VI. Home Sewage Treatment System Plan

Purpose of the HSTS Plan

The Stark County Health Department (SCHD), along with assistance from the Northeast Ohio Four County Regional Planning and Development Organization (NEFCO), has developed and updated a Home Sewage Treatment System (HSTS) Plan for the Nimishillen Creek Watershed (Figure VI-1) to effectively coordinate the correction of failing HSTSs. The HSTS Plan:

- Identifies target areas of impairment caused by failing HSTSs
- Outlines current and long-term inspection and monitoring programs and goals
- Offers a comprehensive educational and outreach program

The Stark County Health Department covers essentially all unsewered areas of the watershed and county. The vast majority of the other health districts in the watershed primarily cover sewered areas. Furthermore, if a land parcel within another health department's jurisdiction within Stark County is proposed to be served by a home sewage treatment system, then the Stark County Health Department, having expertise in the program, does all the siting and installation inspections.

Within its jurisdiction, the Stark County Health Department requires a home sewage treatment system upgrade usually for one of the following reasons:

A. Nuisance abatement program: inspects a HSTS upon submission of a written complaint.
B. Evaluation for an addition to a home i.e. adding living space to home.
C. Inspection conducted by Health Department personnel or a registered service provider.
D. Evaluation of a community with a high density of failing systems, which typically results in working with the community for the expansion of sewers.

Currently, the SCHD or registered service providers investigate on average over 600 HSTSs per year throughout Stark County. The inspections are completed at the time of property transfer, as part of a mandatory inspection program for systems with aerobic treatment units, or as part of an operation and maintenance (O&M) program in the urbanized areas of Stark County. With additional funding, the Health Department would increase HSTS inspections and establish an Operation and Maintenance (O&M) Program for the entire County. The three year goal will be to inspect 3,000 to 5,000 HSTSs in the watershed to determine system location, type, and condition.

The Stark County Health Department's HSTS Plan for the Nimishillen Creek Watershed focuses on the reduction of nonpoint source (NPS) pollution arising from home systems; however, it will also serve as a model for the development of a county-wide O&M Program. Thus, funding for this HSTS Plan will continue to benefit the watershed, as well as other watersheds within Stark County.

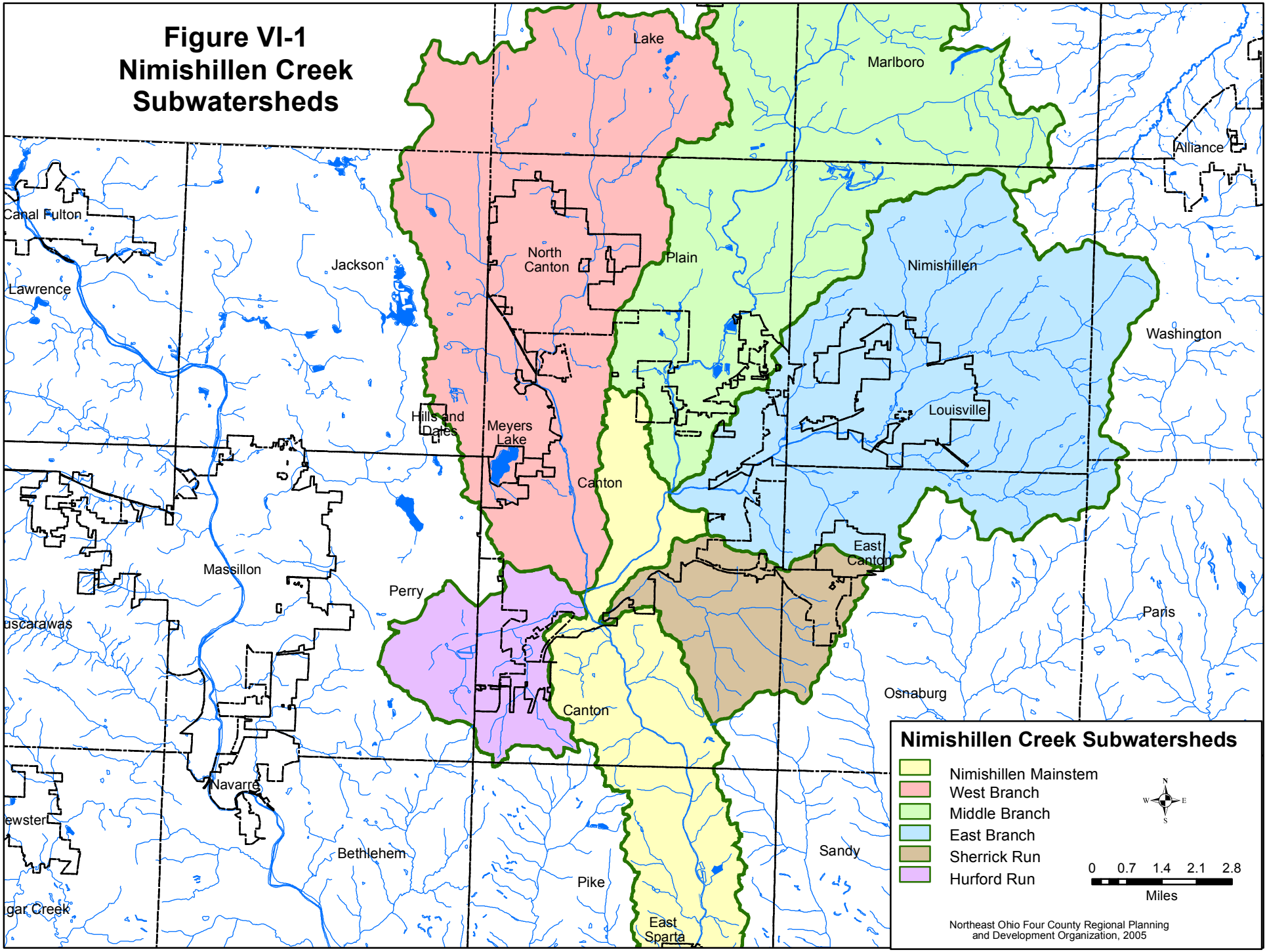


Figure VI-1
Nimishillen Creek
Subwatersheds
Lake
Marlboro
Alliance
Canal Fulton
Jackson
North
Canton
Plain
Nimishillen
Lawrence
Washington
Hills and
Dales
Meyers
Lake
Louisville
Canton
East
Canton
Massillon
Perry
Paris
Osnaburg
Canton
Navarre
Bethlehem
Sandy
Pike
East
Sparta
Nimishillen Creek Subwatersheds
Nimishillen Mainstem
West Branch
Middle Branch
East Branch
Sherrick Run
Hurford Run
N
W
E
S
0 0.7 1.4 2.1 2.8
Miles
Northeast Ohio Four County Regional Planning
and Development Organization, 2005

Key Features Affecting HSTSs in the Nimishillen Creek Watershed

Topography and Geology

As mentioned above, the Nimishillen Creek Watershed lies in two subdivisions of the Appalachian Plateau province. The northern two-thirds of the watershed resides in the glaciated section of the Appalachian Plateau, and the southern one-third in the unglaciated section (Figure II-5). The headwaters in the northern and central portions of the county have moderate relief and gentle slopes due to glacial movement and depositions. However, in the unglaciated southern portion of the watershed, the Creek's Mainstem has cut a narrow gorge through highlands resulting in steep sloping upland areas and broad flat expanses in the floodplains.

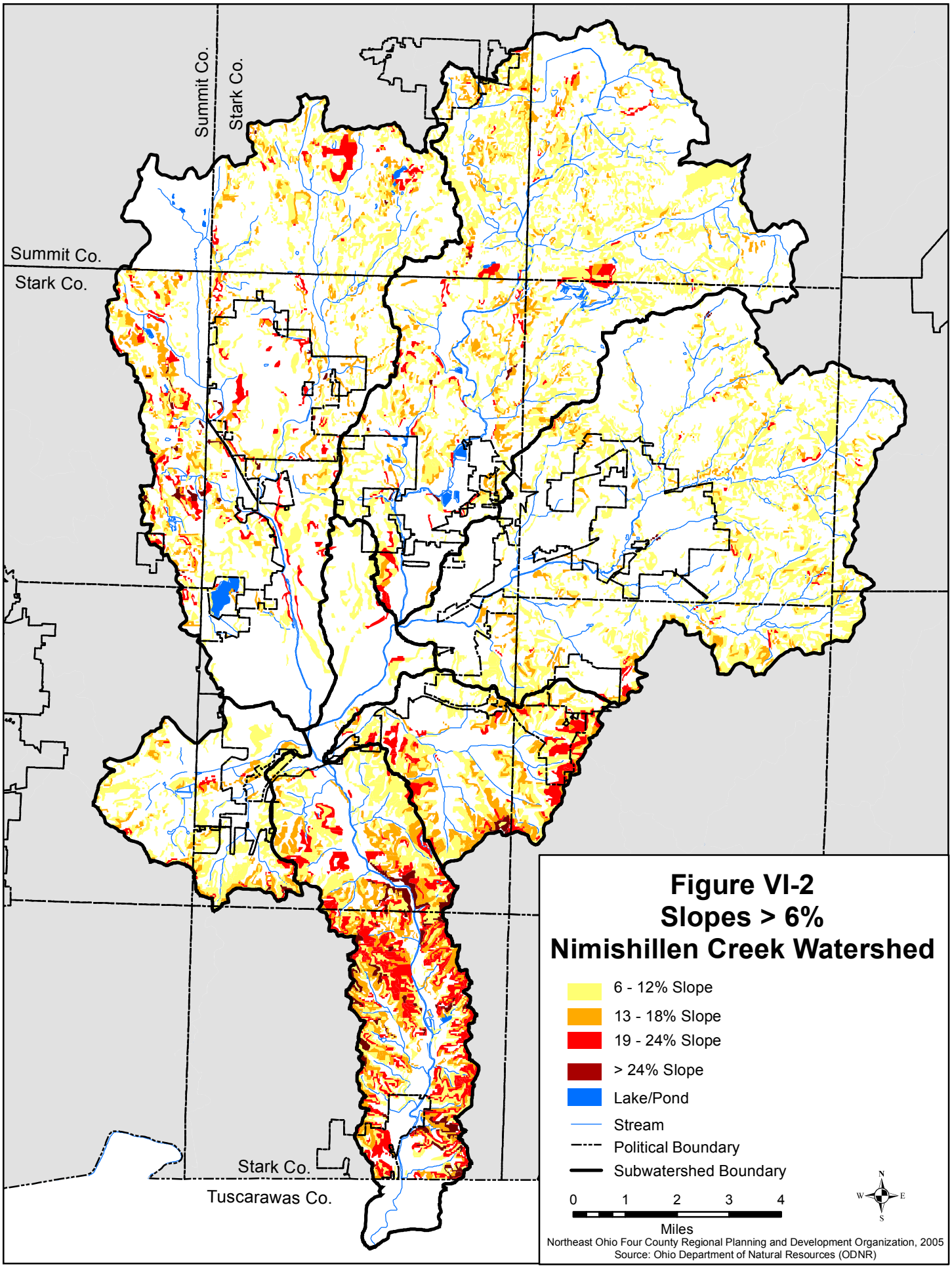
Figure VI-2 shows the areas in the watershed where slopes are greater than 6 percent, with the steepest slopes predominately occurring in the southern portion of the watershed. The townships of Canton, Osnaburg, and Pike in the southern unglaciated section of the watershed have the most areas affected by steep slopes. Slopes greater than 12 percent are generally poor conditions for the installation of a properly functioning HSTS. However, this has not been a severe problem for two main reasons. First, to construct a home and driveway on steeply sloping ground has its own limitations, so many potential sites have not been developed. Second, sewage site evaluations have excluded development on steep slopes. These two factors have limited growth in these areas. In the Nimishillen Creek Watershed, severe soil types have by far caused the greatest problem for HSTSs.

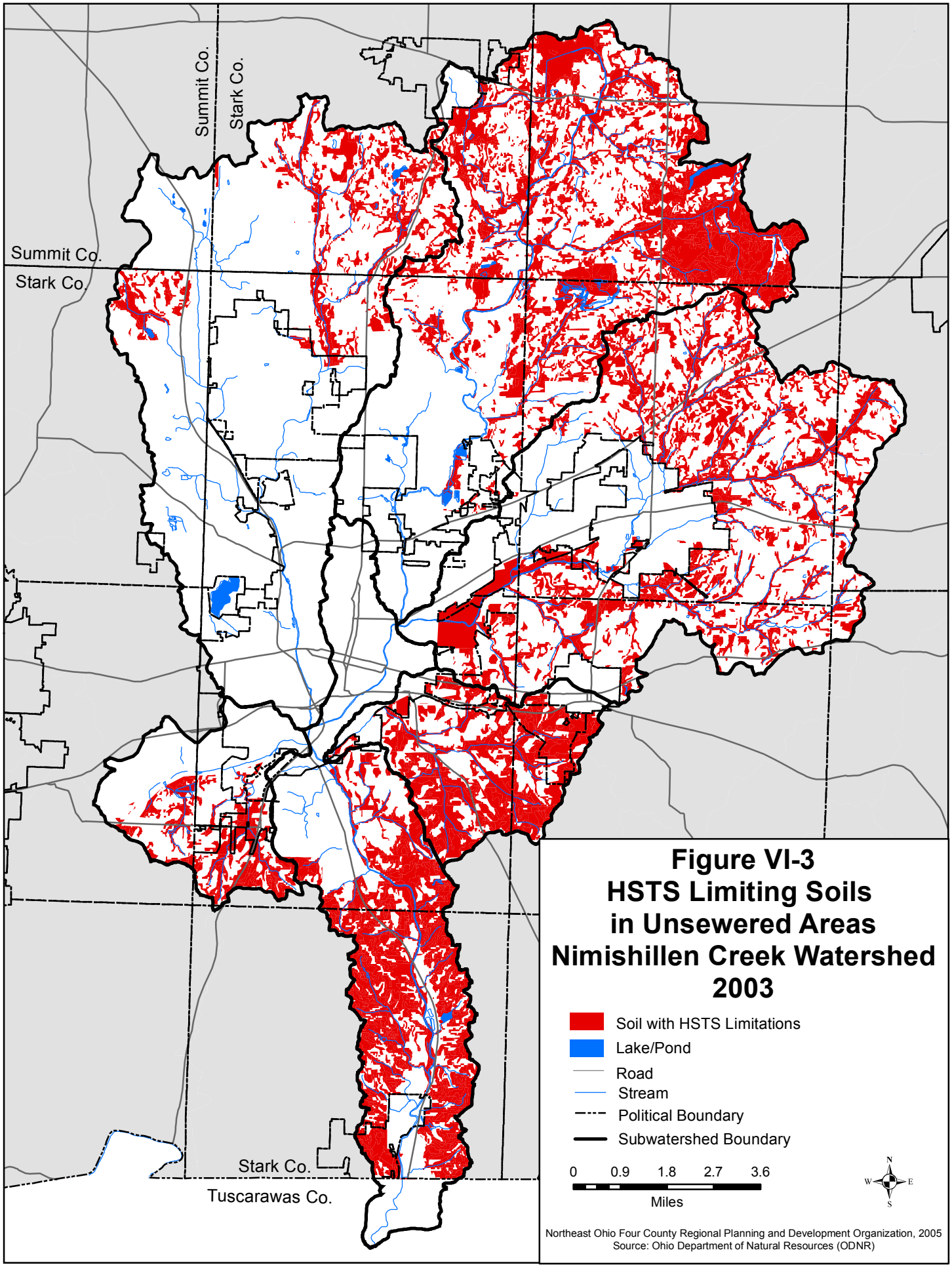
Soils

The principal natural feature limiting HSTS installation and/or function in the Nimishillen Creek Watershed and all of Stark County is its soils. Within the unsewered portions of the watershed, there are 101 HSTS-limiting soil types, as determined by the Stark County Health Department. Figure VI-3 shows all of the soils in the unsewered areas of Nimishillen Creek Watershed which limit HSTS installation and function. The limiting soil types covering the largest areas (greater than 2,000 acres) in the watershed are:

- Ravenna Silt Loam, 0 to 2% slopes (ReA) - 3,344 acres - These soils consist of somewhat poorly drained soils in broad areas in the glaciated (northern) parts of the watershed. They have a seasonally high water table for significant periods and are slow to dry out in the spring. They are categorized as having "severe" limitations in treating home sewage effluent.

- Sebring Silt Loam (Se) - 2,642 acres - This soil occurs in concave areas in shallow drainage ways and in broad basin-like areas on the glacial till plain. Excessive wetness is the major limitation to the use of this soil for most non-farming uses. It is categorized as having "severe" limitations in treating home sewage effluent.


Summit Co.
Stark Co.
Summit Co.
Stark Co.
Stark Co.
Tuscarawas Co.
Figure VI-2
Slopes > 6%
Nimishillen Creek Watershed
6 - 12% Slope
13 - 18% Slope
19 - 24% Slope
> 24% Slope
Lake/Pond
Stream
Political Boundary
Subwatershed Boundary
0 1 2 3 4
Miles
N
W
E
S
Northeast Ohio Four County Regional Planning and Development Organization, 2005
Source: Ohio Department of Natural Resources (ODNR)


Summit Co.
Stark Co.
Summit Co.
Stark Co.
Stark Co.
Tuscarawas Co.
Figure VI-3
HSTS Limiting Soils
in Unsewered Areas
Nimishillen Creek Watershed
2003
Soil with HSTS Limitations
Lake/Pond
Road
Stream
Political Boundary
Subwatershed Boundary
0 0.9 1.8 2.7 3.6
Miles
N
W
E
S
Northeast Ohio Four County Regional Planning and Development Organization, 2005
Source: Ohio Department of Natural Resources (ODNR)

- Canfield Silt Loam, 6 to 12% slopes (CdC2) - 2,527 acres - These soils occur along drainage ways and in the lower part of long slopes. Areas are irregular in size and shape. Limitations to the treatment of home sewage effluent are the soil's moderately slow permeability and the slope.

- Fitchville Silt Loam, 0 to 2% slopes (FcA) - 2,370 acres - This soil is in broad areas in valleys and in partly blocked drainage ways on uplands in the glaciated part of the county. Ponding and seasonal wetness are the major limitation to the use of the soil for home sewage treatment systems.

Water Supply

Three cities and a village, Canton, North Canton, Louisville, and East Sparta, obtain their municipal water supply from wellfields located within the Nimishillen Creek Watershed (Figure II-12). East Canton and Hartville do not have a municipal water system and draw their drinking water from private wells. All of the above water supply areas are within areas serviced by sewers. The City of Canton also receives drinking water from wellfields outside of the Nimishillen Creek Watershed in the Sandy Creek Watershed.

Most of the remaining homes in the watershed rely on individual wells for their drinking water and are located in areas dependant on home sewage treatment systems. These areas include portions of Jackson, Lake, Marlboro, Plain, Nimishillen, Canton, Osnaburg, and Pike Townships. To date, the Stark County Health Department has not recorded a drinking well being contaminated by a failing HSTS.

Land Uses

A detailed description of land usage within the Nimishillen Creek Watershed can be found in Section II - Inventory of the Watershed of this report or in *Phase I* of the *Nimishillen Creek Comprehensive Watershed Management Plan (CWMP)* beginning on page six. In general, the watershed is dominated by three land use/land cover types: 1) agriculture and open areas occupy 52,716 acres or 44.7 percent of the watershed; 2) urban areas (34,852 acres, 29.3 percent); and 3) wooded lands (25,106 acres, 21.3 percent).

Residential areas (which fall under the urban areas category above) with high densities of homes in unsewered portions of the watershed are likely to have the highest concentrations of failing HSTSs. The reasoning being that generally the higher the housing density the smaller the lot sizes, and therefore, less area to treat home sewage effluent. In addition, unsewered urban areas with homes built before 1980 are also a concern because the average life of a full functioning HSTS is approximately 20 years.

Demographics, Socioeconomic, and the 2000 U.S. Census

Like land uses, the demographic characteristics vary greatly throughout the Nimishillen Creek Watershed. Fortunately, most of the densely populated urban areas in and around the Cities of Canton, Louisville, and North Canton are serviced by sewers. However, there are still highly populated areas in the watershed that are dependent on HSTSs, and several of these populated areas have poor soils for HSTSs.

A socioeconomic and demographic analysis was done using 2000 U.S. Census information at the census tract level. Figure VI-4 shows the U.S. Census Tract numbers in relation to sewered and unsewered areas in the watershed. A tract was included if a portion of its area has unsewered areas. Table VI-1 shows the total number of structures built prior to 1980, median household income, population, and the population below the poverty level for each tract number. Please note that these are totals for the entire tract and not just unsewered areas. Therefore, the totals for unsewered areas will be less than those represented on the table. Despite this issue, the census data provides pertinent information for relatively small areas which helps prioritize future actions.

Figure VI-5 shows information for housing units per square mile for Census tract numbers with unsewered areas. In general, areas with high housing densities next to sewered areas would be candidates for sewer extensions if there were numerous failing HSTSs. Also, knowing which areas have lower household incomes or a higher population of people below the poverty level will aid in focusing any assistance programs.

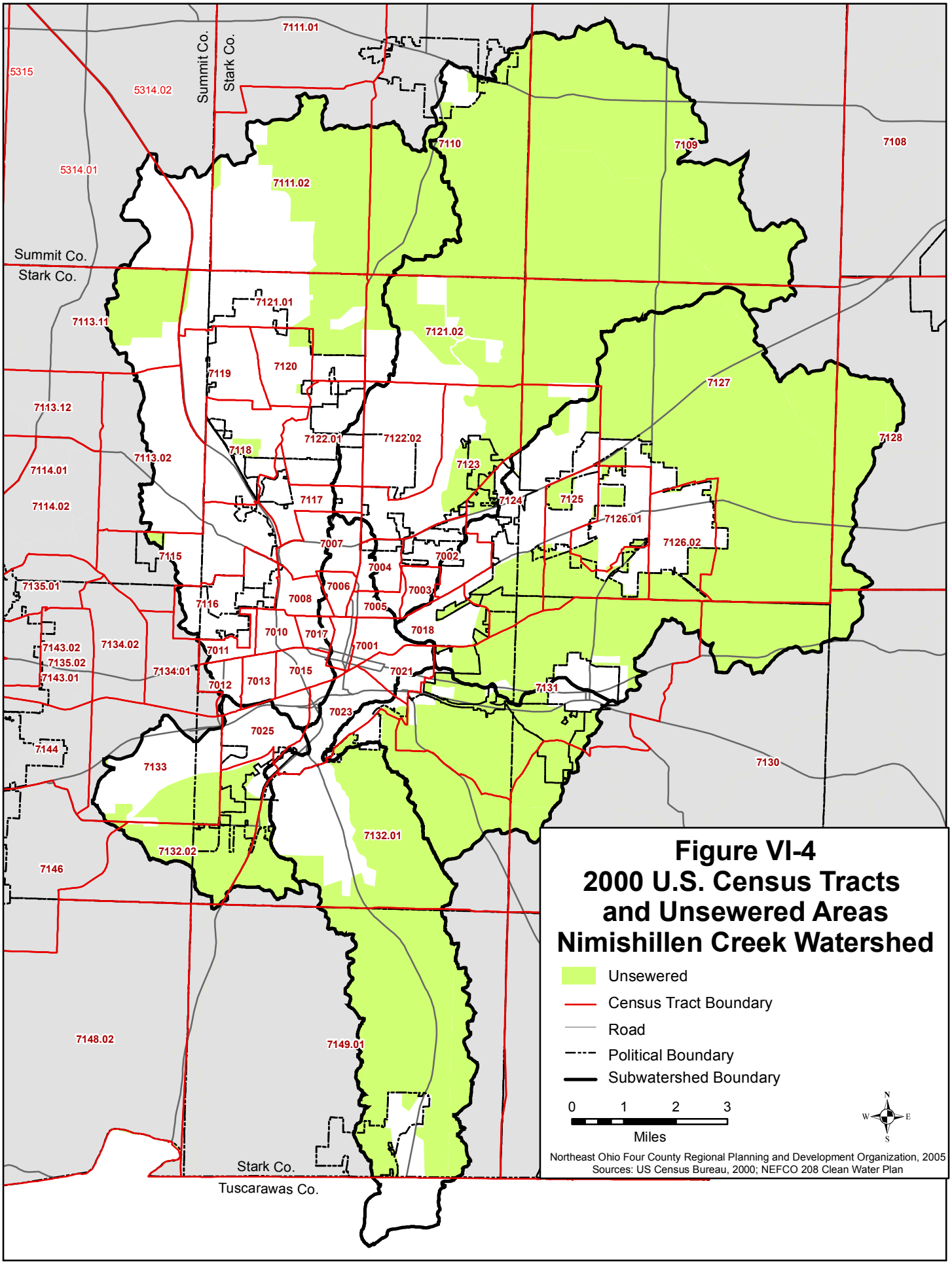

Summit Co.
Stark Co.
5315
5314.02
5314.01
7111.01
7111.02
7110
7109
7108
Summit Co.
Stark Co.
7113.11
7121.01
7121.02
7119
7120
7127
7113.12
7122.01
7122.02
7128
7118
7113.02
7123
7114.01
7117
7124
7125
7114.02
7126.01
7007
7126.02
7115
7002
7004
7135.01
7006
7003
7116
7008
7005
7018
7010
7017
7143.02
7134.02
7001
7011
7135.02
7134.01
7021
7143.01
7012
7013
7015
7131
7023
7025
7144
7130
7133
7132.01
7132.02
7146
7148.02
7149.01
Stark Co.
Tuscarawas Co.
Figure VI-4
2000 U.S. Census Tracts
and Unsewered Areas
Nimishillen Creek Watershed
Unsewered
Census Tract Boundary
Road
Political Boundary
Subwatershed Boundary
0 1 2 3
Miles
N
W E
S
Northeast Ohio Four County Regional Planning and Development Organization, 2005
Sources: US Census Bureau, 2000; NEFCO 208 Clean Water Plan

Table VI-1: 2000 U.S. Census Information for Areas in the Nimishillen Creek Watershed Containing Poor Soils in Unsewered Areas

U.S. Census Tract Number	Number of Structures Built before 1980	Median Household Income	Population	Population Below Poverty
7018	1,164	$20,206	3,366	845
7021	1,641	$24,028	4,282	1,254
7023	1,046	$9,006	2,906	1,778
7109	1,088	$53,351	4,227	187
7110	2,226	$51,013	7,506	387
7111.02	1,814	$62,875	9,324	193
7113.11	1,812	$64,720	7,045	154
7120	1,593	$42,180	4,372	160
7121.01	1,415	$53,112	7,837	277
7121.02	1,626	$51,653	6,940	195
7123	2,177	$44,726	6,339	403
7124	1,533	$39,471	6,351	723
7125	623	$41,116	1,838	78
7126.01	1,687	$39,070	2,286	81
7126.02	1,485	$44,206	4,867	204
7127	1,419	$47,236	5,010	172
7130	1,135	$43,581	3,938	196
7131	2,170	$38,607	6,270	656
7132.01	2,411	$41,217	7,485	346
7132.02	718	$44,268	2,223	24
7133	1,567	$43,234	4,778	254
7134.01	2,120	$40,376	5,239	311
7149.01	1,285	$40,433	4,088	203
Totals*	**35,755**	**N/A**	**118,517**	**9,091**

*Only Tract Numbers 7109, 7127, 7128, and 7130 were 100 percent unsewered; therefore, totals for structures built prior to 1980, population, and poverty rates for unsewered areas will be lower than these totals.

Home Sewage Treatment System Problem Definition

Sewered and Unsewered Areas

Figure VI-4 shows the extent of sewered areas in the Nimishillen Creek Watershed. Generally, sewered areas are limited to the Cities of Canton, North Canton, and Louisville, and the Villages of Hartville, East Canton, and East Sparta. Well over half of the watershed area remains dependent on some type of home sewage treatment system. Where practicable, the Stark County Health Department will promote the extension of sewers to areas with a large percentage of failing HSTSs. Typically, sewer expansion is practicable only if an existing sewer line is in close proximity.

Characterization of Existing Home Sewage Systems

In 1994 the Stark County Residential Sewage Regulation revisions prohibited off-lot discharge and leach wells for new construction. Since that time, the majority of systems installed for new construction have consisted of a leaching tile field or some modification, based upon soil severity. Additional components such as Class 1, NSF

approved aeration units or lift stations may be added to the system based upon need. For repairs, again on-lot treatment and disposal are highly preferred. However, when soils, lot size, or topography dictate, an off-lot discharging sewage treatment system may be used. Currently, that would consist of either: a) a Class 1 NSF approved aeration system with 100 sq. ft. filter and failsafe, or b) a subsurface sand filter (with 24" of Ohio EPA approved filter sand). This may also be followed by chlorination or a french drain, depending upon site characteristics.

The Stark County Health Department records do not predate the 1960s. Between the 1960s and early 1990s, leach fields were again the most common system used. In sand and gravel areas, leach wells may have also been used. Less frequently, an off-lot discharging system was used if soils were severe or the lot size was small. Prior to the 1960s, systems varied between leach fields, leach wells, cesspools, or some type of off-lot discharging systems. Variation was great due to the lack of oversight at that time.

Known Impacts on Specific Stream Segments

In the Nimishillen Creek TMDL report, Ohio EPA listed the entire watershed as being impaired for recreational uses because of high bacteria levels. Refer to the Section III - Water Resource Quality and Section V – Load Reductions for specific information. Home sewage treatment (Septic) systems (HSTSs) are shown in the TMDL to be a significant source of the bacteria load in every subwatershed monitored. It states a need to reduce HSTS loads between 89.5 percent and 100 percent in each subwatershed in order to meet water quality standards for recreation.

Critical Areas

The Stark County Health Department has created a sewer priority list of the “top ten” areas of public health concern that should be evaluated for the extension of sanitary sewers. These are areas with large-scale failure (approximately ten or more failing systems) that are reviewed for feasibility of extension of sanitary sewers. The following criteria are used to prioritize area-wide failure: public health or environmental significance (surface or ground water pollution); urbanized area; failure rate; complaints; proximity to an existing sewer; technical and/or financial feasibility; number of households; property owner’s and political leader’s support or lace of support and/or existing petitions. Upon determining which areas are to be sewered within the next five to ten years, mechanisms of requiring the sewer’s installation and connection are also determined, whether by a petition process or enforcement under O.R.C. 6117. Those areas unable to be served by sewers must install replacement sewage treatment systems. Table VI-2 is the Sewer Priority List for Stark County.

Table VI-2: Sewer Priority List for Stark County, Ohio					
Location	**Township**	**In Nimishillen Creek Watershed**	**Close to Sewer**	**Affecting Drinking Water Source**	**Surface Water Contamination**
Marlboro Village, Lynnette, Wentz, and Lynnpeark	Marlboro	No	Yes	Yes, Alliance City	Yes
Moreland Allotment	Canton	Yes	Yes	Possible, water wells	Yes
North Side Lincoln Street East, West of Trump	Canton	Yes	Yes	No	Yes
Beech, Rambo, Baldwin, Carol, Lacrosse Streets	Washington	No	Yes	No	Yes
Uniontown NW Corner of 619 and Cleveland Ave.	Lake	No	Yes	No	Yes
North Lawrence	Lawrence	No	No	No	Yes
East Greenville	Tuscarawas	No	No	No	Yes
Limaville Village	Lexington	No	No	Yes, Alliance City	Yes
Justus and Harmon	Sugar Creek	No	Yes	No	Yes
NW of Alliance – Nellabrook Allotment	Lexington	No	Yes	No	Yes
Source: Stark County Health Department, 2010					

Based on the Sewer Priority List, there are two areas in the Nimishillen Creek Watershed that are a priority for the extension of sanitary sewers to correct contamination from failing HSTS.

Proposed Corrective Action Plan

Current Actions

The Stark County Health Department, in its 1994 revisions to its county home sewage regulations, established no off-lot discharges for new construction. When doing a repair, all reasonable on-lot possibilities are reviewed before off-lot discharge is considered. Typically, off-lot discharge is only used when dictated by small lot-sizes or poor soil types. The Stark County Health Department criteria for upgrading HSTSs can be found above in the section titled “Characterization of Existing Home Sewage Systems.”

Since 2007, the Stark County Health Department has implemented several programs help alleviate the water quality impacts associated with failing HSTSs. These are:

Aerobic Treatment Unit Operation Permit – Home sewage treatment systems utilizing an Aerobic Treatment Unit (A.T.U.) must attain an operation permit and renew it yearly from the Health Department. The owner must maintain a service contract with a registered service provider for the life of the system. The service provider must collect samples for testing to determine compliance with applicable NPDES standards. Copies of the test results are submitted to the Health Department with a report that the system is functioning properly.

Urbanized Areas Sewage Treatment System Inspections – Sewage treatment systems in the urbanized areas of the County (as defined by the Phase II Storm Water laws) shall be inspected by the Health Department at a minimum of every ten (10) years. In addition, inspections may be conducted at any location or at an increased frequency when the location poses risk conditions, such as but not limited to: higher HSTS density, complexity and reliability, located in areas of high risk for surface/ground water contamination, or where there are existing unsanitary conditions due to high incidence HSTS failures. A report provided by a registered service provider may be accepted demonstrating that the system is functioning properly.

Property Transfer Inspections – Prior to a property transfer where a property is served by a HSTS, the Stark County Health Department or a registered service provider will inspect the system to determine compliance with the Health Departments regulations. When a system fails to have an inspection completed before the transfer, the Health Department may require the new owner to have a post-transfer inspection completed. If it is determined that the sanitary sewer is available to a property at the time of inspection, the property shall be connected to the sanitary sewer within thirty (30) days of the property transfer, with some exceptions. From 2008 thru 2010, an average of 654 sewage treatment systems were inspected under this program.

HSTS Maintenance Reminders and Septage Hauler Disposal/Reporting – Pumping reminders are sent to property owners whose tank pumping frequency is less that once every four (4) years. Septage haulers must submit a list of properties they have serviced once every quarter which includes the address, pumping date, tank capacity, amount pumped, location of disposal, and if the septage was land applied.

The Health Department does not currently have a financial assistance program for the repair or replacement of failing HSTSs. However, financial assistance for HSTS repairs and replacements may be attained through the Stark County Regional Planning Commission (RPC). Through the RPC's Stark County Rehabilitation Emergency Assistance Program, eligible homeowners can receive up to $3,500 in grants to repair or replace failing HSTSs. Anything over $3,500 can be covered by a deferred loan. Eligibility for this program is based on household income. The amount of assistance available through this program is dependent on funding from year-to-year.

Proposed Actions

The Stark County Health Department would like to expand and bolster the current programs they have in place. Specifically if funding were available the Health Department would like to extend the sewage treatment system inspection program currently in place for urbanized areas in the county/watershed to the entire watershed and county. This would result in nearly all of the HSTSs to be enrolled in an

operations and maintenance program. Additional resources may also allow for inspections of each system to be conducted more than once every ten (10) years. This would greatly help in reducing pathogen (bacteria) and nutrient pollution from HSTSs from reaching Nimishillen Creek and its tributaries which would aid in meeting recreational use standards detailed in the Nimishillen Creek TMDL.

Furthermore, additional funding would be used to improve the Health Department's comprehensive education and outreach program. Additional actions could include public meetings and consultation/education with individual homeowners during HSTS inspection and distribution of informational pamphlets detailing proper system maintenance and operation unique to each type of HSTS. The Health Department goal would be to contact between 3,000 to 5,000 watershed residents through their education and outreach program over a three year period.

The efforts outlined above will focus on the reduction of NPS pollution arising from HSTSs within the Nimishillen Creek Watershed; however, it will also benefit other watersheds in Stark County including Sugar Creek, Tuscarawas River, and Mahoning River.. Thus, funding to implement this plan will benefit the watershed; as well as, other watersheds within Stark County long after the initial funding is utilized.

Tracking and Documenting Success

In 2000, the Stark County Health Department acquired environmental health software that enables the entry of sewage records. Currently, all new systems are recorded in the database. Additional funding will allow existing records to be entered into this same database. Once entered, the database can be used to track inspections, document problems, and provide statistical information. The Stark County Health Department also receives copies of inspection reports from registered providers as part of their current inspection and maintenance programs.

VII. Subwatershed Action Plans

East Branch Subwatershed Action Plan

Inventory

Physical Description

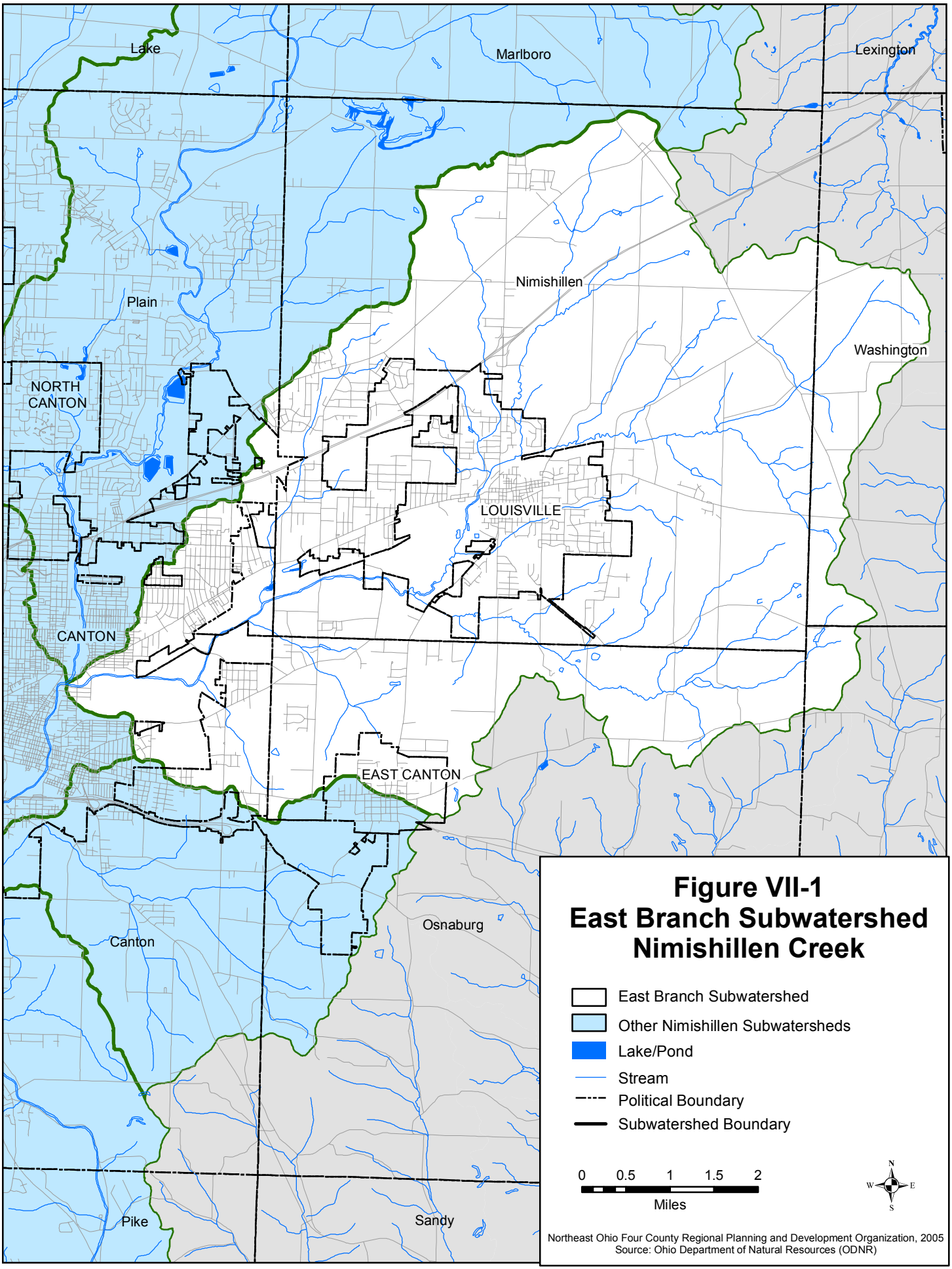
The East Branch of Nimishillen Creek rests entirely in Stark County and originates in the areas around the City of Louisville in Nimishillen, Marlboro, Paris, Osnaburg, and Washington Townships. These small headwater streams flow and join in or near the City of Louisville and flow westerly towards the City of Canton (Figure VII-1). In Canton, the East Branch joins with the West Branch of Nimishillen Creek at river mile (RM) 15 forming the Mainstem. The total length of the East Branch is approximately 10.4 miles.

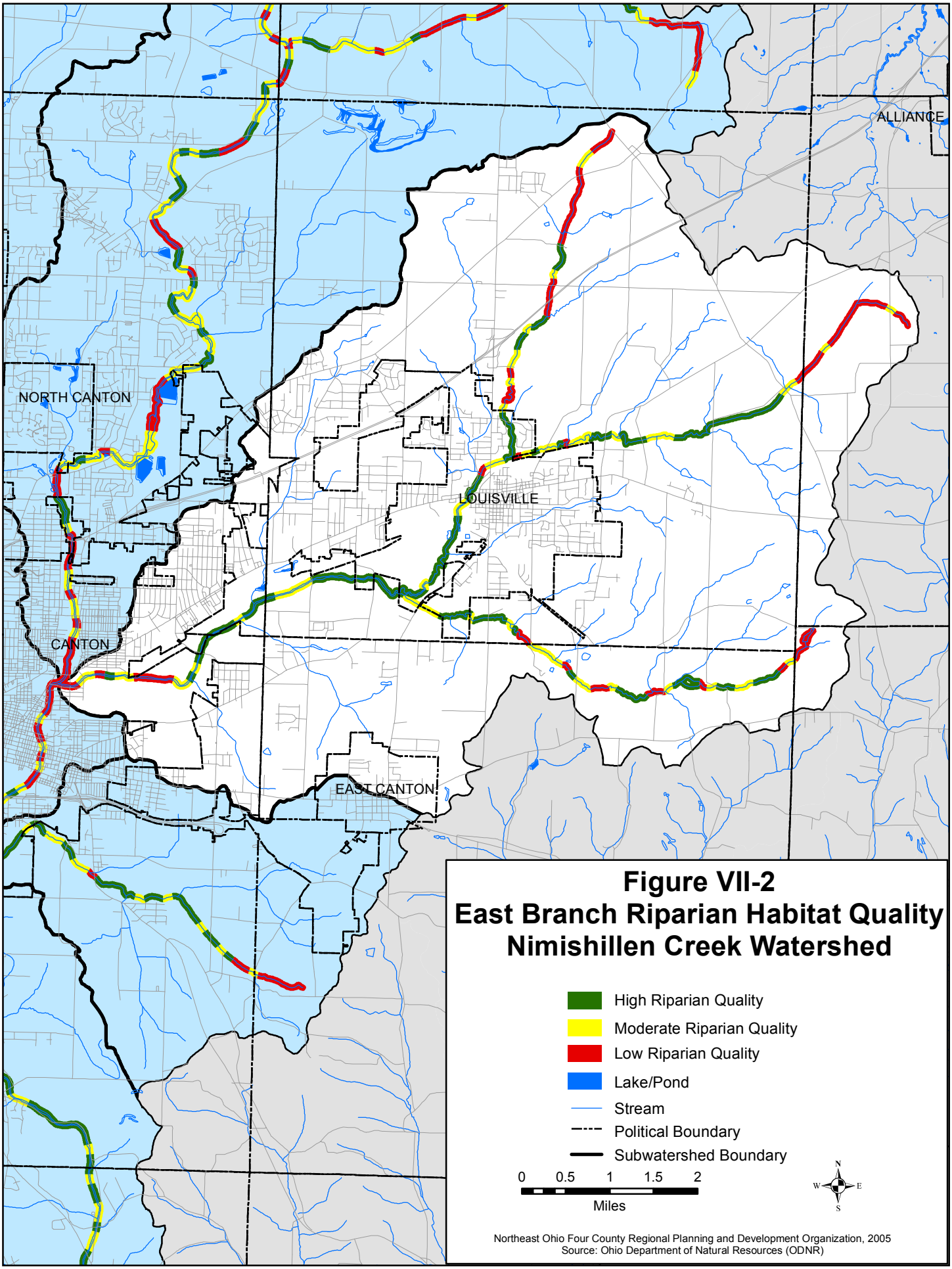
The East Branch subwatershed resides in the glaciated portion of the Nimishillen Creek watershed (Figure II-5). As a result the area has moderate relief and gentle slopes due to glacial actions and depositions. Most of the subwatershed has less than a six percent slope with few slopes above 12 percent (Figure II-6). The soils in the region reflect the area's glacial activities with the primary associations being the Canfield-Wooster, Fitchville-Sebring, Chili-Wheeling-Shoals, and Ravenna-Canfield. Several soil types in this area are poor for the installation of home sewage treatment systems due to poor drainage or permeability (Figure VI-3). The areas along the East Branch and its major tributaries are covered with over 60 feet of glacial outwash. The dominate bedrock types in the areas not covered by a thick layer of glacial outwash are Middle Kittaning Coal, Brookeville Coal, Upper Freeport Coal (Figure II-7). Lastly, flooding has been a documented problem along the East Branch from the City of Louisville until it merges with the West Branch in Canton.

Land Use

The East Branch of Nimishillen Creek has a diverse mix of land use and cover (Figure II-13). The headwater areas upstream of the City of Louisville consist primarily of agricultural land, open space, and wooded - shrub/scrub cover. The riparian habitat in these headwater areas are somewhat impacted, primarily along the smaller stretches of the creek. Agriculture in this area is typical for Stark County and includes cattle and dairy operations, row cropping, poultry, and cover crops. Water quality issues associated with these uses include nutrient and pesticide runoff, soil erosion, channel modifications, and riparian habitat degradation.

Just outside of the city limits of Louisville, the primary land use for the East Branch watershed transitions from agricultural/open space to suburban/urban mix. Near the mouth of the East Branch in Nimishillen Township and the City of Canton, the primary land cover is industrial. Point source discharges, storm water runoff, illegal dumping, and failing wastewater systems are water quality concerns along this portion of the East Branch. However, the riparian habitat is largely intact from the City of Louisville to approximately 1,000 feet prior to its confluence with the West Branch (Figure VII-2).


Lake
Marlboro
Lexington
Plain
Nimishillen
Washington
NORTH CANTON
LOUISVILLE
CANTON
EAST CANTON
Canton
Osnaburg
Pike
Sandy
Figure VII-1
East Branch Subwatershed
Nimishillen Creek
East Branch Subwatershed
Other Nimishillen Subwatersheds
Lake/Pond
Stream
Political Boundary
Subwatershed Boundary
0 0.5 1 1.5 2
Miles
N
W
E
S
Northeast Ohio Four County Regional Planning and Development Organization, 2005
Source: Ohio Department of Natural Resources (ODNR)


ALLIANCE
NORTH CANTON
LOUISVILLE
CANTON
EAST CANTON
Figure VII-2
East Branch Riparian Habitat Quality
Nimishillen Creek Watershed
High Riparian Quality
Moderate Riparian Quality
Low Riparian Quality
Lake/Pond
Stream
Political Boundary
Subwatershed Boundary
0 0.5 1 1.5 2
Miles
N
W
E
S
Northeast Ohio Four County Regional Planning and Development Organization, 2005
Source: Ohio Department of Natural Resources (ODNR)

Point Source Discharges

A point source is defined as a source that discharges pollutants, or any effluent, from a known discharge point, such as a pipe, ditch, or sewer and into a waterbody after treatment (Miller, 1988). Treatment can vary depending on the type of effluent, but generally includes the removal of solids and disinfection. Point source discharges have the potential to introduce high levels of nutrients and chemicals into a waterbody. However, these discharges are monitored and tracked by the Ohio EPA via the National Pollutant Discharge Elimination System (NPDES) program to protect local water resources.

There are twenty-four entities in the East Branch basin that are permitted by the Ohio EPA or the Stark County Health Department to discharge water into the creek. The entities that discharge vary from municipal wastewater treatment plan, and various industrial operations, to private wastewater systems. Table VII-1 shows a list of permitted operations within the East Branch subwatershed. It contains the map symbols for Figure IV-1, the name of the operation, the design flow, and its classification. This table does not show illegal dischargers or storm water discharge pipes.

