these sheets will be updated. Any new PSS created will be submitted to the State of Ohio for funding eligibility verification (i.e., all nine elements are included).

## 4.1 Project and Implementation Strategy Overview Tables

| For ***Community of Mechanicsville-Grand River HUC-12*** (***041100040603***) — Critical Area | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **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)* |
| *Recommend that your critical areas be numbered or coded for reference.That number/code listed here comes from Chapter 3 section 3.1* | *It is recommended that your goals and objectives be numbered or coded for easy reference. The number/code listed here comes from Chapter 3 section 3.x.4.* | | *The information listed here comes from the Project Summary Sheets Chapter 4 Table 4.2.* | *The information listed here comes from the Project Summary Sheets Chapter 4 Table 4.2.* | *The information listed here comes from the Project Summary Sheets Chapter 4 Table 4.2.* | *The information listed here comes from the Project Summary Sheets Chapter 4 Table 4.2.* | *The information listed here comes from the Project Summary Sheets Chapter 4 Table 4.2.* | *The information listed here comes from the Project Summary Sheets Chapter 4 Table 4.2.* |
| **High Quality Waters Protection Strategies** | | | | | | | | |
| 1 | 1 | 1 | 1 | Grand River Streambank Stabilization & Riparian Zone Restoration | Ashtabula Metroparks | 1-3 years | $540,100 | 319, GLRI, SOGL |
| | 1 | 5 | 2 | Update HHEIs | Lake SWCD | 1-3 years | $11,200 | CMAG |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

### 4.2 Critical Area 1: Project Summary Sheet

| Nine Element Criteria | Information needed | Explanation |
|---|---|---|
| *n/a* | **Title** | Grand River Streambank Stabilization and Riparian Zone Restoration |
| *criteria d* | **Project Lead Organization & Partners** | Ashtabula Metroparks, Grand Ashtabula Conneaut (GAC) Partnership, Chagrin River Watershed Partners (through the Central Lake Erie Basin Collaborative) |
| *criteria c* | **HUC-12 and Critical Area** | HUC 12: 041100040603 Community of Mechanicsville-Grand River; Critical Area subwatershed |
| *criteria c* | **Location of Project** | Harpersfield Covered Bridge Metropark, Ashtabula County, OH; River Mile 30.8 of the Grand River |
| *n/a* | **Which strategy is being addressed by this project?** | High Quality Waters Protection Strategies |
| *criteria f* | **Time Frame** | Short-Term Priority (1-3 yr) |
| *criteria* | **Short Description** | Stabilize and restore 1050 feet of the south bank of the Grand River below the Harpersfield Dam in Harpersfield Township, Ashtabula County Ohio. |
| *criteria g* | **Project Narrative** | The Harpersfield Dam has affected the flow of the Grand River below the dam and caused erosion of the south bank of the river. Streambank erosion at the project site currently threatens the high-quality habitat and full attainment of the Grand River's EWH designation. The project will stabilize 1050 feet of the streambank using bioengineering techniques (including installation of native woody vegetation, tree revetments and rock toe protection), revegetate 0.4 acres of the riparian zone and engineer modifications to the riffle below the dam to redirect stream energies away from eroding banks. |
| *criteria d* | **Estimated Total cost** | Estimated total cost: = $540,100; components below:<br>Engineering: $90,000<br>Bioengineered streambank stabilization: $315,000<br>Riparian zone revegetation: $8,000<br>Tree revetments: $117,600<br>Grant management & educational outreach: $9,500 |
| *criteria d* | **Possible Funding Source** | 319, GLRI, SOGL |

| | | |
|---|---|---|
| *criteria a* | **Identified Causes and Sources** | Sources of impairment: none listed<br><br>Causes of impairment: none listed |
| *criteria b & h* | **Part 1: How much improvement is needed to remove the NPS impairment for the whole Critical Area?** | The Critical Area is in attainment. |
| | **Part 2: How much of the needed improvement for the whole Critical Area is *estimated* to be accomplished by this project?** | This project will restore and stabilize 1050 linear feet of eroding streambank and restore 1.5 acres of the riparian buffer.<br>It completely addresses Objective 1 in the Critical Area. |
| | **Part 3: Load Reduced?** | Sediment: 44.6 tons/year; Phosphorus and Nitrogen: 44.6 lb/year |
| *criteria i* | **How will the effectiveness of this project in addressing the NPS impairment be measured?** | The success of the project will be evaluated through continuing attainment of the EWH attainment, and potential increases in the QHEI score. |
| *criteria e* | **Information and Education** | The Community of Mechanicsville-Grand River NPS-IS will be on the Lake and Ashtabula SWCD website. Projects will be featured on the District websites and in the District newsletters as they are completed. |

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Soil Survey of Ashtabula County, Ohio. In cooperation with Ohio Department of Natural Resources, Division of Soil and Water Conservation; Ohio Agricultural Research and Development Center; Ohio State University Extension; Ashtabula County Commissioners; and Ashtabula Soil and Water Conservation District

Soil Survey of Lake County, Ohio; United States Department of Agriculture Soil Conservation Service, in cooperation with Ohio Department of Natural Resources Division of Lands and Soil and Ohio Agricultural Research and Development Center

United States Geological Survey, StreamStats in Ohio. http://water.usgs.gov/osw/streamstats/ssinfo.html

## Appendix A. Acronyms

| | |
|---|---|
| BMPs | Best Management Practices |
| CONUS | Conterminous United States |
| CRWP | Chagrin River Watershed Partners |
| EWH | Exceptional Warmwater Habitat |
| EPA | Environmental Protection Agency |
| HHEI | Headwater Habitat Evaluation Index |
| HUC | Hydrologic Unit Code |
| IBI | Index of Biotic Integrity |
| ICI | Invertebrate Community Index |
| MIwb | Modified Index of Well-Being |
| NLCD | National Land Cover Data |
| NPS-IS | Nonpoint Source Implementation Strategy |
| OEPA | Ohio Environmental Protection Agency |
| PSS | Project Summary Sheets |
| QHEI | Qualitative Habitat Evaluation Index |
| SMD | Stormwater Management Department |
| SSH | Seasonal Salmonid Habitat |
| SWCD | Soil and Water Conservation District |
| USEPA | United States Environmental Protection Agency |