Table VII-1: Point Source Discharging Operations in the East Branch Subwatershed

Map Symbol	Discharging Operation	Design Flow (GPD)	Classification
5	Biery Cheese Company 66544 Paris Ave. NE Paris, OH 44669	Not Given	Private Discharging Semi-Public Sewage Treatment System
10	City of Louisville WWTP 3101 Ravenna Ave. NE Louisville, OH 44266	2,000,000	Municipal Wastewater Treatment Plant
11	Cornerstone Church of God Elementary, Junior, and Senior Schools 511 Trump Ave. NE Canton, OH 44730	Not Given	Private Discharging Semi-Public Sewage Treatment System
17	Hot Laps Sports Bar 536 S. Canal St. Louisville, OH 44641	Not Given	Private Discharging Semi-Public Sewage Treatment System
18*	Allegheny Ludlum 1500 West Main St. Canton, OH 44641	Not Given	Industrial Discharger
23	Nazarene Camp Center 820 Nazarene Ave. Louisville, OH 44641-9720	Not Given	Private Discharging Semi-Public Sewage Treatment System

Table VII-1: Point Source Discharging Operations in the East Branch Subwatershed			
Map Symbol	**Discharging Operation**	**Design Flow (GPD)**	**Classification**
25	North Nimishillen School 7337 Easton St. NE Louisville, OH 44641	>10,000	Private Discharging Semi-Public Sewage Treatment System
29	Republic Storage Systems Co. 1038 Belden Ave. NE Canton, OH 44705	Not Given	Industrial Discharger
33	Thakar Aluminum Corp. 4420 Louisville St. NE Canton, OH 44705	Not Given	Industrial Discharger
40	Akron Dist. Church of Nazarene 8020 Nazarene St. Canton, OH 44641	5,000 to <10,000	Private Discharging Semi-Public Sewage Treatment System
41	Altercare of Louisville 7121 St. Francis St. NE Louisville, OH 44641	<10,000	Private Discharging Semi-Public Sewage Treatment System
42	Bud's Corner Tavern 5750 Columbus Rd. Louisville, OH 44641	1,500 to <5,000	Private Discharging Semi-Public Sewage Treatment System
43	Carriage House East 9033 Columbus Rd. NE Louisville, OH 44641	5,000 to <10,000	Private Discharging Semi-Public Sewage Treatment System
44	Elm's Inn 6786 Meese Rd. NE Alliance, OH 44601	5,000 to <10,000	Private Discharging Semi-Public Sewage Treatment System
45	Hammco Industries 9040 Columbus Rd. NE Canton, OH 44705	1 to <1,500	Private Discharging Semi-Public Sewage Treatment System
46	Hot Laps Sports Bar 7512 Columbus Rd. NE Louisville, OH 44641	5,000 to <10,000	Private Discharging Semi-Public Sewage Treatment System
47	Spee-D-Foods #29 5874 Easton St. NE Louisville, OH 44641	1,500 to <5,000	Private Discharging Semi-Public Sewage Treatment System
48	Robert Rogers Apt. 6901 Atlantic Blvd. NE Louisville, OH 44641	1,500 to <10,000	Private Discharging Semi-Public Sewage Treatment System
49	Phil's Place 6509 Columbus Rd. NE Louisville, OH 44641	5,000 to <10,000	Private Discharging Semi-Public Sewage Treatment System

Table VII-1: Point Source Discharging Operations in the East Branch Subwatershed

Map Symbol	Discharging Operation	Design Flow (GPD)	Classification
50	Thompson Dairyland 7519 Columbus Rd. NE Louisville, OH 44641	5,000 to <10,000	Private Discharging Semi-Public Sewage Treatment System
51	VFW 7459 Columbus Rd. NE Louisville, OH 44641	1,500 to <5,000	Private Discharging Semi-Public Sewage Treatment System
52	WOLI-TV 17 Trinity 6600 Atlantic Blvd. Louisville, OH 44641	1,500 to <5,000	Private Discharging Semi-Public Sewage Treatment System
53	Windy Hill Motel 6404 Columbus Rd. Louisville, OH 44641	1,500 to <5,000	Private Discharging Semi-Public Sewage Treatment System
71	Northmark Inc. 7349 Ravenna Ave. SE Louisville, OH 44641	1,500 to <5,000	Private Discharging Semi-Public Sewage Treatment System

* Permit Expired in 2000; GPD = Gallons Per Day
Sources: Ohio EPA, 2005; Stark County Health Department, 2006

Water Quality Data and Impairments

Ohio EPA's TMDL Water Quality Results

Table VII-2 summaries the aquatic life use attainment, biological criteria scores, and QHEI scores for sampling conducted by the Ohio EPA between 2003 and 2005 for the Nimishillen Creek TMDL.

Table VII-2: East Branch Nimishillen Creek Aquatic Life Use Attainment Status, Biological Criteria Scores, and QHEI Scores

Location - (Lower/Upper River Mile)	Use Designation	Attainment Status	Biological Criteria Scores			QHEI Scores
			IBI	MIwb	ICE	
Cook Park - (0.1)	WWH	Non	34*	6.2*	Fair*	60.5
Harmont Ave. - (1.9)	WWH	Partial	30*	5.9*	40	79.5
Beck Rd. - (4.2)	WWH	Non	28*	5.2*	44	79
Upstream Louisville WWTP - (5.9)	WWH	Non	26*	4.8*	48	73.5
State Route 153 - (6.4)	WWH	Non	22*	--	38	**55**
Meese Rd. - (8.6)	WWH	Partial	28*	--	50	66
Tributary to East Branch State Route 44 - (0.3)	WWH	Non	28*	--	Fair*	**59.5**

* Indicates significant departure for applicable biocriteria (>4 IBI or ICI units, or >0.5 MIwb units).
___ Underlined scores are in the Poor or Very Poor range.
BOLD - QHEI scores are below the TMDL goal of 60 for WWH streams.

Source: Nimishillen Creek TMDL, 2009.

Impairments

Aquatic Life Use:

Of the seven sites sampled by the Ohio EPA in the East Branch subwatershed, none (0%) were in full attainment, two (29%) were in partial attainment, and five (71%) were in non-attainment. Two sites recorded QHEI scores below the TMDL goal score of 60. Both these site were also in non-attainment.

Recreation:

The Nimishillen Creek East Branch is impaired for Primary Contact Recreation (PCR).

Fish Consumption:

There is a fish consumption advisory of only one meal per month of common carp caught from the Nimishillen Creek East Branch. In addition, the Ohio Department of Health has issued a statewide advisory to limit meals of fish caught from all Ohio waterbodies to one meal per week, due to mercury.

Ohio EPA's Causes and Sources of Impairments

The causes of impairments for a stream are the specific pollutants or alterations that result in the stream not meeting state water quality standards. Examples of common causes of water quality impairments are siltation, flow alteration, nutrient enrichment, metals, and temperature. Sources of impairments are where the causes originated or where the causes of impairments are supplied from. Sources include crop production, channelization, urban runoff, dam construction, discharge pipes, and stream bank erosion. Table VII-3 lists the causes and sources of impairment for aquatic life use, recreation, and fish consumption along the East Branch of Nimishillen Creek.

Table VII-3: Nimishillen Creek TMDL's Causes and Sources of Impairments for the East Branch of Nimishillen Creek	
Causes of Impairment	**Sources of Impairment**
Direct Habitat/Flow Alterations	Channelizations - Agriculture
Metals	Channelizations - Development
Organic Enrichment/Dissolved Oxygen	Major Industrial Point Source
Priority Organics	Municipal Point Source
Nutrients	Municipal Point Source Agriculture Storm Water Runoff
Siltation	Nonirrigated Crop Production
Unionized Ammonia & Pathogens	Onsite Home Sewage Treatment (Septic) Systems
Unknown Toxicity	Small Flow Wastewater Treatment (Package) Plants
Sources: Nimishillen Creek TMDL, Ohio EPA, 2009.	

Load Reduction Information

Nutrient, habitat and bacteria (pathogen) TMDLs were completed for the East Branch of Nimishillen Creek. Tables VII-4 thru VII-6 summarizes East Branch's load reductions outlined in the Nimishillen Creek TMDL. For more information of the load reduction information, please refer to Section V above.

Table VII-4: TMDL and Allocations of Total Phosphorus for E. Branch						
	Design Flow (MGD)	**Phosphorus WLA/LA at Sources**		**Phosphorus Loads at Compliance Points[1] (kg/day)**		
		Conc. (mg/l)	**Load (kg/day)**	**TMDL[2]**	**WLA[2]**	**LA[2]**
East Branch Nimishillen Creek				2.34	2.315	0.026
Louisville WWTP	2.00	1.00	7.56			
Republic Steel Corp. 010 Outfall	2.74	0.16	1.66			
Republic Steel Corp. Other Outfalls	0.30	0.08	0.09			
Nonpoint Sources	-	-	0.11			

1 Compliance point at RM 0.05 on East Branch Nimishillen Creek and at RM 0.62 on Nimishillen Creek. The allocations for the East Branch compliance point reflect the sum of the loads contributed in East Branch.

2 The loads contributed to the streams decay and assimilate so that the TMDL is met at both compliance points.

Abbreviations: MGD=million Gallons per Day; WLA = Waste Load Allocation; LA = Load Allocation; mg/l = milligrams per liter; kg/day = kilograms per day; WWTP = wastewater treatment plan; WPCF = water pollution control facility; Conc. = concentration

Source: Nimishillen Creek TMDL, Ohio EPA, 1999.

TableVII-5: Total Existing Load, TMDL, and Allocations of Fecal Coliform Loads (for the recreation season) for the East Branch Nimishillen Creek						
Existing Loads			TMDL[1]	% Reduction	Allocations	
PS	NPS	Total			WLA	LA
1404.0	286.3	1690.3	164.2	90.3	1.6	162.6

Point Source (PS) Fecal Coliform Loads. These Include Existing, Percent Reduction Required, and Wasteload Allocation (WLA) by Source				
	NPDES Discharger	MS4	HSTS	Total WLA
Existing	1.38	0.36	1402.2	1404.0
% Reduction	0	30.2	100	
Allocation	1.38	0.25	0	1.6

Nonpoint Source (NPS) Fecal Coliform Loads. These Include Existing						
	Cropland	Pasture	Forest	Urban	Cattle in Stream	Total LA
Existing	65.20	166.64	0.72	0.12	53.64	286.3
% Reduction	30.2	30.2	0	30.2	100	
Allocation	45.49	166.27	0.72	0.09	0	162.6

[1] cfu * 10^3 * $season^{-1}$ (for cfu * 10^3 * day^{-1} divided each value by 138)
Source: Nimishillen Creek TMDL, Ohio EPA, 2009

Table VII-6: Habitat TMDL							
	Allocations						TMDL
	QHEI Score	# of High Influence Attributes		Total # of Modified Attributes			
TMDL Targets	≥ 60 = 1 point	< 2 = 1 point		< 5 = 1 point			3 points
River Mile	QHEI Score	# of High Influence Attributes	Total # of Modified Attributes	Sub-Score			Total Habitat Score
				QHEI Score	High Influence	Total # Modified	
0.1	60.5	1	7	1	1	0	2

Source: Nimishillen Creek TMDL, Ohio EPA, 2009.

Other Water Quality Information

Nimishillen Creek Macroinvertebrate Survey - 2000, 2002, and 2004:
Since 2000, NEFCO and the City of Canton have conducted three macroinvertebrate surveys along Nimishillen Creek. Three of the seventeen sites were located in the East Branch watershed. The scores recorded in 2000 at all of the sites were higher than the following two surveys in 2002 and 2004. In 2004, the furthest downstream site, RM 15.21 near the mouth, recorded a "Poor" ranking with an average score of 9. No patterns in upstream to downstream scores are evident. Table VII-4 summarizes NEFCO macroinvertebrate monitoring results.

Table VII-7: Mean Cumulative Index Values* (CIV) for the East Branch of Nimishillen Creek Based on NEFCO's Macroinvertebrate Surveys

Station Location	Mean CIV**		
	2000 Segment Condition	2002 Segment Condition	2004 Segment Condition
River Mile 0.21 - Cook Park on Mahoning Rd.	15 Fair	13 Fair	9 Poor
River Mile 2.14 - Georgetown and Trump Ave.	20 Good	13 Fair	15 Fair
River Mile 3.61 - Broadway Road Bridge	18 Good	17 Good	14 Fair

* Stream Quality Assessment
**Excellent: >22, Good: 17-22, Fair: 11-16, Poor < 11
(Source: ODNR, Stream Quality Monitoring Manual)

The Ohio EPA found that generally ODNR's Stream Quality Monitoring Program utilized by NEFCO tend to reflect attainment and non-attainment aquatic life uses. "Excellent" scores in the ODNR method commonly meet the Ohio EPA attainment standards, while stream segments with "Fair" or "Poor" scores generally are assessed as being in non-attainment (Yoder and Davis, 1996). The lower scores at Cook Park (downstream of Allegheny Ludlum) correspond with decreased water quality results from the Ohio EPA. However, Allegheny Ludlum no longer discharges into the East Branch and water quality recovery at this site is possible.

East Branch Subwatershed Issues and Actions

1. **Storm Water Runoff and Flooding**
2. **Riparian Corridor Protection**
3. **Failing HSTSs**
4. **Illegal Dumping**
5. **Agricultural Runoff**

Being a headwater stream of Nimishillen Creek, the water quality of the East Branch is almost entirely reflective of the activities that occur with its watershed. Storm water runoff from both agricultural and suburban/urban areas is a concern along with pollution from failing home sewage treatment systems. Water quantity is a local concern stemming from the severe flooding that occurred along sections of the East Branch in 2003. Other issues include riparian habitat encroachment and illegal dumping along isolated sections of the East Branch.

Using the available data and information along with personal knowledge of the East Branch, watershed stakeholders ranked the top five issues they believe to be hindering water quality attainment in this subwatershed. Under each of the five issues is a goal and objective statements accompanied by recommended actions to address each issue. Please note that the recommended actions are not intended to be a comprehensive list of actions that could address each issue; but rather, a list of actions

that the stakeholders believe is the best course of action given the current circumstances and available information. Refer to NEFCO's *Nimishillen Creek Comprehensive Watershed Management Plan - Phase III* for a more comprehensive list of water quality improvement actions for Nimishillen Creek (NEFCO, 2001). "Focus Areas" were also included under each objective to indicate specific areas to direct actions, if known, and a "Target" was establish to help evaluate the objective and measure accomplishments. Lastly, "Responsible Parties" are identified if a watershed action is ongoing, while "Suggested Responsible Parties" indicate who could or will take the lead on actions not yet being implemented.

East Branch Issue #1 - Storm Water Runoff and Flooding

Goal: Improve the ability of the East Branch watershed to assimilate and treat storm water runoff by promoting the protection and restoration of wetlands, the restoration of floodplains, and the minimization of runoff from impervious areas.

Objectives:

1. Restore and protect active floodplain areas.
   Focus Areas: City of Louisville and Nimishillen Township
   Target: 10 acres of floodplain restored or protected per year
2. Promote the use of storm water treatment wetlands in urban/suburban areas.
   Focus Areas: City of Louisville, City of Canton
   Target: 1 demonstration storm water treatment wetland
3. Permanently protect and restore natural wetland areas.
   Focus Areas: Entire Subwatershed
   Target: 20 acres of wetlands protected or restored per year
4. Reduce obstructions such as log jams that cause flooding or water quality problems along the East Branch.
   Focus Areas: City of Louisville to the mouth of the East Branch
   Target: To be determined

East Branch Issue #1- Recommended Actions:

Action A: Implement NPDES Phase II Storm Water Management Program	
Responsible Parties:	Stark County Regional Planning; City of Louisville; City of Canton
Funding:	Local; Storm Water Utility
Time Frame:	Ongoing - Deadline for Full Development and Implementation is Dec. 8, 2007
Expected Improvements:	Significant reduction of pollution in urban storm water runoff through the establishment of the six minimum control measures.
Evaluation Method:	Annual Review of the Program by permitted communities and the Ohio EPA
Estimated Costs:	Not Given

Estimated Load Reduction:	Variable depending on the practices implemented by each permitted community

Action B: Purchase and Protect Active Floodplain Areas.	
Suggested Responsible Parties:	Federal Emergency Management Agency (FEMA), City of Louisville. City of Canton, Stark County, Stark Parks, Stark County Drainage Task Force, Muskingum Watershed Conservancy District
Funding Options:	FEMA Grants, Clean Ohio Fund, Storm Water Utility, Conservancy District Assessment, Private Sector
Time Frame:	Louisville - Ongoing Balance of the Subwatershed: 2006 and beyond
Expected Improvements:	Reduction in flood damage; Improved water quality from intact, protected river corridor.
Evaluation Method:	Acres of Active Floodplain Purchased and Protected
Estimated Costs:	Variable
Estimated Load Reduction:	Variable depending on the condition and restoration potential of purchased or protected parcels

Action C: Identify natural wetland areas that can be protected or restored.	
Suggested Responsible Parties:	NEFCO, Stark Parks, Earth Action Partnership, ODNR, Stark County Drainage Task Force
Funding Options:	Ohio EPA Section 319 NPS Grant, Local Funds
Time Frame:	2007-2008
Expected Improvements:	The action will identify wetland areas in need of protection and restoration in the East Branch watershed for future actions.
Evaluation Method:	Acres of wetlands identified
Estimated Costs:	To Be Determined
Estimated Load Reduction:	No direct reduction in pollution loads expected from action

Action D: Promote the construction of storm water treatment wetlands for storm sewer outlets near the East Branch.	
Suggested Responsible Parties:	NEFCO, City of Louisville; City of Canton; Townships; Stark County Drainage Task Force, Muskingum Watershed Conservancy District
Funding Options:	Storm Water Utility, Conservation District Assessment, WRRSP, Local Funds
Time Frame:	Ongoing

Expected Improvements:	Reductions in nutrients and sediments from storm water runoff entering the East Branch; Increased flood water retention; Creation of wetland habitat for wildlife.
Evaluation Method:	Acres of Storm Water Wetlands Constructed
Estimated Costs:	$50,000 - $100,000 and up per constructed wetland
Estimated Load Reduction:	Treatment Wetland Median Removal Efficiencies: TSS = 76%; TP = 46%; Orthophosphate Phosphorus = 28%; N

Action E:	Educate riparian landowners on stewardship including the removal of downed trees in the East Branch.
Suggested Responsible Parties:	Earth Action Partnership, Stark SWCD, NEFCO, Stark Parks, Stark County Drainage Task Force, Muskingum Watershed Conservancy District
Funding Options:	Storm Water Utility; Conservation District Assessment; OEEF; Ohio EPA Section 319 NPS Grant
Time Frame:	2007 and beyond
Expected Improvements:	Decrease in obstructions resulting in less localized flooding problems.
Evaluation Method:	Number of Riparian Homeowners Contacted
Estimated Costs:	Riparian landowner list = 3 days work; Pamphlets = $1.50 - $3.00 per pamphlet; Public Meeting = $1,200 per meeting
Estimated Load Reduction:	Variable: Removal will likely decrease localized erosion caused by the redirection of flow around the obstruction. Increase in dissolved oxygen levels likely if the log jam has a standing pool.

East Branch Issue #2 - Riparian Corridor Protection and Restoration

Goal: Maintain and protect areas with "high" riparian habitat scores, and restore habitat areas with "poor" or "moderate" riparian habitat scores to the next attainment level.

Objectives:

1. Establish policies to protect the riparian corridor and habitat.
   Focus Areas: Entire Subwatershed
   Target: Adoption of policies by the county and municipalities
2. Restore riparian habitat where possible.
   Focus Areas: Headwater Streams in Nimishillen, Washington and Paris Townships.
   Target: Restore 1 percent or approximately 700 linear feet of "poor" or "moderate" quality riparian habitat; Protect 5 percent or approximately 2,800 linear feet of "high" quality riparian habitat
3. Purchase land along the riparian corridor for habitat protection and/or public use.
   Focus Areas: Entire Subwatershed

Target: Purchase or protect 5 acres per year of "high" quality riparian habitat

East Branch Issues #2 - Recommended Actions:

Action A: Encourage city and county park districts to purchase selected areas to protect and/or increase intact riparian corridor.	
Suggested Responsible Parties:	Stark Parks; Canton Parks Commission; City of Louisville
Funding Options:	Clean Ohio Fund; Ohio EPA Section 319 NPS Grant; WPCLF; PL-566
Time Frame:	Ongoing
Expected Improvements:	Maintain or increase riparian habitat scores.
Evaluation Method:	Number of riparian acres purchased; Riparian habitat scores
Estimated Costs:	$0 - $5,000 and up per acre; $4,000 and up average set up and maintenance fee
Estimated Load Reduction:	Vegetated Buffer Strips General Removal Efficiencies: TSS = 40%-90%; TP = 30%-90%; TN = 20%-60%; Metals = 20%-80%

Action B: Assist communities with the development of township or municipal ordinances requiring new construction sites to leave easements or a specific distance near shorelines of targeted wetlands and flood plains of streams.	
Suggested Responsible Parties:	Local and County Planning and Zoning Boards; Stark SWCD
Funding Options:	NPS Education Grant and OEEF
Time Frame:	2006 thru 2009
Expected Improvements:	Protection of shoreline and riparian corridor resulting in increase riparian habitat scores, reduction in stream bank erosion, and floodway protection.
Evaluation Method:	Number of ordinances established and enforced; Riparian and shoreline miles protected; Riparian habitat scores
Estimated Costs:	Variable
Estimated Load Reduction:	Vegetated Buffer Strips General Removal Efficiencies: TSS = 40%-90%; TP = 30%-90%; TN = 20%-60%; Metals = 20%-80%

Action C: Provide incentives for landowners to protect shoreline or riparian corridor with long-term protection or permanent conservation easements.	
Suggested Responsible Parties:	Local and County Planning and Zoning Boards; Non-Profit Environmental Groups; Land Conservancies
Funding Options:	Clean Ohio Fund; CWA Section 319 NPS Grant; WRP; CRP; PL-566
Time Frame:	2006 thru 2010
Expected Improvements:	Protection of shoreline and riparian corridor resulting in increase riparian habitat scores, reduction in stream bank erosion, and floodway protection.
Evaluation Method:	Linear feet set aside for long-term protection; Number of permanent conservation easements; Riparian habitat scores
Estimated Costs:	$0-$5,000 per acre and up; $4,000 and up average set up and maintenance fees
Estimated Load Reduction:	No direct reduction in pollution loads expected from action; however, long-term or permanent protection measures will reduce future pollution loading.

Action D: Assist shoreline and riparian landowners to replant shoreline and riparian corridor for selected wetlands, lakes and streams.	
Suggested Responsible Parties:	Stark SWCD; NEFCO; USDA - NRCS; Earth Action Partnership; Ohio EPA; ODNR - DSWC; ODNR - Division of Wildlife
Funding Options:	EQUIP; CRP; WPCLF; CWA Section 319 NPS Grant; PL-566; SIP
Time Frame:	2006 thru 2010
Expected Improvements:	Restoration of shoreline and riparian corridor, increased riparian habitat scores, improved wildlife habitat, and reduction in stream bank erosion during high flow events.
Evaluation Method:	Linear feet of replanted riparian habitat; Wildlife surveys; Riparian habitat scores
Estimated Costs:	$0.25 - $1.10 per yd^2 seeded and mulched; $0.40 - $0.49 per seedling planted
Estimated Load Reduction:	Vegetated Buffer Strips General Removal Efficiencies: TSS = 40%-90%; TP = 30%-90%; TN = 20%-60%; Metals = 20%-80%

Action E: Assist landowners in installing storm water reduction and treatment best management practices like rain gardens, rain barrels, etc.	
Suggested Responsible Parties:	Stark and Summit SWCDs; Earth Action Partnership; NEFCO; Stark County Drainage Task Force; Muskingum Watershed Conservancy District
Funding Options:	Ohio EPA Section 319 NPS Grant; Storm Water Utility; Conservation District Assessment; Local and Private Funds
Time Frame:	2006 thru 2010
Expected Improvements:	Reduction in volume, velocity, and amount of storm water runoff for residential areas entering the West Branch; Improved quality of the storm water runoff entering the West Branch.
Evaluation Method:	Number of best management practices installed; Macroinvertebrate and habitat monitoring
Estimated Costs:	Rain Gardens = Variable Rain Barrel = $50 to $100 and up per barrel
Estimated Load Reduction:	Rain Gardens: TSS = 60%-90%; TP = 60%-90%; TN = 50%-100%; Metals = 50%-100%

East Branch Issue #3 - Failing Home Sewage Treatment Systems

Goal: Reduce the nutrient and bacteria pollution in the East Branch from failing home sewage treatment systems (HSTSs).

Objectives:

1. Establish a comprehensive education and outreach program for stakeholders using home sewage treatment (septic) systems (HSTSs).
   Focus Areas: All unsewered areas
   Target: Program established by 2008
2. Begin an operations and maintenance program in the watershed.
   Focus Areas: Unsewered areas near Louisville and along State Route 62; Route 44 and Columbus Road
   Target: Inspection of 250 systems per year in the subwatershed
3. Provide financial support for the repair and replacement of failing HSTSs for low income property owners.
   Focus Areas: Entire Subwatershed
   Target: Assistance for all low income property owners, if needed

East Branch Issue #3 - Recommended Actions:

Action A: Establish education efforts to increase public awareness of faulty HSTSs through door-to-door surveys, information materials, educational video, public meetings, and/or informational booths at local public events such as fairs	
Suggested Responsible Parties:	Stark County Health Department, Ohio Department of Health; Ohio EPA; NEFCO; Earth Action Partnership
Funding Options:	OEEF; Ohio EPA Section 319 NPS Grant; Local Funding
Time Frame:	Door-to-Door Survey: 2007 - 2008 Information Material: Ongoing Public Meetings: 2007 - 2008 Informational Booths: 2007 - 2008
Expected Improvements:	Increased awareness of water quality impacts associated with malfunctioning or failing HSTSs.
Evaluation Method:	Number of surveys completed; Number of informational materials distributed; Number of public meetings held; Number of fairs or public events attended; Surveys before and after education efforts begin to gauge a change in general knowledge among watershed residents
Estimated Costs:	– Surveys = $2.00 per survey – Pamphlets and Flyers = $1.50 - $3.00 per item – Public Meetings = $1,200 per 2 hour meeting – Displays = $1,000 and up
Estimated Load Reduction:	Variable depending on the number of homeowners that follow the educational information distributed
Action B: Seek funding assistance for homeowners to repair or replace faulty HSTSs.	
Suggested Responsible Parties:	Stark County Health Department; Stark County Regional Planning
Funding Options:	WPCLF; Ohio EPA Section 319 NPS Grant; WPCLF; HUD Block Grant
Time Frame:	2007 - 2010
Expected Improvements:	Lower the number of malfunctioning or failing HSTSs
Evaluation Method:	Number of systems repaired or replaced
Estimated Costs:	$3,000 - $8,000 average cost to replace a HSTS; Up to $1,000 to repair HSTS
Estimated Load Reduction:	Variable depending on the number of homeowners who repair or r On-Site HSTS Repair or Replacement: 100% reduction in bacteria a Off-Site Repair or Replacement: Variable reduction for each HSTS

Action C: Establish an operations and maintenance inspection program to facilitate the repair and replacement of failing home sewage treatment systems (HSTS)	
Suggested Responsible Parties:	Stark County Health Department
Funding Options:	Local Property/Home Owner Operations and Maintenance Fee; Ohio EPA Section 319 NPS Grant; WPCLF
Time Frame:	2007 - 2010
Expected Improvements:	A lower number of malfunctioning or failing HSTSs in the East Branch subwatershed; Reduction in nutrient and pathogens entering the stream
Evaluation Method:	Number of systems inspected, pumped, and/or repaired; water quality sampling
Estimated Costs:	Approximately $250,000 for the Stark County Health Department to establish and run a permit system for three years in the entire Nimishillen Creek Watershed
Estimated Load Reduction:	Variable depending on the number of HSTSs inspected and ordered to be repaired or replaced

Action D: Promote the extension of sewers in the watershed, especially where high concentrations of HSTSs are located on poor soils for septic systems.	
Suggested Responsible Parties:	Stark County Sanitary Engineer; Stark County Health Department; Ohio EPA; Ohio Department of Health
Funding Options:	WPCLF; Local Property/Homeowner via Assessment; WRRSP; USDA - Rural Development Grant
Time Frame:	Ongoing when needed
Expected Improvements:	A lower number of malfunctioning or failing HSTSs polluting local water resources
Evaluation Method:	The Number of homeowners in areas of high housing concentrations with poor soils contacted about sewer expansion; Future plans or projects for sewer expansion into these areas
Estimated Costs:	$1.50 - $3.00 per pamphlet or fact sheet; $2.00 per survey; $9,000 per home and up for sewer tap-in fee.
Estimated Load Reduction:	Up to 100% reduction in pollution including bacteria and nutrients originating from HSTSs in newly sewered areas

East Branch Issue #4 - Illegal Dumping

Goal: Reduce the amount of litter and debris from illegal dumping along the East Branch.

Objectives:

1. Reduce the dumping of trash and debris into the East Branch by increasing local awareness and enforcement of anti-litter laws.
   Focus Areas: Entire Subwatershed
   Target: To be determined
2. Remove trash and debris from the East Branch.
   Focus Areas: City of Louisville to the mouth of the East Branch in Canton
   Target: One clean-up event per year along the East Branch

East Branch Issue #4 - Recommended Actions:

Action A: Educate watershed residences, industries, and businesses about litter prevention and recycling	
Suggested Responsible Parties:	Nimishillen Creek Watershed Partners; Stark County Regional Planning; Stark-Tuscarawas-Wayne Joint Solid Waste District; Canton Regional Chamber of Commerce; Stark County Drainage Task Force
Funding Options:	Local Sponsorship; Private Sector; OEEF; Ohio EPA Section 319 NPS Grant
Time Frame:	Ongoing by the Nimishillen Creek Watershed Partners, Stark County Regional Planning, and the Canton Regional Chamber of Commerce.
Expected Improvements:	Increased awareness of littering issues and proper waste disposal
Evaluation Method:	Number of educational items distributed; Number of hits on stream clean-up webpage
Estimated Costs:	$1.50 - $3.00 per pamphlet or fact sheet; $10.00 per T-shirt; $8.00 - $25.00 per month for website hosting
Estimated Load Reduction:	No direct reduction in pollution loads expected from action

Action B: Organize stream clean-ups along stretches of the East Branch that are heavily polluted with trash and debris.	
Responsible Parties:	Nimishillen Creek Watershed Partners
Funding Options:	Private Sector; Ohio EPA Section 319 NPS Grant; Sponsorships
Time Frame:	Ongoing
Improvements:	Reduction in debris in and along selected clean-up sections along the East Branch
Evaluation Method:	Linear feet of the creek cleaned; Number of tires removed; Weight or volume of litter removed
Costs:	$500 - $1,000 and up for up to a half-mile clean-up

Estimated Load Reduction:	Variable depending on location and items removed from the East Branch

Action C: Report illegal dump sites to local law enforcement officials.	
Suggested Responsible Parties:	Nimishillen Creek Watershed Partners; Stark County Health Department; Ohio EPA; Stark County Drainage Task Force
Funding Options:	Private Sector; OEEF; Ohio EPA Section 319 NPS Grant
Time Frame:	2007 and beyond
Expected Improvements:	Increased monitoring of known illegal and chronic dumping sites
Evaluation Method:	Number of fines given out for littering; Visual inspection of known chronic dumping sites
Estimated Costs:	Variable
Estimated Load Reduction:	Variable depending on the type of illegal activity prevented or cleaned up

East Branch Issue #5 - Agricultural Runoff

Goal: Reduce nonpoint source pollution from agricultural lands.

Objectives:

1. Reduce soil erosion transport and deposition of sediment associated with agricultural areas.
   Focus Areas: Headwater streams north, east, and south of the City of Louisville
   Target: To be determined
2. Reduce fertilizer, herbicide and pesticide runoff from agricultural areas.
   Focus Areas: Headwater streams north, east, and south of the City of Louisville
   Target: To be determined
3. Reduce nutrient and bacteria loads from livestock.
   Focus Areas: Headwater streams north, east, and south of the City of Louisville
   Target: To be determined

East Branch Issue #5 - Recommended Actions:

Action A: Educate farmers about the benefits of implementing appropriate BMPs, e.g., conservation tillage, conservation cropping sequence, contour strip cropping, contour farming, and precision farming, to reduce the impacts associated with sediment.	
Responsible Parties:	Stark SWCD; USDA - NRCS; Ohio Department of Agriculture; ODNR - DSWC; Earth Action Partnership
Funding Options:	EQUIP; Ohio EPA Section 319 NPS Grant; OEEF; WPCLF; CRP
Time Frame:	Ongoing through the USDA - NRCS
Expected Improvements:	Reduction in sediment and nutrient loads entering waterways from agricultural areas
Evaluation Method:	Increase in participation in: Conservation tillage; Conservation cropping sequence; Contour strip cropping; Contour farming; and Precision farming
Estimated Costs:	$1.50 - $3.00 per pamphlet or fact sheet; $3,000 and up for an 80 slide PowerPoint presentation.
Estimated Load Reduction:	No direct reduction in pollution loads expected from action; however, reduction could occur if highlighted BMPs are voluntarily implemented.

Action B: Establish grassed and forested buffer strips on farm croplands, especially adjacent to streams.	
Suggested Responsible Parties:	Stark SWCD; ODNR - DSWC; Ohio Department of Agriculture; USDA - NRCS
Funding Options:	EQUIP; CRP; WPCLF; Ohio EPA Section 319 Grant
Time Frame:	2007-2010
Expected Improvements:	Lower nutrient, sediment, and bacterial pollution from agricultural areas
Evaluation Method:	Linear feet of grassed and forested buffer strips established; Modeled pollution reduction for grassed or forested buffer strips installed
Estimated Costs:	$0.25 - $1.10 per yd^2 seeded and mulched; $0.40 - $0.50 per seeding planned
Estimated Load Reduction:	Vegetated Buffer Strips General Removal Efficiencies: TSS = 40%-90%; TP = 30%-90%; TN = 20%-60%; Metals = 20%-80%

Action C: Implement fencing and development of off-stream watering facilities to limit or exclude livestock from stream areas**.**	
Suggested Responsible Parties:	Stark SWCD; ODNR - DSWC; USDA - NRCS
Funding Options:	EQUIP; WPCLF; Ohio EPA Section 319 NPS Grant; Private Sector
Time Frame:	2007 to 2009
Expected Improvements:	Reduction of nutrients and pathogens entering the East Branch from livestock; Reduced erosion along the stream banks; Improved in-stream habitat
Evaluation Method:	Number of off-stream watering facilities developed; Linear feet of exclusion fencing along streams and lakes
Estimated Costs:	$500 per linear foot for barbed wire fencing; $1,500 - $2,000 and up for off-stream watering sites.
Estimated Load Reduction:	Livestock Exclusion Fencing and Off-Stream Watering Facilities = \

Action D: Establish settling, grass filtration, or soil infiltration systems around animal feeding and containment areas, e.g., buffer strips.	
Suggested Responsible Parties:	Stark SWCD; USDA - NRCS; ODNR - DSWC
Funding Options:	EQUIP; WPCLF; Ohio EPA Section 319 NPS Grant; Private Sector
Time Frame:	2007 - 2009
Expected Improvements:	Reduction in runoff from concentrated animal holding areas resulting in decreases in sediment, nutrients, and pathogens entering local streams and lakes.
Evaluation Method:	Number of buffer strips established and maintained; Water sampling in adjacent streams and lakes to track reductions in nutrients, pathogens, and/or sediment
Estimated Costs:	$0.25 - $1.10 per square yard seeded and mulched; $0.40 - $0.50 per seedling planted; $3.50 per linear foot of grassed diversion; Chemical Sampling = $500 to $1,000 and up for laboratory tests + cost of collection and transportation
Estimated Load Reduction:	Vegetated Filter Strips General Removal Efficiencies: TSS = 40%-90%; TP = 30%-90%; TN = 20%-90%; Metals = 20%-80% Grassed Swales General Removal Efficiencies: TSS = 20%-40%; TP = 20%-40%; TN = 10%-30% Vegetated Buffer Strips General Removal Efficiencies: TSS = 40%-90%; TP = 30%-90%; TN = 20%-60%; Metals = 20%-80%

Action E: Complete and implement manure management plans for agricultural operations.	
Responsible Parties:	USDA - NRCS; Stark SWCD; Certified Consultant
Funding Options:	EQUIP; Private Sector
Time Frame:	Ongoing
Expected Improvements:	Reduced levels of nutrient and bacteria contamination in waterbodies adjacent to the operation.
Evaluation Method:	Number of manure management plans implemented and degree of success; Pre and post plan water quality sampling in adjacent waterbody
Estimated Costs:	Currently NRCS does not charge for plans under the EQUIP program; $10,000 - $50,000 for a concrete holding facility; $15,000 - $20,000 for a lined lagoon
Estimated Load Reduction:	Variable depending on the type of BMPs included in the manure plan and the size of the operation.

Middle Branch Watershed Action Plan

Inventory

Physical Description

The Middle Branch of Nimishillen Creek originates in the northern section of Stark County in Marlboro and Lake Townships including the southern portion of the Village of Hartville (Figure VII-3). Sections of the headwater areas have been modified or ditched long ago to improve drainage in agricultural areas in these townships. Swartz Ditch, a major tributary to the Middle Branch, is an example of this hydromodification. From the creek's origins in the northern portion of Stark County, the Middle Branch and its tributaries flow primarily southwardly into Nimishillen and Plain Township before entering the City of Canton and joining with the East Branch at about RM 15 to form the Mainstem of Nimishillen Creek.

Similar to the East Branch, the Middle Branch watershed resides entirely in the glaciated portion of Stark County (Figure II-5). As a result, the basin has moderate relief and gentle slopes due to glacial actions and depositions. Most of the subwatershed has less than a six percent slope with few slopes above 12 percent (Figure II-6). The soils in the region reflect the area's glacial activities with the primary soil associations being Fitchville-Sebring, Chili-Wheeling-Shoals, Ravenna-Canfield, and Carlisle-Willette-Linwood. Several soil types in this area are not suited for the installation of home sewage treatment systems do to poor drainage or permeability (Figure VI-3). Also like the East Branch, several areas along the Middle Branch and Swartz Ditch are covered with over 60 feet of glacial outwash. The bedrock formations within the middle consist of Middle Kittaning Coal, Brookeville Coal, and Mercer Limestone (Figure II-7). Of all the Nimishillen Creek subwatersheds, the Middle Branch has had the fewest problems with regards to flooding according to the Stark County Drainage Task Force. This is likely because a village, town, or city is not located adjacent to the Middle Branch until its final few miles in the City of Canton, and agricultural drainage systems such as Swartz Ditch continue to quickly remove water from agricultural areas in Marlboro and Lake Townships.

Land Use

The majority of the Middle Branch subwatershed is used for agriculture and open space. Nearly all the headwater areas in Lake, Nimishillen, and Marlboro Township are either agricultural lands, open space, or wooded lots. Old wetland and muck areas are also present in the headwater area of the Middle Branch around the Village of Hartville and northern Marlboro Township. These muck areas are primarily farmed and produce vegetables and other consumption crops. Development is limited in the headwater areas due to the lack of sanitary sewer service and poor soils for traditional home wastewater treatment systems (Figure VI-3). Development is primarily individual or large lot homesteads and businesses along the major roadways e.g. Middle Branch Road and State Route 44 (Figure VII-10). Agricultural runoff, degraded riparian habitat, failing home wastewater treatment systems, and channelization/ditching are the primary water quality concerns in the northern section of the subwatershed.

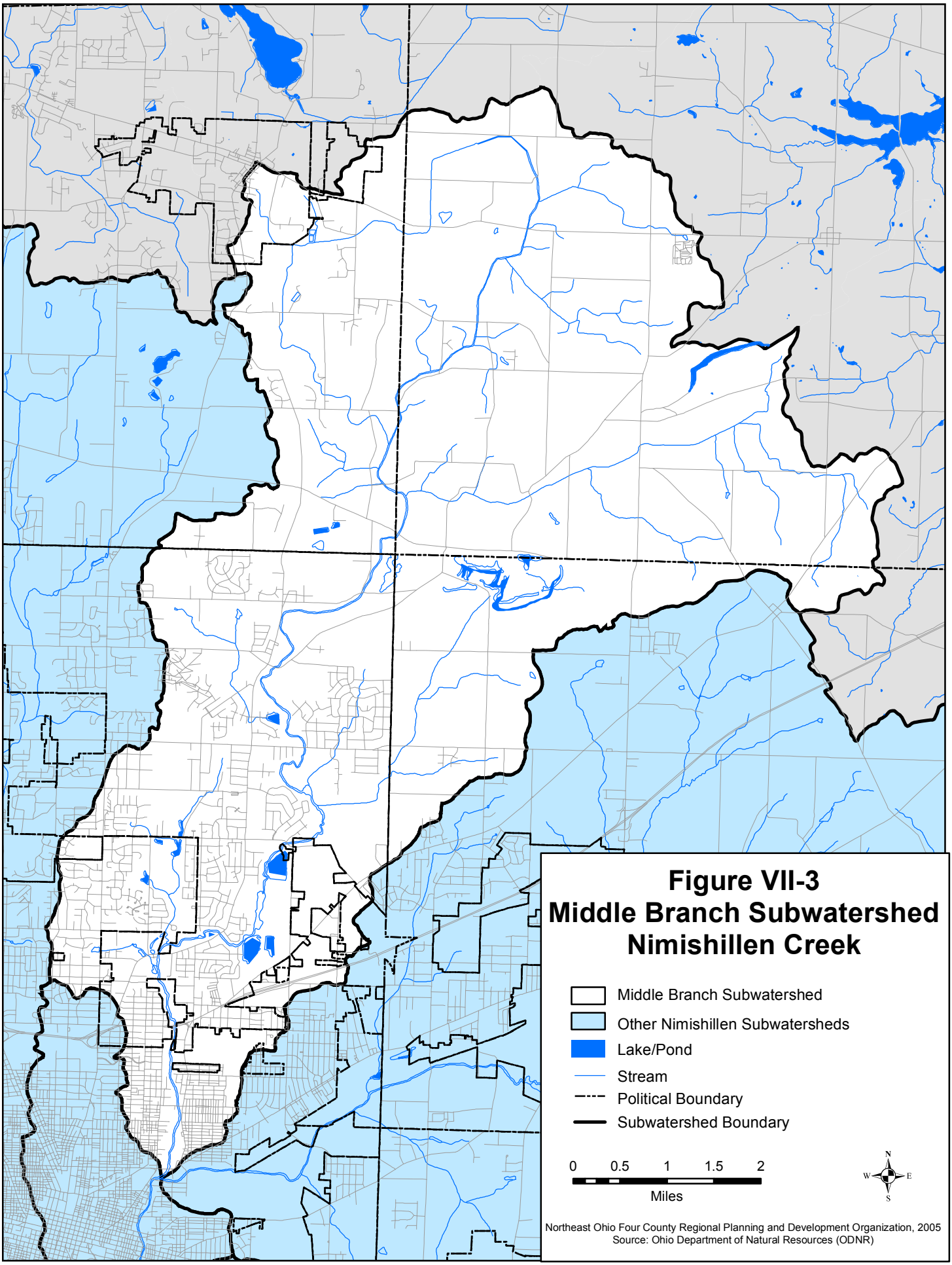


Figure VII-3
Middle Branch Subwatershed
Nimishillen Creek
Middle Branch Subwatershed
Other Nimishillen Subwatersheds
Lake/Pond
Stream
Political Boundary
Subwatershed Boundary
0 0.5 1 1.5 2
Miles
N
W
E
S
Northeast Ohio Four County Regional Planning and Development Organization, 2005
Source: Ohio Department of Natural Resources (ODNR)

As expected, an increase in development density mirrors the areas with access to sanitary sewer service in the lower portion of the Middle Branch basin. As the Middle Branch flows southward towards the City of Canton, urban/suburban development picks up around Easton Road in Plain Township (Figure II-13). This is also the same area where sewer service becomes readily available (Figure II-4). From the Easton Road region south, urban/suburban development increases as the Middle Branch moves through central Plain Township and into the City of Canton. The only industrial sites along the Middle Branch are located along the final mile of the creek before it merges with the East Branch at river mile 15. The total length of the Middle Branch is 16.6 miles long. Sampling conducted by the Ohio EPA along this lower portion of the Middle Branch revealed no water quality degradations from industrial discharges (see below). Therefore water quality concerns in the lower, more developed sections of the Middle Branch are storm water runoff from the urban and suburban areas and the protection and restoration of the riparian corridor (Figure VII-4).

Point Source Discharges

A point source is defined as a source that discharges pollutants, or any effluent, from a known discharge point, such as a pipe, ditch, or sewer and into a waterbody after treatment (Miller, 1988). Treatment can vary depending on the type of effluent, but generally includes the removal of solids and disinfection. Point source discharges have the potential to introduce high levels of nutrients and chemicals into a waterway. However, these discharges are monitored and tracked by the Ohio EPA via the National Pollutant Discharge Elimination System (NPDES) program to protect local water resources.

Along the Middle Branch of Nimishillen Creek, fifteen point sources are permitted to discharge treated wastewater into the watershed. These include the Village of Hartville's wastewater treatment plan, Canton's NE Water Plan, one Stark County treatment facility, eleven private waste treatment systems, and one industrial discharger. The majority of the county and private wastewater treatment discharge points are located along Middlebranch Road that runs between the Cities of Hartville and Canton. The industrial discharger is located in the lower reaches of the Middle Branch. Table VII-5 provides information about each permitted discharge and Figure IV-1 maps their location in the watershed. Please note that this section does not include storm sewer outfalls, off-lot discharging home sewage treatment systems, or illegal point source discharges into the Middle Branch.

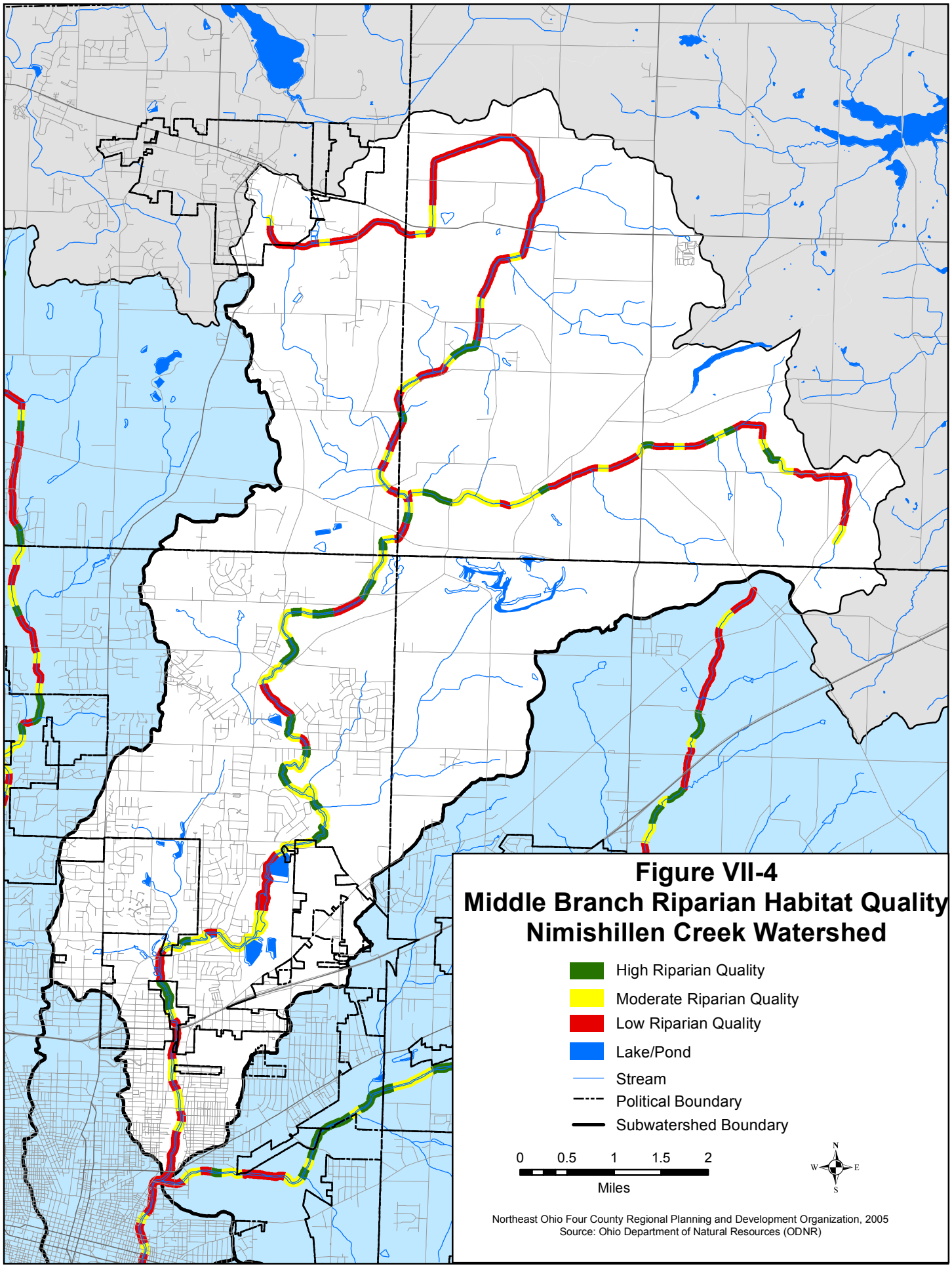


Figure VII-4
Middle Branch Riparian Habitat Quality
Nimishillen Creek Watershed
High Riparian Quality
Moderate Riparian Quality
Low Riparian Quality
Lake/Pond
Stream
Political Boundary
Subwatershed Boundary
0 0.5 1 1.5 2
Miles
N
W
E
S
Northeast Ohio Four County Regional Planning and Development Organization, 2005
Source: Ohio Department of Natural Resources (ODNR)

Table VII-8: Point Source Discharging Operations in the Middle Branch Subwatershed

Map Symbol	Discharging Operation	Design Flow (GPD)	Classification
6	BR Exploration & Oil Inc. 807 Hartford Ave. Canton, OH 44707	Not Given	Industrial Discharger
7	Canton NE Water Plant 2664 Harrisburg Road NE Canton, OH 44705	Not Given	Municipal Water Treatment Plant
14	Village of Hartville WWTP 565 Wales Drive Hartville, OH 44632	450,000	Municipal Wastewater Treatment Plant
30	Shady Knoll MHP 4689 Kirby Ave. N.E. Canton, OH 44705	1,500 to <5,000	Private Discharging Semi-Public Sewage Treatment System
31	Stark County 320 Columbus Rd. Louisville, OH 44641	Not Given	Municipal Wastewater Treatment System
39	Sable Creek Golf 5942 Edison St. Hartville, OH 44632	1,500 to <5,000	Private Discharging Semi-Public Sewage Treatment System
54	Apartment Building 7336 Middlebranch Ave. N.E. Canton, OH 44721	1 to <1,500	Private Discharging Semi-Public Sewage Treatment System
56	Axion Concrete Technology 8282 Middlebranch Ave. N.E. Canton, OH 44721	1,500 to <5,000	Private Discharging Semi-Public Sewage Treatment System
57	Doug's Auto Service 8437 Middlebranch Ave. N.E. Canton, OH 44721	1 to <1,500	Private Discharging Semi-Public Sewage Treatment System
58	Glen Oak High School 2300 Schneider Rd. N.E. North Canton, OH 44721	>10,000	Private Discharging Semi-Public Sewage Treatment System
59	Leno's Restaurant 2494 Easton St. N.E. North Canton, OH 44720	5,000 to >10,000	Private Discharging Semi-Public Sewage Treatment System
60	Little Flower Church and School 2040 Diamond St. N.E. North Canton, OH 44721	1,500 to <5,000	Private Discharging Semi-Public Sewage Treatment System
61	Master Touch Cleaners 2605 Easton St. N.E. North Canton, OH 44721	1,500 to <5,000	Private Discharging Semi-Public Sewage Treatment System
63	Steiner Apartments 7330 Middlebranch Ave. N.E. North Canton, OH 44721	1,500 to <5,000	Private Discharging Semi-Public Sewage Treatment System
70	Maize Valley Farm Market 6163 Edison St. Hartville, OH 44632	1,500 to <5,000	Private Discharging Semi-Public Sewage Treatment System

GPD = Gallons Per Day
Sources: Ohio EPA, 2005; Stark County Health Department, 2006

Water Quality Data and Impairments

Ohio EPA's TMDL Monitoring Results

The Ohio EPA conducted a biological and aquatic life use assessment for the Middle Branch subwatershed from 2003 thru 2005 as part of the Nimishillen Creek TMDL (Table VII-9).

Table VII-9: Middle Branch Nimishillen Creek Aquatic Life Use Attainment Status, Biological Criteria Scores, and QHEI Scores

Location - (Lower/Upper River Mile)	Use Designation	Attainment Status	Biological Criteria Scores			QHEI Scores
			IBI	MIwb	ICI	
12th Street - (0.1/0.2)	WWH	Non	32*	6.7*	Fair*	64.5
Martindale Park - (2.7/2.6)	WWH	Full	36	8.0	34	73.5
Easton St. - (6.8)	WWH	Partial	30*	6.3*	38	**56**
State St. - (10.4)	WWH	Non	28*	5.6*	42	**52**
Immel Ave. - (11.4)	WWH	Full	40	--	--	**59**
State Route 44 - (13.6)	WWH	Non	24*	--	Poor*	**28**
Swartz Ditch: Tyro St. - (0.2)	MWH	Full	24	--	40	65.5
Swartz Ditch: Nimishillen Church Rd. - (1.2)	MWH	Partial	26	--	Poor*	**--**

* Indicates significant departure for applicable biocriteria (>4 IBI or ICI units, or >0.5 MIwb units).
___ Underlined scores are in the Poor or Very Poor range.
BOLD - QHEI scores are below the TMDL goal of 60 for WWH streams.

Source: Nimishillen Creek TMDL, Ohio EPA, 2009.

The three biological indices used to determine attainment status are the Index of Biological Integrity (IBI), the Modified Index of Well Being (MIwb), and the Invertebrate Community Index (ICI). Both the IBI and MIwb are based on sampling of the fish community while the ICI scores are derived from examining the macroinvertebrate organisms.

The Middle Branch subwatershed resides in the Erie/Ontario Lake Plain (EOLP) ecoregion. In order to be in "Full" attainment, results from all three biocriteria (IBI, MIwb, and ICI) must be close to the numerical criteria set for the ecoregion. For the EOLP ecoregion, the IBI score must be no less than 4 units lower than 38, the MIwb has to be within 0.5 units of 7.7, and the ICI score can be no lower than 4 units from 34 to be in attainment. If one or two of the biocriteria meet the ecoregion scoring requirements, then the creek is said to be in partial attainment.

Physical habitat was evaluated using the Qualitative Habitat Evaluation Index (QHEI). Various attributes of the creek's habitat, like substrate, in-stream cover, riparian

habitat, etc. were scored based on the overall importance of each to the maintenance of viable, diverse, and functional aquatic communities. Statewide, scores generally range from 12 to less than 100, and it has been shown from numerous sites throughout Ohio that values greater than 60 generally are conducive to the existence of warmwater fish and invertebrates, while scores less than 45 generally do not support warmwater fish or invertebrates.

Impairments

Aquatic Life Use and Habitat:

Of the eight sites sampled in the Middle Branch subwatershed, three (37.5%) were in full attainment, two (25%) were in partial attainment, and three (37.5%) were in non attainment. Seven of the sites were evaluated using the Qualitative Habitat Evaluation Index (QHEI), with over half (four) scoring below the TMDL goal score of 60. One of the sites was in full attainment, one was in partial attainment, and the remaining two were in non attainment.

Recreation:

The Nimishillen Creek Middle Branch is impaired for Primary Contact Recreation.

Fish Consumption:

There is a fish consumption advisory of only one meal per month of common carp caught from the Nimishillen Creek Middle Branch. In addition, the Ohio Department of Health has issued a statewide advisory to limit meals of fish caught from all Ohio waterbodies to one meal per week due to mercury.

Ohio EPA's Causes and Sources of Impairments

The causes of impairments for a stream are the specific pollutants or alterations that result in the stream not meeting state water quality standards. Examples of common causes of water quality impairments are siltation, flow alteration, nutrient enrichment, metals, and temperature. Sources of impairments are where the causes originated or where the causes of impairments are supplied from. Sources include crop production, channelization, urban runoff, dam construction, discharge pipes, and stream bank erosion. Table VII-10 lists the causes and sources of impairment for aquatic life use, recreation, and fish consumption along the Mainstem of Nimishillen Creek.

Table VII-10: Nimishillen Creek TMDL's Causes and Sources of Impairments for the Middle Branch of Nimishillen Creek	
Causes of Impairment	**Sources of Impairment**
Organic Enrichment/Dissolved Oxygen	Municipal Point Source Major Industrial Point Source
Direct Habitat Alterations	Channelization – Agriculture
Metal	Channelization - Development
Nutrients	Agriculture Storm Water Runoff
Priority Organics	Municipal Point Source
Siltation	Nonirrigated Crop Production
Unionized Ammonia & Pathogens	Home Sewage Treatment (Septic) Systems
Unknown Toxicity	Small Flow Waste Water Treatment (Package) Plants
Sources: Nimishillen Creek TMDL, Ohio EPA, 2009.	

The lower section of the Middle Branch of Nimishillen Creek appears to largely reflect the urbanized nature of the lower one mile of the stream. Numerous storm sewer pipes outflow into the lower mile of the creek, influencing biological communities (Ohio EPA, 2001).

Load Reduction Information

Sediment, habitat and bacteria (pathogen) TMDLs were completed for the Middle Branch of Nimishillen Creek. Tables VII-11 thru VII-13 summarizes Middle Branch's load reductions outlined in the Nimishillen Creek TMDL. For more information of the load reduction information, please refer to Section V above.

Table V-11: Sediment TMDL of the Middle Branch Nimishillen Creek						
TMDL Target for Warm Water Habitat (WWH)	**QHEI Categories**			**Total TMDL Score**		
	Substrate	**Channel**	**Riparian**			
	Allocations					
	≥ 13	≥ 14	≥ 5	32		
Existing Scores						
Location - (Lower/Upper River Mile)	**QHEI Scores**			**Total Sediment Score**	**Percent Deviation from Target**	**Main Impairment Category**
	Substrate	**Channel**	**Riparian**			
State Route 44 - (13.6)	1	4	3	8	75.0	Substrate
State St. - (10.4)	5.5	8	6.5	20	37.5	Substrate
Source: Nimishillen Creek TMDL, Ohio EPA, 2009.						

TableVII-12: Total Existing Load, TMDL, and Allocations of Fecal Coliform Loads (recreation season) for the Upper Middle Branch Nimishillen Creek						
Existing Loads			TMDL[1]	% Reduction	Allocations	
PS	NPS	Total			WLA	LA
467.8	141.4	609.2	74.8	87.7	0.09	74.7

Point Source (PS) Fecal Coliform Loads. These Include Existing, Percent Reduction Required, and Wasteload Allocation (WLA) by Source				
	NPDES Discharger	MS4	HSTS	Total WLA
Existing	0.08	0.015	467.78	467.8
% Reduction	0	24.2	100	
Allocation	0.08	0.011	0	0.09

Nonpoint Source (NPS) Fecal Coliform Loads. These Include Existing						
	Cropland	Pasture	Forest	Urban	Cattle in Stream	Total LA
Existing	31.44	66.74	0.18	0.11	42.91	141.4
% Reduction	24.2	24.2	0	24.2	100	
Allocation	23.85	50.61	0.18	0.08	0	74.7

[1] cfu * 10^3 * season^{-1} (for cfu * 10^3 * day^{-1} divided each value by 138)
Source: Nimishillen Creek TMDL, Ohio EPA, 2009

Table VII-13: Habitat TMDL for the Middle Branch Nimishillen Creek							
	Allocations						TMDL
	QHEI Score	# of High Influence Attributes		Total # of Modified Attributes			
TMDL Targets	≥ 60 = 1 point	< 2 = 1 point		< 5 = 1 point			3 points
Location - (Lower/Upper River Mile)	QHEI Score	# of High Influence Attributes	Total # of Modified Attributes	Sub-Score			Total Habitat Score
				QHEI Score	High Influence	Total # Modified	
State Route 44 - (13.6)	28	5	10	0	0	0	0
State St. - (10.4)	52	2	8	0	0	0	0
Easton St. - (6.8)	56	1	7	0	1	0	1
Swartz Ditch: Nimishillen Church Rd. - (1.2)	31.5	3	8	0	0	0	0*

* Note that stream is designated Modified Warmwater Habitat (MWH)
Source: Nimishillen Creek TMDL, Ohio EPA, 2009.

Other Water Quality Information

Nimishillen Creek Macroinvertebrate Survey - 2000, 2002, and 2004:
Since 2000, NEFCO and the City of Canton have conducted three macroinvertebrate surveys along Nimishillen Creek. One of the seventeen sites sampled is located in the Middle Branch subwatershed. Table VII-8 summarizes

the results of the sampling using ODNR's Stream Quality Monitoring Program protocol.

Table VII-14: Mean Cumulative Index Values* (CIV) for the Middle Branch of Nimishillen Creek Based on NEFCO's Macroinvertebrate Surveys

Station Location	Mean CIV**		
	2000 Segment Condition	2002 Segment Condition	2004 Segment Condition
River Mile 2.1 - Reifsnyder Park on 31st St. and S.R. 62	21 Good	18 Good	19 Good

* Stream Quality Assessment **Excellent: >22, Good: 17-22, Fair: 11-16, Poor < 11
(Source: ODNR, Stream Quality Monitoring Manual)

NEFCO's sampling results at this location have consistently scored in the "Good" range, and it has consistently been one of the top scoring sites among the sixteen or seventeen sampled in the surveys since 2000. However, the survey also noted that upstream of the area sampled, several storm water sewer pipes are discharging into the creek. Also, there is inadequate riparian vegetation and siltation is a concern at some locations.

The Ohio EPA found that generally ODNR's Stream Quality Monitoring Program tend to reflect attainment and non-attainment aquatic life uses. "Excellent" scores in the ODNR method commonly meet the Ohio EPA attainment standards, while stream segments with "Fair" or "Poor" scores generally are assessed as being in non-attainment (Yoder and Davis, 1996). Based on this study, this site is likely in or close to being in attainment for WWH aquatic life uses.

***Reifsnyder Park Constructed Storm Water Wetland - Macroinvertebrate Monitoring Results (November 2004)*:**
The City of Canton, in an effort to improve water quality flowing into the Nimishillen Creek from urban and suburban areas, constructed a wetland in Reifsnyder Park to treat effluent from storm water sewer outlets. The city contracted with NEFCO to monitor the macroinvertebrate community upstream and downstream of the site both before and after construction. Results of the monitoring are summarized in Table VII-9.

Table VII-15: Mean Cumulative Index Values (CIVs) and Stream Segment Conditions Based on Macroinvertebrate Surveys at Reifsynder Park in Canton, Ohio.

Sample Date	Sampling Location	Cumulative Index Values*				Mean	
		A	B	C	Total	CIV	Segment Condition**
6-28-02	River Mile 2.8: Upstream of the Storm Water Wetland - Before Construction	24	23	24	71	24	Excellent
6-09-04	River Mile 2.8: Upstream of the Storm Water Wetland - After Construction	21	25	29	75	25	Excellent
7-12-02	River Mile 2.1: Downstream of the Storm Water Wetland - Before Construction	17	18	22	57	19	Good
6-09-04	River Mile 2.1: Downstream of the Storm Water Wetland - After Construction	21	20	17	58	19	Good

* Stream Quality Assessment **Excellent: >22, Good: 17-22, Fair: 11-16, Poor < 11
(Source: ODNR, Stream Quality Monitoring Manual)

The results show the Middle Branch going from an "Excellent" scoring creek to receiving "Good" scores as it meanders through Reifsnyder Park. This reduction in scoring from RM 2.8 to 2.1 correlates with a reduction of riparian vegetation (Figure VII-4) and the presence of numerous storm sewer discharge pipes located between the two sites. Based on the Ohio EPA studies on this sampling protocol, the upstream site (RM 2.8) is likely in attainment of aquatic life use attainment standards for WWH. The downstream sites attainment status may or may not be reaching WWH attainment standards (Yoder and Davis, 1996).

Pollutant Removal Efficiencies of a Constructed Storm Water Treatment Wetland in Canton, Ohio (2005):

Mr. Jim Eynon from Youngstown State University completed this study as part of his requirements for the Masters of Science in Engineering degree. The purpose of the study was to gauge the effectiveness at removing pollutants from urban runoff of a storm water treatment wetland constructed by the City of Canton. The constructed wetland is located in Reifsynder Park along the Middle Branch of Nimishillen Creek (RM 2.4). The study monitored total suspended solids, nitrate/nitrite, soluble reactive phosphorus, total phosphorus, and ammonia before and after treatment by collecting grab samples in April 2005. Results show some indications of effective removal of pollutants from storm water runoff

before entering the Middle Branch (Table VII-10). However, pollutant reduction was not monitored over an entire season or during an entire storm event (Eynon, 2005).

Table VII-16: Pollutant Removal Efficiencies from the Constructed Storm Water Treatment Wetland at Reifsynder Park in Canton, Ohio

Parameter	Removal Efficiency Range	Mean Removal Efficiency
Total Suspended Solids	45% - 95%	77%
Soluble Reactive Phosphorus	25% - 96%	68%
Total Phosphorus	59% - 86%	74%
Nitrate/Nitrite	98% - 100%	99%
Ammonia	93% - 100%	96%

Source: Jim Eynon. 2005. Pollutant Removal Efficiencies of a Constructed Storm Water Treatment Wetland in Canton, Ohio. Youngstown State University Graduate Project

Biological and Aquatic Life Use Attainment Study: Lower Middle Branch Nimishillen Creek (2001)

The Ohio EPA conducted a biological and aquatic life use assessment along the lower portions of Nimishillen Creek's Middle Branch (Table VII-17). The sampling was the result of an evaluation under the Voluntary Action Program (VAP) at the IUSI-Union Metal facility in Canton. The goals of the sampling was to establish biological conditions in the Middle Branch in the vicinity of Union Metal by evaluating the fish and macroinvertebrate communities, and to determine the aquatic life use attainment status of that section of creek with regard to the Warm Water Habitat (WWH) standards. It was not apparent from the sampling that the Union Metal site was influencing the biological communities in this section of stream (Ohio EPA, 2001).

Table VII-17: Ohio EPA 2001 Biological and Aquatic Life Use Sampling Results from the Middle Branch of Nimishillen Creek

River Mile	IBI	MIwb	ICI	QHEI	Attainment Status	Ohio EPA's Comments
0.8	32	6.2	26	63.5	Non	Upstream of Union Metal
0.6	**35**	7.1	26	54.0	Partial	Adjacent to Union Metal
0.3	27	6.4	26	57.0	Non	Downstream of Union Metal

BOLD = meeting or a nonsignificant departure from ecoregion biocriteria
IBI = Index of Biological Integrity (fish); MIwb = Modified Index of Well Being (fish); ICI = Invertebrate Community Index; QHEI = Qualitative Habitat Evaluation Index
Source: 2001 Biological and Aquatic Life Use Attainment Study: Lower Middle Branch Nimishillen Creek

Middle Branch Subwatershed Issues and Actions

1. **Failing HSTSs**
1. **Environmental Education**
2. **Agricultural Runoff and Practices**
4. **Riparian Corridor Restoration**
5. **Urban Storm Water Runoff**

As with most headwater streams, the water quality of the Middle Branch of Nimishillen Creek is almost entirely reflective of the activities occurring within its basin. This subwatershed has the largest area without sanitary sewer service. Coupled with significant sections of poor soils for home sewage treatment systems results in those systems failing, and thus be the primary concern for water quality. Storm water runoff from both urban/suburban areas and agricultural fields is also a concern that can be addressed through education and targeted best management practices. Lastly, the Middle Branch ranked next to last among Nimishillen Creek subwatersheds for suitable riparian habitat cover. Restoration of riparian cover in the headwater areas and in the City of Canton is a priority.

Using the available data and information along with personal knowledge of the Middle Branch, watershed stakeholders ranked the top five issues they believe to be hindering water quality attainment in this subwatershed. Under each of the five issues is a goal with objective statements accompanied by recommended actions to address each issue. Please note that the recommended actions are not intended to be a comprehensive list of actions that could address each issue; but rather, a list of actions that the stakeholders believe to be the best course of action given the current circumstances and available information. Refer to NEFCO's *Nimishillen Creek Comprehensive Watershed Management Plan - Phase III* for a more comprehensive list of water quality improvement actions for Nimishillen Creek (NEFCO, 2001).

"Focus Areas" were also included under each objective to indicate specific areas to direct actions, if known, and a "Target" was establish to help evaluate the objective and measure accomplishments. Lastly, "Responsible Parties" are identified if a watershed action is ongoing, while "Suggested Responsible Parties" indicate who could take the lead on actions not yet being implemented.

Middle Branch Issue #1 - Failing Home Sewage Treatment Systems

Goal: Reduce the nutrient and bacteria pollution in the Middle Branch from failing home sewage treatment systems (HSTSs).

Objectives:

1. Establish a comprehensive education and outreach program for stakeholders using HSTSs.
   Focus Areas: All unsewered areas
   Target: Program established by 2008
2. Begin an operations and maintenance program in the watershed.
   Focus Areas: HSTSs along Boettler Street, Easton Street, and Middle Branch Road.
   Target: Inspection of 250 systems per year in the subwatershed

3. Provide financial support for the repair and replacement of failing HSTSs for low income property owners.
   Focus Areas: Entire Subwatershed
   Target: Assistance for all low income property owners, if needed

Middle Branch Issue #1 - Recommended Actions Tables:

Action A: Establish education efforts to increase public awareness of faulty HSTSs through door-to-door surveys, information materials, educational video, public meetings, and/or informational booths at local public events e.g. fairs.	
Suggested Responsible Parties:	Stark County Health Department, Ohio Department of Health; Ohio EPA; NEFCO; Earth Action Partnership
Funding Options:	OEEF; Ohio EPA Section 319 NPS Grant; Local Funding
Time Frame:	Door-to-Door Surveys: 2007 - 2008 Information Materials: Ongoing Public Meetings: 2007 - 2008 Informational Booths: 2007 - 2008
Expected Improvements:	Increased awareness of water quality impacts associated with malfunctioning or failing HSTSs; Increased number of voluntary HSTS repairs
Evaluation Method:	Number of surveys completed; Number of informational materials distributed; Number of public meetings held; Number of fairs or public events attended; Surveys before and after educational efforts begin to gauge a change in general knowledge among watershed residents
Estimated Costs:	– Surveys = $2.00 per survey – Pamphlets and Flyers = $1.50 - $3.00 per item – Public Meetings = $1,200 per 2 hour meeting – Display = $1,000 and up
Estimated Load Reduction:	No direct reduction in pollution loads expected from action; however, indirect reductions possible depending on the number of homeowners that utilize the information presented

Action B: Seek funding assistance for homeowners to repair or replace faulty HSTSs.	
Suggested Responsible Parties:	Stark County Health Department; Stark County Regional Planning
Funding Options:	WPCLF; Ohio EPA Section 319 NPS Grant; WPCLF; EDA Block Grant
Time Frame:	2007 - 2010
Expected Improvements:	Lower number of malfunctioning or failing HSTSs

Evaluation Method:	Number of systems repaired or replaced
Estimated Costs:	$3,000 - $8,000 average cost to replace a HSTS; Up to $1,000 to repair a HSTS
Estimated Load Reduction:	On-Site HSTS Repair or Replacement: 100% reduction in bacteria and nutrient pollution from a HSTS Off-Site Repair or Replacement: Variable reduction for each HSTS
Action C: Establish an operations and maintenance inspection program to facilitate the repair and replacement of failing home sewage treatment systems (HSTS).	
Suggested Responsible Parties:	Stark County Health Department
Funding Options:	Local Property/Home Owner Operations and Maintenance Fee; Ohio EPA Section 319 NPS Grant; WPCLF
Time Frame:	2007 - 2010
Expected Improvements:	Lower number of malfunctioning or failing HSTSs in the Middle Branch watershed; Reduction in nutrient and pathogens entering the stream
Evaluation Method:	Number of systems inspected, pumped, and/or repaired; Water quality sampling of effluent before and after repair or replacement
Estimated Costs:	Approximately $250,000 for Stark County Health Department to establish and run a permit system for three years in the entire Nimishillen Creek Watershed
Estimated Load Reduction:	Variable depending on the number of HSTSs inspected and ordered to be repaired or replaced

Action D: Promote the extension of sewers in the watershed, especially where high concentrations of HSTSs are located on poor soils for septic systems.	
Suggested Responsible Parties:	Stark County Sanitary Engineer; Stark County Health Department; Ohio EPA; Ohio Department of Health
Funding Options:	WPCLF; Local Property/Homeowner via Assessment; WRRSP; USDA - Rural Development Grant
Time Frame:	2007 and beyond
Expected Improvements:	Lower number of malfunctioning or failing HSTSs that pollute local water resources
Evaluation Method:	Number of homeowners in areas of high housing concentrations with poor soils who are contacted about sewer expansion; Future plans or projects for sewer expansion into these areas
Estimated Costs:	$1.50 - $3.00 per pamphlet or fact sheet; $2.00 per survey; $9,000 per home and up for sewer tap-in fee.

Estimated Load Reduction:	Up to 100% reduction in pollution including bacteria and nutrients originating from HSTSs in newly sewered areas

Middle Branch Issue #2 - Environmental Education

Goal: Educate residents, government officials, and businesses about watershed issues impacting the Middle Branch of Nimishillen Creek.

Objectives:

1. Educate riparian and shoreline landowners on the value of a healthy riparian habitat.
   Focus Areas: All riparian land owners
   Target: Provide education material to 75 percent of riparian land owners
2. Increase general knowledge of local watershed issues.
   Focus Areas: Entire Subwatershed
   Target: To be determined
3. Support and enhance educational efforts associated with the Storm Water NPDES Phase II permit program.
   Focus Areas: Entire Subwatershed
   Target: To be determined

Middle Branch Issue #2 - Recommended Actions:

Action A: Identify shoreline and riparian landowners and educate them about the importance of shoreline or riparian zone protection.	
Suggested Responsible Parties:	NEFCO; Earth Action Partnership; Stark Parks
Funding Options:	NPS Education Grant; OEEF; WPCLF; CWA Section 319 Grant; Private Sector
Time Frame:	2006 thru 2008
Expected Improvements:	Increased protection of shoreline and riparian corridor
Evaluation Method:	List of riparian landowners; Number of educational pamphlets distributed; Riparian habitat scores
Estimated Costs:	Riparian landowner list = 3 days work; Pamphlets = $1.50 - $3.00 per pamphlet
Estimated Load Reduction:	No direct reduction in pollution loads expected from action

Action B: Educate residents about watershed issues through regularly scheduled events and activities that are recognized by the public. These events and activities can include watershed surveys, presentations at local meetings, information booths at local fairs, creek clean-ups, and other public meetings.	
Responsible Parties:	Nimishillen Creek Watershed Partners; NEFCO; Stark SWCD; Stark RPC
Funding Options:	Private Sector; NPS Education Grant; OEEF Grant; CWA Section 319 NPS Grant
Time Frame:	Ongoing
Expected Improvements:	Greater awareness regarding watershed issues
Evaluation Method:	Number of events held; Surveys taken; Presentations given; Fairs attended; Public meetings held
Estimated Costs:	Survey = $2.00 per survey; Presentation = $3,000 and up per 80 picture slide/PowerPoint show; County Fair Display = $1,000 and up + $1.50 to $3.00 per pamphlet + $15.00 per volunteer hour; Public Meeting = $1,200 per meeting
Estimated Load Reduction:	No direct reduction in pollution loads expected from action

Action C: Implement a watershed protection and awareness program in local schools.	
Suggested Responsible Parties:	Stark Parks; Ohio EPA - Division of Surface Water; County SWCDs; Local Boards of Education; Local Schools; Earth Action Partnership
Funding Options:	OEEF; NPS Education Grant; CWA Section 319 NPS Grant
Time Frame:	2006 thru 2007
Expected Improvements:	Stronger knowledge of future generations regarding the importance of watershed protection
Evaluation Method:	Number of local schools implementing program; Number of students exposed to watershed education efforts
Estimated Costs:	$400 - $7,000
Estimated Load Reduction:	No direct reduction in pollution loads expected from action

Action D: Educate riparian landowners on stewardship including the removal of downed trees in the Creek.	
Suggested Responsible Parties:	Earth Action Partnership; Stark SWCD; NEFCO; Stark Parks; Stark County Drainage Task Force; Muskingum Watershed Conservancy District
Funding Options:	Storm Water Utility; Conservation District Assessment; OEEF, Ohio EPA Section 319 NPS Grant
Time Frame:	2007 and beyond
Expected Improvements:	Decrease in obstructions resulting in less localized flooding and water quality problems.
Evaluation Method:	Number of riparian homeowners contacted
Estimated Costs:	Riparian landowner list = 3 days work; Pamphlets = $1.50 - $3.00 per pamphlet; Public Meeting = $1,200 per meeting
Estimated Load Reduction:	No direct reduction in pollution loads expected from action

Middle Branch Issue #3 - Agriculture Runoff and Practices

Goal: Reduce nonpoint source pollution from agricultural lands.

Objectives:

1. Reduce sediment transport and deposition of sediment associated with agricultural erosion.
   Focus Areas: Headwater streams and Swartz Ditch basin
   Target: To be determined
2. Reduce fertilizer, herbicide and pesticide runoff from agricultural areas.
   Focus Areas: Headwater streams and Swartz Ditch basin
   Target: To be determined
3. Reduce nutrient and bacteria loads from livestock.
   Focus Areas: Headwater streams and Swartz Ditch basin
   Target: To be determined

Middle Branch Issue #3 - Recommended Actions:

Action A: Educate farmers about the benefits of implementing appropriate BMPs, e.g., conservation tillage, conservation cropping sequence, contour strip cropping, contour farming, and precision farming, to reduce the impacts associated with sediment runoff.	
Responsible Parties:	Stark SWCD; USDA - NRCS; Ohio Department of Agriculture; ODNR - DSWC; Earth Action Partnership
Funding Options:	EQUIP; Ohio EPA Section 319 NPS Grant; OEEF; WPCLF; CRP
Time Frame:	Ongoing
Expected Improvements:	Reduction in sediment and nutrient loads entering waterways from agricultural areas
Evaluation Method:	Increase in participation in conservation tillage, conservation cropping sequence; contour strip cropping, contour farming, and precision farming in the Middle Branch subwatershed
Estimated Costs:	$1.50 - $3.00 per pamphlet or fact sheet; $3,000 and up for an 80 slide PowerPoint presentation.
Estimated Load Reduction:	No direct reduction in pollution loads expected from action; however, reduction could occur if highlighted BMPs are voluntarily implemented.

Action B: Establish grassed and forested buffer strips on farm croplands, especially adjacent to streams.	
Suggested Responsible Parties:	Stark SWCD; ODNR - DSWC; Ohio Department of Agriculture; USDA - NRCS
Funding Options:	EQUIP; CRP; WPCLF; Ohio EPA Section 319 Grant
Time Frame:	2007-2010
Expected Improvements:	Lower nutrient, sediment, and bacterial pollution from agricultural areas
Evaluation Method:	Linear feet of grassed and forested buffer strips established; Modeled pollution reduction for grassed or forested buffer strips installed
Estimated Costs:	$0.25 - $1.10 per yd^2 seeded and mulched; $0.40 - $0.50 per seeding planed
Estimated Load Reduction:	Vegetated Buffer Strips General Removal Efficiencies: TSS = 40%-90%; TP = 30%-90%; TN = 20%-60%; Metals = 20%-80%

Action C: Implement fencing and development of off-stream watering facilities to limit or exclude livestock from stream areas.	
Suggested Responsible Parties:	Stark SWCD; ODNR - DSWC; USDA - NRCS
Funding Options:	EQUIP; WPCLF; Ohio EPA Section 319 NPS Grant; Private Sector
Time Frame:	2007 - 2009
Expected Improvements:	Reduction of nutrients and pathogens entering the Middle Branch from livestock; Reduced erosion along the stream banks; Improved in-stream habitat
Evaluation Method:	Number of off-stream watering facilities developed; Linear feet of exclusion fencing along streams and lakes
Estimated Costs:	$500 per linear foot for barbed wire fencing; $1,500 - $2,000 and up for off-stream watering sites.
Estimated Load Reduction:	Livestock Exclusion Fencing and Off-Stream Watering Facilities = Variable Reduction in TP, TN, TSS, and Bacteria Pollution

Action D: Establish settling, grass filtration or soil infiltration systems around animal feeding and containment areas, e.g., buffer strips.	
Suggested Responsible Parties:	Stark SWCD; USDA - NRCS; ODNR - DSWC
Funding Options:	EQUIP; WPCLF; Ohio EPA Section 319 NPS Grant; Private Sector
Time Frame:	2007 - 2009
Expected Improvements:	Reduction in runoff from concentrated animal holding areas resulting in decreases in sediment, nutrients, and pathogens entering the Middle Branch.
Evaluation Method:	Number of buffer strips established and maintained; Water sampling in adjacent streams and lakes to track reductions in nutrients, pathogens, and/or sediment
Estimated Costs:	$0.25 - $1.10 per square yard seeded and mulched; $0.40 - $0.50 per seedling planted; $3.50 per linear foot of grassed diversion; Chemical Sampling = $500 to $1,000 and up for laboratory tests + cost of collection and transportation
Estimated Load Reduction:	Vegetated Filter Strips General Removal Efficiencies: TSS = 40%-90%; TP = 30%-90%; TN = 20%-90%; Metals = 20%-80% Grassed Swales General Removal Efficiencies: TSS = 20%-40%; TP = 20%-40%; TN = 10%-30% Vegetated Buffer Strips General Removal Efficiencies: TSS = 40%-90%; TP = 30%-90%; TN = 20%-60%; Metals = 20%-80%

Action E: Complete and implement manure management plans for agricultural operations.	
Responsible Parties:	USDA - NRCS; Stark SWCD; Certified Consultant
Funding Options:	EQUIP; Private Sector
Time Frame:	Ongoing
Expected Improvements:	Reduced levels of nutrient and bacteria contamination in waterways adjacent to the operation.
Evaluation Method:	Number of manure management plans implemented and degree of success; Pre and post plan water quality sampling in adjacent waterways
Estimated Costs:	Currently NRCS does not charge for plans under the EQUIP program; $10,000 - $50,000 for concrete holding facility; $15,000 - $20,000 for lined lagoon
Estimated Load Reduction:	Variable depending on the type of BMPs included in the manure plan and the size of the operation.

Middle Branch Issue #4 - Riparian Corridor Restoration

Goal: Restore habitat areas with "poor" or "moderate" riparian habitat scores to the next attainment level.

Objectives:

1. Work with property owners to improve the riparian habitat in the Middle Branch basin.
   Focus Areas: Headwater streams and Swartz Ditch basin; Lake and Marlboro Townships
   Target: Restore 10 percent or approximately 7,000 linear feet of "poor" or "moderate" quality riparian habitat
2. Establish policies to protect the riparian corridor and habitat.
   Focus Areas: Entire Subwatershed
   Target: Adoption of policies by the county and municipalities

Middle Branch Issue #4 - Recommended Actions:

Action A: Provide incentives for agricultural landowners to protect shoreline or riparian corridor with long-term protection or permanent conservation easements.	
Responsible Parties:	Stark County SWCD; USDA - NRSC; Land Conservancies; Stark Parks
Funding Options:	EQUIP; Farm Bill; CRP; WRP
Time Frame:	2007 thru 2010
Expected Improvements:	Protection of shoreline and riparian corridor resulting in increase riparian habitat scores, reduction in stream bank erosion, and floodway protection.
Evaluation Method:	Linear feet set aside for long-term protection; Number of permanent conservation easements; Riparian habitat scores
Estimated Costs:	$0.00 to $5,000 per acre and up; $4,000 and up on average to set up a maintenance fees
Estimated Load Reduction:	No direct reduction in pollution loads expected from action; however, long-term or permanent protection measures will reduce future pollution loading or provide an opportunity to restore degraded riparian areas.

Action B: Encourage city and county park districts to purchase selected areas to protect and/or increase intact riparian corridor.	
Responsible Parties:	Stark Parks; Canton Parks Commission
Funding Options:	Clean Ohio Fund; Ohio EPA Section 319 NPS Grant; WPCLF; PL-566
Time Frame:	Ongoing
Expected Improvements:	Maintain or increase riparian habitat scores
Evaluation Method:	Number of riparian acres purchased; Riparian habitat scores
Estimated Costs:	$0 - $5,000 and up per acre; $4,000 and up average set up and maintenance fee
Estimated Load Reduction:	No direct reduction in pollution loads expected from action; however, long-term or permanent protection measures will reduce future pollution loading or provide an opportunity to restore degraded riparian areas.

Action C: Assist communities with the development of township or municipal ordinances requiring new construction sites to leave easements of a specific distance near shorelines of targeted wetlands and flood plains of streams.	
Suggested Responsible Parties:	Stark County Regional Planning Commission; Stark SWCD
Funding Options:	NPS Education Grant; OEEF
Time Frame:	2007 thru 2010
Expected Improvements:	Protection of shoreline and riparian corridor resulting in increase riparian habitat scores, reduction in stream bank erosion, and floodway protection.
Evaluation Method:	Number of ordinances established and enforced; Riparian and shoreline miles protected; Riparian habitat scores
Estimated Costs:	Variable
Estimated Load Reduction:	Vegetated Buffer Strips General Removal Efficiencies: TSS = 40%-90%; TP = 30%-90%; TN = 20%-60%; Metals = 20%-80%

Action D: Assist shoreline and riparian landowners to stabilize shoreline and riparian corridor using appropriate BMPs.	
Suggested Responsible Parties:	County SWCDs; NEFCO; ODNR - DSWC; USDA - NRCS; Earth Action Partnership; ODNR - Division of Wildlife
Funding Options:	EQUIP; CRP; WPCLF; CWA Section 319 NPS Grant; PL-566; SIP
Time Frame:	2005 thru 2008
Expected Improvements:	Restabilization of shoreline and riparian corridor; Reduction in stream bank erosion; Improved wildlife habitat
Evaluation Method:	Linear feet of bank or shoreline stabilized; Wildlife survey; Riparian habitat scores
Estimated Costs:	Approximately $350,000 to restore or stabilize 1,300 linear feet of stream channel; Fiber Rolls = $12.00 per linear foot; Plant Cuttings = $0.40 - $0.50 per cutting; Erosion Control Blankets = $2.00 per yd^2
Estimated Load Reduction:	Erosion Control Blankets: Runoff Reduction = 80%; Erosion Rate Reduction = up to 99%; Weed Growth Reduction = 75% Fiber Rolls: TSS Reduction = 58% Vegetated Buffer Strips General Removal Efficiencies: TSS = 40%-90%; TP = 30%-90%; TN = 20%-60%; Metals = 20%-80%

Middle Branch Issue #5 - Storm Water Runoff from Urban and Suburban Areas

Goal: Improve the ability of the Middle Branch watershed to assimilate and treat storm water runoff by promoting the protection and restoration of wetlands, the restoration of floodplains, and minimizing runoff from impervious areas.

Objectives:

3. Create or restore wetland areas in the Middle Branch subwatershed.
   Focus Areas: Martindale Park to Cook Park
   Target: Construct or restore 20 acres of wetlands per year
4. Permanently protect and restore natural, high quality wetland areas
   Focus Areas: Entire Subwatershed
   Target: Protect 10 acres of existing wetlands per year
5. Reduce flow obstructions like log jams along the Middle Branch.
   Focus Areas: Headwater streams and Swartz Ditch basin
   Target: To be determined
6. Restore and protect active floodplain area.
   Focus Areas: Martindale Park to Cook Park
   Target: Protect or restore 5 acres per year of active floodplain

Middle Branch Issue #5 - Recommended Actions:

Action A: Implement NPDES Phase II Storm Water Management Program	
Responsible Parties:	Stark County; City of Canton; City of Hartville
Funding:	Local; Storm Water Utility
Time Frame:	Ongoing - Deadline for Full Development and Implementation is Dec. 8, 2007
Expected Improvements:	Significant reduction of pollution in urban storm water runoff through the establishment of six minimum control measures.
Evaluation Method:	Annual Review of the Program by permitted communities and the Ohio EPA
Estimated Costs:	Not given
Estimated Load Reduction:	Variable depending on the practices implemented by each permitted community

Action B: Purchase and protect active floodplain areas.	
Suggested Responsible Parties:	Federal Emergency Management Agency (FEMA); City of Canton; Stark County; Stark County Drainage Task Force; Muskingum Watershed Conservancy District
Funding Options:	FEMA Grants, Clean Ohio Fund, Storm Water Utility, Conservancy District Assessment, Private Sector
Time Frame:	2006 and beyond
Expected Improvements:	Reduction in flood damage, improved water quality from intact, protected river corridor.
Evaluation Method:	Acres of active floodplain purchased or protected
Estimated Costs:	Variable
Estimated Load Reduction:	Variable depending on the condition and restoration potential of purchased or protected parcels

Action C: Identify natural wetland areas that can be protected or restored.	
Suggested Responsible Parties:	NEFCO; Stark Parks; Earth Action Partnership; ODNR; Stark County Drainage Task Force
Funding Options:	Ohio EPA Section 319 NPS Grant, Local Funds
Time Frame:	2007-2008
Expected Improvements:	The action will identify wetland areas in need of protection and restoration in the Middle Branch subwatershed for future actions.
Evaluation Method:	Acres of wetlands identified
Estimated Costs:	To be determined
Estimated Load Reduction:	No direct reduction in pollution loads expected from action

Action D: Promote the construction of storm water treatment wetlands for storm sewer outlets near the Middle Branch.	
Suggested Responsible Parties:	NEFCO; Local Municipalities; Stark County Drainage Task Force; Muskingum Watershed Conservancy District
Funding Options:	Storm Water Utility, Conservation District Assessment, WRRSP, Local Funds
Time Frame:	Ongoing
Expected Improvements:	Reductions in nutrients and sediments from storm water runoff entering the East Branch; Increased flood water retention; Creation of wetland habitat for wildlife
Evaluation Method:	Acres of storm water wetlands constructed
Estimated Costs:	$50,000 - $100,000 and up per constructed wetland
Estimated Load Reduction:	Constructed Wetland Median Removal Efficiencies: TSS = 76%; TP = 46%; Orthophosphate Phosphorus = 28%; Nitrate = 46%; and NH_3 = 33%

West Branch Watershed Action Plan

Inventory

Physical Description

The West Branch subwatershed begins in Lake Township in northern Stark and near the Akron-Canton Regional Airport in the City of Green in Summit County. The West Branch drains central and southern Lake Township then flows south into Plain Township and North Canton. The major tributary to the West Branch is Zimber Ditch which begins around the Akron-Canton Airport and also flows directly south into Jackson Township, Plain Townships and the City of North Canton while nearly paralleling Interstate 77. At approximately river mile 4.0, the Zimber Ditch joins the West Branch in the City of Canton and flows south along Interstate 77 before joining with the Mainstem just south of the Interstate 77/State Route 30 interchange in the City of Canton at river mile 12 (Figure VII-5).

The West Branch subwatershed is positioned in the glaciated portion of Stark and Summit Counties (Figure II-5). The resulting topography in the watershed is primarily moderate relief and gentle slopes. Most of the subwatershed contains slopes of less than twelve percent. However, isolated area in the western edge of the subwatershed in Jackson Township has some slopes greater than 25 percent (Figure II-6). Soils in the West Branch are typical of glaciated regions in the area with the primary associations being Chili-Wheeling-Shoals, Fitchville-Sebring, Canfield-Wooster, Ravenna-Canfield, and Carlisle-Willette-Linwood. Although several of the soil types in each of these associations is poorly suited for the installation of home sewage treatment systems due to poor drainage or permeability, most of the watershed is served by sanitary sewers. Only the areas around the Akron-Canton Airport and sections in Lake or Plain Townships in the northeast portion of the subwatershed do not currently have access to a sanitary sewer system.

The bedrock within the West Creek basin consists of Mercer Limestone, Brookville Coal, and Middle Kittaning Coal (Figure II-7). The Mercer Limestone is located largely along Zimber Ditch in the west portion of the subwatershed. Brookville Coal bedrock is dominant in the area between Zimber Ditch and West Branch, with Middle Kittaning Coal bedrock scattered throughout the area. However, significant portions of the bedrock in the West Branch subwatershed are covered by over 60 feet of glacial outwash.

Hydromodification in the form of channelization (ditching) has influenced the characteristics of the West Branch. Zimber Ditch is the primary example of these past practices that has lead to flood problems and reduced water quality as agricultural lands have been converted to urban and suburban areas. Lastly, several flooding issues have been documented throughout the West Branch subwatershed by the Stark County Drainage Task Force.

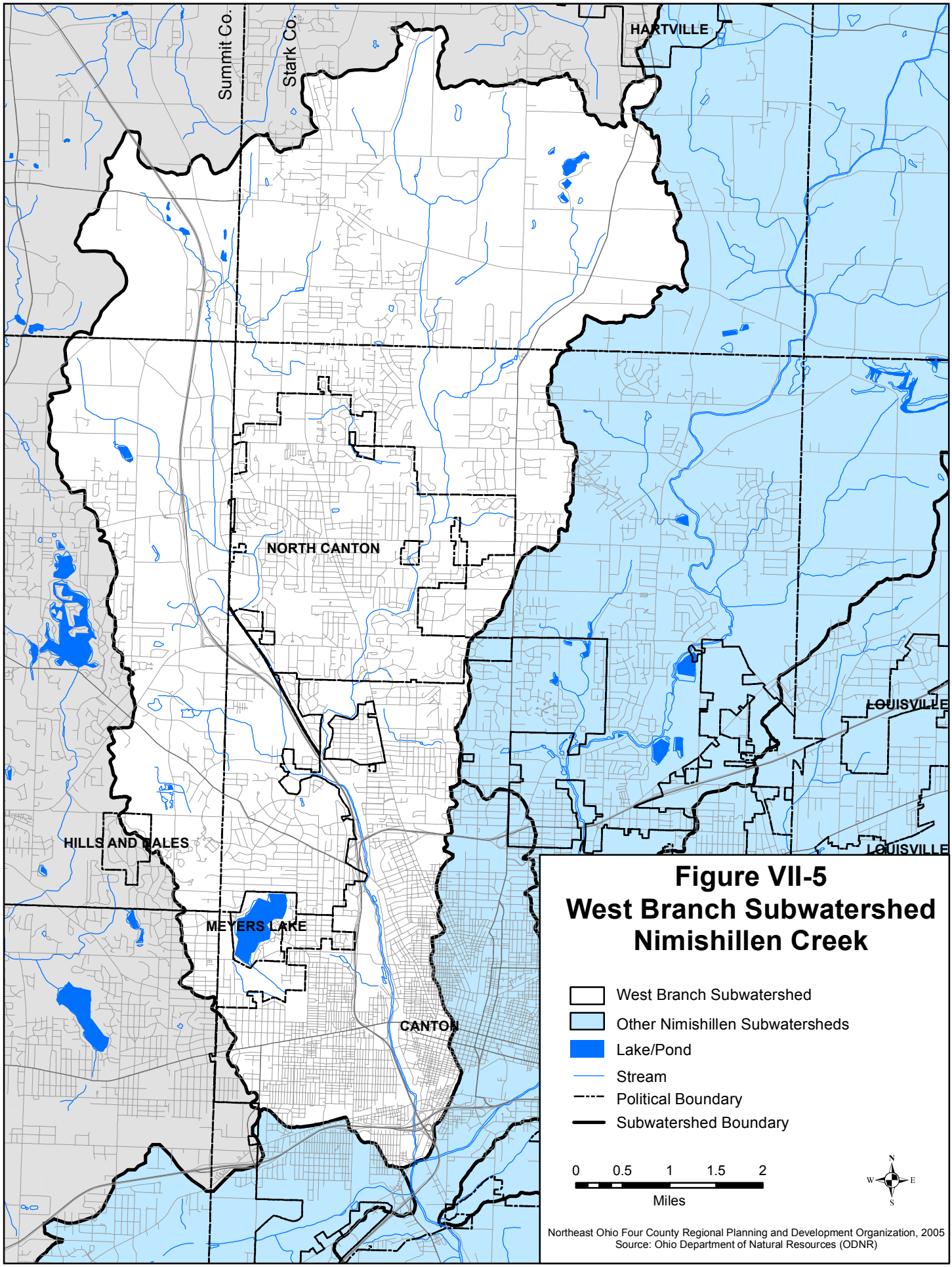


Figure VII-5
West Branch Subwatershed
Nimishillen Creek

West Branch Subwatershed
Other Nimishillen Subwatersheds
Lake/Pond
Stream
Political Boundary
Subwatershed Boundary

0 0.5 1 1.5 2
Miles

N
W E
S

Northeast Ohio Four County Regional Planning and Development Organization, 2005
Source: Ohio Department of Natural Resources (ODNR)

Land Use

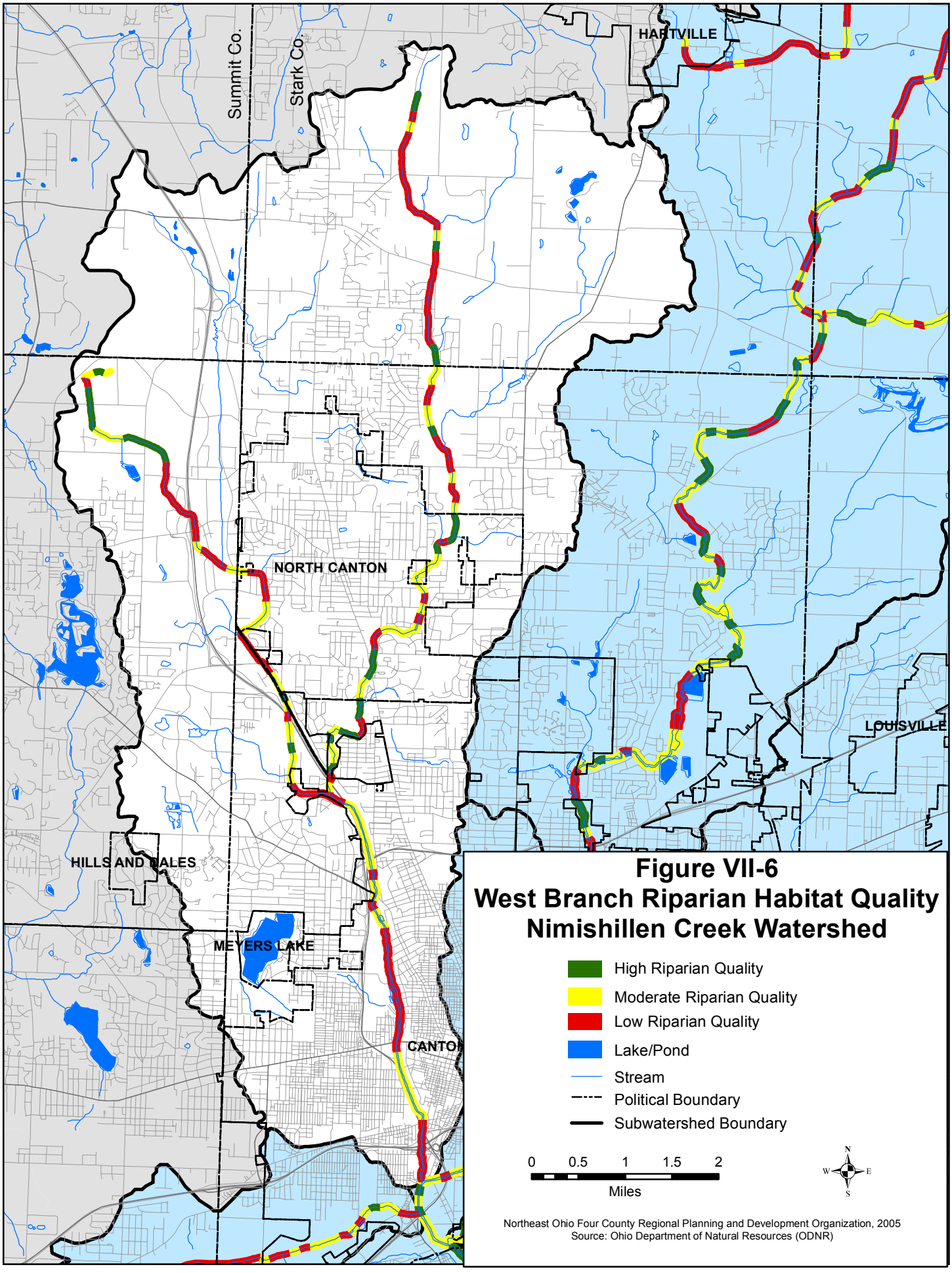
The West Branch subwatershed is the most developed in the Nimishillen Creek basin (Figure II-13). Nearly half of the watershed is used for urban, suburban, or industrial uses. The Cities of Canton and North Canton are both partially located in the West Branch Watershed. Interstate 77 between Akron and Canton parallels the creek from the headwaters of Zimber Ditch to is confluence with the Mainstem in the City of Canton. As a result, urban sprawl from both the Akron and Canton metropolitan areas has occurred. Industrial areas are concentrated around the Akron-Canton Regional Airport, the Hoover Company in the City of North Canton, and the lower mile of the West Branch in the City of Canton. Agriculture, open, and wooded areas are mostly found in the headwaters of the West Branch in Lake Township. However, the City of Canton has developed an extensive park system along the West Branch from the State Route 62 bridge south to the State Route 30 bridge (Figure II-3). These riparian parks are the primary open areas/buffers in the lower reaches of the West Branch.

The riparian habitat was rated as moderate to poor along most sections of the West Branch (Figure VII-6). The worst riparian scores were found in the headwaters in Lake Township, along Zimber Ditch in Jackson Township and North Canton, along the riparian parks in the City of Canton, and the final half mile of the West Branch. Restoration of this habitat will be limited in some areas due to encroachment from development, but is possible in select locations. Other water quality concerns from the land usage include storm water runoff from urban and suburban areas, lack of environmental education by the watershed stakeholders, and the need to monitor water quality changes from the continued development of agriculture and open lands. Lastly, abandoned land mines, primarily in the lower portion of the subwatershed, is also of concern.

Point Source Discharges

A point source is defined as a source that discharges pollutants, or any effluent, from a known discharge point, such as a pipe, ditch, or sewer and into a waterbody after treatment (Miller, 1988). Treatment can vary depending on the type of effluent, but generally includes the removal of solids and disinfection. Point source discharges have the potential to introduce high levels of nutrients and chemicals into a stream or lake. However, these discharges are monitored and tracked by the Ohio EPA via the National Pollutant Discharge Elimination System (NPDES) program to protect local water resources.

Along the West Branch of Nimishillen Creek a total of thirteen discharge points are permitted. Five sources release treated wastewater, six are industrial dischargers, and two are effluents from water treatment plants. The remaining permitted discharges are from private wastewater treatment systems. Table VII-11 provides information about each permitted discharge and Figure IV-1 maps the location in the watershed. Please note that this section does not include storm sewer outfalls, off-


Summit Co.
Stark Co.
HARTVILLE
NORTH CANTON
LOUISVILLE
HILLS AND DALES
MEYERS LAKE
CANTON
Figure VII-6
West Branch Riparian Habitat Quality
Nimishillen Creek Watershed
High Riparian Quality
Moderate Riparian Quality
Low Riparian Quality
Lake/Pond
Stream
Political Boundary
Subwatershed Boundary
0 0.5 1 1.5 2
Miles
N
W
E
S
Northeast Ohio Four County Regional Planning and Development Organization, 2005
Source: Ohio Department of Natural Resources (ODNR)

lot discharging home sewage treatment systems, or illegal point source discharges into the Nimishillen Creek Watershed. Additional point source dischargers will be added as information becomes available.

Table VII-18: Point Source Discharging Operations in the West Branch Subwatershed

Map Symbol	Discharging Operation	Design Flow (GPD)	Classification
3	Akron Canton Regional Airport 5400 Lauby Rd. North Canton, OH 44720	100,000	Commercial Discharger
4	Akron Canton Truck Plaza Inc. 4450 Portage Rd. North Canton, OH 44720	Not Given	Private Discharging Semi-Public Sewage Treatment System
8	Canton NW Water Plant 44044 Guilford NW Canton, OH 44709	Not Given	Municipal Water Treatment Plant
15	The Hoover Company Plant 1 101 East Maple St. North Canton, OH 44720	600,000	Industrial Discharger
16	Hoover Co. Industrial Park 8200 Freedom Ave. North Canton, OH 44720	300,000	Industrial Discharger
22	McCann Plastics Inc. 5600 Mayfair Rd. North Canton, OH 44720	Not Given	Industrial Discharger
24	North Canton Water Plant 7300 Freedom Ave. NW North Canton, OH 44720	Not Given	Municipal Water Treatment Plant
27*	Republic Engineered Steels 2633 8th St. NW Canton, OH 44708	Not Given	Industrial Discharger
32	Stark County - Bob-O-Link 2000 Mohler Dr. North Canton, OH 44720	Not Given	Private Discharging Semi-Public Sewage Treatment System
35	Timken Co. Research Center 500 Mt. Pleasant Rd. North Canton, OH 44720	Not Given	Industrial Discharger
55	Avondale Professional Building 3996 Fulton Rd. N.W. Canton, OH 44718	1,500 to <5,000	Private Discharging Semi-Public Sewage Treatment System
62	North Market Home Sales 8139 Kent Ave. N.E. Louisville, OH 44646	1,500 to <5,000	Private Discharging Semi-Public Sewage Treatment System
64	Whipple Center Building 2922 Whipple Ave. N.W. Canton, OH 44708	1,500 to <5,000	Private Discharging Semi-Public Sewage Treatment System

* Permits Expired in 2005; GPD = Gallons Per Day
Sources: Ohio EPA, 2005; Stark County Health Department, 2006

Water Quality Data and Impairments

Ohio EPA's TMDL Monitoring Results

The Ohio EPA conducted a biological and aquatic life use assessment for the West Branch subwatershed from 2003 thru 2005 as part of the Nimishillen Creek TMDL (Table VII-19).

Table VII-19: West Branch Nimishillen Creek Aquatic Life Use Attainment Status, Biological Criteria Scores, and QHEI Scores

Location - (Lower/Upper River Mile)	Use Designation	Attainment Status	Biological Criteria Scores			QHEI Scores
			IBI	MIwb	ICI	
Market St. - (0.1)	WWH	Non	36	5.8*	Fair*	69
Upstream Gregory Galvanizing - (0.4/0.3)	WWH	Non	31*	6.7*	Fair*	74
Downstream Fulton Rd. - (3.2)	WWH	Non	22*	5.1*	--	**42**
Upstream Fulton Rd. - (3.5/3.4)	WWH	Partial	32*	6.6*	40	77
Upstream McDowell Ditch - (4.6/4.7)	WWH	Non	28*	--	Fair*	**58.5**
Applegrove St. - (9.3/9.0)	WWH	Non	26*	--	Fair*	**47**
Mr. Pleasant St. - (10.5/10.4)	WWH	Partial	40	--	Fair*	60.5
McDowell Ditch: Everhard Rd. - (1.9/1.8)	MWH	Full	24	--	High	**--**
Zimber Ditch: Applegrove St. – (2.4)	WWH	Partial	40	--	Low	60

* Indicates significant departure for applicable biocriteria (>4 IBI or ICI units, or >0.5 MIwb units).
___ Underlined scores are in the Poor or Very Poor range.
BOLD - QHEI scores are below the TMDL goal of 60 for WWH streams.

Source: Nimishillen Creek TMDL, Ohio EPA, 2009.

Impairments

Aquatic Life Use and Habitat:

Of the nine sites sampled in the West Branch subwatershed, one site (11%) was in full attainment of aquatic life use standards, three sites (33%) were in partial attainment, and the remaining five sites (56%) were in non attainment.

Recreation:

The Nimishillen Creek West Branch is impaired for Primary Contact Recreation (PCR).

Fish Consumption:
There is a fish consumption advisory of only one meal per month of common carp caught from the Nimishillen Creek West Branch. In addition, the Ohio Department of Health has issued a statewide advisory to limit meals of fish caught from all Ohio waterbodies to one meal per week due to mercury.

Ohio EPA's Causes and Sources of Impairments

The causes of impairments for a stream are the specific pollutants or alterations that results in the stream not meeting state water quality standards. Examples of common causes of water quality impairments are siltation, flow alteration, nutrient enrichment, metals, and temperature. Sources of impairment are where the causes originate or where the causes of impairments are supplied from. Sources can include crop production, channelization, urban runoff, dam construction, discharge pipes, and stream bank erosion. Table VII-20 lists the causes and sources of impairment for aquatic life use, recreation, and fish consumption for the West Branch of Nimishillen Creek.

Table VII-20: Nimishillen Creek TMDL's Causes and Sources of Impairments for the West Branch of Nimishillen Creek

Causes of Impairment	Sources of Impairment
Direct Habitat/Flow Alterations	Channelization – Agriculture
Metal	Channelization – Development Industrial Point Source
Organic Enrichment/Dissolved Oxygen	Major Industrial Point Source
Nutrients	Storm Water Runoff
Siltation	Nonirrigated Crop Production Urban Storm Water Runoff
Unionized Ammonia & Pathogens	Onsite Home Sewage Treatment (Septic) Systems

Sources: Nimishillen Creek TMDL, Ohio EPA, 2009.

Load Reduction Information

Sediment, habitat and bacteria (pathogen) TMDLs were completed for the West Branch of Nimishillen Creek. Tables VII-21 thru VII-23 summarizes West Branch's load reductions outlined in the Nimishillen Creek TMDL. For more information of the load reduction information, please refer to Section V above.

Table VII-21: Sediment TMDL of the West Branch Nimishillen Creek				
TMDL Target for Warm Water Habitat (WWH)	QHEI Categories			Total TMDL Score
	Substrate	Channel	Riparian	
	Allocations			
	≥ 13	≥ 14	≥ 5	32

Existing Scores						
Location - (Lower/Upper River Mile)	QHEI Scores			Total Sediment Score	Percent Deviation from Target	Main Impairment Category
	Substrate	Channel	Riparian			
Mr. Pleasant St. - (10.5/10.4)	12	14	6.5	32.5	-	Substrate

Source: Nimishillen Creek TMDL, Ohio EPA, 2009.

Table VII-22: Total Existing Load, TMDL, and Allocations of Fecal Coliform Loads (recreation season) for the West Branch Nimishillen Creek						
Existing Loads			TMDL[1]	% Reduction	Allocations	
PS	NPS	Total			WLA	LA
2246.7	41.1	2287.8	143.6	93.7	113.3	30.4

Point Source (PS) Fecal Coliform Loads. These Include Existing, Percent Reduction Required, and Wasteload Allocation (WLA) by Source				
	NPDES Discharger	MS4	HSTS	Total WLA
Existing	0.20	0.78	2245.7	2246.7
% Reduction	0	0	95.0	
Allocation	0.20	0.78	112.29	113.3

Nonpoint Source (NPS) Fecal Coliform Loads. These Include Existing						
	Cropland	Pasture	Forest	Urban	Cattle in Stream	Total LA
Existing	12.96	17.01	0.24	0.17	10.73	41.1
% Reduction	0	0	0	0	100	
Allocation	12.96	17.01	0.24	0.17	0	30.4

[1] cfu * 10^3 * season^{-1} (for cfu * 10^3 * day^{-1} divided each value by 138)
Source: Nimishillen Creek TMDL, Ohio EPA, 2009

Table VII-23: Habitat TMDL for the West Branch Nimishillen Creek							
	Allocations						TMDL
	QHEI Score	# of High Influence Attributes	Total # of Modified Attributes				
TMDL Targets	≥ 60 = 1 point	< 2 = 1 point	< 5 = 1 point				3 points
Location - (Lower/Upper River Mile)	QHEI Score	# of High Influence Attributes	Total # of Modified Attributes	Sub-Score			Total Habitat Score
				QHEI Score	High Influence	Total # Modified	
Mr. Pleasant St. - (10.5/10.4)	60.5	1	4	1	1	1	3

Applegrove St. - (9.3/9.0)	47	3	9	0	0	0	0
Upstream McDowell Ditch - (4.6/4.7)	58.5	1	6	0	1	0	1
Downstream Fulton Rd. - (3.2)	77	0	1	1	1	1	3
Upstream Gregory Galvanizing - (0.4/0.3)	74	0	3	1	1	1	3
Market St. - (0.1)	69	1	5	1	1	0	2
McDowell Ditch: Everhard Rd. - (1.9/1.8)	67.5	1	5	1	1	0	2*
Zimber Ditch: Applegrove St. – (2.4)	60	1	5	1	1	0	2

* Note that stream is designated Modified Warmwater Habitat (MWH)
Source: Nimishillen Creek TMDL, Ohio EPA, 2009.

Other Water Quality Information

Nimishillen Creek Macroinvertebrate Survey - 2000, 2002, and 2004: Since 2000, NEFCO and the City of Canton have conducted three macroinvertebrate surveys along Nimishillen Creek. Four of the seventeen sites are located in the West Branch watershed. Scores over the years have ranged from "Excellent" to "Fair" with a general trend of decreasing scores from upstream to downstream sites. A summary of the West Branches macroinvertebrate scores are summarized in Table VII-14.

Table VII-24: Mean Cumulative Index Values* (CIV) for the West Branch from NEFCO's Macroinvertebrate Surveys

Station Location	Mean CIV**		
	2000 Segment Condition	2002 Segment Condition	2004 Segment Condition
River Mile 0.26 - Cleveland Ave. and Market St.	15 Fair	11 Fair	12 Fair
River Mile 0.84 - Navarre Rd.	16 Fair	14 Fair	16 Fair
River Mile 2.45 -Monument Park at 12th St.	26 Excellent	17 Good	22 Good
River Mile 6.52 - Everhard Rd. Bridge	11 Fair	22 Good	17 Good

* Stream Quality Assessment **Excellent: >22, Good: 17-22, Fair: 11-16, Poor < 11
(Source: ODNR, Stream Quality Monitoring Manual)

The Ohio EPA found that generally ODNR's Stream Quality Monitoring Program used by NEFCO tend to reflect attainment and non-attainment for aquatic life uses. "Excellent" scores in the ODNR method commonly meet the Ohio EPA attainment standards, while stream segments with "Fair" or "Poor" scores generally are assessed as being in non-attainment (Yoder and Davis, 1996). Consequently, it is likely that the upstream sites (RM 2.45 and 6.52) are closer to attaining WWH aquatic life use standards than the two downstream locations at RM 0.84 and RM 0.26.

West Branch Subwatershed Issues and Actions

1. **Environmental Education**
2. **Storm Water Runoff**
3. **Watershed Monitoring**
4. **Mine Drainage**
5. **Riparian Corridor Restoration**

The location of the West Branch subwatershed along Interstate 77 has hastened the development of open areas in Lake, Plain, and Jackson Townships in Stark County. Nearly half of the watershed has already been developed, and the continued urban and suburban sprawl in this area ensures more development in the foreseeable future. Therefore, West Branch subwatershed issues are those commonly associated with urban or suburban development including storm water runoff and riparian habitat reduction. Another priority is establishing a watershed monitoring program to assess water quality shifts as the landscape continues to change. The increasing level of knowledge among residents regarding water resources and watershed concepts and problems is a core component for water quality improvement in the basin. Lastly, small isolated areas of drainage from old abandoned mines needs to be further investigated to determine their impact on the West Branch.

Using the available data and information along with personal knowledge of the West Branch, watershed stakeholders ranked the top five issues they believe to be hindering water quality attainment in this subwatershed. Under each of the five issues are a goal and objective statements for each issues accompanied by recommended actions. Please note that the recommended actions are not intended to be a comprehensive list of actions that could address each issue; but rather, a list of actions that the stakeholders believe is the best course of action given the current information and circumstances. Refer to NEFCO's *Nimishillen Creek Comprehensive Watershed Management Plan - Phase III* for a more comprehensive list of water quality improvement actions for Nimishillen Creek (NEFCO, 2001).

"Focus Areas" were also included under each objective to indicate specific areas to direct actions, if known, and a "Target" was establish to help evaluate the objective and measure accomplishments. Finally, "Responsible Parties" are identified if a watershed action is ongoing, while "Suggested Responsible Parties" indicate who could take the lead on actions not yet being implemented.

West Branch Issue #1 - Environmental Education

Goal: Acquire a stronger understanding, cooperation, and participation among residents, students, government officials, and businesses regarding watershed issues impacting the West Branch of Nimishillen Creek.

Objectives:

1. Strengthen awareness of and involvement in watershed issues.
   Focus Areas: Entire Subwatershed
   Target: Direct contact with 100 West Branch stakeholders per year
2. Reduce fertilizer, herbicide, pesticide, and other lawn care by-products from reaching the West Branch.
   Focus Areas: Zimber Ditch Subwatershed
   Target: To be determined
3. Support and enhance education efforts associated with the Storm Water NPDES Phase II permit program.
   Focus Areas: North Canton, Canton, and Plain Townships
   Target: To be determined

West Branch Issue #1 - Recommended Actions:

Action A: Educate residents about watershed issues through regularly scheduled events and activities that are recognized by the public. These events and activities can include watershed surveys, presentation at local meetings, information booths at local fairs, creek clean-ups, and other public meetings.

Responsible Parties:	Nimishillen Creek Watershed Partners; NEFCO; Summit and Stark SWCDs; Stark RPC; City of Green
Funding Options:	Private Sector; NPS Education Grant; OEEF Grant; CWA Section 319 NPS Grant
Time Frame:	Ongoing
Expected Improvements:	Greater awareness regarding watershed issues.
Evaluation Method:	Number of: Events held; Surveys taken; Presentations given; Fairs attended; Public meetings held
Estimated Costs:	Survey = $2.00 per survey; Presentation = $3,000 and up per 80 picture slide/PowerPoint show; County Fair Display = $1,000 and up + $1.50 to $3.00 per pamphlet + $15.00 per volunteer hour; Public Meeting = $1,200 per meeting
Estimated Load Reduction:	No direct reduction in pollution loads expected from action

Action B: Identify shoreline and riparian landowners and educate them about the importance of shoreline or riparian zone maintenance and protection.

Suggested Responsible Parties:	NEFCO; Earth Action Partnership; Stark Parks; Summit County Metro Parks
Funding Options:	NPS Education Grant; OEEF; WPCLF; CWA Section 319 Grant; Private Sector
Time Frame:	2006 thru 2008
Expected Improvements:	Increased protection of the shoreline and riparian corridor
Evaluation Method:	List of riparian landowners; Number of education pamphlets distributed; Riparian habitat scores
Estimated Costs:	Riparian landowner list = 3 days work; Pamphlets = $1.50 - $3.00 per pamphlet
Estimated Load Reduction:	No direct reduction in pollution loads expected from action

Action C: Implement a watershed protection and awareness program in local schools.	
Suggested Responsible Parties:	Stark Parks; Summit County Metro Parks; Ohio EPA - Division of Surface Water; County SWCDs; Local Boards of Education; Local Schools; Earth Action Partnership
Funding Options:	OEEF; NPS Education Grant; CWA Section 319 NPS Grant
Time Frame:	2007 thru 2009
Expected Improvements:	Stronger knowledge of future generations regarding the importance of watershed protection
Evaluation Method:	Number of local schools implementing program; Number of students exposed to watershed education efforts
Estimated Costs:	$400 - $7,000
Estimated Load Reduction:	No direct reduction in pollution loads expected from action

Action D: Educate riparian landowners on stewardship including the removal of downed trees in the Creek.	
Suggested Responsible Parties:	Earth Action Partnership; Stark SWCD; NEFCO; Stark Parks; Stark County Drainage Task Force; Muskingum Watershed Conservancy District
Funding Options:	Storm Water Utility; Conservation District Assessment; OEEF, Ohio EPA Section 319 NPS Grant
Time Frame:	2007 and beyond

Expected Improvements:	Decrease in obstructions resulting in less localized flooding problems.
Evaluation Method:	Number of riparian homeowners contacted; Stewardship Survey
Estimated Costs:	Riparian landowner list = 3 days work; Pamphlets = $1.50 - $3.00 per pamphlet; Public Meeting = $1,200 per meeting
Estimated Load Reduction:	Variable depending on stewardship practices adopted by landowners

West Branch Issue #2 - Storm Water Runoff from Urban and Suburban Areas

Goal: Improve the ability of the West Branch subwatershed to assimilate and treat storm water runoff by promoting the protection and restoration of wetlands, the restoration of floodplains, and minimizing runoff from impervious areas.

Objectives:

1. Restore and protect active floodplains where possible.
   Focus Areas: Entire Subwatershed
   Target: Restore or protect 5 acres of active floodplains per year
2. Reduce flow obstructions like log and debris jams along the West Branch.
   Focus Areas: Zimber Ditch
   Target: To be determined
3. Promote the use of storm water treatment and retention practices such as rain gardens or constructed treatment wetlands in urban/suburban areas.
   Focus Areas: Canton; North Canton
   Target: Two demonstration projects by 2008
4. Permanently protect and restore natural wetland areas.
   Focus Areas: Lake and Jackson Townships
   Target: Protect or restore 5 acres of natural wetlands per year

West Branch Issue #2 - Recommended Actions:

Action A: Construct regional detention basins in the headwaters of the Zimber Ditch basin.	
Responsible Parties:	Stark County Regional Planning Commission
Funding:	U.S. Army Corps of Engineers 594 Program; Local
Time Frame:	Completed in 2006
Expected Improvements:	Reduction in excess water entering Zimber Ditch for industrial and business areas around the Akron-Canton Regional Airport. This will reduce peak flows downstream of the basins reducing flood damage to adjacent properties and habitat areas. A secondary benefit includes the removal of sediment from storm water runoff.
Evaluation Method:	Total capacity of the basins; Macroinvertebrate Survey; Modeling or directly measuring sediment reduction

Estimated Costs:	$1,000,000 and up
Estimated Load Reduction:	Detention basins general removal efficiency for TSS = 60%-97%

Action B: Implement NPDES Phase II Storm Water Management Program	
Responsible Parties:	Stark County; City of Canton; City of North Canton; City of Green
Funding:	Local; Storm Water Utility
Time Frame:	Ongoing - Deadline for Full Development and Implementation is Dec. 8, 2007
Expected Improvements:	Significant reduction of pollution in urban storm water runoff through the establishment of six minimum control measures.
Evaluation Method:	Annual Review of the Program by permitted communities and the Ohio EPA
Estimated Costs:	Variable
Estimated Load Reduction:	Variable depending on the practices implemented by each permitted community

Action C: Promote the construction of storm water treatment wetlands for storm sewer outlets near the West Branch basin.	
Suggested Responsible Parties:	NEFCO; Local Municipalities; Stark County Drainage Task Force; Muskingum Watershed Conservancy District
Funding Options:	Storm Water Utility; Conservation District Assessment; WRRSP, Local Funds
Time Frame:	2007 and beyond
Expected Improvements:	Reductions in nutrients and sediments from storm water runoff entering the East Branch; Increased flood water retention; Creation of wetland habitat for wildlife
Evaluation Method:	Acres of storm water wetlands constructed
Estimated Costs:	$50,000 - $100,000 and up per constructed wetland
Estimated Load Reduction:	Treatment Wetland Median Removal Efficiencies: TSS = 76%; TP = 46%; Orthophosphate Phosphorus = 28%; N

Action D: Identify natural wetland areas that can be protected or restored.	
Suggested Responsible Parties:	NEFCO; Stark Parks; Summit Metro Parks; Earth Action Partnership, ODNR, Stark County Drainage Task Force
Funding Options:	Ohio EPA Section 319 NPS Grant, Local Funds
Time Frame:	2007-2008 (Completed in Summit County by the Metro Parks)
Expected Improvements:	The action will identify wetland areas in need of protection and restoration in the East Branch watershed for future actions.
Evaluation Method:	Acres of wetlands identified
Estimated Costs:	To be determined
Estimated Load Reduction:	No direct reduction in pollution loads expected from action

Action E: Assist landowners in installing storm water reduction and treatment best management practices such as rain gardens, rain barrels, etc.	
Suggested Responsible Parties:	Stark and Summit SWCDs; Earth Action Partnership; NEFCO; Stark County Storm Water Task Force; Muskingum Watershed Conservancy District
Funding Options:	Ohio EPA Section 319 NPS Grant; Storm Water Utility; Conservation District Assessment; Local and Private Funds
Time Frame:	2006 thru 2010
Expected Improvements:	Reduction in volume, velocity, and amount of storm water runoff for residential areas entering the West Branch; Improved quality of the storm water runoff entering the West Branch.
Evaluation Method:	Number of best management practices installed; Macroinvertebrate and habitat monitoring
Estimated Costs:	Rain Gardens = Variable Rain Barrel = $50 to $100 and up per barrel
Estimated Load Reduction:	Rain Gardens: TSS = 60%-90%; TP = 60%-90%; TN = 50%-100%; Metals = 50%-100%

West Branch Issue #3 - Watershed Monitoring

Goal: Establish a monitoring system to document changes to the water resources, record changes to riparian habitat, and document illegal discharges or dumping into the West Branch.

Objectives:

1. Implement local macroinvertebrate sampling and habitat assessment along the West Branch.
   Focus Areas: Everhard Road bridge to the mouth.
   Target: Program established by 2008
2. Establish a citizens monitoring program for basic water chemistry parameters.
   Focus Areas: Headwater Tributaries
   Target: Program established by 2008
3. Establish and promote a protocol to report illegal dumping, discharges, or other activities that might threaten the West Branch's water quality.
   Focus Areas: Entire Subwatershed
   Target: To be determined

West Branch Issue #3 - Recommended Actions:

Action A: Continue and expand NEFCO's macroinvertebrate and habitat monitoring at station in the West Branch basin.	
Responsible Parties:	NEFCO
Funding Options:	Local Funding; Ohio EPA Section 319 NPS Grant
Time Frame:	Ongoing
Expected Improvements:	Increase knowledge macroinvertebrate, water quality, and habitat conditions over time
Evaluation Method:	Macroinvertebrate monitoring scores; Photograph comparison of sites over time; Habitat rating scores
Estimated Costs:	- NEFCO Macroinvertebrate Monitoring = $750 per site - Chemical Sampling: $500 - $1,000 and up for laboratory tests + cost of collection and transportation
Estimated Load Reduction:	No direct reduction in pollution loads expected from action

Action B: Establish a procedure to report activities (illegal dumping) or flow impairments (log jams) that impact local water resources.	
Suggested Responsible Parties:	Nimishillen Creek Watershed Partners; Stark County Health Department; Ohio EPA; Stark County Drainage Task Force; NEFCO
Funding Options:	Private Sector; OEEF; Ohio EPA Section 319 NPS Grant
Time Frame:	2007 and beyond
Expected Improvements:	Increased monitoring of known illegal and chronic dumping sites; Correction of illicit discharges into the West Branch
Evaluation Method:	Number of activities or situation reported; Corrective actions taken
Estimated Costs:	Variable
Estimated Load Reduction:	Variable depending on the type of activity or impairment reported

Action C: Establish citizens monitoring program for the West Branch subwatershed focusing on headwater areas.	
Suggested Responsible Parties:	NEFCO; Earth Action Partnership; Crossroads RC&D; Stark County and Summit SWCD; Local University
Funding Options:	CWA Section 319 NPS Grant; OEEF; Private Sector
Time Frame:	2007 and beyond
Expected Improvements:	Increase knowledge of the water quality in the basin
Evaluation Method:	Macroinvertebrate monitoring; Chemical sampling
Estimated Costs:	- Macroinvertebrate monitoring: $15 per volunteer per hour + $50 monitoring kit; - Chemical Sampling: $500 to $1,000 and up for laboratory tests + cost of collection and transportation +$15 per volunteer per hour + $35 chemical monitoring kit
Estimated Load Reduction:	No direct reduction in pollution loads expected from action

West Branch Issue #4 - Abandoned Mine Drainage

Goal: Identify and reduce pollution from acid mine drainage sources in order to improve aquatic life along the West Branch of Nimishillen Creek.

Objectives:

1. Investigate known abandoned mines in the watershed to determine which are impacting Nimishillen Creek Mainstem.

Focus Areas: Altman Road and State St.; Green; Lake Township; North Canton
Target: Completed by 2007

2. Decrease the impacts of acid mine drainage entering the West Branch.
Focus Areas: To be determined
Target: To be determined

3. Establish a biological and chemical monitoring program for areas impacted by acid mine drainage.
Focus Areas: To be determined
Target: To be determined

West Branch Issue #4 - Recommended Actions:

Action A: Investigate abandoned mines in the watershed and determine if acid mine drainage is impacting the water quality of the West Branch and its tributaries.	
Suggested Responsible Parties:	NEFCO; Earth Action Partnership; Crossroads RC&D; Stark and Summit SWCDs; Stark and Summit County Health Departments; Local University
Funding Options:	Private Sector; CWA Section 319 NPS Grant
Time Frame:	2006 thru 2007
Expected Improvements:	Increase knowledge of the extent of the AMD problem along the Mainstem
Evaluation Method:	List of sites visited; Documentation of AMD problems
Estimated Costs:	To be determined
Estimated Load Reduction:	No direct reduction in pollution loads expected from action

Action B: Decrease acid mine drainage entering the West Branch by using the best available technology.	
Suggested Responsible Parties:	ODNR - Division of Mineral Resources Management; Stark County; Stark and Summit County Health Department; Ohio EPA; NEFCO; Crossroads RC&D; Rural Action; USDA - NRCS
Funding Options:	CWA Section 319 NPS Grant; State and Federal Abandoned Mine Land (AML) Reclamation Programs; Rural Abandoned Mine (RAMP) Program; Appalachian Clean Stream Program (ACSP); Ohio EPA's WRRSP
Time Frame:	2007 thru 2010
Expected Improvements:	Reduction in dissolved metals, acids, and flocculates (yellow boy) associated with AMD; Improved biology in West Creek
Evaluation Method:	Macroinvertebrate monitoring; Chemical sampling of effluent; Number of AMD abatement projects completed
Estimated Costs:	Variable - site dependent
Estimated Load Reduction:	To be determined

Action C: Establish long-term chemical and biological monitoring program for AMD areas.	
Suggested Responsible Parties:	NEFCO; Earth Action Partnership; Crossroads RC&D; Stark County SWCD; Stark County Health Department; Local University
Funding Options:	CWA Section 319 NPS Grant; OEEF; Private Sector
Time Frame:	2007 and beyond
Expected Improvements:	Increase knowledge of the extent of the AMD problem along the Mainstem; Better evaluation of AMD abatement projects
Evaluation Method:	Macroinvertebrate monitoring; Chemical sampling of effluent
Estimated Costs:	- Macroinvertebrate monitoring: $15 per volunteer per hour + $50 monitoring kit - NEFCO Macroinvertebrate Monitoring = $750 per site - Chemical Sampling: $500 - $1,000 and up for laboratory tests + cost of collection and transportation
Estimated Load Reduction:	No direct reduction in pollution loads expected from action

West Branch Issue #5 - Riparian Corridor Restoration

Goal: Where possible, restore habitat areas with "poor" or "moderate" riparian habitat scores to the next attainment level.

Objectives:

1. Work with property owners to improve the riparian habitat in the West Branch basin.
   Focus Areas: Canton Parks; Lake Township
   Target: Restore one percent or approximately 900 linear feet of "poor" or "moderate" quality riparian habitat
2. Establish policies to protect the riparian corridor and habitat.
   Focus Areas: Entire Subwatershed
   Target: Adoption of policies by the county and municipalities
3. Update the riparian zone analysis for the West Branch.
   Focus Areas: Entire Subwatershed
   Target: Update completed by 2007

West Branch Issue #5 - Recommended Actions:

Action A: Provide incentives for agricultural landowners to protect shoreline or riparian corridors with long-term protection or permanent conservation easements.	
Responsible Parties:	Stark County SWCD; USDA - NRSC
Funding Options:	EQUIP; Farm Bill; CRP; WRP
Time Frame:	2007 thru 2010
Expected Improvements:	Protection of shoreline and riparian corridor resulting in increase riparian habitat scores, reduction in stream bank erosion, and floodway protection.
Evaluation Method:	Linear feet set aside for long-term protection; Number of permanent conservation easements; Riparian habitat scores
Estimated Costs:	$0.00 to $5,000 per acre and up; $4,000 and up on average to set up a maintenance fees
Estimated Load Reduction:	Vegetated Buffer Strips General Removal Efficiencies: TSS = 40%-90%; TP = 30%-90%; TN = 20%-60%; Metals = 20%-80%

Action B: Encourage city and county park districts to purchase selected areas to protect and/or increase intact riparian corridor.	
Responsible Parties:	Stark Parks; Canton Parks Commission; North Canton
Funding Options:	Clean Ohio Fund; Ohio EPA Section 319 NPS Grant; WPCLF; PL-566
Time Frame:	Ongoing
Expected Improvements:	Maintain or increase riparian habitat scores.
Evaluation Method:	Number of riparian acres purchased; Riparian habitat scores
Estimated Costs:	$0 - $5,000 and up per acre; $4,000 and up average set up and maintenance fee
Estimated Load Reduction:	Vegetated Buffer Strips General Removal Efficiencies: TSS = 40%-90%; TP = 30%-90%; TN = 20%-60%; Metals = 20%-80%

Action C: Assist communities with the development of township or municipal ordinances requiring new construction sites to leave easements or a specific distance near shorelines of targeted wetlands and floodplains of streams.	
Suggested Responsible Parties:	Stark County; Stark and Summit SWCDs; City of Canton; City of North Canton; City of Green
Funding Options:	NPS Education Grant; OEEF
Time Frame:	City of Green adopted riparian setback regulations in 2003 Rest of the basin: 2006 thru 2008
Expected Improvements:	Protection of shoreline and riparian corridor resulting in increase riparian habitat scores, reduction in stream bank erosion, and floodway protection.
Evaluation Method:	Number of ordinances established and enforced; Riparian and shoreline miles protected; Riparian habitat scores
Estimated Costs:	Variable
Estimated Load Reduction:	Vegetated Buffer Strips General Removal Efficiencies: TSS = 40%-90%; TP = 30%-90%; TN = 20%-60%; Metals = 20%-80%

Action D: Assist shoreline and riparian landowners to stabilize shoreline and riparian corridor using appropriate BMPs.	
Suggested Responsible Parties:	County SWCDs; NEFCO; ODNR - DSWC; USDA - NRCS; Earth Action Partnership; ODNR - Division of Wildlife
Funding Options:	EQUIP; CRP; WPCLF; CWA Section 319 NPS Grant; PL-566; SIP
Time Frame:	2006 and beyond
Expected Improvements:	Stabilization of shoreline and riparian corridor; Reduction in stream bank erosion; Improved wildlife habitat
Evaluation Method:	Linear feet of bank or shoreline stabilized; Wildlife survey; Riparian habitat scores
Estimated Costs:	Approximately $350,000 to restore or stabilize 1,300 linear feet of stream channel; Fiber Rolls = $12.00 per linear foot; Plant Cuttings = $0.40 - $0.50 per cutting; Erosion Control Blankets = $2.00 per yd^2
Estimated Load Reduction:	Erosion Control Blankets: Runoff Reduction = 80%; Erosion Rate Reduction = up to 99%; Fiber Rolls: TSS Reduction = 58% Buffer Strips General Removal Efficiencies: TSS = 40%-90%; TP = 30%-90%; TN = 20%-60%; Metals = 20%-80% Erosion Control Blankets: Runoff Reduction = 80%; Erosion Rate Reduction = up to 99%;

Action E: Update NEFCO's riparian habitat evaluation.	
Responsible Parties:	NEFCO
Funding Options:	Local Fund; Ohio EPA Section 319 NPS Grant
Time Frame:	2006 to 2007
Expected Improvements:	Updated information on the riparian habitat along the West Branch; Monitor the change in riparian habitat since 1999
Evaluation Method:	Completed riparian evaluation
Estimated Costs:	$500 to $1,000
Estimated Load Reduction:	No direct reduction in pollution loads expected from action

Sherrick Run Subwatershed Action Plan

Inventory

Physical Description

Sherrick Run is a 6.8 mile long tributary located in the southeastern portion of the Nimishillen Creek Watershed (Figure VII-7). Its headwaters are located in Osnaburg Township and flows east into Canton Township before joining Nimishillen Creek south of the City of Canton. Sherrick Run's watershed resides on the divide between the glaciated and unglaciated portions of Stark County (Figure II-5) resulting in varying topography. The northern portion of the subwatershed has gentle to rolling slopes, while the southern section is characterized by steep upland areas and broad, flat expanses in the floodplain. In the areas with steep slopes, erosion and rapid runoff during storm events is an issue.

Soil associations in this area include Fitchville-Sebring, Chili-Wheeling, Loudonville-Wooster, Latham-Keene, and Muskingum-Gilpin-Dekalb. The dominant bedrock in the watershed is Middle Kittaning Coal and there are several abandoned underground coal mines in the watershed (Figure VII-8). The largest abandoned mine is located just south of the unincorporated Village of Waco along State Route 43 (RM 3.1). Lastly, primarily due to the topography, Sherrick Run's riparian habitat is mainly intact (Figure VII-9). The riparian area near Alderman Trucking and State Route 43 and a stretch along the headwaters are the only poor riparian quality areas of note.

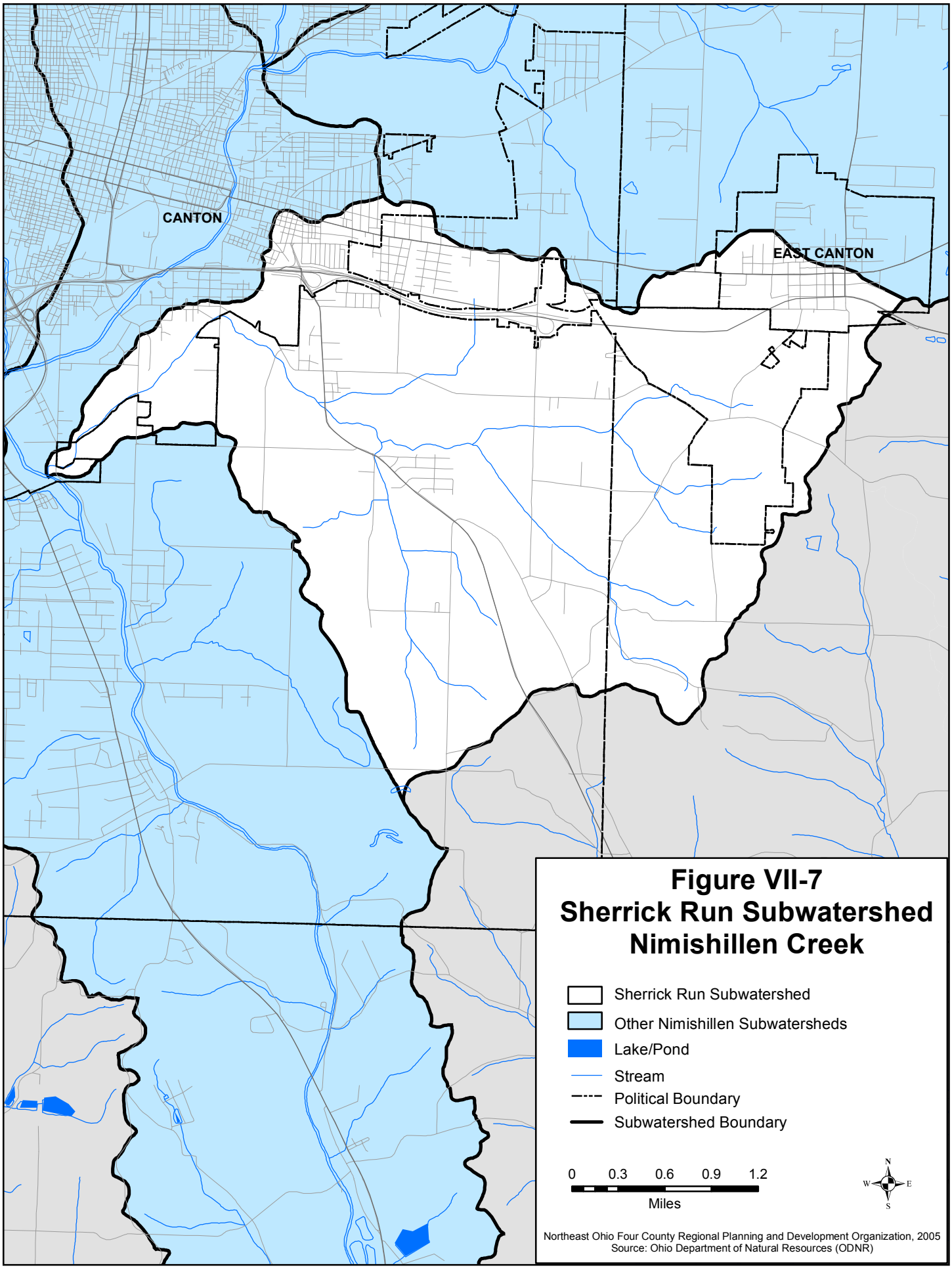
Land Use

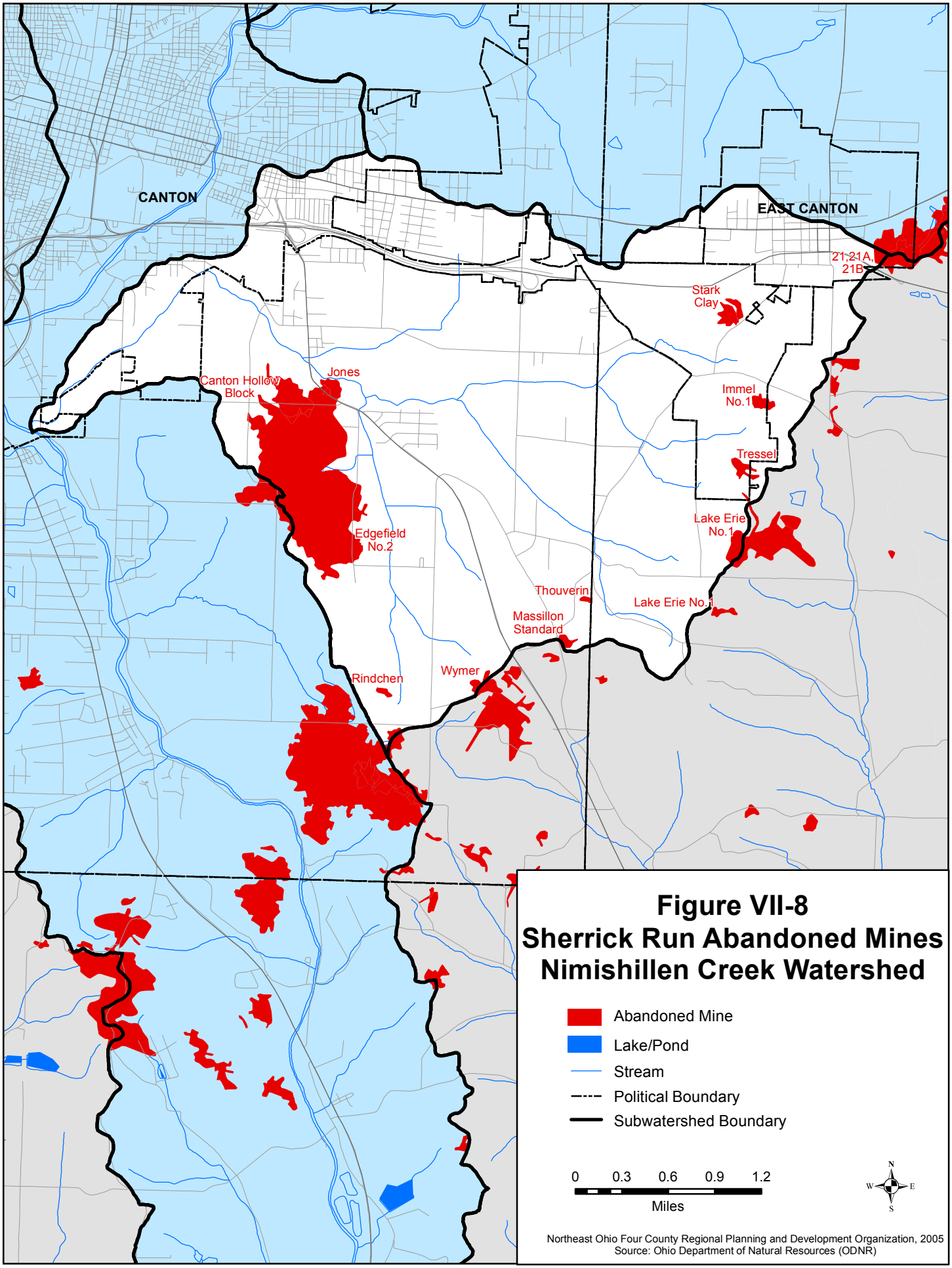
The Sherrick Run watershed is the least developed of all the Nimishillen Creek subbasins. The steep topography associated with this unglaciated section of the Nimishillen Creek Watershed leaves few suitable sites for development, especially in the southern portions of the basin (Figure II-6). The primary land covers in the headwater areas are wooded, shrub/scrub, agriculture, and open land (Figure II-13). Some housing developments and business in these headwater areas have been along primary roads. The population density increases downstream (west) of State Route 43 as it nears the City of Canton. Land cover in the downstream section of the basin is a mix of urban, industrial, wooded, and shrub/scrub. Historically, areas within the Sherrick Run watershed have been mined for coal resulting in abandoned mines peppering the basin. The largest of the abandoned coal mines is located in Canton Township near the intersection of State Route 43 and Millerton Road (Figure VII-8). All mines in the watershed have been abandoned since at least 1934.

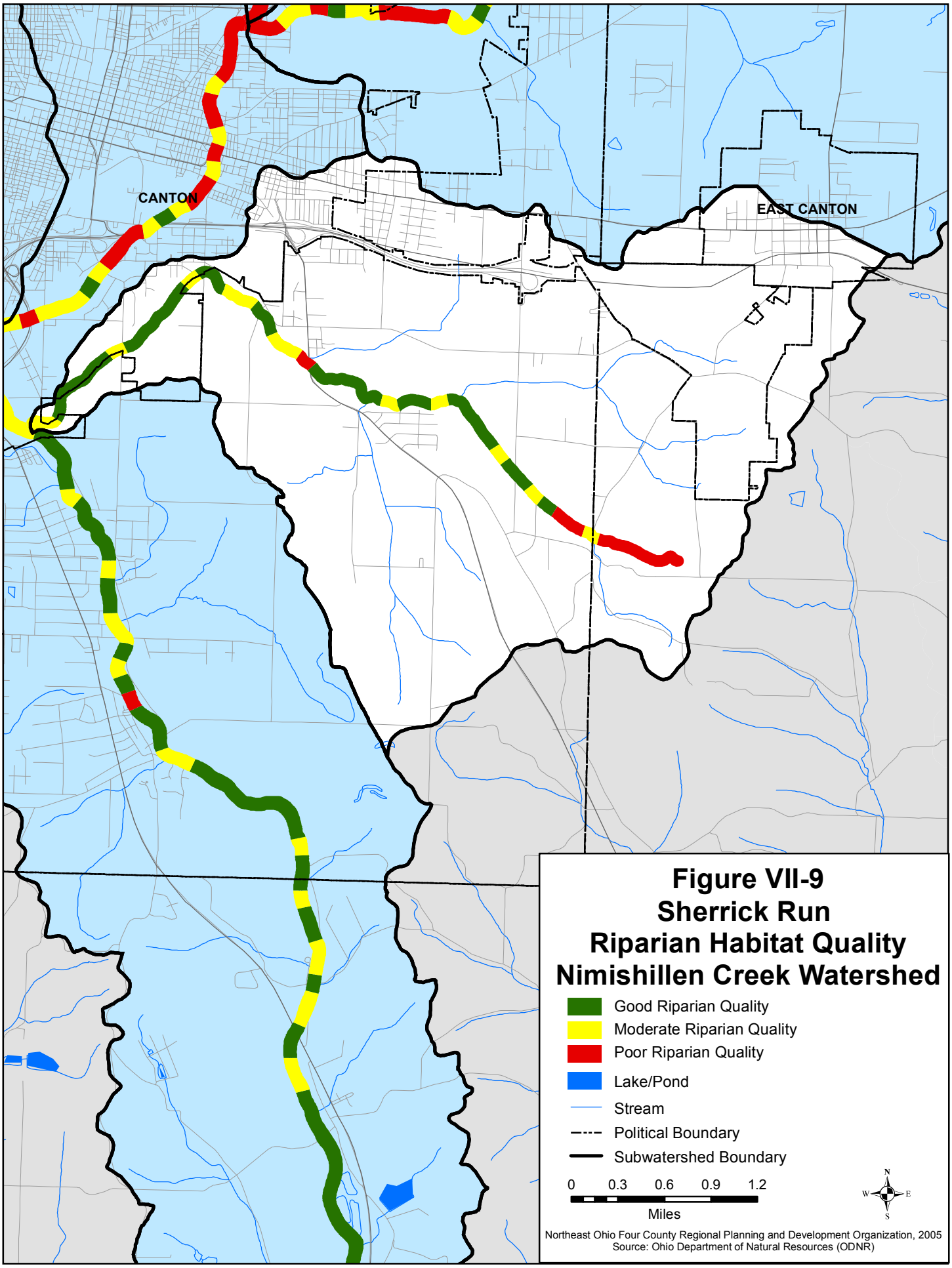
Water quality concerns primarily for this watershed center around discharges from the abandoned mine land, failing HSTSs in areas of concentrated development, and illegal dumping along isolated sections of Sherrick Run.

Point Source Dischargers

A point source is defined as a source that discharges pollutants, or any effluent, from a known discharge point, such as a pipe, ditch, or sewer into a waterway after treatment (Miller, 1988). Treatment can vary depending on the type of effluent, but generally


CANTON
EAST CANTON
Figure VII-7
Sherrick Run Subwatershed
Nimishillen Creek
Sherrick Run Subwatershed
Other Nimishillen Subwatersheds
Lake/Pond
Stream
Political Boundary
Subwatershed Boundary
0 0.3 0.6 0.9 1.2
Miles
N
W
E
S
Northeast Ohio Four County Regional Planning and Development Organization, 2005
Source: Ohio Department of Natural Resources (ODNR)


CANTON
EAST CANTON
21
21A
21B
Stark
Clay
Canton Hollow
Block
Jones
Immel
No.1
Tressel
Lake Erie
No.1
Edgefield
No.2
Thouverin
Lake Erie No.1
Massillon
Standard
Rindchen
Wymer
Figure VII-8
Sherrick Run Abandoned Mines
Nimishillen Creek Watershed
Abandoned Mine
Lake/Pond
Stream
Political Boundary
Subwatershed Boundary
0
0.3
0.6
0.9
1.2
Miles
N
W
E
S
Northeast Ohio Four County Regional Planning and Development Organization, 2005
Source: Ohio Department of Natural Resources (ODNR)


CANTON
EAST CANTON
Figure VII-9
Sherrick Run
Riparian Habitat Quality
Nimishillen Creek Watershed
Good Riparian Quality
Moderate Riparian Quality
Poor Riparian Quality
Lake/Pond
Stream
Political Boundary
Subwatershed Boundary
0 0.3 0.6 0.9 1.2
Miles
N
W
E
S
Northeast Ohio Four County Regional Planning and Development Organization, 2005
Source: Ohio Department of Natural Resources (ODNR)

includes the removal of solids and disinfection. Point source discharges have the potential to introduce high levels of nutrients and chemicals into a stream or lake. However, these discharges are monitored and tracked by the Ohio EPA via the National Pollutant Discharge Elimination System (NPDES) program to protect local water resources.

Along Sherrick Run, seven point sources have permits to discharge water into the watershed. Six of the permits are for sewage treatment systems for private businesses without access to sanitary sewers. There is one permit issued to an industrial discharger, but no permitted public treatment plants in the Sherrick Run subwatershed. Table VII-25 provides information about each permitted discharge and Figure IV-1 maps the location in the watershed. Please note that this section does not include storm sewer outfalls, off-lot discharging home sewage treatment systems, or illegal point source discharges into the Nimishillen Creek Watershed. Additional discharge information will be added as it becomes available.

Table VII-25: Point Source Discharging Operations in the Sherrick Run Subwatershed

Map Symbol	Discharging Operation	Design Flow (GPD)	Classification
19	Koch Engineering 5385 Orchard Drive East Canton, OH 44730	Not Given	Industrial Discharger
36	Walker Elementary School 3525 Sandy Ave. SE Canton, OH 44707	Not Given	Private Discharging Semi-Public Sewage Treatment System
37	Anheuser Busch Sales of Canton 1611 Marietta Ave. S.E. Canton, OH 44707	1,500 to <5,000	Private Discharging Semi-Public Sewage Treatment System
69	Thunderbird Terrace 1581 Pekin Dr. S.E. East Canton, OH 44730	5,000 to <10,000	Private Discharging Semi-Public Sewage Treatment System
72	Arvilla oil Field Service Co. 1821 Moore Ave. SE Canton, OH 44707	Not Given	Private Discharging Semi-Public Sewage Treatment System
73	Roadside Tavern 2521 Waynesburg Dr. SE Canton, OH 44707	Not Given	Private Discharging Semi-Public Sewage Treatment System
74	Vine Ministries 3206 Lincoln St. E Canton, OH 44707	Not Given	Private Discharging Semi-Public Sewage Treatment System

GPD = Gallons Per Day;
Sources: Ohio EPA, 2005; Stark County Health Department, 2006

Water Quality Data and Impairments

Ohio EPA's TMDL Monitoring Results

The Ohio EPA conducted a biological and aquatic life use assessment for the Sherrick Run subwatershed from 2003 thru 2005 as par of the Nimishillen Creek TMDL (Table VII-26).

Table VII-26: Sherrick Run Aquatic Life Use Attainment Status, Biological Criteria Scores, and QHEI Scores

Location - (Lower/Upper River Mile)	Use Designation	Attainment Status	Biological Criteria Scores			QHEI Scores
			IBI	MIwb	ICI	
Allen Ave. - (0.1)	WWH	Non	34*	--	Poor*	78.5

* Indicates significant departure for applicable biocriteria (>4 IBI or ICI units, or >0.5 MIwb units).
___ Underlined scores are in the Poor or Very Poor range.

Source: Nimishillen Creek TMDL, Ohio EPA, 2009.

Impairments

Aquatic Life Use and Habitat:

Only one site was sampled for aquatic life use and it was in non attainment. However, the recorded QHEI score was above the TMDL goal score of 60.

Recreation:

Sherrick Run is impaired for Primary Contact Recreation (PCR).

Fish Consumption:

No specific fish consumption advisories exist for Sherrick Run; however, the Ohio Department of Health has issued a statewide advisory to limit meals of fish caught from all Ohio waterbodies to one meal per week, due to mercury.

Ohio EPA's Causes and Sources of Impairments

The causes of impairments for a stream are the specific pollutants or alterations that result in the stream not meeting state water quality standards. Examples of common causes of water quality impairments are siltation, flow alteration, nutrient enrichment, metals, and temperature. Sources of impairment are where the causes originate or where the causes of impairments are supplied from. Sources can include crop production, channelization, urban runoff, dam construction, discharge pipes, and stream bank erosion. Table VII-27 lists the causes and sources of impairment for aquatic life use, recreation, and fish consumption for Sherrick Run.

Table VII-27: Nimishillen Creek TMDL's Causes and Sources of Impairments for Sherrick Run	
Causes of Impairment	**Sources of Impairment**
Acid Mine Drainage	Abandoned Mine Discharges
Flow Alterations	Channelization – Development
Unionized Ammonia & Pathogens	Onsite Home Sewage Treatment (Septic) Systems
Sources: Nimishillen Creek TMDL, Ohio EPA, 2009.	

Load Reduction Information

Habitat and bacteria (pathogen) TMDLs were completed for Sherrick Run. Tables VII-28 and VII-29 summarizes Sherrick Run's load reductions outlined in the Nimishillen Creek TMDL. For more information of the load reduction information, please refer to Section V above.

TableVII-28: Total Existing Load, TMDL, and Allocations of Fecal Coliform Loads (recreation season) for Sherrick Run

Existing Loads			TMDL[1]	% Reduction	Allocations	
PS	**NPS**	**Total**			**WLA**	**LA**
560.3	6.03	566.4	35.1	93.8	29.1	6.03

Point Source (PS) Fecal Coliform Loads. These Include Existing, Percent Reduction Required, and Wasteload Allocation (WLA) by Source

	NPDES Discharger	MS4	HSTS	Total WLA
Existing	0.01	0.05	560.27	560.3
% Reduction	0	0	94.8	
Allocation	0.01	0.05	28.33	29.1

Nonpoint Source (NPS) Fecal Coliform Loads. These Include Existing, Percent Reduction Required, and Wasteload Allocation (WLA) by Source

	Cropland	Pasture	Forest	Urban	Cattle in Stream	Total LA
Existing	4.37	1.29	0.32	0.05	0	6.03
% Reduction	0	0	0	0	-	
Allocation	4.37	1.29	0.32	0.05	0	6.03

[1] cfu * 10^3 * season^{-1} (for cfu * 10^3 * day^{-1} divided each value by 138)
Source: Nimishillen Creek TMDL, Ohio EPA, 2009

Table VII-29: Habitat TMDL for Sherrick Run

	Allocations			TMDL
	QHEI Score	# of High Influence Attributes	Total # of Modified Attributes	
TMDL Targets	**≥ 60 = 1 point**	**< 2 = 1 point**	**< 5 = 1 point**	**3 points**

Location - (Lower/Upper River Mile)	QHEI Score	# of High Influence Attributes	Total # of Modified Attributes	Sub-Score			Total Habitat Score
				QHEI Score	High Influence	Total # Modified	
Allen Ave. - (0.1)	78.5	0	0	1	1	1	3

* Note that stream is designated Modified Warmwater Habitat (MWH)
Source: Nimishillen Creek TMDL, Ohio EPA, 2009.

Other Waters Quality Information

Nimishillen Creek Macroinvertebrate Survey - 2000, 2002, and 2004: Since 2000, NEFCO and the City of Canton have conducted three macroinvertebrate surveys along Nimishillen Creek. Four of the seventeen sites in the survey are located in the Sherrick Run watershed. Sherrick Run consistently scored the worst among all the Nimishillen Creek subwatersheds. In 2004, none of the four sites sampled scored out of the poor range. Table VII-16 summaries NEFCO macroinvertebrate monitoring results from 2000 to 2004.

Table VII-30: Mean Cumulative Index Values* (CIV) for Sherrick Run Based on NEFCO's Macroinvertebrate Surveys

Station Location	Mean CIV**		
	2000 Segment Condition	2002 Segment Condition	2004 Segment Condition
River Mile 0.4 - Allen Rd. Bridge	10 Poor	14 Fair	8 Poor
River Mile 1.3 - Cherry Rd/Central Ave. Bridge	13 Fair	12 Fair	9 Poor
River Mile 2.5 - Moore Rd. Bridge	10 Poor	11 Poor	4 Poor
River Mile 3.1 - Upstream of Route 43 Bridge	No Sample	No Sample	9 Poor

* Stream Quality Assessment **Excellent: >22, Good: 17-22, Fair: 11-16, Poor < 11

(Source: ODNR, Stream Quality Monitoring Manual)

The Ohio EPA found that generally ODNR's Stream Quality Monitoring Program tends to reflect attainment and non-attainment aquatic life uses. "Excellent" scores in the ODNR method commonly meet the Ohio EPA attainment standards, while stream segments with "Fair" or "Poor" scores generally are assessed as being in non-attainment (Yoder and Davis, 1996). Based on correlation, Sherrick Run is believed not to be meeting WWH aquatic life use standards at any of these sampling locations.

Canton Water Pollution Control Center Chemical Sampling of Sherrick Run

In 2003 and 2004, staff from the City of Canton's Water Pollution Control Center conducted pH measurements of a suspected acid mine drainage discharge point at RM 3.1, immediately upstream of Waynesburg Road in Canton Township. Four samples were taken from December 23, 2003, to November 30, 2004, and the pH values ranged from 6.31 to 7.2. From these results, acidic conditions were determined not be a cause of impairment. However, Canton submitted a water quality grab sample collected on September 9, 2003, from the acid mine discharge point to the Aqua Tech Environmental Laboratories, Inc. (ATEL) for a

complete analysis of possible contaminants. The results of the water sample for components found above detection limits are summarized in Table VII-17.

Table VII-31: Selected Water Chemistry Results from Grab Sample at the Acid Mine Drainage Discharge Point (RM 3.1) on Sherrick Run

Test	Result	Analysis Date	EPA Method
Iron, Fe	1,900 ug/l	9/16/03	200.7/6010B
Manganese, MN	3,970 ug/l	9/16/03	200.7/6010B
Nickel, Ni	21ug/l	9/15/03	200.8/6020
Nitrogen, Ammonia, N	0.58 mg/l	9/15/03	350.1
Nitrogen, Total Kjaldahl, TKN	0.73 mg/l	9/19/03	351.2
pH, Lab	6.43	9/10/03	150.1/9040
Sulfate, SO4	730 ug/l	9/16/03	300.0

ug/l = micrograms per liter; mg/l = milligrams per liter

Source: City of Canton Water Pollution Control Center

The results from the testing indicate that the discharge from an adjacent abandoned mine is impacting Sherrick Run. Metals found in the water quality samples can affect both Sherrick Run's water quality and the physical habitat of the biological community. As a dissolved form, metals can be poisonous to aquatic life. As a precipitate often referred to as "yellow boy", metals from AMD can coat the substrate of a stream covering fish eggs and crevasses between rocks which reduces macroinvertebrate habitat. Metal precipitate can also cover the gills of fish reducing oxygen intake.

The combination of low macroinvertebrate scores and high metal concentrations point to acid mine drainage being the primary source of impairment along Sherrick Run. The Ohio Department of Natural Resources Division of Mineral Resource Management is investigating the extent of the mine drainage problem along Sherrick.

Sherrick Run Watershed Issues and Actions

1. **Acid Mine Drainage**
2. **Failing HSTSs**
3. **Illegal Dumping**
4. **Environmental Education**

The water quality of Sherrick Run is a reflection of past activities and current land uses. Specifically, past coal mining activity and the water discharges from these remnant mines significantly impact Sherrick Run. Although mine drainage seepage can be observed in several locations, especially during wet periods, the primary mine discharge point is located immediately upstream of the State Route 43/Waynesburg Road bridge.

The impact on the water chemistry, biology, and habitat have been well documented from this location to the mouth of Sherrick Run (see above). Addressing impairments caused by mine drainage is the top priority in Sherrick Run. Additional concerns include failing HSTSs in dense residential areas without sewers that are situated on poor soils for wastewater treatment. Illegal dumping into Sherrick Run has in the past been a concern due to the isolated location of many bridges over the stream. Some sections of Sherrick Run have been modified over time reducing in-stream and riparian habitat and its connection to an active floodplain. Lastly, environmental education and water quality monitoring is lacking in this tributary to Nimishillen Creek.

Using the available data and information along with personal knowledge on this section of Nimishillen Creek, watershed stakeholders ranked the top four issues they believe to be hindering water quality attainment in this subwatershed. Under each of the four issues are a goal and objective statements for each issues accompanied by recommended actions. Please note that the recommended actions are not intended to be a comprehensive list of actions that could address each issue; but rather, a list of actions that the stakeholders believe is the best course of action given the current circumstances and available information. Refer to NEFCO's *Nimishillen Creek Comprehensive Watershed Management Plan - Phase III* for a more comprehensive list of water quality improvement actions for Nimishillen Creek (NEFCO, 2001).

"Focus Areas" were also included under each objective to indicate specific areas to direct actions, if known, and a "Target" was establish to help evaluate the objective and measure accomplishments. Lastly, "Responsible Parties" are identified if a watershed action is ongoing, while "Suggested Responsible Parties" indicate who could take the lead on actions not yet being implemented.

Sherrick Run Issue #1 - Acid Mine Drainage

Goal: Identify and reduce pollution from acid mine drainage sources in order to improve aquatic life along Sherrick Run.

Objectives:

1. Treat the acid mine drainage from abandoned coal mine(s) in Canton Township.
   Focus Areas: Discharge point upstream of the State Route 43 bridge at RM 3
   Target: Treatment project completed by 2008
2. Establish biological and chemical monitoring program for areas impacted by acid mine drainage.
   Focus Areas: RM 3 to confluence with Nimishillen Creek
   Target: Program established by 2008
3. Investigate known abandoned mines in the watershed to determine which are impacting Sherrick Run.
   Focus Areas: Abandoned mines in the headwaters of Sherrick Run
   Target: Completed by 2007

Sherrick Run Issue #1 - Recommended Actions Tables

Action A: Develop and acid mine drainage abatement and treatment (AMDAT) plan for the mine drainage discharge located at RM 3.1 (upstream of the State Route 43 bridge) on Sherrick Run.	
Responsible Parties:	ODNR - Division of Mineral Resources Management
Funding Options:	ODNR - Division of Mineral Resources
Time Frame:	Ongoing
Expected Improvements:	Completion of a plan to reduce the impacts of mine drainage on Sherrick Run
Evaluation Method:	Completed plan
Estimated Costs:	Unknown
Estimated Load Reduction:	To be determined

Action B: Implement the AMDAT plan in Action A.	
Suggested Responsible Parties:	ODNR - Division of Mineral Resources; Nimishillen Creek Watershed Partners; NEFCO; City of Canton; Stark County Health Department
Funding Options:	Ohio EPA Section 319 NPS Grant; State and Federal Abandoned Mine Land (AML) Reclamation Programs; Rural Abandoned Mine (RAMP) Program; Appalachian Clean Stream Program (ACSP); Ohio EPA's WRRSP
Time Frame:	2006 - 2007
Expected Improvements:	Reduction in heavy metals (Fe, MN, Ni), ammonia, nitrogen, sulfates, and sediment entering Sherrick Run for the RM 3.1 AMD discharge; Improved in-stream habitat; Increase macroinvertebrate scores
Evaluation Method:	Chemical testing before and after restoration projects; Macroinvertebrate sampling after completion of restoration plan
Estimated Costs:	Unknown until the AMDAT plan is completed
Estimated Load Reduction:	Unknown until the AMDAT plan is completed

Action C: Establish long-term chemical and biological monitoring program for AMD areas.	
Suggested Responsible Parties:	NEFCO; Earth Action Partnership; Crossroads RC&D; Stark County SWCD; Stark County Health Department; Local University
Funding Options:	CWA Section 319 NPS Grant; OEEF; Private Sector
Time Frame:	2007 and beyond
Expected Improvements:	Increase knowledge of the extent of the AMD problem along the Mainstem; Better evaluation of AMD abatement projects
Evaluation Method:	Macroinvertebrate monitoring; Chemical sampling of effluent
Estimated Costs:	- Macroinvertebrate monitoring: $15 per volunteer per hour + $50 monitoring kit; - NEFCO Macroinvertebrate Monitoring = $750 per site; - Chemical Sampling: $500 - $1,000 and up for laboratory tests + cost of collection and transportation
Estimated Load Reduction:	No direct reduction in pollution loads expected from action

Action D: Investigate remaining abandoned mines in the watershed and determine if acid mine drainage is impacting the water quality of Sherrick Run and its tributaries.	
Suggested Responsible Parties:	NEFCO; Earth Action Partnership; Crossroads RC&D; Stark County SWCD; Stark County Health Department; Local University
Funding Options:	Private Sector; CWA Section 319 NPS Grant
Time Frame:	2006 thru 2007
Expected Improvements:	Increase knowledge of the extent of the AMD problem along the Sherrick Run
Evaluation Method:	List of sites visited; Documentation of AMD problem
Estimated Costs:	To Be Determined
Estimated Load Reduction:	No direct reduction in pollution loads expected from action

Action E: Educate riparian landowners on stewardship including the removal of downed trees and debris in Sherrick Run.	
Suggested Responsible Parties:	Earth Action Partnership; Stark and Summit SWCDs; NEFCO; Stark Parks; Summit County Metro Parks; Stark County Drainage Task Force; Muskingum Watershed Conservancy District
Funding Options:	Storm Water Utility; Conservation District Assessment; OEEF; Ohio EPA Section 319 NPS Grant
Time Frame:	2007 and beyond
Expected Improvements:	Decrease in obstructions resulting in less localized flooding and water quality problems.
Evaluation Method:	Number of riparian homeowners contacted
Estimated Costs:	Riparian landowner list = 3 days work; Pamphlets = $1.50 - $3.00 per pamphlet; Public Meeting = $1,200 per meeting
Estimated Load Reduction:	Variable depending on landowner's adoption of stewardship actions

Sherrick Run Issue #2 - Failing Home Sewage Treatment Systems

Goal: Reduce the nutrient and bacteria pollution in the East Branch from failing home sewage treatment systems (HSTSs).

Objectives:

1. Establish a comprehensive education and outreach program for stakeholders using HSTSs.
   Focus Areas: All unsewered areas
   Target: Program established by 2008
2. Begin an operations and maintenance program in the watershed.
   Focus Areas: 24th Street and State Route 43; 17th St. and State Route 43
   Target: Inspection of 25 systems per year in the subwatershed
3. Provide financial support for the repair and replacement of failing HSTSs for low income property owners.
   Focus Areas: Entire Subwatershed
   Target: Assistance for all low income property owners, if needed

Sherrick Run Issue #2 - Recommended Actions Tables

Action A: Establish education efforts to increase public awareness of faulty HSTSs through door-to-door surveys, information materials, educational video, public meetings, and/or informational booths at local public events like fairs	
Suggested Responsible Parties:	Stark County Health Department, Ohio Department of Health; Ohio EPA; NEFCO; Earth Action Partnership
Funding Options:	OEEF; Ohio EPA Section 319 NPS Grant; Local Funding
Time Frame:	Door-to-Door Survey: 2007 - 2008 Information Materials: Ongoing Public Meetings: 2007 - 2008 Informational Booths: 2007 - 2008
Expected Improvements:	Increased awareness of water quality impacts associated with malfunctioning or failing HSTSs
Evaluation Method:	Number of surveys completed; Number of informational material distributed; Number of public meetings held; Number of fair or public event attended; Surveys before and after education efforts begin to gauge a change in general knowledge among watershed residents
Estimated Costs:	– Surveys = $2.00 per survey – Pamphlets and Flyers = $1.50 - $3.00 per item – Public Meeting = $1,200 per 2 hour meeting – Display = $1,000 and up
Estimated Load Reduction:	No direct reduction in pollution loads expected from action; however, indirect reductions possible depending on then number of homeowners that utilize the information presented.

Action B: Seek funding assistance for homeowners to repair or replace faulty HSTSs.	
Suggested Responsible Parties:	Stark County Health Department; Stark County Regional Planning
Funding Options:	WPCLF; Ohio EPA Section 319 NPS Grant; WPCLF; Community Development Block Grant
Time Frame:	2007 - 2010
Expected Improvements:	Lower number of malfunctioning or failing HSTSs
Evaluation Method:	Number of systems repaired or replaced
Estimated Costs:	$3,000 - $8,000 average cost to replace a HSTS; Up to $1,000 to repair HSTS
Estimated Load Reduction:	On-Site HSTS Repair or Replacement: 100% reduction in bacteria and nutrients pollution from a HSTS Off-Site Repair or Replacement: Variable reduction for each HSTS

Action C: Establish an operations and maintenance inspection program to facilitate the repair and replacement of failing home sewage treatment systems (HSTS)	
Suggested Responsible Parties:	Stark County Health Department
Funding Options:	Local Property/Home Owner Operations and Maintenance Fee; Ohio EPA Section 319 NPS Grant; WPCLF
Time Frame:	2007 - 2010
Expected Improvements:	Lower number of malfunctioning or failing HSTSs in the Sherrick Run basin; Reduction in nutrient and pathogens entering the stream
Evaluation Method:	Number of systems inspected, pumped, and/or repaired
Estimated Costs:	Approximately $250,000 for Stark County Health Department to establish and run a permit system for three years in the entire Nimishillen Creek Watershed
Estimated Load Reduction:	Variable depending on the number of HSTSs inspected and ordered to be repaired or replaced

Action D: Promote the extension of sewers in the watershed, especially where high concentrations of HSTSs are located on poor soils for septic systems.	
Suggested Responsible Parties:	Stark County Sanitary Engineer; Stark County Health Department; Ohio EPA; Ohio Department of Health
Funding Options:	WPCLF; Local Property/Homeowner via Assessment; WRRSP; USDA - Rural Development Grant
Time Frame:	2007 and beyond
Expected Improvements:	Lower number of malfunctioning or failing HSTSs polluting local water resources
Evaluation Method:	Number of homeowners in areas of high housing concentrations with poor soils contacted about sewer expansion; Future plans or projects for sewer expansion into these areas
Estimated Costs:	$1.50 - $3.00 per pamphlet or fact sheet; $2.00 per survey; $9,000 per home and up for sewer tap-in fee
Estimated Load Reduction:	Up to 100% reduction in pollution including bacteria and nutrients originating from HSTSs in newly sewered areas

Sherrick Run Issue #3 - Illegal Dumping

Goal: Reduce the amount of litter and debris from illegal dumping along Sherrick Run.

Objectives:

1. Reduce the dumping of trash and debris into Sherrick Run by increasing local awareness and enforcement of anti-litter laws.
   Focus Areas: Entire Subwatershed
   Target: To be determined
2. Remove trash and debris from the East Branch.
   Focus Areas: Route 43 Bridge to confluence with Nimishillen Creek; Crenshaw Park.
   Target: One clean-up event once every two years

Sherrick Run Issue #3 - Recommended Actions Tables

Action A: Education watershed residences, industries, and businesses about litter prevention and recycling	
Suggested Responsible Parties:	Nimishillen Creek Watershed Partners; Stark County Regional Planning; Stark-Tuscarawas-Wayne Joint Solid Waste District; Canton Regional Chamber of Commerce; Stark County Drainage Task Force
Funding Options:	Local Sponsorship; Private Sector; OEEF; Ohio EPA Section 319 NPS Grant
Time Frame:	Ongoing by the Nimishillen Creek Watershed Partners, Stark County Regional Planning, and the Canton Regional Chamber of Commerce
Expected Improvements:	Increased awareness of littering issues and proper waste disposal
Evaluation Method:	Number of educational items distributed; Number of hits on stream clean-up webpage
Estimated Costs:	$1.50 - $3.00 per pamphlet or fact sheet; $10.00 per T-shirt; $8.00 - $25.00 per month for website hosting
Estimated Load Reduction:	No direct reduction in pollution loads expected from action

Action B: Organize stream clean-ups along stretches of Sherrick Run that are heavily polluted with trash and debris.	
Responsible Parties:	Nimishillen Creek Watershed Partners
Funding Options:	Private Sector; Ohio EPA Section 319 NPS Grant; Sponsorships
Time Frame:	Ongoing
Improvements:	Reduction in debris in and along selected clean-up sections along the East Branch
Evaluation Method:	Linear feet of the creek cleaned; Number of tires removed; Weight or volume of litter removed
Costs:	$500 - $1,000 and up for up to a half-mile clean-up
Estimated Load Reduction:	Variable depending on location and items removed from Sherrick Run

Action C: Report illegal dump sites to local law enforcement officials.	
Suggested Responsible Parties:	Nimishillen Creek Watershed Partners; Stark County Health Department; Ohio EPA; Stark County Drainage Task Force
Funding Options:	Private Sector; OEEF; Ohio EPA Section 319 NPS Grant
Time Frame:	2007 and beyond
Expected Improvements:	Increased monitoring of known illegal and chronic dumping sites
Evaluation Method:	Number of fines for littering given out; Visual inspection of known chronic dumping sites
Estimated Costs:	Variable
Estimated Load Reduction:	Variable depending on the type of illegal activity prevented or cleaned up

Sherrick Run Issue #4 - Environmental Education and Monitoring

Goal: Educate residents, government officials, and businesses about watershed issues impacting Sherrick Run.

Objectives:

1. Establish a water quality monitoring program to document current and future condition along Sherrick Run
   Focus Areas: RM 3 (State Route 43 bridge) to confluence with Nimishillen creek; areas identified to be impacted by AMD
   Target: Program established by 2008
2. Educate riparian and shoreline landowners on the value of a healthy riparian habitat.
   Focus Areas: All riparian land owners

Target: Distribute education information to 75 percent of riparian landowners

3. Increase general knowledge of local watershed issues.
Focus Areas: Entire Subwatershed
Target: Direct contact with 25 Sherrick Run stakeholders per year

Sherrick Run Issue #4 - Recommended Actions Tables

Action A: Distribute flyers informing watershed residents on how to identify suspicious activities and who to contact to report illegal activities. Types of activities targeted illegal dumping, illegal discharges, and the filling in of floodplain and wetland areas.	
Suggested Responsible Parties:	Ohio EPA - Division of Environmental and Remedial Response; NEFCO; Earth Action Partnership; Stark County Health Department
Funding Options:	NPS Education Grant; OEEF; CWA Section 319 Grant; Private Sector
Time Frame:	2006 and beyond
Expected Improvements:	Decrease in illegal activities that can cause reduced habitat and/or water quality
Evaluation Method:	Number of flyers distributed; Number of contacts made to authorities listed on flyers; Number of illegal water resource activities stopped or corrected
Estimated Costs:	$1.50 - $3.00 per flyer or fact sheet
Estimated Load Reduction:	Variable depending on the type of illegal activity cleaned up

Action B: Establish long-term chemical and biological monitoring program for subwatershed focusing on any AMD impacted areas.	
Suggested Responsible Parties:	NEFCO; Earth Action Partnership; Crossroads RC&D; Stark County SWCD; Stark County Health Department; Local University
Funding Options:	CWA Section 319 NPS Grant; OEEF; Private Sector
Time Frame:	2007 and beyond
Expected Improvements:	Increase knowledge of the extent of the AMD problem along the Mainstem; Better evaluation of AMD abatement projects
Evaluation Method:	Macroinvertebrate monitoring; Chemical sampling of effluent
Estimated Costs:	- Macroinvertebrate monitoring: $15 per volunteer per hour + $50 monitoring kit; - NEFCO Macroinvertebrate Monitoring = $750 per site; - Chemical Sampling: $500 - $1,000 and up for laboratory tests + cost of collection and transportation

Estimated Load Reduction:	No direct reduction in pollution loads expected from action

Action C: Educate residents about watershed issues through regularly scheduled events and activities that are recognized by the public. These events and activities can include watershed surveys, presentation at local meetings, information booths at local fairs, creek clean-ups, and other public meetings.	
Suggested Responsible Parties:	Nimishillen Creek Watershed Partners; NEFCO; Stark SWCD; Stark RPC; Stark Parks; Stark County Drainage Task Force
Funding Options:	Private Sector; NPS Education Grant; OEEF Grant; CWA Section 319 NPS Grant
Time Frame:	Ongoing
Expected Improvements:	Greater awareness regarding watershed issues.
Evaluation Method:	Number of events held; Surveys taken; Presentations given; Fairs attended; Public meeting held
Estimated Costs:	Survey = $2.00 per survey; Presentation = $3,000 and up per 80 picture slide/PowerPoint show; County Fair Display = $1,000 and up + $1.50 to $3.00 per pamphlet + $15.00 per volunteer hour; Public Meeting = $1,200 per meeting
Estimated Load Reduction:	No direct reduction in pollution loads expected from action

Action D: Implement a watershed protection and awareness program in local schools.	
Suggested Responsible Parties:	Stark Parks; Ohio EPA - Division of Surface Water; County SWCDs; Local Boards of Education; Local Schools; Earth Action Partnership
Funding Options:	OEEF; NPS Education Grant; CWA Section 319 NPS Grant
Time Frame:	2006 thru 2007
Expected Improvements:	Stronger knowledge of future generations regarding the importance of watershed protection
Evaluation Method:	Number of local schools implementing program; Number of students exposed to watershed education efforts
Estimated Costs:	$400 - $7,000
Estimated Load Reduction:	No direct reduction in pollution loads expected from action

Hurford Run Subwatershed Action Plan

Inventory

Physical Description

Hurford Run is a five mile long tributary in the southwest portion of the Nimishillen Creek Watershed draining approximately 8.5 square miles of Stark County. The headwaters are located in Perry Township and flow primarily northeast before merging with the Nimishillen Creek Mainstem at RM 11.5. The only significant tributary to Hurford Run is Domer Ditch which originates in Canton Township. Domer Ditch flows north near Interstate 77 for approximately three miles before joining Hurford Run east of Linwood Road (Figure VII-10).

Nearly the entire watershed resides in the unglaciated portion of Stark County (Figure II-5) resulting in moderate relief and generally less than six percent slopes (Figure II-6). The primary soils are the Fitchville-Sebring, the Chili-Wheeling-Shoals, and the Canfield-Wooster associations, typical of glaciated areas in Stark County. Also like other areas in the watershed, most soils in the basin have poor drainage and infiltration properties resulting in poor locations for HSTSs (Figure VI-3). Fortunately, only the headwater areas are without sanitary sewers (Figure VI-4). The bedrock in the area along Domer Ditch is covered by over 60 feet of glacial outwash. In areas not covered by this thick layer of glacial sediment, the primary bedrock types are Brookville Coal, Mercer Limestone, and Middle Kittaning Coal (Figure II-7).

Land Use

Hurford Run has the greatest concentration of industrial land usage of any of the six subwatersheds of Nimishillen Creek. Industrial companies in the subwatershed include the Marathon Petroleum Company, Canton Alloys Inc., Republic Engineered Steel Inc., and the Timken Company. Point source discharges, storm water runoff, and riparian habitat degradation are concerns in these areas. Other land uses in the area include urban/suburban areas primarily in the northern portions of the subwatershed, with agriculture and wooded areas the dominant use in the southern portion (Figure II-13). Soil erosion, nutrient runoff, channel modification, and riparian habitat destruction are concerns. In addition, the Hurford Run watershed is encountering development pressures from continued suburbanization of Stark County due to its location near both Massillon and Canton and being adjacent to two highways. Habitat encroachment and increased runoff from increasing impervious area is a long-term concern for water quality. Lastly, the riparian habitat quality along Hurford Run was rated the lowest in NEFCO's evaluation (Figure VII-11). Riparian habitat restoration, where possible, is a priority.

Point Source Dischargers

A point source is defined as a source that discharges pollutants, or any effluent, from a known discharge point, such as a pipe, ditch, or sewer and into a waterbody after treatment (Miller, 1988). Treatment can vary depending on the type of effluent, but

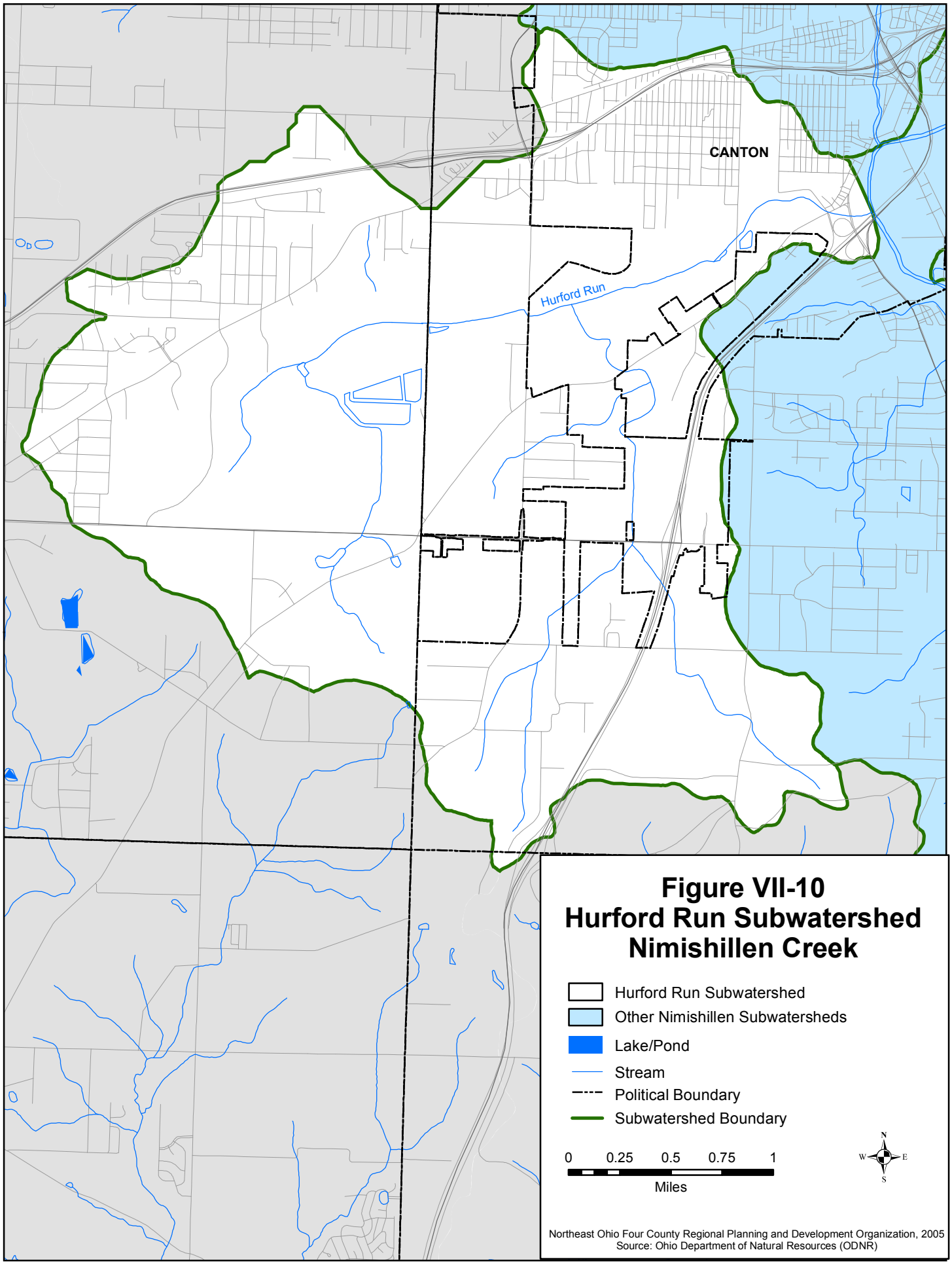


Figure VII-10
Hurford Run Subwatershed
Nimishillen Creek

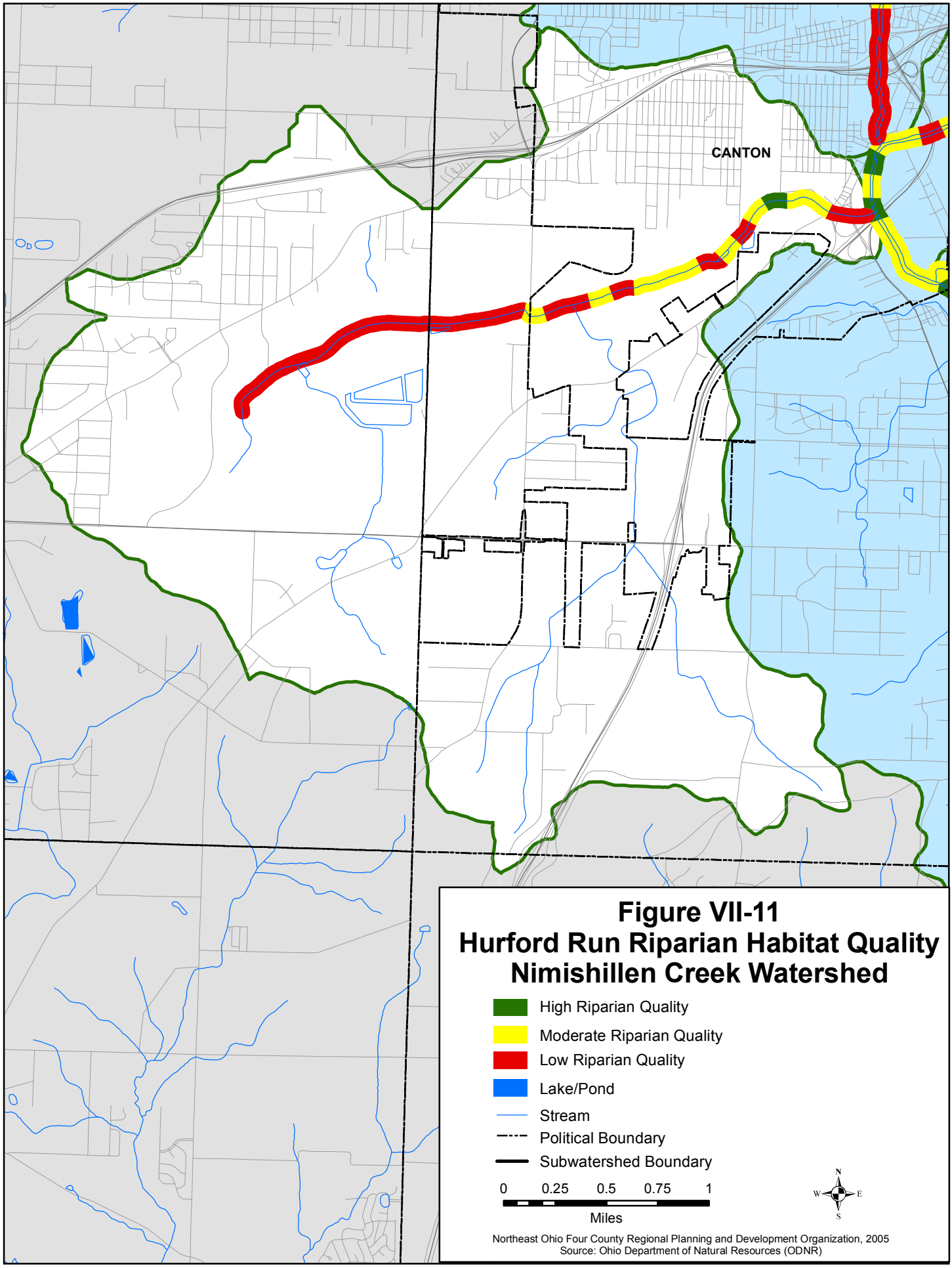
- Hurford Run Subwatershed
- Other Nimishillen Subwatersheds
- Lake/Pond
- Stream
- Political Boundary
- Subwatershed Boundary

0 0.25 0.5 0.75 1

Miles

N
W E
S

Northeast Ohio Four County Regional Planning and Development Organization, 2005
Source: Ohio Department of Natural Resources (ODNR)


CANTON
Figure VII-11
Hurford Run Riparian Habitat Quality
Nimishillen Creek Watershed
High Riparian Quality
Moderate Riparian Quality
Low Riparian Quality
Lake/Pond
Stream
Political Boundary
Subwatershed Boundary
0 0.25 0.5 0.75 1
Miles
N
W
E
S
Northeast Ohio Four County Regional Planning and Development Organization, 2005
Source: Ohio Department of Natural Resources (ODNR)

generally includes the removal of solids and disinfection. Point source discharges have the potential to introduce high levels of nutrients and chemicals into a waterway. However, these discharges are monitored and tracked by the Ohio EPA via the National Pollutant Discharge Elimination System (NPDES) program to protect local water resources.

Along Hurford Run, eight point sources were identified as discharging into the watershed. These include five industrial dischargers and three private wastewater treatment systems. Table VII-32 provides information about each permitted discharge and Figure IV-1 maps the location of them in the watershed. Please note that this section does not include storm sewer outfalls, off-lot discharging home sewage treatment systems, or illegal point source discharges into the Nimishillen Creek Watershed. Additional point source discharge information will be added when it becomes available.

Table VII-32: Point Source Discharging Operations in the Hurford Run Subwatershed

Map Symbol	Discharging Operation	Design Flow (GPD)	Classification
2	AGA Gas Incorporated 2505 Shepler Church S.W. Canton, OH 44706	Not Given	Industrial Discharger
13	Gulliver's 77 Travel Center Inc. 2320 Faircrest St. SW Canton, OH 44706	Not Given	Private Discharging Semi-Public Sewage Treatment System
21*	Marathon Ashland Petroleum LLC - Ohio Refining Div. 2408 Gambrinus Rd. SW Canton, OH 44706	Not Given	Industrial Discharger
26	Praxair (Liquid Carbonic Corp.) 2225 Bolivar Rd. S.W. Canton, OH 44706	Not Given	Industrial Discharger
28	Republic Engineered Steel Inc. Special Metals Division 2201 Harrison Ave. S.W. Canton, OH 44706	Not Given	Industrial Discharger
34	The Timken Company - Faircrest Steel Plant Canton, OH 44706	Not Given	Industrial Discharger
38	Prairie College School 3021 Prairie College Ave. S.W. Canton, OH 44706	5,000 to <10,000	Private Discharging Semi-Public Sewage Treatment System
65	The WG Fairfield Co. 4255 Kropf Ave. S.W. Canton, OH 44706	1 to <1,500	Private Discharging Semi-Public Sewage Treatment System

* Permit Expired in 2004; GPD = Gallons Per Day
Source: Ohio EPA, 2005

Water Quality Data and Impairments

Ohio EPA's TMDL Quality Results

The Ohio EPA conducted a biological and aquatic life use assessment for the Hurford Run subwatershed from 2003 thru 2005 as part of the Nimishillen Creek TMDL (Table VII-33).

Table VII-33: Hurford Run Aquatic Life Use Attainment Status, Biological Criteria Scores, and QHEI Scores

Location - (Lower/Upper River Mile)	Use Designation	Attainment Status	Biological Criteria Scores			QHEI Scores
			IBI	MIwb	ICI	
At Mouth - (0.1)	WWH	Non	24*	--	Poor*	69
Downstream Ashland Oil - (1.8)	LRW	--	Very Poor*	--	--	--

* Indicates significant departure for applicable biocriteria (>4 IBI or ICI units, or >0.5 MIwb units).
___ Underlined scores are in the Poor or Very Poor range.
BOLD - QHEI scores are below the TMDL goal of 60 for WWH streams.

Source: Nimishillen Creek TMDL, Ohio EPA, 2009.

In the comments section of the 2000 305(b) Ohio Water Resource Inventory, the Ohio EPA noted high levels of manganese present in the headwaters of Hurford Run. Downstream of the Timken Company Outfall 006 there were high levels of pH. In addition, the Marathon Petroleum Company's effluent increased stream temperature and has high ammonia concentrations. They noted additional exceedences of pH, temperature, conductivity and ammonia.

Impairments

Aquatic Life Use and Habitat:
The mouth of Hurford Run was in non attainment for WWH streams. The QHEI score exceeded the TMDL goal score of 60.

Recreation:
All of Hurford Run, except Domer Ditch, is impaired for Primary Contact Recreation. Domer Ditch is impaired for Secondary Contact Recreation.

Fish Consumption:
There is a fish consumption advisory of only one meal per month of common carp caught from Hurford Run. In addition, the Ohio Department of Health has issued a statewide advisory to limit meals of fish caught from all Ohio waterbodies to one meal per week due to mercury.

Ohio EPA's Causes and Sources of Impairments

The causes of impairments for a stream are the specific pollutants or alterations that result in the stream not meeting state water quality standards. Examples of common causes of water quality impairments are siltation, flow alteration, nutrient enrichment,

metals, and temperature. Sources of impairments are where the cause(s) originated or where the causes of impairments are supplied from. Sources include crop production, channelization, urban runoff, dam construction, discharge pipes, and stream bank erosion. Table VII-20 lists the causes and sources of impairment for aquatic life use, recreation, and fish consumption for Hurford Run.

Table VII-34: Nimishillen Creek TMDL's Causes and Sources of Impairments for Hurford Run

Causes of Impairment	Sources of Impairment
Thermal	Industrial Point Source
Ammonia	Industrial Point Source
pH and Unknown	Industrial Point Source
Pathogens	Onsite Home Sewage Treatment (Septic) Systems

Sources: Nimishillen Creek TMDL, Ohio EPA, 2009.

Load Reduction Information

No TMDLs were completed were completed specifically for Hurford Run as part of Ohio EPA's TMDL report.

Other Water Quality Information

Nimishillen Creek Macroinvertebrate Survey - 2000, 2002, and 2004: Since 2000, NEFCO and the City of Canton have conducted three macroinvertebrate surveys along Nimishillen Creek. Three of the seventeen sites sampled are located in Hurford Run. The two downstream sites, RM 0.5 and 1.1, are situated in heavily industrial areas that include The Timken Company Canton Steel Plant, Republic Engineered Steel Inc. Special Metals Division, and Marathon-Ashland Petroleum LLC refinery. The location of the upstream site, RM 2.5, is on an unnamed tributary to Hurford with a subwatershed comprised mainly of wooded and agricultural/pasture areas. Table VII-34 summaries the sampling results.

Table VII-35: Mean Cumulative Index Values* (CIV) for Hurford Run Based on NEFCO's Macroinvertebrate Surveys

Station Location	Mean CIV**		
	2000 Segment Condition	2002 Segment Condition	2004 Segment Condition
River Mile 0.5 - Bolivar Ave. and I-77 Off Ramp	13 Fair	15 Fair	16 Fair
River Mile 1.1 - Harrison Ave. Bridge	17 Good	18 Good	20 Good
River Mile 2.5 - Shepler Church Rd. Bridge	22 Good	19 Good	18 Good

* Stream Quality Assessment **Excellent: >22, Good: 17-22, Fair: 11-16, Poor < 11
(Source: ODNR, Stream Quality Monitoring Manual)

The general trend for the sampling locations is a gradual decrease in macroinvertebrate scores from upstream to downstream sites. This corresponds with decreased riparian cover and increased industrial land use. River miles 1.1 and 2.5 consistently scored in the "Good" range, while RM 0.5, near the mouth of Hurford Run, ranked as only "Fair" each year.

It is likely that the upstream sites are closer to attainment of state water quality standards than the downstream location because the Ohio EPA found that generally ODNR's Stream Quality Monitoring Program tend to reflect attainment and non-attainment aquatic life uses. "Excellent" scores in the ODNR method commonly meet the Ohio EPA attainment standards, while stream segments with "Fair" or "Poor" scores generally are assessed as being in non-attainment (Yoder and Davis, 1996). Based on this assumption, it is believed that Hurford is in or close to attainment for aquatic life uses in the headwaters and becomes gradually worse and likely in non-attainment as it flows through urban and industrial areas near the confluence with Nimishillen Creek.

Hurford Run Subwatershed Issues:

1. **Industrial Site Runoff**
2. **Environmental Education**
3. **Riparian Corridor Restoration**
4. **Failing HSTSs**

Hurford Run, as noted above, has the greatest concentration of industrial activity of any of Nimishillen Creek's subwatersheds. Both nonpoint and point source water quality concerns result from discharges and runoff from these vast industrial sites. Pollution discharges for point sources is strictly monitored by the Ohio EPA through the National Pollutant Discharge Elimination System (NPDES) permits, although spills and accidental discharges are still possible. Another issue is the storm water runoff from the large and old industrial complexes which pickup various pollutants before entering Hurford Run.

Hurford Run also has the most degraded riparian corridor of any of the Nimishillen Creek tributaries (Table II-10 and Figure VII-11). This is due to the heavy concentration of industrial sites along the downstream section and agricultural areas in the headwaters. Restoration of the riparian habitat is a priority in this subwatershed. Where development has occurred without the aid of a sanitary sewer system, failing home sewage treatment systems (HSTSs) is also an issue due to the prevalence of poor soils in the subwatershed.

Using available data and information along with personal knowledge of Hurford Run, watershed stakeholders ranked the top four issues they believe to be hindering water quality attainment in this subwatershed. Under each of the four issues are goal and objective statements accompanied by recommended actions. Please note that the recommended actions are not intended to a comprehensive list of actions that could address each issue; but rather, a list of actions that the stakeholders believe is the best

course of action given the current circumstances and available information. Refer to NEFCO's *Nimishillen Creek Comprehensive Watershed Management Plan - Phase III* for a more comprehensive list of water quality improvement actions for Nimishillen Creek (NEFCO, 2001).

"Focus Areas" were also included under each objective to indicate specific areas to direct actions, if known, and a "Target" was establish to help evaluate the objective and measure accomplishments. Lastly, "Responsible Parties" are identified if a watershed action is ongoing, while "Suggested Responsible Parties" indicate who could take the lead on actions not yet being implemented.

Hurford Run Issue #1 - Industrial Site Runoff

Goal: Decrease the levels of toxic substances and dissolved solids (heavy metals, petroleum products, etc.) entering surface water and/or groundwater.

Objectives:

1. Decrease levels of toxic substances from industrial land use areas.
   Focus Areas: Watershed area between Shepler Church Ave. and U.S. Route 30; Timken Company Property; Republic Steel Property; Marathon Petroleum Company
   Target: To be determined
2. Decrease levels of toxic substances from storm water runoff.
   Focus Areas: Watershed area between Shepler Church Ave. and U.S. Route 30; Timken Company Property; Republic Steel Property; Marathon Petroleum Company
   Target: To be determined

Hurford Run Issue #1 - Recommended Actions Tables:

Action A: Implement a regional/watershed-based storm water management plan.	
Responsible Parties:	Stark County Drainage Task Force
Funding Options:	Local; Conservancy District; Storm Water Utility
Time Frame:	Ongoing
Expected Improvements:	Improved water quality and moderated peak storm water flows.
Evaluation Method:	Completion of the plan; Level of participation; Improved macroinvertebrate and water chemistry results
Estimated Costs:	$300,000 and up annually for all of Stark County
Estimated Load Reduction:	To be determined

Action B: Implement NPDES Phase II Storm Water Program	
Responsible Parties:	Stark County; City of Canton
Funding:	Local
Time Frame:	Ongoing
Expected Improvements:	Significant reduction of pollution in urban storm water runoff through the establishment of six minimum control measures.
Evaluation Method:	Annual review of the Program by permitted communities and the Ohio EPA
Estimated Costs:	Variable
Estimated Load Reduction:	Variable depending on the practices implemented by each permitted community

Action C: Identify by-products of industrial processes taking place in the watershed.	
Suggested Responsible Parties:	Ohio EPA; Stark County Health Department; Private Sector
Funding Options:	OEEF; Ohio EPA Section 319 NPS Grant; Private Sector
Time Frame:	2006 - 2007
Expected Improvements:	Lower releases of toxic substances from Industrial operations.
Evaluation Method:	A listing of identified by-products from industrial processes.
Estimated Costs:	Sorting through RCRA Documents = $500
Estimated Load Reduction:	No direct reduction in pollution loads expected from action

Action D: Limit the amount of impervious areas for commercial and industrial establishments.	
Suggested Responsible Parties:	Stark County Zoning Commission; Canton Zoning Commission; Building Industry Association
Funding Options:	OEEF; Private Sector; Ohio EPA Section 319 NPS Grant; Smart Growth Grant
Time Frame:	2007 and beyond
Expected Improvements:	Lower levels of toxic substances entering the environment due to runoff from impervious areas
Evaluation Method:	Number of permits or ordinances in effect; Number of companies voluntarily adopting best management practices
Estimated Costs:	Variable
Estimated Load Reduction:	Porous Pavement General Removal Efficiencies: Sediment = 82%-95%; TPs = 65%; TN = 80%-85% Infiltration Basin General Removal Efficiencies: TSS = 75%; TP = 60%-70%; TN = 55%-60%; Metals = 85%-90%; E Treatment Wetland Median Removal Efficiencies: TSS = 76%; TP = 46%; Orthophosphate Phosphorus = 28%; N Grass Swales General Removal Efficiencies: TSS = 81%; TP = 29%; Nitrate = 38%; Metals =14%-55%; E

Hurford Run Issue #2 - Environmental Education

Goal: Educate residents, government officials, and businesses about watershed issues impacting Hurford Run.

Objectives:

1. Increase awareness among operators of industrial facilities of the implementing preventative and control measures to reduce pollutants.
   *Focus Areas:*Industrial Sites
   Target: Direct contact with 10 Hurford Run industrial stakeholders per year
2. Strengthen awareness of and involvement in watershed issues.
   *Focus Areas:*Residential and Commercial Areas
   Target: Direct contact with 15 Hurford Run residential or commercial stakeholders per year
3. Increase awareness regarding the location and pollution potential of oil and gas pipelines in relation to drinking water wells.
   Focus Areas: Entire Subwatershed
   Target: To be determined
4. Monitor and evaluate surface water quality in the watershed.
   Focus Areas: Sherrick Run and Domer Ditch
   Target: Program established by 2008

Hurford Run Issue #2 - Recommended Actions Tables:

Action A: Educate owners and operators of industrial facilities about the benefits of implementing preventive and control measures to reduce pollutants.	
Suggested Responsible Parties:	Ohio EPA; City of Canton; Stark County Regional Planning Commission; NEFCO; Stark County and Canton Health Departments; Canton Regional Chamber of Commerce
Funding Options:	OEEF; WPCLF; Ohio EPA Section 319 NPS Grant
Time Frame:	2007 - 2008
Expected Improvements:	Increased awareness about the benefits of BMPs and reduced levels of pollutants from industrial land use areas.
Evaluation Method:	List of contacts; Number of operations that have implemented BMPs; Water quality testing showing the reduction of pollutants after implementation
Estimated Costs:	Workshop = $15 per person; Pamphlet or fact sheet = $1.50 to $3.00 per sheet; Chemical Sampling = $500 - $1,000 and up for laboratory tests + cost of collection and transportation
Estimated Load Reduction:	No direct reduction in pollution loads expected from action

Action B: Educate industrial owners and operators about the hazards of negligent management of industrial by-products.	
Suggested Responsible Parties:	Ohio EPA; Stark and Canton Health Departments; Private Sector
Funding Options:	OEEF; Ohio EPA Section 319 NPS Grant
Time Frame:	2007 - 2008
Expected Improvements:	Lower releases of toxic substances from industrial operations
Evaluation Method:	Number of owners/operators educated about the hazards of negligent management
Estimated Costs:	Workshop = $15 per person; Pamphlet or fact sheet = $1.50 to $3.00 per sheet
Estimated Load Reduction:	No direct reduction in pollution loads expected from action

Action C: Educate residents about watershed issues through regularly scheduled events and activities that are recognized by the public. These events and activities can include watershed surveys, presentation at local meetings, information booths at local fairs, creek clean-ups, and other public meetings.	
Suggested Responsible Parties:	Nimishillen Creek Watershed Partners; NEFCO; Stark SWCD; Stark RPC
Funding Options:	Private Sector; NPS Education Grant; OEEF Grant; CWA Section 319 NPS Grant
Time Frame:	Ongoing
Expected Improvements:	Greater awareness regarding watershed issues
Evaluation Method:	Number of events held; Surveys taken; Presentations given; Fairs attended; Public meetings held
Estimated Costs:	Surveys = $2.00 per survey; Presentations = $3,000 and up per 80 picture slide/PowerPoint show; County Fair Display = $1,000 and up + $1.50 to $3.00 per pamphlet + $15.00 per volunteer hour; Public Meeting = $1,200 per meeting
Estimated Load Reduction:	No direct reduction in pollution loads expected from action

Action D: Create a map of pipeline and drinking well locations to provide to community planning and zoning officials.	
Suggested Responsible Parties:	ODNR - Div. of Oil and Gas; Stark County Regional Planning Commission; NEFCO
Funding Options:	Private Sector; Local Funds; Ohio EPA Section 319 NPS Grant
Time Frame:	2006 - 2009
Expected Improvements:	More precise locations of oil and gas pipelines; Detection of leaks or ruptures in pipelines; Increased knowledge regarding pipeline location and potential drinking water wells
Evaluation Method:	Detailed maps of oil and gas pipeline locations in relation to drinking water wells
Estimated Costs:	$7,000 to $25,000; $140 t0 $490 and up per map
Estimated Load Reduction:	No direct reduction in pollution loads expected from action

Action E: Establish long-term chemical and biological monitoring program for subwatershed.	
Suggested Responsible Parties:	NEFCO; Earth Action Partnership; Crossroads RC&D; Stark County SWCD; Stark County Health Department; Local University
Funding Options:	CWA Section 319 NPS Grant; OEEF; Private Sector
Time Frame:	2007 and beyond
Expected Improvements:	Increase knowledge of the extent of the AMD problem along the Mainstem; Better evaluation of AMD abatement projects
Evaluation Method:	Macroinvertebrate monitoring; Chemical sampling of effluent
Estimated Costs:	- Macroinvertebrate monitoring: $15 per volunteer per hour + $50 monitoring kit; - NEFCO Macroinvertebrate Monitoring = $750 per site; - Chemical Sampling: $500 - $1,000 and up for laboratory tests + cost of collection and transportation
Estimated Load Reduction:	No direct reduction in pollution loads expected from action

Hurford Run Issue #3 - Riparian Corridor Restoration

Goal: Restore habitat areas with "poor" or "moderate" riparian habitat scores to the next attainment level.

Objectives:

1. Work with industrial property owners to improve the riparian habitat along Hurford Run.
   Focus Areas: Watershed area between Shepler Church Ave. and U.S. Route 30; Timken Company Property; Republic Steel Property; Marathon Petroleum Company
   Target: Restore 5 percent or approximately 900 linear feet of "poor" or "moderate" quality riparian habitat
2. Establish policies to protect the riparian corridor and habitat.
   Focus Areas: Entire Subwatershed
   Target: Adoption of policies by the county and municipalities

Hurford Run Issue #3 - Recommended Actions:

Action A: Provide incentives for industrial landowners to protect the shoreline, riparian corridor, or wetlands with long-term protection or permanent conservation easements.	
Suggested Responsible Parties:	Stark County RPC; City of Canton; Stark Parks; Land Conservancy Organizations
Funding Options:	Clean Ohio Fund; Ohio EPA Section 319 NPS Grant; Private Sector; WRRSP
Time Frame:	2007 thru 2010
Expected Improvements:	Protection of shoreline and riparian corridor resulting in increase riparian habitat scores, reduction in stream bank erosion, and floodway protection
Evaluation Method:	Linear feet set aside for long-term protection; Number of permanent conservation easements; Riparian habitat scores
Estimated Costs:	$0.00 to $5,000 per acre and up; $4,000 and up on average to set up a maintenance fees
Estimated Load Reduction:	No direct reduction in pollution loads expected from action; however, long-term or permanent protection measures will reduce future pollution loading.

Action B: Assist landowners in re-vegetating shoreline and riparian areas.	
Suggested Responsible Parties:	Stark SWCD; NEFCO; Earth Action Partnership; Stark Parks; City of Canton; ODNR - DSWC
Funding Options:	WPCLF; Ohio EPA Section 319 NPS Grant; PL-566; SIP
Time Frame:	2006 thru 2010
Expected Improvements:	Restoration of shoreline and riparian corridor; Increased riparian habitat scores; Improved wildlife habitat; Reduction in stream bank erosion during high flow events
Evaluation Method:	Linear feet of replanted riparian habitat; Wildlife surveys; Riparian habitat scores
Estimated Costs:	$0.25 - $1.10 per yd^2 seeded and mulched; $0.40 - $0.50 per seedling planted
Estimated Load Reduction:	Vegetated Buffer Strips General Removal Efficiencies: TSS = 40%-90%; TP = 30%-90%; TN = 20%-60%; Metals = 20%-80%

Action C: Assist shoreline and riparian landowners to stabilize shoreline and riparian corridor using appropriate BMPs.	
Suggested Responsible Parties:	County SWCDs; NEFCO; ODNR - DSWC; USDA - NRCS; Earth Action Partnership; ODNR - Division of Wildlife
Funding Options:	EQUIP; CRP; WPCLF; CWA Section 319 NPS Grant; PL-566; SIP
Time Frame:	2006 thru 2009
Expected Improvements:	Stabilization of shoreline and riparian corridor; Reduction in stream bank erosion; Improved wildlife habitat
Evaluation Method:	Linear feet of bank or shoreline stabilized; Wildlife survey; Riparian habitat scores
Estimated Costs:	Approximately $350,000 to restore or stabilize 1,300 linear feet of stream channel; Fiber Rolls = $12.00 per linear foot; Plant Cuttings = $0.40 - $0.50 per cutting; Erosion Control Blankets = $2.00 per yd^2
Estimated Load Reduction:	Erosion Control Blankets: Runoff Reduction = 80%; Erosion Rate Reduction = up to 99%; Fiber Rolls: TSS Reduction = 58% Vegetated Buffer Strips General Removal Efficiencies: TSS = 40%-90%; TP = 30%-90%; TN = 20%-60%; Metals = 20%-80%

Action D: Assist communities with the development of township or municipal ordinances requiring new construction sites to leave easements or a specific distance near shorelines of targeted wetlands and floodplains of streams.	
Suggested Responsible Parties:	Stark County Regional Planning Commission; Stark SWCD; City of Canton
Funding Options:	OEEF
Time Frame:	2007 thru 2009
Expected Improvements:	Protection of shoreline and riparian corridor resulting in increases in riparian habitat scores, reduction in stream bank erosion, and floodway protection
Evaluation Method:	Number of ordinances established and enforced; Riparian and shoreline miles protected; Riparian habitat scores
Estimated Costs:	Variable
Estimated Load Reduction:	Vegetated Buffer Strips General Removal Efficiencies: TSS = 40%-90%; TP = 30%-90%; TN = 20%-60%; Metals = 20%-80%

Hurford Run Issue #4 - Failing Home Sewage Treatment Systems

Goal: Reduce the nutrient and bacteria pollution in the Hurford Run and Domer Ditch from failing home sewage treatment systems (HSTSs).

Objectives:

1. Establish a comprehensive education and outreach program for stakeholders using HSTSs.
   Focus Areas: All unsewered areas
   Target: Program established by 2008
2. Begin an operations and maintenance program in the watershed.
   Focus Areas: Prairie College Subdivision
   Target: Inspection of 25 systems per year in the subwatershed
3. Provide financial support for the repair and replacement of failing HSTSs for low income property owners.
   Focus Areas: Entire Subwatershed
   Target: Assistance available for all low income property owners

Hurford Run Issue #4 - Recommended Actions Tables

Action A: Establish education efforts to increase public awareness of faulty HSTSs through door-to-door surveys, information materials, educational video, public meetings, and/or informational booths at local public events like fairs	
Suggested Responsible Parties:	Stark County Health Department, Ohio Department of Health; Ohio EPA; NEFCO; Earth Action Partnership
Funding Options:	OEEF; Ohio EPA Section 319 NPS Grant; Local Funding
Time Frame:	Door-to-Door Survey: 2007 - 2008 Information Material: Ongoing Public Meetings: 2007 - 2008 Informational Booths: 2007 - 2008
Expected Improvements:	Increased awareness of water quality impacts associated with malfunctioning or failing HSTSs
Evaluation Method:	Number of surveys completed; Number of informational material distributed; Number of public meetings held; Number of fair or public events attended; Surveys before and after education efforts begin to gauge a change in general knowledge among watershed residents
Estimated Costs:	– Surveys = $2.00 per survey – Pamphlets and Flyers = $1.50 - $3.00 per item – Public Meeting = $1,200 per 2 hour meeting – Display = $1,000 and up
Estimated Load Reduction:	No direct reduction in pollution loads expected from action; however, indirect reductions possible depending on the number of homeowners that utilize the information presented.

Action B: Seek funding assistance for homeowners to repair or replace faulty HSTSs.	
Suggested Responsible Parties:	Stark County Health Department; Stark County Regional Planning Commission; Ohio EPA
Funding Options:	WPCLF; Ohio EPA Section 319 NPS Grant; WPCLF; Community Development Block Grant
Time Frame:	2007 - 2010
Expected Improvements:	Lower number of malfunctioning or failing HSTSs
Evaluation Method:	Number of systems repaired or replaced
Estimated Costs:	$3,000 - $8,000 average cost to replace a HSTS; Up to $1,000 to repair HSTS
Estimated Load Reduction:	On-Site HSTS Repair or Replacement: 100% reduction in bacteria a Off-Site Repair or Replacement: Variable reduction for each HSTS

Action C: Establish an operations and maintenance inspection program to facilitate the repair and replacement of failing HSTSs.	
Suggested Responsible Parties:	Stark County Health Department
Funding Options:	Local Property/Home Owner Operations and Maintenance Fee; Ohio EPA Section 319 NPS Grant; WPCLF
Time Frame:	2007 - 2010
Expected Improvements:	Lower number of malfunctioning or failing HSTSs in the Hurford Run subwatershed; Reduction in nutrient and pathogens entering the stream
Evaluation Method:	Number of systems inspected, pumped, and/or repaired
Estimated Costs:	Approximately $250,000 for Stark County Health Department to establish and run a permit system for three years in the entire Nimishillen Creek Watershed
Estimated Load Reduction:	Variable depending on the number of HSTSs inspected and ordered to be repaired or replaced

Action D: Promote the extension of sewers in the watershed, especially where high concentrations of HSTSs are located on poor soils for septic systems.	
Suggested Responsible Parties:	Stark County Sanitary Engineer; Stark County Health Department; Ohio EPA; Ohio Department of Health
Funding Options:	WPCLF; Local Property/Homeowner via Assessment; WRRSP; USDA - Rural Development Grant
Time Frame:	2007 and beyond
Expected Improvements:	Lower number of malfunctioning or failing HSTSs polluting local water resources
Evaluation Method:	Number of homeowners contacted about sewer expansion in areas of high housing concentrations with poor soils; Future plans or projects for sewer expansion into these areas
Estimated Costs:	$1.50 - $3.00 per Pamphlet or Fact Sheet; $2.00 per Survey; $9,000 per Home and Up for Sewer Tap-in Fee
Estimated Load Reduction:	Up to 100% reduction in pollution including bacteria and nutrients originating from HSTSs in newly sewered areas

Nimishillen Creek Mainstem Subwatershed Action Plan

Inventory

Physical Description

For this action plan, the Nimishillen Creek Mainstem begins when the Middle and East Branches merge in Cook Park around river mile (RM) 15 on the east side of the City of Canton. It flows south and west a few miles through the urban areas of Canton before the West Branch joins in on the south side of the city at approximately RM 12. From this point it begins a nearly due south course out of Canton where it meets with Hurford Run (RM 12) and Sherrick Run (RM 11). Canton's Water Pollution Control Center (wastewater treatment plant) is located adjacent to the river just south of Sherrick Run at RM 9.9. The plant has a designed flow capacity of 39 million gallons per day (MGD) and discharged an average of 30.76 MGD in 2005. It continues to flow south through a narrow valley in the unglaciated southern portion of the county. The Mainstem passes through East Sparta before entering Tuscarawas County and emptying into Sandy Creek (Figure VII-12).

As the Mainstem flows from north to south, around the confluence with Sherrick Run it crosses from the northern glaciated portion of the Appalachian Plateau into the unglaciated section of the watershed (Figure II-5). The topography switches from flat to gently rolling lands to steep sloping uplands and broad flat floodplains resulting in the Mainstem cutting through a narrow valley through the unglaciated southern highlands (Figure II-6). The majority of the northern portion of the Mainstem is covered with over 60 feet of glacial outwash from the Chili-Wheeling-Shoals soil association over the bedrock. In the southern section of the Nimishillen Creek Mainstem the dominant bedrock is Middle Kittaning Coal with some areas of Brookville Coal and Mahoning Sandstone (Figure II-7). Soil associations in the unglaciated area include Chili-Wheeling-Shoals in the narrow river valley and with Loudonville-Wooster, Latham-Keene, and Muskingum-Gilpin-Dekalb covering the steep slopes. The steep slopes in the southern portion of the watershed result in rapid storm water runoff that increases the likelihood of soil erosion on land with insufficient cover.

Land Use

The usage of land in the Mainstem of the subwatershed is largely dictated by its past glacial history. Areas in the northern glaciated portion of the subwatershed are primarily used for urban or industrial uses in or near the City of Canton (Figure II-13). Water quality issues associated with an urban and industrial setting, such as increased runoff, point source discharges, and illegal dumping, are typical of this section of the watershed.

Land use in the unglaciated southern portion of the Mainstem is limited due to steep slopes and thin soils creating poor sites for development. Wooded and shrub/scrub areas are the primary land cover in this area. Land development is mostly limited to the narrow creek valley that is primarily used for homesteads and agriculture.

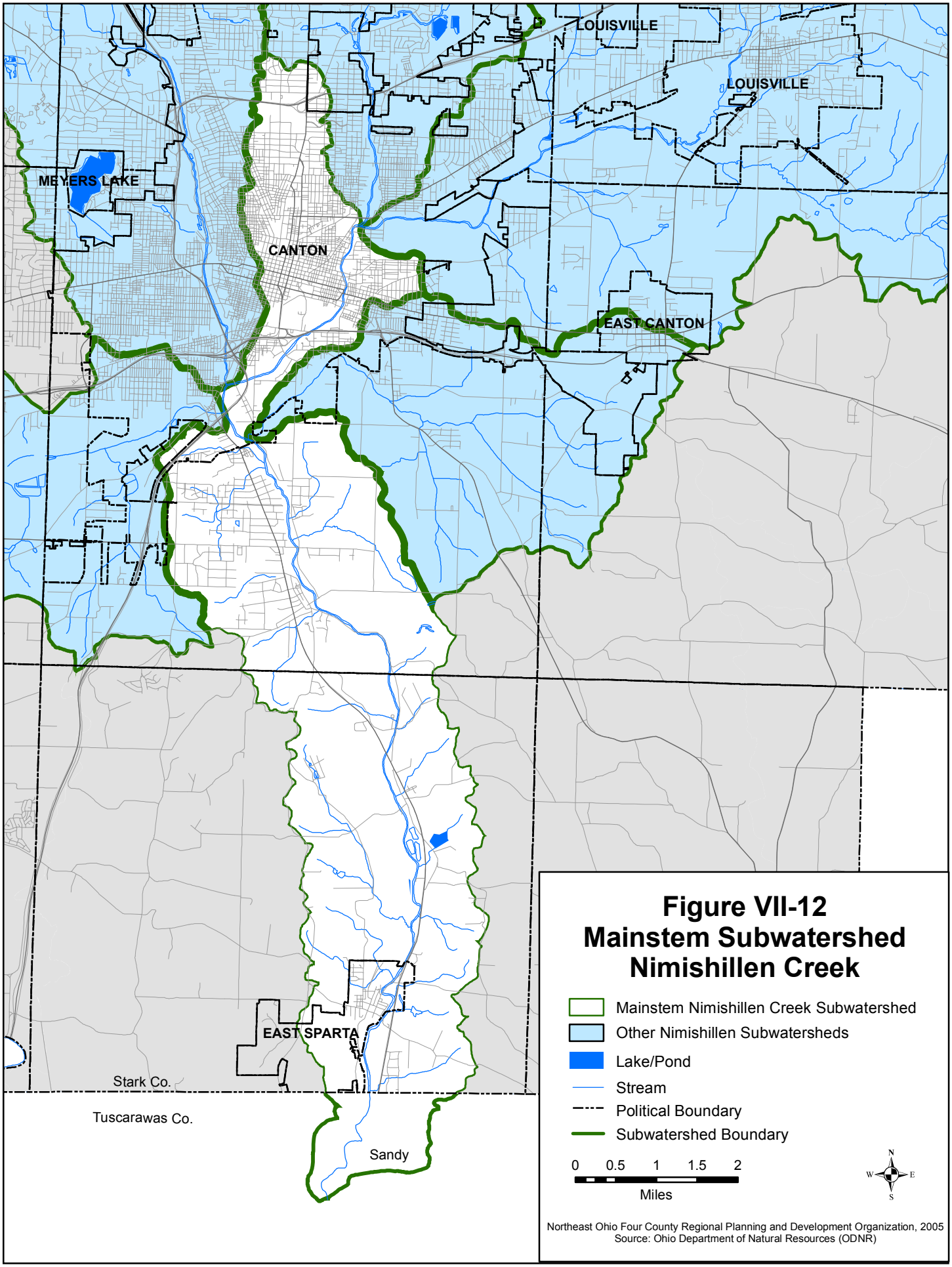


Figure VII-12
Mainstem Subwatershed
Nimishillen Creek

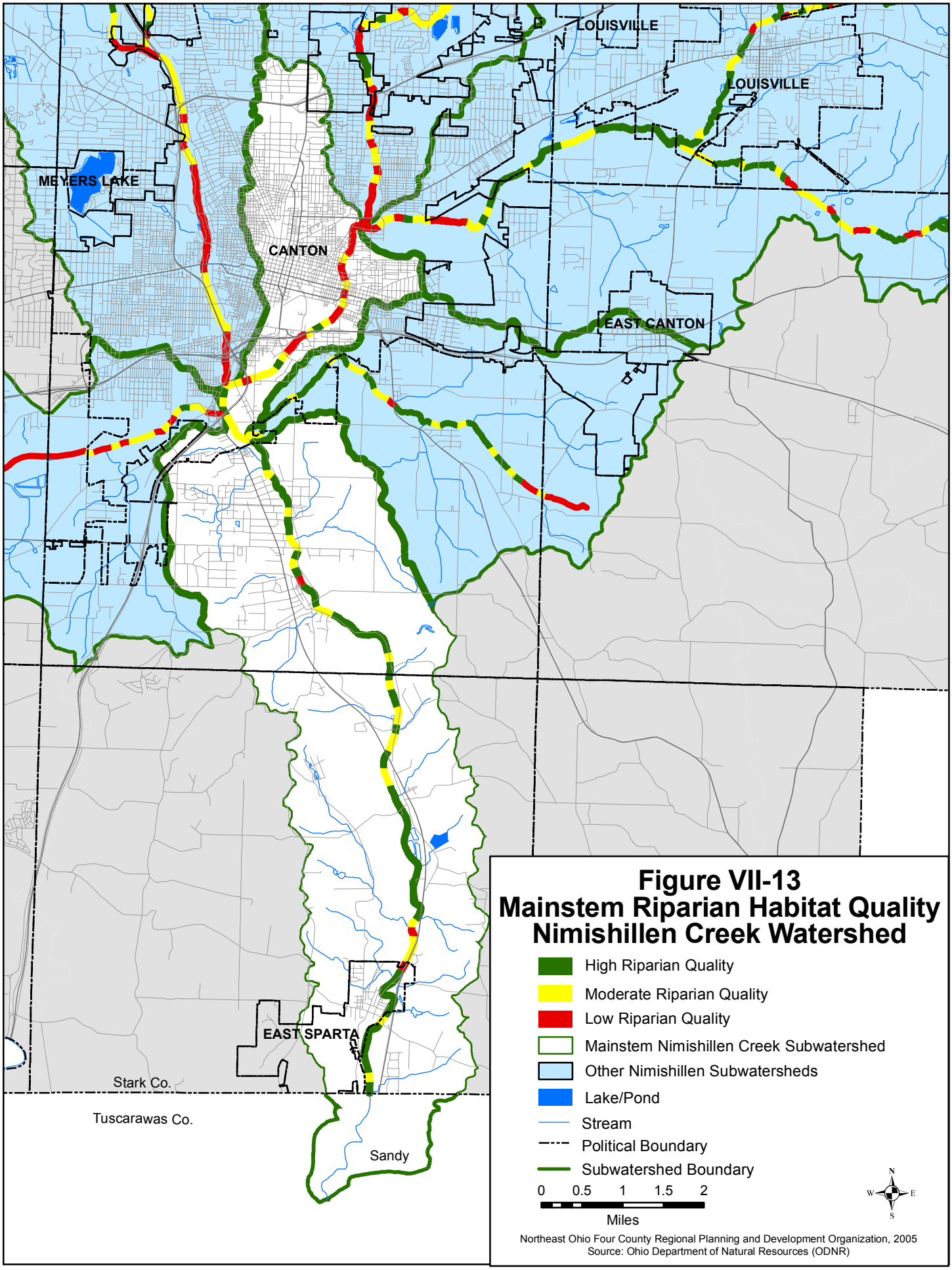
- Mainstem Nimishillen Creek Subwatershed
- Other Nimishillen Subwatersheds
- Lake/Pond
- Stream
- Political Boundary
- Subwatershed Boundary

0 0.5 1 1.5 2

Miles

N
W E
S

Northeast Ohio Four County Regional Planning and Development Organization, 2005
Source: Ohio Department of Natural Resources (ODNR)


LOUISVILLE
LOUISVILLE
MEYERS LAKE
CANTON
EAST CANTON
EAST SPARTA
Stark Co.
Tuscarawas Co.
Sandy
Figure VII-13
Mainstem Riparian Habitat Quality
Nimishillen Creek Watershed
High Riparian Quality
Moderate Riparian Quality
Low Riparian Quality
Mainstem Nimishillen Creek Subwatershed
Other Nimishillen Subwatersheds
Lake/Pond
Stream
Political Boundary
Subwatershed Boundary
0 0.5 1 1.5 2
Miles
N
W
E
S
Northeast Ohio Four County Regional Planning and Development Organization, 2005
Source: Ohio Department of Natural Resources (ODNR)

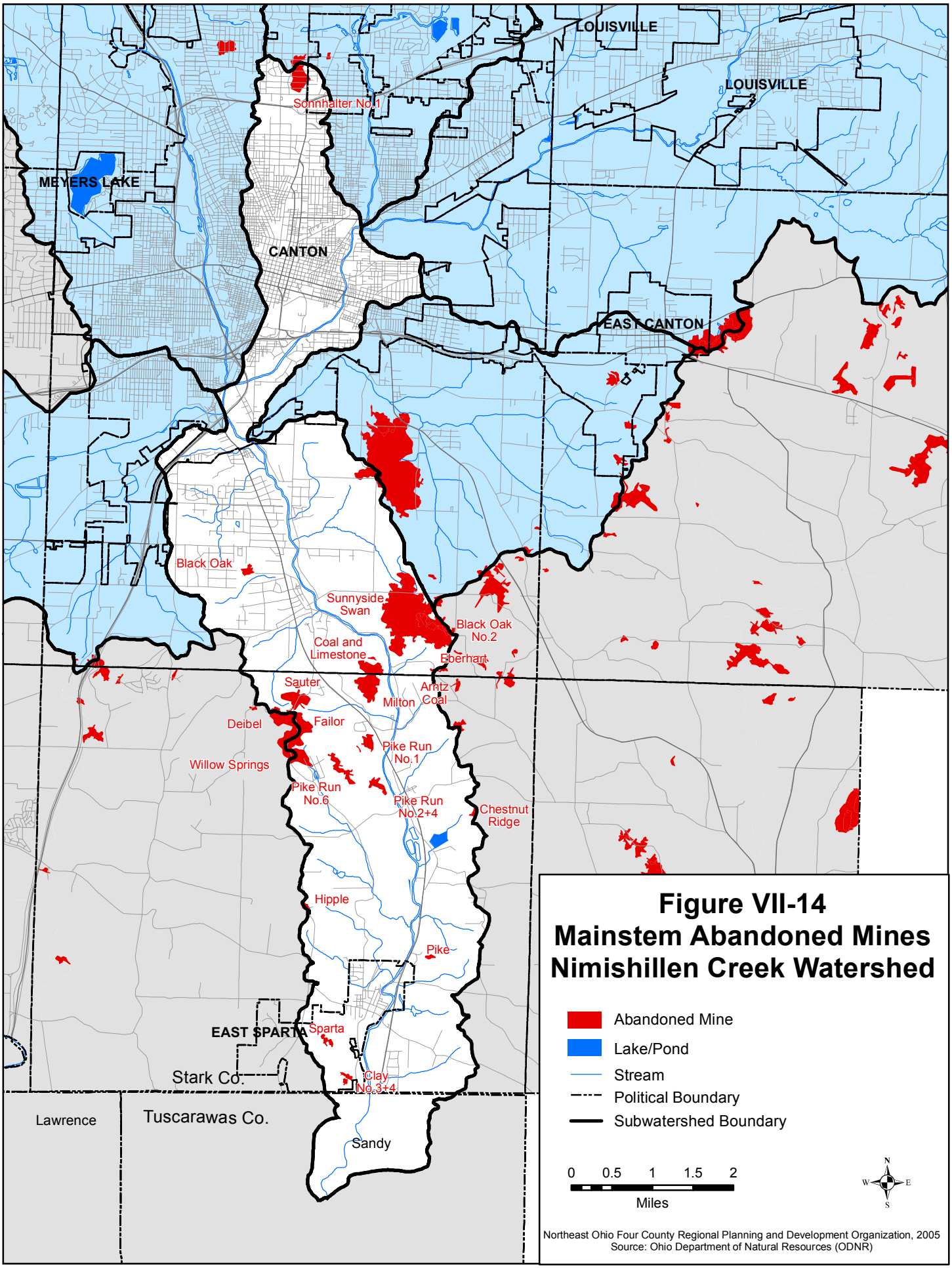


Figure VII-14
Mainstem Abandoned Mines
Nimishillen Creek Watershed

- Abandoned Mine
- Lake/Pond
- Stream
- Political Boundary
- Subwatershed Boundary

0 0.5 1 1.5 2
Miles

N
W E
S

Northeast Ohio Four County Regional Planning and Development Organization, 2005
Source: Ohio Department of Natural Resources (ODNR)

However, because the dominate bedrock in this section of the Mainstem is either Kittaning Coal or Brookville Coal, there are several current and abandoned coal mining operations. Runoff from these mines, particularly older abandoned mining areas, can negatively impact water quality of the Mainstem (Figure VII-14).

The condition of the riparian habitat is reflective of development in the basin. As would be expected in an urban area, the northern unglaciated, developed portion of the subwatershed has riparian habitat ratings of primarily "low" to "moderate" quality. In contrast, the riparian habitat in the unglaciated portion of the Mainstem is predominately "high" quality habitat (Figure VII-13). Protection of "high" quality and restoration of "low" to "moderate" quality riparian habitat is a priority.

Point Source Discharges

A point source is defined as a source that discharges pollutants, or any effluent, from a known discharge point, such as a pipe, ditch, or sewer and into a waterbody after treatment (Miller, 1988). Treatment can vary depending on the type of effluent, but generally includes the removal of solids and disinfection. Point source discharges have the potential to introduce high levels of nutrients and chemicals into a waterbody. However, these discharges are monitored and tracked by the Ohio EPA via the National Pollutant Discharge Elimination System (NPDES) program to protect local water resources.

Along the Mainstem of Nimishillen Creek, eight point sources are permitted to discharge water. These include the City of Canton's Water Pollution Control (sewage) Center, East Sparta's water treatment plant, two industrial effluents, and four private wastewater treatment systems. Table VII-36 provides information about each permitted discharge and Figure IV-1 depicts their locations in the watershed. Please note that this section does not include storm sewer outfalls, off-lot discharging home sewage treatment systems, or illegal point source discharges into the Nimishillen Creek Watershed. Point source discharge Information will be added as it becomes available.

Table VII-36: Point Source Discharging Operations in the Nimishillen Creek Mainstem Watershed			
Map Symbol	**Discharging Operation**	**Design Flow (GPD)**	**Classification**
1	A&R Machine Co. Inc. 11882 Sandyville Rd. East Sparta, OH 44626	Not Given	Industrial Discharger
9	City of Canton WPCC 3550 Central Ave. Canton, OH 44707	33.0 M	Municipal Wastewater Treatment Plant
12	East Sparta Water Treatment Plant 8930 Maplehurst Dr. East Sparta, OH 44626	Not Given	Municipal Water Treatment System
20*	Marathon Ashland Petroleum LLC 8930 Maplehurst Ave. SE East Sparta, OH 44626	Not Given	Industrial Discharger
66	Adams Fabricating Inc. 10125 Sandyville Rd. SE East Sparta, OH 44626	Not Given	Private Discharging Semi-Public Sewage Treatment System
67	Barb Huff Apartments 5477 Cleveland Ave. SE East Sparta, OH 44626	2,500	Private Discharging Semi-Public Sewage Treatment System
68	*U.S. Ceramic Tile Co. 10233 Sandyville Rd. SE East Sparta, OH 44626	Not Given	Private Discharging Semi-Public Sewage Treatment System
75	Stanley Miller Construction 2250 Howenstine Dr. East Sparta, OH 44626	Not Given	Private Discharging Semi-Public Sewage Treatment System

* Permit Expired in 2005; GPD = Gallons Per Day
Source: Ohio EPA, 2005

Water Quality Data and Impairments

Ohio EPA's TMDL Water Quality Results

The Ohio EPA conducted a biological and aquatic life use assessment for the Mainstem subwatershed from 2003 thru 2005 as part of the Nimishillen Creek TMDL (Table VII-37).

Table VII-37: Mainstem Nimishillen Creek Aquatic Life Use Attainment Status, Biological Criteria Scores, and QHEI Scores

Location - (Lower/Upper River Mile)	Use Designation	Attainment Status	Biological Criteria Scores			QHEI Scores
			IBI	MIwb	ICI	
Farber Rd. - (2.7)	WWH	Partial	34*	6.5*	34	75
Howenstien Rd. – (6.7/6.7)	WWH	Non	32*	5.4*	38	78
Faircrest Rd. - (9.2/9.6)	WWH	Non	31*	6.5*	26*	77
Upstream of Canton WWTP – (9.9)	WWH	Non	32*	6.9*	--	79.5
Upstream of Sherrick Run - (11.1)	WWH	Partial	30*	6.1*	38	68.5
Eighth St. - (14.2/14.3)	WWH	Partial	40	7.1*	38	71.5

* Indicates significant departure for applicable biocriteria (>4 IBI or ICI units, or >0.5 MIwb units).
___ Underlined scores are in the Poor or Very Poor range.

Source: Nimishillen Creek TMDL, Ohio EPA, 2009.

Impairments

Aquatic Life Use and Habitat:

Six sites were sampled by Ohio EPA with three sites (50%) in partial attainment and three sites (50%) in non attainment for WWH aquatic life use criteria. All the sites monitored had QHEI scores above the TMDL score goal of 60.

Recreation:

The Nimishillen Creek Mainstem is impaired for Primary Contact Recreation.

Fish Consumption:

There is a fish consumption advisory of only one meal per month of common carp caught from the Nimishillen Creek Mainstem. In addition, the Ohio Department of Health has issued a statewide advisory to limit meal of fish caught from all Ohio waterbodies to one meal per week due to mercury.

Ohio EPA's Causes and Sources of Impairments:

The causes of impairments for a stream are the specific pollutants or alterations that result in the stream not meeting state water quality standards. Examples of common causes of water quality impairments are siltation, flow alteration, nutrient enrichment, metals, and temperature. Sources of impairments are from where the causes originated or from where the causes of impairments are supplied from. Sources include crop production, channelization, urban runoff, dam construction, discharge pipes, and stream bank erosion. Table VII-38 lists the causes and sources of impairment for aquatic life use, recreation, and fish consumption along the Mainstem of Nimishillen Creek.

Table VII-38: Nimishillen Creek TMDL's Causes and Sources of Impairments for the Mainstem of Nimishillen Creek	
Causes of Impairment	**Sources of Impairment**
Flow Alterations	Channelization – Agriculture
Nutrients	Municipal Point Source
Pathogens	Onsite Home Sewage Treatment (Septic) Systems
Sources: Nimishillen Creek TMDL, Ohio EPA, 2009.	

Load Reduction Information

Nutrient, habitat and bacteria (pathogen) TMDLs were completed for the Mainstem of Nimishillen Creek. Tables VII-39 thru VII-41 summarizes the Mainstem's load reductions outlined in the Nimishillen Creek TMDL. For more information of the load reduction information, please refer to Section V above.

Table VII-39: Mainstem's TMDL and Allocations of Total Phosphorus

	Design Flow (MGD)	Phosphorus WLA/LA at Sources		Phosphorus Loads at Compliance Points[1] (kg/day)		
		Conc. (mg/l)	Load (kg/day)	TMDL[2]	WLA[2]	LA[2]
Nimishillen Creek				21.78	21.368	0.416
Canton WPCF	39.00	0.40	59.05			
Canton Water Dept. NE Plan	0.16	1.00	0.60			
Marathon Ashland Petroleum	1.67	0.27	1.70			
Timken Company	3.50	0.27	3.58			
Nonpoint Sources	-	-	1.34			

1 Compliance point at RM 0.62 on Nimishillen Creek. The allocations for the Nimishillen Creek compliance point reflect the sum of the loads contributed in Nimishillen Creek.

2 The loads contributed to the streams decay and assimilate so that the TMDL is met at both compliance points.

Abbreviations: MGD=million Gallons per Day; WLA = Waste Load Allocation; LA = Load Allocation; mg/l = milligrams per liter; kg/day = kilograms per day; WWTP = wastewater treatment plan; WPCF = water pollution control facility; Conc. = concentration

Source: Nimishillen Creek TMDL, Ohio EPA, 1999.

TableVII-40: Total Existing Load, TMDL, and Allocations of Fecal Coliform Loads (recreation season) for the Mainstem Nimishillen Creek

Existing Loads			TMDL[1]	% Reduction	Allocations	
PS	NPS	Total			WLA	LA
664.3	2.49	666.8	94.6	85.5	92.1	2.49

Point Source (PS) Fecal Coliform Loads. These Include Existing, Percent Reduction Required, and Wasteload Allocation (WLA) by Source

	NPDES Discharger	MS4	HSTS	Total WLA
Existing	24.82	0.07	639.39	664.3
% Reduction	0	0	98.5	
Allocation	24.82	0.07	67.20	92.1

Nonpoint Source (NPS) Fecal Coliform Loads. These Include Existing, Percent Reduction Required, and Wasteload Allocation (WLA) by Source

	Cropland	Pasture	Forest	Urban	Cattle in Stream	Total LA
Existing	0.77	0.64	0.98	0.09	0	2.49
% Reduction	0	0	0	0	-	
Allocation	0.77	0.64	0.98	0.09	0	2.49

[1] cfu * 10^3 * season^{-1} (for cfu * 10^3 * day^{-1} divided each value by 138)
Source: Nimishillen Creek TMDL, Ohio EPA, 2009

Table VII-41: Habitat TMDL for the Mainstem Nimishillen Creek

	Allocations			TMDL
	QHEI Score	# of High Influence Attributes	Total # of Modified Attributes	
TMDL Targets	≥ 60 = 1 point	< 2 = 1 point	< 5 = 1 point	3 points

Location - (Lower/Upper River Mile)	QHEI Score	# of High Influence Attributes	Total # of Modified Attributes	Sub-Score			Total Habitat Score
				QHEI Score	High Influence	Total # Modified	
Eighth St. - (14.2/14.3)	71.5	1	7	1	1	0	2
Upstream of Sherrick Run - (11.1)	68.5	1	5	1	1	0	2
Upstream of Canton WWTP – (9.9)	79.5	0	6	1	1	0	2
Howenstien Rd. – (6.7/6.7)	78	0	3	1	1	1	3
Farber Rd. - (2.7)	78	0	3	1	1	1	3

* Note that stream is designated Modified Warmwater Habitat (MWH)
Source: Nimishillen Creek TMDL, Ohio EPA, 2009.

Other Water Quality Information

Nimishillen Creek Macroinvertebrate Survey - 2000, 2002, and 2004: Since 2000, NEFCO has conducted three macroinvertebrate surveys along Nimishillen Creek. Two of the seventeen sites sampled are located along the

Creek's Mainstem. Table VII-42 summarizes the results of the sampling using ODNR's Stream Quality Monitoring Program protocol.

Table VII-42: Mean Cumulative Index Values* (CIV) for the Nimishillen Creek Mainstem Based on NEFCO's Macroinvertebrate Surveys

Station Location	Mean CIV**		
	2000 Segment Condition	2002 Segment Condition	2004 Segment Condition
River Mile 13.14 - Cherry Rd. and Sherrick Dr.	15 Fair	13 Fair	18 Good
River Mile 8.97 - Baum Rd. Bridge	12 Fair	14 Fair	14 Fair

* Stream Quality Assessment **Excellent: >22, Good: 17-22, Fair: 11-16, Poor < 11
(Source: ODNR, Stream Quality Monitoring Manual).

Results show "Fair" to "Good" mean scores for river mile 13.14 site and "Fair" scores for the site at river mile 8.97. The Ohio EPA found that generally ODNR's Stream Quality Monitoring Program tend to reflect attainment and non-attainment aquatic life uses. "Excellent" scores in the ODNR method commonly meet the Ohio EPA attainment standards, while stream segments with "Fair" or "Poor" scores generally are assessed as being in non-attainment (Yoder and Davis, 1996). The 2004 scores for both sites along the Mainstem, which have the highest scores of the three years of sampling, indicate that the macroinvertebrate community is not declining.

Water Quality Permit Support Document for Canton WWTP (2000)

The Ohio EPA extensively sampled the Mainstem of Nimishillen Creek in 1998 to determine NPDES permit limits for the City of Canton's Water Pollution Control Center (wastewater treatment plant) located at river mile 9.9 (Table VII-43). The focus of the sampling was to determine the impact of point source dischargers into this section of Nimishillen Creek. Although causes of impairments were identified, nonpoint sources of impairment were not investigated in this report.

Table VII-43: Ohio EPA 1998 Aquatic Life Use Sampling Results from Nimishillen Creek Mainstem

River Mile	IBI	MIwb	ICI	QHEI	Attainment Status	Ohio EPA's Comments
14.2	**35**	**7.4**	**34**	76.5	**Full**	Downstream of East & Middle Branches
11.7	30	5.7	**30**	79.5	Non	Downstream of West Branch
11.2	32	6.1	**30**	77.0	Partial	Downstream of Hurford Run
10.2	30	6.1	**32**	76.5	Partial	Upstream of Canton WWTP
9.9	20	4.4	--	--	--	Canton WWTP Mix Zone
9.8	31	5.5	--	66.5	Non	Downstream of Canton WWTP
6.7	35	6.2	--	75.0	Partial	Howenstine Road
0.6	32	5.4	--	73.0	Non	Upstream of Mouth

BOLD = meeting or a nonsignificant departure from ecoregion biocriteria
IBI = Index of Biological Integrity (fish); MIwb = Modified Index of Well Being (fish); ICI = Invertebrate Community Index; QHEI = Qualitative Habitat Evaluation Index; WWTP = Wastewater Treatment Plant
Source: October 2000 Water Quality Permit Support Document for Canton WWTP

The subwatershed resides in two ecoregions: Erie/Ontario Lake Plain (EOLP) and Western Allegheny Plateau (WAP). Each of these ecoregions have different values for attainment in each biocriteria category. The Index of Biological Integrity (IBI) and the Modified Index of Well Being (MIwb) are based of fish sampling. The Invertebrate Community Index (ICI) is determined by measuring the macroinvertebrate community. Below is the criteria each stream must reach to be considered in attainment for each ecoregion:

EOLP Ecoregion Biocriteria for WWH Attainment:
IBI = 38 (wading)
MIwb = 7.9 (wading)
ICI = 34

WAP Ecoregion Biocriteria for WWH Attainment:
IBI = 44 (wading)
MIwb = 8.4 (wading)
ICI = 36

All sites sampled by the Ohio EPA except the two most downstream sites (river mile 6.7 and 0.6) reside in the EOLP ecoregion, with the two downstream sites in the WAP ecoregion. For ICI and IBI biocriteria, values cannot be more than 4 units lower than the ecoregion attainment value to be considered in attainment. The MIwb score must not be more than 0.5 units lower than the ecoregion attainment value to be considered in attainment.

The Qualitative Habitat Evaluation Index (QHEI) is used by the Ohio EPA to evaluate the physical habitat at each sampling site. Statewide, scores generally

range from 20 to less than 100. Data from hundreds of sites throughout Ohio show that values greater than 60 generally are conducive to the existence of warmwater fish and invertebrates, while scores less than 45 generally do not support these warmwater species. QHEI scores for all the areas sampled are above 60 and therefore should be able to support a normal array of warmwater aquatic life. The majority of the QHEI scores are above 75 which are frequently associated with habitat in areas with exceptional warmwater biology.

Mainstem Subwatershed Issues:

1. **Riparian Corridor Protection**
2. **Soil Erosion and Sedimentation**
3. **Acid Mine Drainage**
4. **Environmental Education**
5. **Storm Water Runoff and Flooding**

The Mainstem has several nonpoint source pollution issues resulting in water quality impairments. Due to its location at the lower end of the watershed, many of the Mainstem's problems originate outside of its subwatershed boundaries along its primary tributaries. However, there are NPS pollution issues occurring within the Mainstem watershed that are contributing to its continued impairment, or working against the recovery of Mainstem's water quality.

Using available data and information along with personal knowledge on this section of Nimishillen Creek, watershed stakeholders ranked the top five issues they believe to be hindering water quality attainment in this subwatershed. Under each of the five issues are a goal and objectives statements accompanied by recommended actions. Please note that the recommended actions are not intended to be a comprehensive list of actions that could address each issue; but rather, a list of actions that the stakeholders believe is the best course of action given the current circumstances and available information. Refer to NEFCO's *Nimishillen Creek Comprehensive Watershed Management Plan - Phase III* for a more comprehensive list of water quality improvement actions for Nimishillen Creek (NEFCO, 2001).

"Focus Areas" were also included under each objective to indicate specific areas to direct actions, if known, and a "Target" was establish to help evaluate the objective and measure accomplishments. Lastly, "Responsible Parties" are identified if a watershed action is ongoing, while "Suggested Responsible Parties" indicate who could take the lead on actions not yet being implemented.

Mainstem Issue #1 - Riparian Corridor Restoration and Protection

Goal: Maintain and protect areas with "high" riparian habitat scores, and restore habitat areas with "poor" or "moderate" riparian habitat scores to the next attainment level.

Objectives:

1. Purchase land along the riparian corridor for habitat protection and public use.
   Focus Areas: Mouth (RM 0) to Sherrick Run (RM 11)

Target: Purchase or protect 5 acres per year of "high" quality riparian habitat

2. Establish policies to protect the riparian corridor and habitat.
   Focus Areas: Entire Subwatershed
   Target: Adoption of policies by the county and municipalities
3. Restore riparian habitat where possible.
   Focus Areas: Sherrick Run (RM 11) to Cook Park (RM 15)
   Target: Restore 3 percent or approximately 1,000 linear feet of "poor" or "moderate" quality riparian habitat

Mainstem Issue #1 - Recommended Actions Tables:

Action A: Encourage city and county park districts to purchase selected areas to protect and/or increase intact riparian corridor.	
Suggested Responsible Parties:	Stark Parks; Canton Parks Commission; Village of East Sparta
Funding Options:	Clean Ohio Fund; Ohio EPA Section 319 NPS Grant; WPCLF; PL-566
Time Frame:	Ongoing
Expected Improvements:	Maintain or increase riparian habitat scores
Evaluation Method:	Number of riparian acres purchased; Riparian habitat scores
Estimated Costs:	$0 - $5,000 and up per acre; $4,000 and up average set up and maintenance fee
Estimated Load Reduction:	Riparian Buffer Strips General Removal Efficiencies: TSS = 40%-90%; TP = 30%-90%; TN = 20%-60%; Metals = 20%-80%

Action B: Assist communities with the development of township or municipal ordinances requiring new construction sites to leave easements or a specific distance near shorelines of targeted wetlands and flood plains of streams.	
Suggested Responsible Parties:	Local and County Planning and Zoning Boards; Stark SWCD
Funding Options:	NPS Education Grant; OEEF; Local Funds
Time Frame:	2006 thru 2008
Expected Improvements:	Protection of shoreline and riparian corridor resulting in increased riparian habitat scores, reduction in stream bank erosion, and floodway protection
Evaluation Method:	Number of ordinances established and enforced; Riparian and shoreline miles protected; Riparian habitat scores
Estimated Costs:	Variable
Estimated Load Reduction:	Vegetated Buffer Strips General Removal Efficiencies: TSS = 40%-90%; TP = 30%-90%; TN = 20%-60%; Metals = 20%-80%

Action C: Provide incentives for landowners to protect shoreline or riparian corridor with long-term protection or permanent conservation easements	
Suggested Responsible Parties:	Local and County Planning and Zoning Boards; Non-Profit Environmental Groups and Land Conservancies
Funding Options:	Clean Ohio Fund; CWA Section 319 NPS Grant; WRP; CRP; PL-566
Time Frame:	2006 thru 2010
Expected Improvements:	Protection of shoreline and riparian corridor resulting in increased riparian habitat scores, reduction in stream bank erosion, and floodway protection
Evaluation Method:	Linear feet set aside for long-term protection; Number of permanent conservation easements; Riparian habitat scores
Estimated Costs:	$0-$5,000 per acre and up for easement; $4,000 and up average set up and maintenance fees
Estimated Load Reduction:	No direct reduction in pollution loads expected from action; however, long-term or permanent protection measures will reduce future pollution loading

Action D: Assist shoreline and riparian landowners to replant shoreline and riparian corridor for selected wetlands, lakes and streams.	
Suggested Responsible Parties:	Stark SWCD; NEFCO; USDA - NRCS; Earth Action Partnership; Ohio EPA; ODNR - DSWC; ODNR - Division of Wildlife
Funding Options:	EQUIP; CRP; WPCLF; CWA Section 319 NPS Grant; PL-566; SIP
Time Frame:	2006 thru 2010
Expected Improvements:	Restoration of shoreline and riparian corridor, increased riparian habitat scores, improved wildlife habitat, and reduction in stream bank erosion during high flow events
Evaluation Method:	Linear feet of replanted riparian habitat; Wildlife surveys; Riparian habitat scores
Estimated Costs:	\$0.25 - \$1.10 per yd^2 Seeded and Mulched; \$0.40 - \$0.50 per Seedling Planted; Tree Plantings = \$800 per acre; Fiber Rolls = \$12.00 per Linear Foot; Plant Cuttings = \$0.40 - \$0.50 per Cutting; Erosion Control Blankets = \$2.00 per yd^2
Estimated Load Reduction:	Erosion Control Blankets: Runoff Reduction = 80%; Erosion Rate Reduction = up to 99%; V Fiber Rolls: TSS Reduction = 58% Vegetated Buffer Strips General Removal Efficiencies: TSS = 40%-90%; TP = 30%-90%; TN = 20%-60%; Metals = 20%-80% Wetland Median Removal Efficiencies: TSS = 76%; TP = 46%; Orthophosphate Phosphorus = 28%; N

Mainstem Issue #2 - Soil Erosion and Sedimentation

Goal: Establish appropriate best management practices to reduce soil erosion on steep slopes and along stream banks.

Objectives:

1. Reduce erosion of stream banks and shorelines.
   Focus Areas: 9th Street and Fulton
   Target: To be determined
2. Ameliorate impacts of soil erosion from construction sites.
   Focus Areas: To be determined
   Target: To be determined
3. Reduce soil erosion from agriculture and pasture areas.
   Focus Areas: To be determined
   Target: To be determined
4. Reduce the impact of storm water runoff from urban and suburban areas.
   Focus Areas: To Be Determined
   Target: To be determined

Mainstem Issue #2 - Recommended Actions:

Action A: Assist shoreline and riparian landowners to stabilize shoreline and riparian corridor using appropriate BMPs.	
Suggested Responsible Parties:	County SWCDs; NEFCO; ODNR - DSWC; USDA - NRCS; Earth Action Partnership; ODNR - Division of Wildlife
Funding Options:	EQUIP; CRP; WPCLF; CWA Section 319 NPS Grant; PL-566; SIP
Time Frame:	2005 thru 2008
Expected Improvements:	Restabilization of shoreline and riparian corridor; Reduction in stream bank erosion; Improved wildlife habitat
Evaluation Method:	Linear feet of bank or shoreline stabilized; Wildlife survey; Riparian habitat scores
Estimated Costs:	Approximately $350,000 to restore or stabilize 1,300 linear feet of stream channel; Fiber Rolls = $12.00 per linear foot; Plant Cuttings = $0.40 - $0.50 per cutting; Erosion Control Blankets = $2.00 per yd^2
Estimated Load Reduction:	Erosion Control Blankets: Runoff Reduction = 80%; Erosion Rate Reduction = up to 99%; V Fiber Rolls: TSS Reduction = 58% Buffer Strips General Removal Efficiencies: TSS = 40%-90%; TP = 30%-90%; TN = 20%-60%; Metals = 20%-80% Erosion Control Blankets: Runoff Reduction = 80%; Erosion Rate Reduction = up to 99%; V

Action B: Implement control measures to reduce impacts from construction sites. Control measures include frequent inspection of construction site, vegetated buffer strips and riparian zones near construction sites, and promoting the design of post-construction BMPs that addresses both water quantity and quality.	
Responsible Parties:	Stark County SWCD; Stark County Regional Planning
Funding Options:	Locally Funded
Time Frame:	Currently ongoing as part of the Storm Water NPDES Phase II Program
Expected Improvements:	Reduction in sediment erosion, transport, and deposition from construction sites
Evaluation Method:	Number of construction site inspections; Number of riparian buffer strips at construction sites; Number of post-construction BMPs implemented; Calculated/modeled reduction in sediment entering Nimishillen Creek as a result of control measures
Estimated Costs:	Site Inspections = $250 - $2,000 depending on size (Stark SWCD); Buffer Strips = $0.25 - $1.10/yd^2 seeded and mulched, $0.40 - $0.49/seeding planted; Detention Basin = $10,000 - $50,000 per system depending on size and features; Fiber Rolls = $12.00 per linear foot; Plant Cuttings = $0.40 - $0.50 per cutting; Erosion Control Blankets = $2.00 per yd^2
Estimated Load Reduction:	Detention Basin General Removal Efficiencies: TSS = 55%-100% Grass Swales General Removal Efficiencies: TSS = 81%; TP = 29%; Nitrate = 38%; Metals =14%-55%; Buffer Strips General Removal Efficiencies: TSS = 40%-90%; TP = 30%-90%; TN = 20%-60%; Metals = 20%-80% Porous Pavement General Removal Efficiencies): Sediment = 82%-95%; TPs = 65%; TN = 80%-85% Silt Fence General Removal Efficiency: TSS = 75%-80% Erosion Control Blankets: Runoff Reduction = 80%; Erosion Rate Reduction = up to 99%;

Action C: Implement appropriate structural BMPs to alleviate soil-related pollution for agricultural runoff. Appropriate BMPs include livestock exclusion fencing, off-stream watering facilities, grassed and forested buffer strips in agricultural areas, and water and sediment control basins equipped with treatment systems for water quality improvements.	
Responsible Parties:	Stark SWCD; USDA - NRCS; Ohio Farm Bureau; ODNR - DSWC
Funding Options:	EQUIP; CRP; WPCLF; PL-566; CWA Section 319 NPS Grants; SIP
Time Frame:	Ongoing
Expected Improvements:	Lower soil-related pollution from agricultural areas; Reduction in bacteria and pathogens entering Nimishillen Creek via livestock
Evaluation Method:	Linear feet of livestock exclusion fencing installed; Number of off-stream watering facilities associated with livestock exclusion fences; Linear feet of grassed and forested buffer strips established; Number of water and sediment control basins established; Calculated or modeled reduction in sediment entering Nimishillen Creek as a result of control measures.
Estimated Costs:	Fencing = $4.70 per linear foot for barbed wire; Watering Station = $1,500 - $2,000 and up; Buffer Strips = $0.25 - $1.10 per yd^2 seeded and mulched, $0.40 - $0.49 per seeding planted; Detention Basin = $10,000 - $50,000 per system depending on size and features
Estimated Load Reduction:	Livestock Exclusion Fencing and Off-Stream Watering Facilities = V Buffer Strips General Removal Efficiencies: TSS = 40%-90%; TP = 30%-90%; TN = 20%-60%; Metals = 20%-80% Water and Sediment Control Basins General Removal Efficiencies: TSS = 50%-90%; TP = 20%-90%; TN = 10%-90%

Action D: Installing BMPs to treat and absorb runoff from impervious areas. Types of BMPs include porous pavement, infiltration basins, treatment wetlands, and grass swales.	
Responsible Parties:	Stark County SWCD; County Engineers; Local and County Planning and Zoning Boards; USDA - NRCS; NEFCO
Funding Options:	WPCLF; CWA Section 319 NPS Grant
Time Frame:	Grass Swales - ongoing Infiltration Basins - ongoing Impervious Pavement - 2006 thru 2010 Treatment Wetland - ongoing
Expected Improvements:	Decreased runoff, which may contain dissolved solids and other pollutants, from impervious areas; Decreased quantity of water reaching Nimishillen Creek; Decrease in nutrients, sediment, and other pollutant from reaching the creek
Evaluation Method:	Acres of impervious pavement installed; Linear feet of grass swales installed; Number of infiltration basin and treatment wetlands installed
Estimated Costs:	$3.20/linear foot for grass-lined diversion; $3.60/linear foot for grass-lined waterway; Approximately $15,000 for 5,000 ft^2 Grasspave porous pavement installed; Infiltration Basin = $10,000 to $50,000 and up; Treatment Wetland = $50,000 - $100,000 and up
Estimated Load Reduction:	Porous Pavement General Removal Efficiencies): Sediment = 82%-95%; TPs = 65%; TN = 80%-85% Infiltration Basin General Removal Efficiencies: TSS = 75%; TP = 60%-70%; TN = 55%-60%; Metals = 85%-90%; E Treatment Wetland Median Removal Efficiencies: TSS = 76%; TP = 46%; Orthophosphate Phosphorus = 28%; N Grass Swales General Removal Efficiencies: TSS = 81%; TP = 29%; Nitrate = 38%; Metals =14%-55%; E

Mainstem Issue #3 - Acid Mine Drainage (AMD)

Goal: Identify and reduce pollution from acid mine drainage sources in order to improve aquatic life along the Mainstem of Nimishillen Creek.

Objectives:

1. Decrease the impacts of acid mine drainage entering Nimishillen Creek Mainstem.
   Focus Areas: Howentein Rd. Bridge (RM 6.7)
   Target: Complete abatement plan by 2007
2. Establish a biological and chemical monitoring program for areas impacted by acid mine drainage.
   Focus Areas: Mouth (RM 0) to Sherrick Run (RM 11)
   Target: To be determined
3. Investigate known abandoned mines in the watershed to determine which are impacting Nimishillen Creek Mainstem.
   Focus Areas: Mouth (RM 0) to Sherrick Run (RM 11) and Tributaries

Target: Completed by 2007

Mainstem Issue #3 - Recommended Actions:

Action A: Decrease acid mine drainage entering the Mainstem of Nimishillen Creek by using the best available technology.	
Suggested Responsible Parties:	ODNR - Division of Mineral Resources Management; Stark County; Stark County Health Department; Ohio EPA; NEFCO; Crossroads RC&D; Rural Action; Nimishillen Creek Watershed Partners
Funding Options:	CWA Section 319 NPS Grant; State and Federal Abandoned Mine Land (AML) Reclamation Programs; Rural Abandoned Mine Program (RAMP); Appalachian Clean Stream Program (ACSP); WRRSP
Time Frame:	2006 thru 2010
Expected Improvements:	Reduction in dissolved metals, acids, and flocculates (yellow boy) associated with AMD; Improved biology in the Creek
Evaluation Method:	Macroinvertebrate monitoring; Chemical sampling of effluent; Number of AMD abatement projects completed
Estimated Costs:	Variable - site dependent
Estimated Load Reduction:	To be determined

Action B: Establish long-term chemical and biological monitoring program for AMD areas.	
Suggested Responsible Parties:	NEFCO; Earth Action Partnership; Crossroads RC&D; Stark County SWCD; Stark County Health Department; Local University
Funding Options:	CWA Section 319 NPS Grant; OEEF; Private Sector
Time Frame:	2007 and beyond
Expected Improvements:	Increase knowledge of the extent of the AMD problem along the Mainstem; Better evaluation of AMD abatement projects
Evaluation Method:	Macroinvertebrate monitoring; Chemical sampling of effluent
Estimated Costs:	- Macroinvertebrate Volunteer Monitoring: $15 per volunteer per hour + $50 monitoring kit; - NEFCO Macroinvertebrate Monitoring = $750 per site; - Chemical Sampling: $500 - $1,000 and up for laboratory tests + cost of collection and transportation
Estimated Load Reduction:	No direct reduction in pollution loads expected from action

Action C: Investigate remaining abandoned mines in the watershed and determine if acid mine drainage is impacting the water quality of Nimishillen Creek Mainstem and its tributaries.	
Suggested Responsible Parties:	NEFCO; Earth Action Partnership; Crossroads RC&D; Stark County SWCD; Stark County Health Department; Local University
Funding Options:	Private Sector; CWA Section 319 NPS Grant
Time Frame:	2006 thru 2007
Expected Improvements:	Increase knowledge of the extent of the AMD problem along the Mainstem
Evaluation Method:	List of sites visited; Documentation of AMD problems
Estimated Costs:	To Be Determined
Estimated Load Reduction:	No direct reduction in pollution loads expected from action

Mainstem Issue #4 - Environmental Education

Goal: Educate residents, government officials, and businesses about watershed issues impacting Nimishillen Creek Mainstem.

Objectives:

1. Educate riparian and shoreline landowners on the value of a healthy riparian habitat.
   Focus Areas: All riparian land owners
   Target: Distribute information to 50% of the riparian land owners
2. Reduce illegal dumping into the Mainstem.
   Focus Areas: City of Canton and Canton Township
   Target: To be determined
3. Increase general knowledge of local watershed issues.
   Focus Areas: Entire Subwatershed
   Target: Direct contact with 25 Mainstem stakeholders per year

Mainstem Issue #4 Recommended Actions Tables:

Action A: Identify shoreline and riparian landowners and educate them about the importance of shoreline or riparian zone protection.	
Suggested Responsible Parties:	NEFCO; Earth Action Partnership; Stark Parks
Funding Options:	NPS Education Grant; OEEF; WPCLF; CWA Section 319 Grant; Private Sector
Time Frame:	2006 thru 2008
Expected Improvements:	Increased protection of shoreline and riparian corridor
Evaluation Method:	List of riparian landowners; Number of education pamphlets distributed; Riparian habitat scores
Estimated Costs:	Riparian landowner list = 3 days work; Pamphlets = $1.50 - $3.00 per pamphlet
Estimated Load Reduction:	No direct reduction in pollution loads expected from action

Action B: Distribute flyers informing watershed residents on how to identify suspicious activities and who to contact to report illegal activities. Types of activities targeted illegal dumping, illegal discharges, and the filling in of floodplain and wetland areas.	
Suggested Responsible Parties:	Ohio EPA - Division of Environmental and Remedial Response; NEFCO; Earth Action Partnership; Stark County Health Department
Funding Options:	NPS Education Grant; OEEF; CWA Section 319 Grant; Private Sector
Time Frame:	2006 and on
Expected Improvements:	Decrease in illegal activities that can cause reduced habitat and/or water quality
Evaluation Method:	Number of flyers distributed; Number of contacts made to authorities listed on flyers; Number of illegal water resource activities stopped or corrected
Estimated Costs:	$1.50 - $3.00 per flyer or fact sheet
Estimated Load Reduction:	Variable depending on the type of illegal activity prevented

Action C: Educate residents about watershed issues through regularly scheduled events and activities that are recognized by the public. These events and activities can include watershed surveys, presentations at local meetings, information booths at local fairs, creek clean-ups, and other public meetings.	
Suggested Responsible Parties:	Nimishillen Creek Watershed Partners; NEFCO; Stark SWCD; Stark County RPC; Stark County Health Department
Funding Options:	Private Sector; NPS Education Grant; OEEF Grant; CWA Section 319 NPS Grant; Local Funds; Private Sector
Time Frame:	Ongoing
Expected Improvements:	Greater awareness regarding watershed issues
Evaluation Method:	Number of: Events held; Surveys taken; Presentations given; Fairs attended; Public meetings held
Estimated Costs:	Survey = $2.00 per survey; Presentation = $3,000 and up per 80 picture slide/PowerPoint show; County Fair Display = $1,000 and up + $1.50 to $3.00 per pamphlet + $15.00 per volunteer hour; Public Meeting = $1,200 per meeting
Estimated Load Reduction:	No direct reduction in pollution loads expected from action

Action D: Implement a watershed protection and awareness program in local schools.	
Suggested Responsible Parties:	Stark Parks; Ohio EPA - Division of Surface Water; County SWCDs; Local Boards of Education; Local Schools; Earth Action Partnership
Funding Options:	OEEF; NPS Education Grant; CWA Section 319 NPS Grant
Time Frame:	2006 thru 2007
Expected Improvements:	Stronger knowledge of future generations regarding the importance of watershed protection
Evaluation Method:	Number of local schools implementing program; Number of students exposed to watershed education efforts
Estimated Costs:	$400 - $7,000
Estimated Load Reduction:	No direct reduction in pollution loads expected from action

Action E: Educate homeowners on ways to deter waterfowl from grazing on their property and on the proper disposal of pet wastes.	
Suggested Responsible Parties:	Earth Action Partnership; Stark Parks; NEFCO; Stark SWCD
Funding Options:	OEEF; NPS Education Grant; CWA Section 319 NPS Grant; Private Sector
Time Frame:	2006 and beyond
Expected Improvements:	Reduced nutrients and bacteria entering Nimishillen Creek from waterfowl and domestic animal waste
Evaluation Method:	Number of information pamphlets or fact sheets distributed
Estimated Costs:	$1.50 - $3.00 per pamphlet of fact sheet
Estimated Load Reduction:	Localized Decrease in Bacteria, Phosphorus, and Nitrogen Levels Estimated Nitrogen Reduction = Number of Geese Reduced x 82 g Estimated Phosphorus Reduction = Number of Geese Reduced x 82 g

Mainstem Issue #5 - Storm Water Runoff and Flooding

Goal: Reduce storm water runoff and flooding along the Nimishillen Creek Mainstem while protecting and promoting water quality and riparian habitat protection and restoration.

Objectives:

1. Reduce stressors that contribute to flooding (log jams, floodplain incursion, decreased riparian vegetation, wetland filling, etc.).
   Focus Areas: Canton South; Canton Township; East Sparta
   Target: To be determined
2. Educate subwatershed stakeholder about flooding issues.
   Focus Areas: Entire Subwatershed
   Target: Direct contact with 50 subwatershed stakeholders per year
3. Improve floodplain management.
   Focus Areas: Entire Subwatershed
   Target: To be determined
4. Promote natural channel design principles in the Nimishillen Creek Watershed.
   Focus Areas: To be determined
   Target: Organize a workshop to promote natural channel design

Mainstem Issue #5 - Recommended Actions:

Action A: Remove log jams and other obstructions that cause localized flooding in the Subwatershed	
Suggested Responsible Parties:	Landowners; Stark County Drainage Task Force; Stark County Engineer; Stark Parks; Stark County RPC; Muskingum Watershed Conservancy District; Stark SWCD; Municipalities; Stark EMA
Funding Options:	Storm Water Utility; Conservation District Assessment; Private Sector
Time Frame:	Ongoing by Stark County
Expected Improvements:	Reduction in localized flooding and erosion caused by obstructions like log jams
Evaluation Method:	Number of obstructions removed
Estimated Costs:	$0 - $1,000 and up; dependent on the size of the obstruction
Estimated Load Reduction:	Variable: Removal will likely decrease localized erosion caused by the redirection of flow around the obstruction. Increase in dissolved oxygen levels likely if the log jam has a standing pool.

Action B: Distribute information from Ohio Emergency Management Agency (OEMA) and the Federal Emergency Management Agency (FEMA) about flooding and mitigation to residence. Hold regular meetings about local flooding issues.	
Suggested Responsible Parties:	Stark County Drainage Task Force; Stark County EMA; Nimishillen Creek Watershed Partners; Stark County RPC; Municipalities; Stark Parks; Stark SWCD
Funding Options:	OEEF; Storm Water Utility; Conservation District Assessment
Time Frame:	Ongoing by the Stark County Drainage Task Force and Stark County EMA
Expected Improvements:	Increased understand by residents of flooding issues and assistance available in the Nimishillen Creek Watershed
Evaluation Method:	Number of pamphlets distributed; Number of meetings held
Estimated Costs:	Public Meeting = $1,200 per meeting; $15 per person for workshop; $1.50 - $3.00 per pamphlet or fact sheet
Estimated Load Reduction:	No direct reduction in pollution loads expected from action

Action C: Develop a comprehensive flood abatement strategy for the entire Nimishillen Creek Watershed that includes problem identification, a funding strategy, and an education plan.	
Suggested Responsible Parties:	Nimishillen Creek Drainage Task Force; Stark Parks; Stark RPC; Municipalities; U.S. Army Corps of Engineers
Funding Options:	Storm Water Utility; Conservation District Assessment; Private Sector; Federal Appropriations
Time Frame:	Ongoing
Expected Improvements:	Understanding of flooding issues by local government officials and residents; Coordinated efforts in handling flooding problems
Evaluation Method:	Completion of a comprehensive flooding plan for the watershed.
Estimated Costs:	$1,000,000 and up
Estimated Load Reduction:	To be determined

Action D: Encourage and support activities and/or policies that reduces floodplain incursion, wetland filling, riparian habitat loss, and other activities that contribute to increased flooding.	
Suggested Responsible Parties:	Nimishillen Creek Drainage Task Force; Stark Parks; Stark RPC; Municipalities;
Funding Options:	Storm Water Utility; Conservation District Assessment; WRP; CRP; Clean Ohio Fund; Private Sector; CWA Section 319 NPS Grant; Private Sector
Time Frame:	2006 thru 2020
Expected Improvements:	Preserve and maintain remaining natural features (floodplains, wetlands, etc.) that helps abate flooding in the Nimishillen Creek Watershed.
Evaluation Method:	Number of local policies or ordinance adopted to protect floodplains, riparian habitat, and wetlands; Acres protected and preserved
Estimated Costs:	Storm Water Utility = $20 - $50 per parcel per year (residential); Conservation District Assessment = $2 - $35 per year per parcel (residential); Conservation Easement = $0 - $5,000 and up per acre + $4,000 and up average set up and maintenance fee; Constructed Wetland = $45,000 - $110,000 and up
Estimated Load Reduction:	Constructed Wetland Median Removal Efficiencies: TSS = 76%; TP = 46%; Orthophosphate Phosphorus = 28%; N

Action E: Investigate establishing a watershed program to reward landowners that adopt natural channel design principles on their property.	
Suggested Responsible Parties:	NEFCO; Stark County Drainage Task Force; Stark RPC; Stark SWCD; ODNR
Funding Options:	Storm Water Utility; Conservation District Assessment; CWA Section 319 NPS Grant
Time Frame:	2007thru 2008
Expected Improvements:	Increased understanding of natural channel design concepts in the watershed; Improved biological and QHEI scores if enacted
Evaluation Method:	Miles of stream restored using natural channel design techniques; QHEI scores; Macroinvertebrate scores
Estimated Costs:	To be determined
Estimated Load Reduction:	To be determined

VIII. Water Quality Monitoring

The City of Canton and NEFCO have been conducting macroinvertebrate and habitat monitoring in the Nimishillen Creek Watershed since 2000. Results have been used to establish base line information regarding the creek's water quality and habitat conditions in addition to identifying causes and sources of water quality impairments. Results from these monitoring efforts can be located in the subwatershed plans in Section VII of this plan.

As mentioned in Section V, the Ohio EPA is currently working on the Total Maximum Daily Load (TMDL) report for the Nimishillen Creek Watershed. This report will provide detailed water quality monitoring information collected by the agency in 2004 and 2005. In addition, the report will contain modeling information for the sections of Nimishillen Creek that are not meeting designated water quality standards. This report is scheduled for completion by 2007. It is hoped that this study will help local stakeholders focus future water quality monitoring efforts to reduce cost and improve effectiveness.

Current and future water quality monitoring efforts are also outlined in each subwatershed plan found in Section VII. Please refer to this section from more monitoring information.

IX. Evaluation and Funding

Evaluation

Evaluation of the effectiveness of this action plan will largely rest on the ability to evaluate the success of the actions this plan recommends. To this end, each action found in Section VII contains information on evaluation methods, estimated costs, general load reduction values. The ultimate goal of each action is to help the Nimishillen Creek and its tributaries meet state water quality standards. Therefore, any evaluation of this plan or actions it outlines should be evaluated as to whether it is helping achieve this ultimate goal in the short or long term.

The evaluation and updating of the content in this plan will be the responsibility of the Watershed Coordinator for the Nimishillen Creek area. Absent a Watershed Coordinator, NEFCO will take charge of evaluation and updating this action plan. As with the creation of this plan, whomever leads the update process should do so with direct input and guidance from private, government, business, commercial, and industrial watershed stakeholders.

Funding

A formal funding strategy has not been done for implementation of this entire plan. Instead, funding strategies will be completed on a project by project basis. To help stakeholder in the completing these funding strategies, most actions in Section VII provide an estimate on costs for implementation. Some actions with great variability in costs or unknown costs do not have these estimates. Each action also contains potential funding sources from the federal, state, and local sources. Although some of the actions can and are completely funded by local stakeholders, the overall goal is to leverage local money to bring in outside monies to pay for the various water quality improvement projects.

X. Appendices

Appendix A: Acronyms

AMD	Acid Mine Drainage
AML	Abandoned Mine Land
BMP	Best Management Practice
CIV	Commutative Index Value
CRP	Conservation Reserve Program
CWA	Clean Water Act
CWH	Coldwater Habitat
CWMP	Comprehensive Watershed Management Plan
DSWC	Division of Soil and Water Conservation
EOLP	Erie/Ontario Lake Plain Ecoregion
EPA	Environmental Protection Agency
EQUIP	Environmental Quality Incentive Program
EWH	Exceptional Warmwater Habitat
FPA	Facilities Planning Area
GPD	Gallons Per Day
HSTS	Home Sewage Treatment System
HUC	Hydrologic Unit Code
IBI	Index of Biological Integrity
ICI	Invertebrate Community Index
LRW	Limited Resource Water
Mlwb	Modified Index of Well Being
MWCD	Muskingum Watershed Conservancy District
MWH	Modified Warmwater Habitat
NEFCO	Northeast Ohio Four County Regional Planning and Development Organization
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
MGD	Million Gallons per Day
NPS	Nonpoint Source Pollution
NSF	National Sanitation Foundation
ODNR	Ohio Department of Natural Resources
OEEF	Ohio Environmental Education Fund
O&M	Operation and Maintenance
PCBs	Polychlorinated Biphenyls
QHEI	Qualitative Habitat Evaluation Index
RC&D	Resource Conservation and Development
RM	River Mile
SCHD	Stark County Health Department

SWCD	Soil and Water Conservation Districts
SWP3	Storm Water Pollution Prevention Plan
TN	Total Nitrogen
TSS	Total Suspended Solids
TP	Total Phosphorus
USGS	United States Geological Survey
WAP	Western Allegheny Plateau Ecoregion
WPCLF	Water Pollution Control Loan Fund
WRP	Wetland Reserve Program
WRRSP	Water Resource Restoration Sponsor Program
WWH	Warmwater Habitat

Appendix B:
Nimishillen Creek Watershed Partners' By-Laws

1.01 PURPOSE

The mission of the Nimishillen Creek Watershed Partners is to promote the restoration of the Creek's water quality to fishable, swimable standards and the protection of the Creek corridor.

2.0 MEMBERSHIP

2.1 Membership is open to any individual, family, or organization that subscribes to the purposes of the Watershed Partners.

2.2 The Watershed Partners will be directed by the Nimishillen Creek Core Committee consisting of voting representatives from the following:

- At least 5 members who are residents of the watershed.
- 5 to 10 members from any of the following sectors: jurisdictional units of government in the watershed, educational, recreational, commercial, and agriculture.
- The Core Committee shall consist of no more that 15 members.

2.3 Each participating state or federal agency may be represented by one (1) ex-officio, non-voting member of the Core Committee.

2.4 Core Committee membership shall be selected as follows:

- A list of candidates from an open invitation for nominations to represent the units of government, educational, recreational, commercial, and agriculture (non-residential) sectors shall be maintained; an election by written, secret ballot of all members present shall be conducted to elect Core Committee members.
- A list of candidates from an open invitation for nominations to represent residents of the watershed shall be maintained; an election by written, secret ballot of all members present shall be conducted to elect Core Committee members.
- The five (5) residential and the five (5) non-residential candidates with the most votes will be elected to the Core Committee.
- The last five (5) Core Committee members shall be the remaining five (5) candidates from both the residential and non-residential sectors with the most votes.

2.5 Core Committee vacancies shall be filled following the process in Section 2.4, except in the case of the Chair, which vacancy shall be filled pursuant to Section 3.3.

2.6 Except for the initial election, all Core Committee members shall be elected to a four-year term. For the initial election, the four (4) residential and four (4) non-residential candidates receiving the most votes will be elected to a four-year term. The remaining elected members will serve a two-year term. Re-election to the Core Committee is permitted.

3.0 ORGANIZATION AND OFFICERS

3.1 The officers of the Watershed Partners are the Chair, Vice-Chair, and Secretary. The Chair shall be one of watershed residents on the Core Committee.

3.2 The duties of the Chair include, but are not limited to:

- Developing meeting agendas;
- Presiding over all meetings of the Watershed Partners; and
- Serving as Chair of the Core Committee and as an ad-hoc member of other committees.

3.3 The Vice-Chair may be any member of the Core Committee. The Vice-Chair shall assume the duties of the Chair for the remainder of that term should that office become vacant, and shall preside at meetings of the Watershed Partners and Core Committee when the Chair is unable to attend.

3.4 The Secretary may be any member of the Core Committee. The duties of the Secretary include, but are not limited to:

- Maintaining the official records of the Watershed Partners;
- Recording and distributing the summaries of the Watershed Partners meetings;
- Maintaining a current record of the names and addresses of Watershed Partners members; and
- Sending out notices of meetings and any supporting meeting materials at least two (2) weeks prior to scheduled meetings.

3.5 Election of the Chair, Vice-Chair, and Secretary shall be by written, secret ballot by the Nimishillen Creek Watershed Partners members. For each vacant position, the candidate with the most votes wins the election. For the initial election, nomination shall be made by the Organizational Committee (refer to Section 4.2); in subsequent elections, nominations shall be made by the Core Committee. Additional nominations may be made by any Watershed Partners member from the floor or in writing to any member of the Organizational Committee (the Core Committee after the first election). It is incumbent upon the nominator to determine willingness of the nominee to serve.

3.6 The Chair shall be elected for a two-year term. The initial Vice-Chair shall be elected for a one-year term; thereafter, the Vice-Chair shall be elected for a two-year term. The Secretary shall be elected for a two-year term. Re-election of these offices is permitted.

3.7 If a Treasurer or Fiscal Agent becomes necessary, the Core Committee shall appoint a Treasurer or Fiscal Agent for the Watershed Partners. If it becomes legally necessary that a Treasurer be elected, the election procedures in Section 3.5 shall be followed.

4.0 COMMITTEES

4.1 Standing Committees:
The following standing committees shall be established by the Core Committee to address concerns of the Watershed Partners:

- Creek LEAP
- Education Committee

4.2 Organizational Committee
The Organizational Committee was previously established on 4/10/02. When the bylaws are adopted by the Watershed Partners, the Officers elected, and the Core Committee selected, the Organizational Committee will cease to exist.

4.3 Other Committees
The Core Committee may appoint such other Standing or Ad-Hoc Committees as deemed necessary to support the efforts of the Watershed Partners.

4.4 Core Committee
The Core Committee shall be composed of residential and non-residential sector members elected by the Watershed Partners as outlined in Section 2.4. The duties of the Core Committee shall include, but not limited to:

A. Directing the business activities of the Task Force;
B. Nominating members for elected positions;
C. Creating or disbanding Standing or Ad -Hoc Committees;
D. Calling emergency meetings without two weeks' notice; and
E. Recommending projects to Committees.

4.5 Each Committee shall elect a Committee Chair by the end of its second meeting, except the Chair of the Core Committee which will follow the election procedure in Sections 3.2 - 3.5.

5.0 MEETINGS

5.1 The Watershed Partners shall meet as determined by the Core Committee.

5.2 Notice shall be sent (mail or email) to all members at least two (2) weeks in advance of all Watershed Partners meetings. Notice shall include an agenda and business material that may be considered or acted upon.

5.3 The Core Committee can meet as often as needed, but must meet at least 4 times during the calendar year.

6.0 DECISION MAKING

6.1 The Watershed Partners and its Core Committee shall strive to operate by consensus.

6.2 In the event consensus cannot be reached, any Watershed Partners Core Committee member may call for a vote on any issue during the course of any meeting. However, at least seven (7) Core Committee members must be present to call for a vote.

6.3 Decisions made by vote shall require a majority of the Core Committee members present for passage.

6.4 Core Committee members may be represented by designated alternates. Alternates must be designated by letter to the Chair or Vice Chair in advance of the meeting. The alternate shall have all the rights and duties of a voting member during the meeting(s) for which they are a designated alternate.

6.5 Any officer or Core Committee member may be removed, with or without cause, by the Core Committee. A written notice of a removal vote must be sent to all Core Committee members at least two (2) weeks in advance of the meeting where the vote will occur. Any such removal shall require a two-thirds (2/3) vote by the Core Committee members who are present. In accordance with Section 6.2, at least seven (7) Core Committee members must be present in order to call for a removal vote.

6.6 Any officer or Core Committee member may resign by giving written notice to the Core Committee. The acceptance of such resignation shall not be necessary to make it effective.

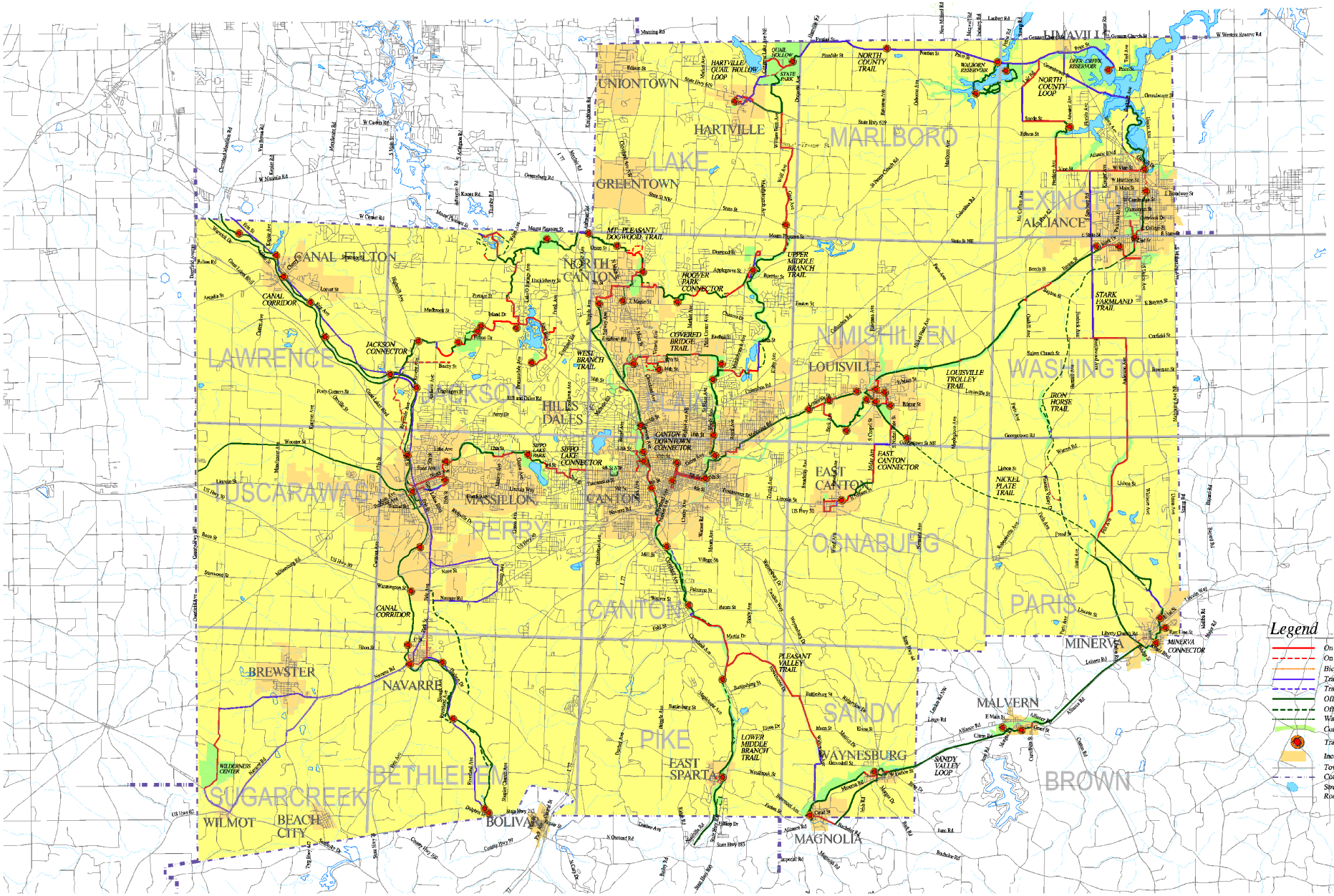
7.0 MISCELLANEOUS PROVISIONS

8.0 ADOPTION AND AMENDMENTS

8.1 These bylaws and any amendments shall be adopted by a simple majority vote of the Watershed Partners. Amendments to the bylaws shall be summarized in the notice of the Watershed Partners meeting at which the proposed amendments are to be voted on.

Adopted: 6/29/04

Appendix C:
Stark County Trail and Greenway Master Plan



Stark County Trail and Greenway Master Plan

Prepared By:

EDG ENVIRONMENTAL DESIGN GROUP
450 Grant St. Akron, Ohio 44113

In Association with:
Schmidt Copeland Parker Stevens
1220 West Sixth Street The Bradley Building Cleveland, Ohio 44113

STARK PARKS
STARK COUNTY PARK DISTRICT

0 6000 12000

January 1999

Overall Map

Appendix D:
2000-2001 Ohio Natural Heritage Database for Rare Plant Species in Stark County

Endangered (E):

1998 *Glyceria Acutiflora* - Sharp-Glumed Manna-Grass
1994 *Agalinis Purpurea Var. Parviflora* - Small Purple Foxglove
1993 *Galium Labradoricum* - Bog Bedstraw
1993 *Sphagnum Riparium* - Shore-Growing Peat Moss
1991 *Salix Pedicellaris* - Bog Willow
1960 *Juncus Platyphyllus* - Flat-Leaved Rush

Threatened (T):

1998 *Lechea Pulchella* - Leggett's Pinweed
1998 *Hypericum Boreale* - Northern St. John's-Wart
1998 *Tofieldia Glutinosa* - False Asphodel
1996 *Vaccinium Oxycoccos* - Small Cranberry
1995 *Carex Oligosperma* - Few-Seeded Sedge
1995 *Sagittaria Rigida* - Deer's-Tongue Arrowhead
1995 *Viburnum Opulus Var. Americanum* - Highbush-Cranberry
1995 *Zizania Aquatica* - Wild Rice
1994 *Aster Drummondii* - Drummond's Aster
1994 *Spiranthes Romanzoffiana* - Hooded Ladies'-Tresses
1994 *Utricularia Intermedia* - Flat-Leaved Bladderwort
1971 *Myriophyllum Sibiricum* - American Water-Milfoil
1972 *Lechea Intermedia* - Round-Fruited Pinweed
1960 *Epilobium Strictum* - Simple Willow-Herb
1960 *Equisetum Variegatum* - Variegated Scouring-Rush
1960 *Panicum Philadelphicum* - Philadelphia Panic-Grass

Potentially Threatened (P):

1998 *Calla Palustris* - Wild Calla
1998 *Eriophorum Viridicarinatum* - Green Cottongrass
1996 *Eriophorum Virginicum* - Tawny Cottongrass
1996 *Rhexia Virginica* - Virginia Meadow-Beauty
1996 *Sarracenia Purpurea* - Pitcher-Plan
1995 *Castanea Dentata* - American Chestnut
1995 *Chamaedaphne Calyculata* - Leather-Leaf
1995 *Corallorhiza Maculata* - Spotted Coral-Root

1995 *Glyceria Grandis* - Tall Manna-Grass
1995 *Hydrocotyle Americana* - American Water-Pennywort
1995 *Juglans Cinerea* - Butternut
1995 *Larix Laricina* - Tamerack
1995 *Potentilla Palustris* - Marsh Fivefinger
1994 *Carex Lasiocarpa* - Slender Sedge
1994 *Cladium Mariscoides* - Twip-Rush
1994 *Juncus Balticus* - Baltic Rush
1994 *Rhynchospora Alba* - White Beak-Rush
1994 *Triglochin Palustre* - Marsh Arrow-Grass
1993 *Carex Crawei* - Crawe's Sedge
1993 *Carex Flava* - Yellow Sedge
1993 *Deschampsia Caespitosa* - Tufted Hairgrass
1993 *Drosera Rotundifolia* - Round-Leaved Sundew
1993 *Gentianopsis Procera* - Small Fringed Gentian
1993 *Salix Serissima* - Autumn Willow
1993 *Solidago Ohioensis* - Ohio Goldenrod
1990 *Vaccinium Macrocarpon* - Large Cranberry
1984 *Carex Atlantica Var. Capillacea* - Howe's Sedge
1982 *Poa Languida* - Weak Spear-Grass
1981 *Potamogeton Zosteriformis* - Flat-Stem Pondweed
1979 *Platanthera Flava* - Tubercled Rein-Orchid
1976 *Lechea Villosa* - Hairy Pinweed
1961 *Zigadenus Elegans Var. Glaucus* - Wand-Lily

Appendix E:
Lakes Greater Than Five Acres in the Nimishillen Creek Watershed

Appendix E: Lakes Greater Than Five Acres in the Nimishillen Creek Watershed.					
Lake Name or Owner	**Size (acres)**	**Lake Type**	**Subwatershed**	**Township or Municipality**	**Public or Private**
Alpine Village Development	70	Dug Out Impoundment	Middle Branch	Plain Twp.	Private
Central Allied Lake	Not Given	Natural Lake and Dug Out Impoundment	Middle Branch	Plain Twp.	Private
H. Fry	5	Dam and Permanent Impoundment	Mainstem	Pike Twp.	Private
Mack Lake	9	Not Given	West Branch	Jackson Twp.	Private
Meyers Lake	134	Natural Lake	West Branch	Meyers Lake	Private
Lake O'Pines	16	Natural Lake	Middle Branch	Lake Twp.	Private
Petros Lake	12	Not Given	Hurford Run	Perry Twp.	Public
Unknown	6	Dug Out Impoundment	Middle Branch	Lake Twp.	Private
Unknown	10	Not Given	Middle Branch	Marlboro Twp.	Private
Unknown	6	Dam and Permanent Impoundment	East Branch	Nimishillen Twp.	Private
Unknown	5	Dug Out Impoundment	Sherrick Run	Osnaburg Twp.	Private
Unknown	10	Upground	Hurford Run	Perry Twp.	Private
Unknown	7	Upground	Hurford Run	Perry Twp.	Private
Unknown	18	Upground	Hurford Run	Canton	Private
Unknown	6	Dug Out Impoundment	Mainstem	Pike Twp.	Private
Zellers Lake	9	Dam and Permanent Impoundment	Middle Branch	Marlboro Twp.	Private

Sources: *Inventory of Ohio Lakes*, Ohio Department of Natural Resources - Division of Water, 1980. Stark Parks, 2006.
Northeast Ohio Four County Regional Planning and Development Organization (NEFCO), 2006.

Appendix F:
Stark County "Dedicated" Ditches in the Nimishillen Creek Watershed

Ditch Name	Subwatershed	Stark Co. Eng. Map Number	Map Coordinate	Date Petitioned	Stark Co. Eng. File Number
Graber	East Branch	35	H-19	9/10/1908	133
Domer	Hurford Run	11	M-10	4/21/1915	137
Kocher	Hurford Run	51	L-11	3/3/1898	126
Sweeny	Hurford Run	50	L-9	3/4/1921	130
Taylor	Hurford Run	156	M-9		124
Turner	Hurford Run	148	L-9	8/1/1948	133
Wentworth	Hurford Run	147	N-10	7/1/1948	137
Cunningham	Mainstem	149	L-11		128
Heinbuch	Mainstem	31	P-13	9/8/1937	123
Steinmetz	Mainstem	32	O-13	9/15/1937	130
A. J. Smith	Middle Branch	124	E-12	8/5/1912	
Adams	Middle Branch	134	C-16	4/8/1890	
Bixler	Middle Branch	110	H-14	1941	
Conrad	Middle Branch	53	H-14		
Duquette	Middle Branch	5	B-15	11/16/1938	123
Ebie	Middle Branch	78	C-14	1/13/1906	137
Elmer Smith	Middle Branch	57	C-15	1/15/1894	137
Etter	Middle Branch	80	C-15	6/13/1899	
F. N. Swartz	Middle Branch	37	C-14	8/16/1905	
Firestone	Middle Branch	63	G-13	4/28/1924	127-124
Frederick	Middle Branch	131	E-17	9/24/1887	
Guiley	Middle Branch	15	D-13	4/7/1909	
Immel	Middle Branch	126	E-14	11/11/1880	
Keener	Middle Branch	4	B-14	4/6/1911	126
Kinsley	Middle Branch	3	C-13	1/18/1938	126
Krammer-Glass	Middle Branch	88	C-13	4/21/1906	
Kurtz	Middle Branch	38	C-13	4/22/1912	126
Machmer	Middle Branch	16	C-12	7/7/1917	127
Monarch Rubber	Middle Branch	39	C-13	4/25/1928	130
Reed	Middle Branch	23	E-16	8/26/1929	129
Royer	Middle Branch	43	D-13	8/16/2005	
Snyder	Middle Branch	128	E-15	5/2/1883	
Steiner	Middle Branch	118	G-13	10/11/1935	130
Swartz, Big	Middle Branch	24	D-14	8/6/1900	
Sweitzer	Middle Branch	56	C-16	4/30/1903	
Uriah Brumbaugh	Middle Branch	62	C-15	6/28/1902	
Vaughn	Middle Branch	55	D-15	2/18/1907	

Ditch Name	Subwatershed	Stark Co. Eng. Map Number	Map Coordinate	Date Petitioned	Stark Co. Eng. File Number
Wales	Middle Branch	116	C-13	1/3/1930	
Wearstler	Middle Branch	125	E-13	1/30/1915	124
Werner, B. W.	Middle Branch	127	D-15	4/27/1882	
Werner, David	Middle Branch	136	D-15	8/29/1891	
Wiley	Middle Branch	113	C-14	5/2/1911	
Wymer	Middle Branch	129	C-15	7/25/1884	
Deckard	Sherrick Run	76	L-14	9/7/1931	123
Hayden	Sherrick Run	12	M-13	6/21/1913	
Neisz	Sherrick Run	60	L-13	6/7/1933	127
Osnaburg	Sherrick Run	27	L-15	12/12/1913	137
Rudnicka	Sherrick Run	155	L-12		129
Baker	West Branch	150	I-9		123
Correll	West Branch	114	H-12	1/11/1867	
Dockus	West Branch	75	D-10	5/6/1932	123-137-127
Eckroate	West Branch	81	I-9	11/22/1913	123
Edgefield	West Branch	79	I-11	5/25/1922	124
F.J. Hinkle	West Branch	119	F-9	5/17/1922	
Fair	West Branch	85	I-11	5/1/1937	124
Fry	West Branch	86	F-12	9/1/1921	124
Fulton Road	West Branch	83	I-10	11/22/1929	129
Grubb	West Branch	41	B-11	10/1/1926	133
Hoover	West Branch	33	G-11	6/23/1906	133
Marchand	West Branch	13	G-9	5/26/1911	127
McDowell	West Branch	45	G-9	9/18/1878	127
Mohler	West Branch	151	G-9		118
Patton	West Branch	1	J-10	2/11/1925	128
Phillips	West Branch	158	I-11		124
Pontius	West Branch	97	J-9	9/18/1912	124
Price	West Branch	98	C-10	8/31/1914	
Reemsnyder	West Branch	111	H-10	4/6/1905	129
Rettig	West Branch	14	F-9	10/7/1935	129
Schrantz-Slusser	West Branch	54	E-10	8/7/1925	130
Sichat	West Branch	104	H-9	7/26/1913	
Stickler	West Branch	17	D-11	8/17/1910	130
Stripe	West Branch	42	E-10	8/6/1918	128
Swanson	West Branch	157	G-9		130
Thomas	West Branch	101	H-9	10/18/1906	
Troyer	West Branch	99	E-11	6/11/1913	
Wackerly	West Branch	84	I-10	4/8/1922	
Zimber	West Branch	47	F-10	8/8/1908	131

Source: Stark County Engineer's Office, 2006

Appendix G:
Point Source Dischargers in the Nimishillen Creek Watershed

Map Symbol	Discharging Operation	Design Flow (GPD)	Classification
1	A&R Machine Co. Inc. 11882 Sandyville Rd. East Sparta, OH 44626	Not Given	Industrial Discharger
2	AGA Gas Incorporated 2505 Shepler Church S.W. Canton, OH 44706	Not Given	Industrial Discharger
3	Akron Canton Regional Airport 5400 Lauby Rd. North Canton, OH 44720	100,000	Commercial Discharger
4	Akron Canton Truck Plaza Inc. 4450 Portage Rd. North Canton, OH 44720	Not Given	Private Discharging Semi-Public Sewage Treatment System
5	Biery Cheese Company 66544 Paris Ave. NE Paris, OH 44669	Not Given	Private Discharging Semi-Public Sewage Treatment System
6	BR Exploration & Oil Inc. 807 Hartford Ave. Canton, OH 44707	Not Given	Industrial Discharger
7	Canton NE Water Plant 2664 Harrisburg Road NE Canton, OH 44705	Not Given	Municipal Water Treatment Plant
8	Canton NW Water Plant 44044 Guilford NW Canton, OH 44709	Not Given	Municipal Water Treatment Plant
9	City of Canton WPCC 3550 Central Ave. Canton, OH 44707	33.0 M	Municipal Wastewater Treatment Plant
10	City of Louisville WWTP 3101 Ravenna Ave. NE Louisville, OH 44266	2,000,000	Municipal Wastewater Treatment Plant
11	Cornerstone Church of God Elementary, Junior, and Senior Schools 511 Trump Ave. NE Canton, OH 44730	Not Given	Private Discharging Semi-Public Sewage Treatment System

Map Symbol	Discharging Operation	Design Flow (GPD)	Classification
12	East Sparta Water Treatment Plant 8930 Maplehurst Dr. East Sparta, OH 44626	Not Given	Municipal Water Treatment System
13	Gullivers 77 Travel Center Inc. 2320 Faircrest St. SW Canton, OH 44706	Not Given	Private Discharging Semi-Public Sewage Treatment System
14	Village of Hartville WWTP 565 Wales Drive Hartville, OH 44632	450,000	Municipal Wastewater Treatment Plant
15	The Hoover Company Plant 1 101 East Maple St. North Canton, OH 44720	600,000	Industrial Discharger
16	Hoover Co. Industrial Park 8200 Freedom Ave. North Canton, OH 44720	300,000	Industrial Discharger
17	Hot Laps Sports Bar 536 S. Canal St. Louisville, OH 44641	Not Given	Private Discharging Semi-Public Sewage Treatment System
18*	Allegheny Ludlum 1500 West Main St. Canton, OH 44641	Not Given	Industrial Discharger
19	Koch Engineering 5385 Orchard Drive East Canton, OH 44730	Not Given	Industrial Discharger
20^	Marathon Ashland Petroleum LLC 8930 Maplehurst Ave. SE East Sparta, OH 44626	Not Given	Industrial Discharger
21#	Marathon Ashland Pertoleum LLC - Ohio Refining Div. 2408 Gambrinus Rd. SW Canton, OH 44706	Not Given	Industrial Discharger
22	McCann Plastics Inc. 5600 Mayfair Rd. North Canton, OH 44720	Not Given	Industrial Discharger

Map Symbol	Discharging Operation	Design Flow (GPD)	Classification
23	Nazarene Camp Center 820 Nazarene Ave. Louisville, OH 44641-9720	Not Given	Private Discharging Semi-Public Sewage Treatment System
24	North Canton Water Plant 7300 Freedom Ave. NW North Canton, OH 44720	Not Given	Municipal Water Treatment Plant
25	North Nimishillen School 7337 Easton St. NE Louisville, OH 44641	>10,000	Private Discharging Semi-Public Sewage Treatment System
26	Praxair (Liquid Carbonic Corp.) 2225 Bolivar Rd. S.W. Canton, OH 44706	Not Given	Industrial Discharger
27^	Republic Engineered Steels 2633 8th St. NW Canton, OH 44708	Not Given	Industrial Discharger
28	Republic Engineered Steel Inc. Special Metals Division 2201 Harrison Ave. S.W. Canton, OH 44706	Not Given	Industrial Discharger
29	Republic Storage Systems Co. 1038 Belden Ave. NE Canton, OH 44705	Not Given	Industrial Discharger
30	Shady Knoll MHP 4689 Kirby Ave. N.E. Canton, OH 44705	1,500 to <5,000	Private Discharging Semi-Public Sewage Treatment System
31	Stark County 320 Columbus Rd. Louisville, OH 44641	Not Given	Municipal Wastewater Treatment System
32	Stark County - Bob-O-Link 2000 Mohler Dr. North Canton, OH 44720	Not Given	Private Discharging Semi-Public Sewage Treatment System
33	Thakar Aluminum Corp. 4420 Louisville St. NE Canton, OH 44705	Not Given	Industrial Discharger
34	The Timken Company - Faircrest Steel Plant Canton, OH 44706	Not Given	Industrial Discharger

Map Symbol	Discharging Operation	Design Flow (GPD)	Classification
35	Timken Co. Research Center 500 Mt. Pleasant Rd. North Canton, OH 44720	Not Given	Industrial Discharger
36	Walker Elementary School 3525 Sandy Ave. SE Canton, OH 44707	Not Given	Private Discharging Semi-Public Sewage Treatment System
37	Anheuser Busch Sales of Canton 1611 Marietta Ave. S.E. Canton, OH 44707	1,500 to <5,000	Private Discharging Semi-Public Sewage Treatment System
38	Prairie College School 3021 Prairie College Ave. S.W. Canton, OH 44706	5,000 to <10,000	Private Discharging Semi-Public Sewage Treatment System
39	Sable Creek Golf 5942 Edison St. Hartville, OH 44632	1,500 to <5,000	Private Discharging Semi-Public Sewage Treatment System
40	Akron Dist. Church of Nazarene 8020 Nazarene St. Canton, OH 44641	5,000 to <10,000	Private Discharging Semi-Public Sewage Treatment System
41	Altercare of Louisville 7121 St. Francies St. NE Louisville, OH 44641	<10,000	Private Discharging Semi-Public Sewage Treatment System
42	Bud's Corner Tavern 5750 Columbus Rd. Louisville, OH 44641	1,500 to <5,000	Private Discharging Semi-Public Sewage Treatment System
43	Carriage House East 9033 Columbus Rd. NE Louisville, OH 44641	5,000 to <10,000	Private Discharging Semi-Public Sewage Treatment System
44	Elm's Inn 6786 Meese Rd. NE Alliance, OH 44601	5,000 to <10,000	Private Discharging Semi-Public Sewage Treatment System
45	Hammco Industries 9040 Columbus Rd. NE Canton, OH 44705	1 to <1,500	Private Discharging Semi-Public Sewage Treatment System
46	Hot Laps Sports Bar 7512 Columbus Rd. NE Louisville, OH 44641	5,000 to <10,000	Private Discharging Semi-Public Sewage Treatment System

Map Symbol	Discharging Operation	Design Flow (GPD)	Classification
47	Spee-D-Foods #29 5874 Easton St. NE Louisville, OH 44641	1,500 to <5,000	Private Discharging Semi-Public Sewage Treatment System
48	Robert Rogers Apt. 6901 Atlantic Blvd. NE Louisville, OH 44641	1,500 to <10,000	Private Discharging Semi-Public Sewage Treatment System
49	Phil's Place 6509 Columbus Rd. NE Louisville, OH 44641	5,000 to <10,000	Private Discharging Semi-Public Sewage Treatment System
50	Thompson Dairyland 7519 Columbus Rd. NE Louisville, OH 44641	5,000 to <10,000	Private Discharging Semi-Public Sewage Treatment System
51	VFW 7459 Columbus Rd. NE Louisville, OH 44641	1,500 to <5,000	Private Discharging Semi-Public Sewage Treatment System
52	WOLI-TV 17 Trinity 6600 Atlantic Blvd. Louisville, OH 44641	1,500 to <5,000	Private Discharging Semi-Public Sewage Treatment System
53	Windy Hill Motel 6404 Columbus Rd. Louisville, OH 44641	1,500 to <5,000	Private Discharging Semi-Public Sewage Treatment System
54	Apartment Building 7336 Middlebranch Ave. N.E. Canton, OH 44721	1 to <1,500	Private Discharging Semi-Public Sewage Treatment System
55	Avondale Professional Building 3996 Fulton Rd. N.W. Canton, OH 44718	1,500 to <5,000	Private Discharging Semi-Public Sewage Treatment System
56	Axion Concrete Technology 8282 Middlebranch Ave. N.E. Canton, OH 44721	1,500 to <5,000	Private Discharging Semi-Public Sewage Treatment System
57	Doug's Auto Service 8437 Middlebranch Ave. N.E. Canton, OH 44721	1 to <1,500	Private Discharging Semi-Public Sewage Treatment System
58	Glen Oak High School 2300 Schneider Rd. N.E. North Canton, OH 44721	>10,000	Private Discharging Semi-Public Sewage Treatment System

Map Symbol	Discharging Operation	Design Flow (GPD)	Classification
59	Leno's Restaurant 2494 Easton St. N.E. North Canton, OH 44720	5,000 to >10,000	Private Discharging Semi-Public Sewage Treatment System
60	Little Flower Church and School 2040 Diamond St. N.E. North Canton, OH 44721	1,500 to <5,000	Private Discharging Semi-Public Sewage Treatment System
61	Master Touch Cleaners 2605 Easton St. N.E. North Canton, OH 44721	1,500 to <5,000	Private Discharging Semi-Public Sewage Treatment System
62	North Market Home Sales 8139 Kent Ave. N.E. Louisville, OH 44646	1,500 to <5,000	Private Discharging Semi-Public Sewage Treatment System
63	Steiner Apartments 7330 Middlebranch Ave. N.E. North Canton, OH 44721	1,500 to <5,000	Private Discharging Semi-Public Sewage Treatment System
64	Whipple Center Building 2922 Whipple Ave. N.W. Canton, OH 44708	1,500 to <5,000	Private Discharging Semi-Public Sewage Treatment System
65	The WG Fairfield Co. 4255 Kropf Ave. S.W. Canton, OH 44706	1 to <1,500	Private Discharging Semi-Public Sewage Treatment System
66	Adams Fabricating Inc. 10125 Sandyville Rd. SE East Sparta, OH 44626	Not Given	Private Discharging Semi-Public Sewage Treatment System
67	Barb Huff Apartments 5477 Cleveland Ave. SE East Sparta, OH 44626	2,500	Private Discharging Semi-Public Sewage Treatment System
68	*U.S. Ceramic Tile Co. 10233 Sandyville Rd. SE East Sparta, OH 44626	Not Given	Private Discharging Semi-Public Sewage Treatment System
69	Thunderbird Terrace 1581 Pekin Dr. S.E. East Canton, OH 44730	5,000 to <10,000	Private Discharging Semi-Public Sewage Treatment System
70	Maize Valley Farm Market 6163 Edison St. Hartville, OH 44632	1,500 to <5,000	Private Discharging Semi-Public Sewage Treatment System

Map Symbol	Discharging Operation	Design Flow (GPD)	Classification
71	Northmark Inc. 7349 Ravenna Ave. SE Louisville, OH 44641	1,500 to <5,000	Private Discharging Semi-Public Sewage Treatment System
72	Arvilla oil Field Service Co. 1821 Moore Ave. SE Canton, OH 44707	Not Given	Private Discharging Semi-Public Sewage Treatment System
73	Roadside Tavern 2521 Waynesburg Dr. SE Canton, OH 44707	Not Given	Private Discharging Semi-Public Sewage Treatment System
74	Vine Ministries 3206 Lincoln St. E Canton, OH 44707	Not Given	Private Discharging Semi-Public Sewage Treatment System
75	Stanley Miller Construction 2250 Howenstine Dr. East Sparta, OH 44626	Not Given	Private Discharging Semi-Public Sewage Treatment System

* Permit Expired in 2000; ^ = Permits Expired in 2005; # = Permit Expired in 2004; GPD = Gallons Per Day
Sources: Ohio EPA, 2005; Stark County Health Department, 2006

Appendix H: Spills in the Nimishillen Creek Watershed Responded to by Ohio EPA Division of Emergency and Remedial Response Since 1990.						
Entity	**Location**	**Material Spilled - Cause**	**Amount Spilled (Report Date)**	**Subwatershed - Township/City**	**Map Number**	**Ohio EPA Spill Number**
Republic Engineered Steels Inc.	2633 8th St. NE	Diesel Fuel - Leak	100 gallons (11/02/90)	East Branch - Canton	1	9077-76-5942
Unknown	Mill St. at Nimishillen Creek Near Allenford	Paint Waste & Sand - Unknown	Unknown (9/4/90)	Mainstem - Canton Twp.	2	9009-76-4292
Unknown	West of Harrisburg Road	Petroleum - Unknown	Unknown (8/25/90)	West Branch - Plain Twp.	3	9008-76-4155
Unknown	Thurman Munson Stadium	Fish Kill - Discharge/Bypass Treatment System	Unknown (6/26/91)	Mainstem - Canton	4	9106-76-2572
Unknown	Near 2714 Tulip St. NE	Oil - Dumping/Disposal	Unknown (1/10/91)	Middle Branch - Plain Twp.	5	9101-46-0098
Mr. Larry Krebs	5250 Ridge Ave. SE	Oil - Dumping/Disposal	Unknown (10/9/92)	Mainstem - Canton Twp.	6	9210-76-4364
Liquid Carbonic	SR 153 & Broadway	Material Unknown - Dumping/Disposal	Unknown (5/27/92)	East Branch - Nimishillen Twp.	7	9206-76-2171
Unknown	8120 Garnet Ave. NE	Diesel Fuel - Unknown	Unknown (4/29/92)	Middle Branch - Plain Twp.	8	9204-76-1630
US Ceramic Tile Company	10233 Sandyville Rd. SE	Oil - Dumping/Disposal	Unknown (4/18/92)	Mainstem - Pike Twp.	9	9204-76-1442
Unknown	SR 800 & Sparta Ave.	Material Black - Discharge/Bypass Treatment System	Unknown (4/10/92)	Mainstem - East Sparta	10	9204-76-1332

Unknown	Georgetown Rd. & SR 153	Flammable Stuff - Dumping/Disposal	Unknown (3/29/92)	East Branch - Louisville	12	9203-76-1133
Unknown	3800 Block of I-77 in South Bound Land	Diesel Fuel - Leak	30 Gallons (12/2/93)	West Branch - Canton	13	9312-76-4925
US Ceramic Tile Company	10233 Sandyville Rd. SE	Waste Water - Discharge/Bypass Treatment System	Unknown (11/15/93)	Mainstem - Pile Twp.	14	9311-76-7690
J M W Trucking	512 45th St. SW	Diesel Fuel - Equipment Failure	250 Gallons (11/2/93)	Mainstem - Canton Twp.	15	9311-76-4495
US Ceramic Steel	10233 Sandyville Rd. SE	Waste Water - Permit Violation	Unknown (11/1/93)	Mainstem - East Sparta	16	9311-76-4482
US Ceramic Tile Company	10233 Sandyville Rd. SE	Waste Water - Permit Violation	Unknown (10/13/93)	Mainstem - East Sparta	17	9310-76-4247
US Ceramic Tile Company	10233 Sandyville Rd. SE	Waste Water - Permit Violation	Unknown (9/28/93	Mainstem - East Sparta	18	9309-76-4038
US Ceramic Tile Company	10233 Sandyville Rd. SE	Waste Water - Permit Violation	Unknown (9/9/93)	Mainstem - East Sparta	19	9309-76-3796
H&H Auto Parts	Cleveland Ave. S & 15th St. SW	Oil - Unknown	50 Gallons (8/30/93)	West Branch - Canton	20	9308-76-3636
Unknown	Spangler Rd. & 35th St. NE	Oil - Unknown	Unknown (8/26/93)	Middle Branch - Canton	21	9308-76-3561
US Ceramic Tile Company	10233 Sandyville Rd. SE	Waste Water - Permit Violation	Unknown (8/13/93)	Mainstem - East Sparta	22	9308-76-3398
US Ceramic Tile Company	10233 Sandyville Rd. SE	Waste Water - Permit Violation	Unknown (8/2/93)	Mainstem - East Sparta	23	9308-76-3215
US Ceramic Tile Company	10233 Sandyville Rd. SE	Waste Water - Permit Violation	Unknown (7/27/93)	Mainstem - East Sparta	24	9307-76-3129

US Ceramic Tile Company	10233 Sandyville Rd. SE	Waste Water - Permit Violation	Unknown (7/15/93)	Mainstem - East Sparta	25	9307-76-2938
US Ceramic Tile Company	10233 Sandyville Rd. SE	Waste Water - Permit Violation	Unknown (6/23/93)	Mainstem - East Sparta	26	9306-76-2523
US Ceramic Tile Company	10233 Sandyville Rd. SE	Waste Water - Permit Violation	Unknown (6/15/93)	Mainstem - East Sparta	27	9306-76-2392
Quaker State Refinery Corp.	Walters St. NE	Oil -Leak	3 Gallons (6/9/93)	East Branch - Osnaburg	28	9306-76-2258
Old Dominion Trucking	I-77 Median @ Mile Marker 108	Diesel Fuel - Human Error	75 Gallons (6/8/93)	West Branch - Canton	29	9306-76-2223
Canton STP	Westbrook Park Pond (3530 Central Ave. SE)	Sewage - Discharge/Bypass Treatment System	Unknown (6/6/93)	Mainstem - Canton	30	9306-76-2200
J&L Specialty Prod	1600 W. Main St.	Oil & Water - Permit Violation	2,042 Gallons (4/9/93)	East Branch - Louisville	31	9304-76-1324
Ryder Truck Rental	5353 N. Circle Ct.	Diesel Fuel - Human Error	100 Gallons (3/16/93)	West Branch - North Canton	32	9309-76-0954
Romany Ceramics	10233 Sandyville Rd. SE	Waste Water - Permit Violation	Unknown (3/10/93)	Mainstem - East Sparta	33	9303-76-0888
Republic Storage Systems	1038 Belden Ave. NE	Paint - Leak	300 Gallons (2/23/93)	East Branch - Canton	34	9302-76-0666
Unknown	820 Lynbrook SE	Fish Kill - No Spill/ Natural Occurrence	Unknown (12/5/94)	West Branch - North Canton	35	9412-76-5150
J&L Speciality Steel Inc.	1500 W. Main St.	Waste Water - Permit Violation	Unknown (10/28/94)	East Branch - Louisville	36	9410-76-4680
Unknown	2715 Tulip St. NE	Orphan Drum - Dumping/Disposal	8.0 DMS (3/14/94)	Middle Branch - Canton	37	9403-76-1039

Stark Ceramics Inc.	600 W. Church St. SE	30% Ammonium Hydroxide Sollution - Tank Rupture	8,100 Gallons (8/25/95)	Sherrick Run - East Canton	38	9508-76-3656
Bison Painting & Sheeting	Baum & Central Bridge	Lead Paint - Improper Handling	7,000 CFT (8/25/95)	Mainstem - Canton Twp.	39	9507-76-2895
Timken Company	1835 Duber Ave. SW	Soluble Oil - Overflow	500 Gallons (6/11/95)	Hurford Run - Canton	40	9506-76-2389
Canton WWTP	Monument Rd. & Park Dr.	Sewage - Discharge/Bypass Treatment System	Unknown (10/27/97)	West Branch - Canton	41	9710-76-4286
Conrail	4000 Division Rd. NE	Waste Water - Permit Violation	Unknown (6/28/97)	East Branch - Canton	42	9706-76-3551
Canton WWTP	3530 Central Ave. SE	Sewage - Discharge/Bypass Treatment System	Unknown (5/5/97)	Mainstem - Canton	43	9705-76-1738
Canton WWTP	3530 Central Ave. SE	Sewage - Human Error	Unknown (4/8/97)	Mainstem - Canton	44	9704-76-1335
Chris Hauling Company	1500 Rte. 30 East Bound	Residential Solid Waste - DA/Cut or Break	16,000 Pounds (12/1/98)	Mainstem - Canton	45	9812-76-4761
Chris Hauling Company	1500 Rte. 30 East Bound	Petroleum - DA/Cut or Break	40 Gallons (12/1/98)	Mainstem - Canton	46	9812-76-4761
Unknown	10233 Sandyville Rd. SE	Petroleum - Unknown	25 Gallons (10/15/98)	Mainstem - East Sparta	47	9810-76-4248
Unknown	4th St. NE & Riverside St.	Sewage - Discharge/Bypass Treatment System	Unknown (11/20/99)	Mainstem - Canton	48	9911-76-4100
Central Allied Enterprises	2905 Columbus Rd.	Transformer Oil - Facility Fire	5 Gallons (11/19/99)	Middle Branch - Canton	49	9911-76-4089
Unknown	Ira Turpin Way	Fish Kill - Unknown	Unknown (6/1/99)	Mainstem - Canton	50	9906-76-1979

Conrail	4000 Division Rd.	Waste Water - Permit Violation	Unknown (4/12/99)	East Branch - Canton	51	9904-76-1294
Canton City	Mt. Vernon Blvd. & Overbrook	Sewage - Discharge/Bypass Treatment System	Unknown (2/12/99)	West Branch - Canton	52	9902-76-0590
Unknown	4731 Corporate St. SW	Unidentified Petroleum - Unknown	Unknown (2/5/99)	Hurford Run - Perry Twp.	53	9902-76-0462
Unknown	5200 Peach St.	Material Green - Unknown	Unknown (11/13/00)	East Branch - Nimishillen Twp.	54	0011-76-4244
Alpha Plating & Polishing Co.	601 Second St. NE	Fire Stream Runoff - Facility Fire	100,000 Gallons (3/15/00)	Mainstem - Canton	55	0003-76-0874
Nature	2660 46th St. NE	Blue Green Algae - Natural Phenomena	Unknown (12/12/01)	Middle Branch - Plain Twp.	56	0112-76-4685
Superior Dairy	4719 Navarre Rd. SW	Milk Production Waste - Discharge/Bypass Treatment System	Unknown (12/7/01)	Hurford Run - Perry Twp.	57	0112-76-4646
Louisville WWTP	Pennsylvania Ave. & Howard Ave.	Sewage - Discharge/Byapss Treatment System	Unknown (10/24/01)	East Branch - Louisville	58	0101-76-4046
Unknown	Guilford Ave. North of 38th St.	Oil - Unknown	Unknown (7/26/01)	West Branch - Plain Twp.	59	0107-76-2781
Greystone Trucking	3334 Bruening Circle	Diesel Fuel - Leak	100 Gallons (2/26/01)	Hurford Run - Canton Twp.	60	0102-76-0659
Republic Technologies International	2633 8th Street NE	Waste Water - Permit Violation	Unknown (1/19/01)	East Branch - Canton	61	0101-76-0178
North Canton WWTP	Briar Ave.	Sewage - Discharge/Bypass Treatment System	Unknown (10/28/03)	West Branch - North Canton	62	0310-76-4154

Republic Storage Systems	1038 Beldn Ave. NE	Xylene - Discharge/Bypass Treatment Systems	Unknown (7/28/03)	East Branch - Canton	63	0307-76-2880
South Haven Mobile Home Park	2812 Cleveland Ave. SW	Sheen/Fuel Oil - Natural Phenomena	Unknown (7/28/03)	Mainstem - Canton	64	0307-76-2867
South Haven Mobile Home Park	2812 Cleveland Ave. SW	Fuel Oil - Weather Related Damage (Flood)	25 Gallons (7/28/03)	Mainstem - Canton	65	0307-76-2861
Unknown	Baum Rd. @ Sinn Property	Garbage & Paint Cans - Unknown	Unknown (5/1/03)	Mainstem - Canton Twp.	66	0305-76-1445
AJ Diana Inc.	1704 W. Main St.	Diesel Fuel - Soil Contamination	5 Gallons (4/8/03)	East Branch - Louisville	67	0304-76-1166
Stanley Miller Construction, Inc.	2250 Howenstein Dr. SE	Oil - Dumping/Disposal	Unknown (4/4/03)	Mainstem - Pike Twp.	68	0304-76-1086
North Canton WWTP	Lindy Lane Manhole 17B	Sewage - Discharge/Bypass Treatment System	Unknown (1/31/03)	West Branch - North Canton	69	0301-76-0287
Cassandra Bey	3226 Allenford Dr. SE	Fuel Oil - Leak	Unknown (6/15/04)	Mainstem - Canton Twp.	70	0406-76-2634
Canton WWTP	3530 Central Ave. SE	Sewage - Discharge/Bypass Treatment System	Unknown (6/15/04)	Mainstem - Canton	71	0406-76-2617
North Canton WWTP	Marquardt Lift Station	Sewage - Discharge/Bypass Treatment System	Unknown (4/28/05)	West Branch - North Canton	72	0504-76-1979
North Canton WWTP	Lindy Lane Manholes 17B & 1341	Sewage - Discharge/Bypass Treatment System	Unknown (7/11/06)	West Branch - North Canton	73	0607-76-2457
North Canton WWTP	Lindy Lane Manholes 17B & 520	Sewage - Discharge/Bypass Treatment System	Unknown (6/23/06)	West Branch - North Canton	74	0606-76-2198

Canton WWTP	Guilford Rd.	Waste Water - Permit Violation	Unknown (6/5/06)	West Branch - Canton	75	0606-76-1905
Royer Farms	11617 SR 44 Ravenna Rd.	Manure/Fish Kill - Discharge/Bypass Treatment System	3,000 Gallons (6/30/99)	Middle Branch - Marlboro Twp.	77	9906-77-2373
Akron Canton Airport	5400 Lauby Rd.	Sewage - Discharge/Bypass Treatment System	Unknown (8/12/04)	West Branch - Green	78	0408-77-3439
Source: Ohio EPA RRS - 2000: Short Report, 2006						

Appendix I:
Nimishillen Creek Comprehensive Watershed Management Plan Comments
June 26, 2006
Eric Akin's Response

I. Introduction, Defining the Watershed

A) This plan needs to indicate park districts, school districts, regional planning and RC&D agencies. Plan does not show Phase II stormwater communities.
Response: All comments have been added to the new plan.

B) More specific detail needed on watershed population, ages, education levels, income levels, locations of growth and economic patterns.
Response: This information has been added to the new plan.

C) Show the six 14 digit HUC's in this plan, however, can work in the four subwatersheds already established.
Response: The watershed was broken into six subwatershed instead of four in the new plan. Specifically, subwatershed 1 was broken into 3 different subwatersheds to address unique water quality problems.

D) Summarize all watershed protection activities over the past 10 years.
Response: A list of watershed activities and reports completed over the last 10 years has been added.

II. Watershed Plan Development

A) The plan has listed the watershed partners, they will add an electronic list of contacts.
Response: An electronic list of the Watershed Partners can be provided upon request.

B) NEFCO has developed a mission statement, recommended the watershed group develop one. Add a section/chapter on the structure of the decision-making body, decision- making processes, organizational set-up, by-laws, etc.
Response: Information has been added in Appendix B with regards to the Nimishillen Creek Watershed Partners that include the group's structure, decision making process, and by-laws.

C) Have an established watershed group, however, do not have documented partner roles/responsibilities, procedures, bylaws, group decision-making processes and have not yet decided if they want to file for 501 (c) 3 status since Earth Action Partnership is a nonprofit partner.
Response: By-laws, procedures, and group decision-making processes are all

outlined in Appendix B of the Action Plan. Roles and responsibilities for various current or future actions are indentified in the various Action Tables found in Section VII.

D) The Plan does not have an endorsement page to be signed by key partners. Also need to refine an informational/educational component for public understanding that encourages early and continued participation.

Responses:

- The Action Plan has been endorsed by NEFCO's General Policy Board which includes elected officials from the areas within and outside of the watershed. The General Policy Board resolution is found after the title page.
- Educational components can be found in each of the subwatershed action plans. It is believed that the plan reflects the need for great public understanding and encourages participation. The Watershed Partners annual stream clean-up is a reflection of this.

III. Watershed Inventory

A) Plan does not contain topographic maps of the watershed. Need to investigate existence of studies on fish, mussels, mammals, birds, reptiles, amphibians, plants invasive nonnative species and potential impacts. Need climate and precipitation info. Tributary information should include CFS, 10 year low flows, floodplain areas, sinuosity and entrenchment indices. Lakes & reservoirs have been identified, however, need sizes, uses, watersheds and detention times. Need to specify the location of aquifers, recharge rates, uses, flow regimes. Advised Eric to check with Kelvin Rogers from Ohio EPA NEDO about potential SWAP info and our groundwater section about DRASTIC. Land uses are discussed. Lacking specific breakdown info on agricultural uses such as tillage, rotations, livestock inventory, grazing chemical use patterns, and irrigation. Also need non-forested wetlands and protected lands indicated. Beneficial to have status and trends of land uses projected.

Responses:

- Relief is represented in the slope figures found in Sections II and IV. In addition, stream gradients for each of the major tributaries can be found in Table II-12. A topographic map was considered, but the size of the watershed limited the usefulness of an 8.5" x 11" topo map in the plan.
- Local experts were contacted with regards to plants and wildlife found within the watershed. The information is included in the Action Plan.
- Climate and precipitation information has been added.
- USGS gauging information from the two stations located in the watershed has been added.
- A 100-year FEMA floodplain map has been added.
- Lake and reservoir information outlined above is not currently available. It will

be added in the future when available.
- SWAP information has been included into the plan.
- Information on tillage, rotations, livestock, and chemical use patterns have been added based on information provided by Wayne SWCD, Ohio Dept. of Agriculture, and the Farm Bureau.
- Wetland map was added that represents the best information available for the watershed basin (Ohio Wetland Inventory). Information on protected lands outside what is already provided in the plan (parks) was not found. Efforts were made to attain Conservation Reserve Program (CRP) and other agricultural program information from the Farm Service Agency, but the information was not provide in time for inclusion into this Action Plan.
- Land usage trends provided by Stark County Regional Planning have been added.

B) Need to discuss sites of historical, cultural and recreational significance.
Response: This information has been included that addresses the historical, cultural, and recreational significance of Nimishillen Creek.

C) Needs a listing of all current efforts helping improve water quality in the watershed.
Response: This information is provided in the new Action Plan.

D) The watershed plan has a very detailed riparian corridor assessment. Need discussion on early settlement conditions, channel and floodplain condition, miles of forested riparian buffer, miles permanently protected, miles of natural channel, miles and location of modified channels, location of dams, streams with unrestricted livestock access, locations of eroding embankments, floodplain connectivity, riparian levees, entrenchment, expected residential/commercial development and expected road/highway/bridge construction.
Responses:
- Information on historical watershed conditions is limited, so limited information was included in the Action Plan.
- Ditch/channeled portions of Nimishillen Creek have been added, including length and location. Appendix E contains all the “dedicated” ditches in the watershed that are on record with the Stark County Engineers office.
- The location of known low head dams have been added to the Action Plan.
- Information on expected residential and commercial development has been added based on information provided by the Stark County Regional Planning Commission.
- Miles of permanently protected riparian habitat are addressed in Section II of the Action Plan.
- The type of riparian cover, including forested riparian habitat, was taken into consideration in developing the scoring for the Riparian Corridor Study found in Section II. Areas with “high” riparian quality will almost certainly contain a

forested buffer. The overall goal of the plan is to protect high quality, forested buffers and restore the degraded riparian habitat to a similar "high" quality condition.

- The following recommendations have very limited information available: channel and floodplain condition, floodplain connectivity, entrenchment, miles of natural channel, streams with unrestricted livestock access, riparian levees, and locations of eroding embankments. Sections within the Action were added for future inclusion of this information when or if it become available.

E) The locations of point sources have been mapped and discussion on HSTS is present in this plan. Need to indicate use designations with use attainment, partial attainment or non-attainment. Incorporate causes and sources info from 305 (b) & 303(d) reports. Also include info on spills and illicit discharges, number of new homes being built, animal feeding operations, highly erodible lands, culverted streams, channelized streams, effluent volumes, stream miles impounded, petition ditches and areas susceptible to water quality degradation if conditions don't change.

Responses:

- All available water quality information has been added to the Action Plan, including designations for aquatic life uses, water supply, and recreation.
- The watershed has no traditional petitioned ditches. However, Appendix E contains a list of "dedicated" ditches created from the 1860s through 1940s.
- Land use and development trends were incorporated into the Action Plan's Land Use inventory found in Section II.
- There was insufficient information found on spills, illicit dischargers, and animal feeding operations to be included in this report.
- Again, limited information was available regarding culverted streams, effluent volume, and stream miles impounded. This information can be easily added to the Watershed Inventory section once collected.

F) The inventory needs to include water quality use attainment maps, with an analysis linking causes of water quality impairment to sources.

Responses:

- Currently there is not enough information available to link water quality impairments to sources of impairments. The TMDL, which will greatly assist in this area, has been delayed due to flooding in 2003. The scheduled TMDL completion date has been pushed back to 2007.
- Available water quality attainment information can be found in Section III, titled Water Resource Quality, which contains an aquatic life use attainment map.
- The Load Reduction section (V) will contain an analysis linking the causes to the sources of water quality impairments once the TMDL is completed. Until that time, load reductions will be determined on a project by project basis.

IV. Watershed Impairments

A) The TMDL for this basin has been postponed and is not developed yet. Eric will need to request assistance from OEPA and ODNR to develop pollutant load calculations, once the inventory details exact locations and sources of impairments. Need to develop problem statements linking cause and sources with impairments and estimated loads.

Responses:

- Until the TMDL is completed, all the Nimishillen Creek Watershed Partners and NEFCO can do is prioritize watershed activities based on existing water quality data and "best professional judgments" by watershed stakeholders.
- Problem statements have been replaced by "Issues" in the Action Plan. The general watershed-wide issues can be found in Section IV. Also for each of the six subwatershed action plan, a prioritized list of issues was developed (Section VII). For each issue there is a goal, objectives, and specific actions. Where known, these objectives and actions are directed to "Focus Areas" which are known sources of impairment.
- Issues, goals, objectives, and actions will be updated, if needed, to address impairments identified in the future Nimishillen Creek TMDL.

V. Watershed Restoration and Protection Goals

A) Streamline the document by organizing it according to Appendix 8 instead of each chapter as a Phase in the planning process. This should minimize the repeated information and make the document easier to work with into the future. For example, use 8 chapters according to the sections in Appendix 8, listed as such; Introduction, Watershed Plan Development, Watershed Inventory, Watershed Impairments, Watershed Restoration and Protection Goals, Implementation, Evaluation, and Plan Revision Strategy. Use Appendix 8 to guide the content of each.

Responses:

- The new Action Plan has been reformatted and streamlined to closely follow the Appendix 8 format. Some of the sections or chapters names have been changed and/or reordered from the Appendix 8 format to remain consistent with previous NEFCO reports.
- As part of the Action Plan update, repetitive information was removed by combining the four phases of the previous report into a single, stand-alone document.

B) Do not bury the goals/objectives in an appendix table. This should be the most important section to reference for implementation. Make it a major section of the Plan, preferably its own chapter.

Response: The goals and objectives are now found in the Subwatershed Action Plan Section (VII). Each of the six subwatershed has prioritized goals, objectives,

and actions.

C) Define the goals and objectives in specific terms. Remove "suggested responsible parties" and identify the actual person/entity that has agreed to perform the action and when they intend to complete the task. Suggestions or recommendations tend not to get implemented. A workplan is needed to actually move things forward.

Responses:

- Comment noted. Responsible parties have been identified for several on-going and future actions (Section VII). However, NEFCO and the Nimishillen Creek Watershed Partners feel that the plan would be less useful and robust if we only put in actions that entities committed to doing at this time.
- The contributors to the plan prioritized watershed problems as best as possible (lacking needed TMDL-type data), but they do not believe it is appropriate to try and "force" an entity to fix a NPS pollution when a) there is no data to back up sources of impairments; and b) there is no regulatory backing in fixing NPS pollution problems.
- These comments seem to be more in-line with a grant application/agreement rather than a voluntary NPS reduction program/plan. To this end, a workplan will be developed by the responsible parties on a project by project basis.
- NEFCO and the Nimishillen Creek Watershed Partners intend to utilize this plan to work with watershed stakeholders to implement needed actions. The Action Plan will be updated accordingly as projects are identified, responsible parties take ownership, and actions are completed.

D) Likewise, priorities will need to be established. In no way can NEFCO or the "suggested responsible parties" complete all the actions recommended. A target of where to start is necessary and then the stakeholders must agree to do them, with a deadline to make them accountable.

Responses:

- Comment noted. The contributors to the new Action Plan prioritized the issues for each of the six subwatersheds (Section VII). Under each of the issues are a goal, objectives, and prioritized (specific) actions. Also added to each of the objectives is "Focus Areas" to indicate specific locations to direct actions, and a "Target" as a way to evaluate the success of a watershed improvement effort.
- In each of the Action Tables found in Section VII, a "Time Frame" is included. The term "deadline" seems more appropriate for a grant (Section 319) or regulatory (NPDES Phase II) program than a voluntary watershed NPS reduction plan.
- Lastly, the Watershed Partners are uncomfortable with using the language "must" and "make them" in associations with the Action Plan. Outside of NPDES Storm Water Phase II requirement, stakeholders are rarely obligated to implement any NPS pollution reduction practices. Attaching such language to

this plan would hurt its acceptance among many of the needed stakeholders. Again, this comment seems more in line with a grant (Section 319) application/agreement or a regulatory program than a voluntary watershed action plan.

E) Once the actions are prioritized and responsible parties determined, consider using Memorandums of Understanding to manage all the many agreements that result with the stakeholders.

Response: Comment noted. Please provide examples of Memorandums of Understanding from other action plans. Again, this seems somewhat out of place for a voluntary watershed plan and more in-line with a grant requirement.

VI. Implementation

A) Objectives will need to be prioritized and an education/information/marketing strategy documented. Plan should clearly document in which subwatershed you will work first on what water quality issues. Include a rationale on why the Partners decided to start there first.

Responses:

- The Action Plan contributors prioritized the issues for each of the six subwatersheds (Section VII). Under each of the issues are a goal, objectives, and prioritized (specific) actions. Also added to each of the objectives is "Focus Areas" to indicate specific locations to direct actions, and a "Target" as a way to evaluate the success of a watershed improvement effort.
- The Action Plan does not prioritize which subwatershed to work in first. The report is designed to act like six "mini" watershed plans for each of the subbasins. Therefore, any stakeholder, not just NEFCO or the Nimishillen Creek Watershed Partners can pursue any watershed project outlined in this plan.
- Watershed Partners and NEFCO will prioritize their future watershed activities, but was not included in the update.
- A detailed marketing strategy was not completed for this plan. Suggestions or examples of such a strategy would be welcomed.

B) NEFCO's effort on this Plan is to be commended. There is a wealth of information presented. The Plan just needs to go one step further by taking the recommended actions and putting them into a workplan, whereby people become accountable to make sure the actions happen.

Response: Please see the comments above regarding workplans and accountability.

VII. Evaluation

A) Specific load calculations will be necessary before setting criteria for determining progress. Criteria for determining when revising of the plan will be necessary must be documented. This part of the plan must specify who will monitor the plan's progress and how. Specify how progress of the plan will be publicized to the public and officials. Who will track and monitor water quality progress? What will trigger a revision of the implementation plan? Highlight successful activities and avoid activities that were unsuccessful. Macroinvertebrate monitoring is discussed, chemical monitoring should be documented as well.

Responses:

- Although important, the Watershed Partners do not entirely agree that load calculations are necessary for determining progress. Activities like public education and the protection of existing high quality natural areas aren't likely to be proven successful by specific load reduction calculations, but both actions would be considered progress in the watershed.
- For activities that can be directly tied to the reduction of specific pollutants, load reduction estimates have been provided when possible in the Action Tables found in Section VII.
- The action tables in Section VII have an evaluation method to monitor progress. In addition, the objectives in this section have a "Target" in order to help evaluate progress.
- Without a completed TMDL by Ohio EPA, it was not possible set criteria for reaching State water quality standards.
- The logical trigger for the next revision of the Action Plan will be the completion of the Nimishillen Creek TMDL.
- Resources currently are not in place for prolong, watershed-wide chemical monitoring program. Information regarding a cost effective implementation of such a watershed-wide monitoring program would be appreciated.

VIII. Plan Update/Revision

A) Need to have a title page with contact names, phone numbers and e-mail addresses. Need to publish a calendar of past and planned events. Also a table of acronyms used in this plan. Need one sentence that states that NEFCO will be the keeper of the records and documents.

Responses:

- A statement was added that Watershed Coordinator and/or NEFCO is responsible for maintenance and revisions to the Action Plan (Section I).
- Contact information is now on the title page.
- After the Action Plan is submitted for endorsement a calendar or spreadsheet of past and future watershed events and activity due dates will be completed. This action was identified as a need during this year's Functional Review with

the AAT.
- A list of acronyms used in the plan is found in Appendix A.

IX. Other items for consideration

A) The public meetings focused on getting input only, not involvement. Please reconvene some work groups to define exactly "who is going to do what by when and with what resources". While stakeholder involvement was mentioned several times as necessary, participatory decision making on priorities and responsible parties has not occurred.

Response:
- The Nimishillen Creek Watershed Partners were convened several times to identify issues, determine goals, set objectives, and decide on needed actions. The Partners determined the priority of the issues in each subwatershed and determined responsible parties where appropriate.
- Please see my comments above regarding deadlines and responsible parties.
- In general, the obstacles for improving water quality in the Nimishillen Creek Watershed have not been due to a lack of involvement or participation by local stakeholder, but rather the lack of resources (money) available to complete needed best management practices.

B) The Plan needs to be updated to include a prioritization on the many recommended actions.

Response: Please see my comments above regarding prioritization.

C) Information is repeated in each of the sections i.e. "introductions" to the chapters are very similar which might discourage readership.

Response: The *Nimishillen Creek Watershed – State Action Plan* is an updated and new stand-alone report replacing the four phases of the *Nimishillen Creek Comprehensive Watershed Management Plan* (CWMP) previously submitted for endorsement. The new report eliminates the repetitive text of the previous plan.

D) The geographic area covered needs to be subdivided into smaller HUCs. The Plan is too big and complex, and the goals & objectives are not specific enough (according to research done by the Center for Watershed Protection, these are all reasons that watershed plans fail to be implemented).

Responses:
- The new Action Plan has increased the number of subwatershed from four to six and each subwatershed has its own "mini" action plan specifically for that subbasin. In other words this report contains six individualized action plans for each of the primary Nimishillen Creek tributaries and the mainstem.
- Goals and objectives were completed with as much specificity as possible given the limit data available to the stakeholders. These goals and objectives

will be reevaluated and almost certainly updated once Ohio EPA has completed the TMDL for the watershed.

E) We recommend that the plan highlight subwatersheds and implementation be detailed at the subwatershed scale in priority order of which implementation should occur first. Recommend reorganizing this plan with the Appendix 8 Update.
Response: Please see my responses above regarding prioritization, subwatershed action plans, and reorganization of this plan based on Appendix 8.

F) If NEFCO would prefer to take some low hanging fruit initially to learn and get some quick success, please tackle the big problem areas. We also agree with your project that preservation and restoration should have equal priority.
Responses:
- NEFCO feels picking "low hanging" fruit is vital to build momentum to tackle the bigger water quality problems. Tackling the "big problems" has been the result of lacking the financial resources to complete needed projects.
- If preservation and restoration are to have equal priority, then we would suggest modifying the "Guide to Developing Local Watershed Action Plans in Ohio" and specifically Appendix 8 so it reflects this view.

Specific Comments on Text:
Response: As already mentioned, the *Nimishillen Creek Watershed – State Action Plan* is a completely new and independent document produced by the Upper Tuscarawas River Watershed Coordinator, the Nimishillen Creek Watershed Partners, and NEFCO. As such, most of the comments below are regarding to text that was not included in the new Action Plan. However, comments from the previous plan were reviewed and given due consideration while completing the new Action Plan.

A) Place the "play-by-play" from the public meetings (i.e. Phase I, pgs. 84-85) into an appendix instead of in the body of the text, or remove it entirely. This is cumbersome, not necessary, and draws attention away from the important aspects of the plan ie."who is going to do what" matrix.
Response: This text does not appear in the new Action Plan.

Phase I
A) Page 11: Potential Pollution Sources: Rather than examine potential sources based on what is in the watershed that could affect water quality, as the plan does now, consider following "A Guide to Developing Local Watershed Action Plans in Ohio" and look first at where the water quality is not in attainment with water quality standards (or threatened). Attempt to quantify the sources that are leading to the cause of this impairment and plan implementation that will address these

sources.

Responses:

- Comments noted and have been incorporated into the new plan. However, the plan these comments are directed to was completed using the "Guide" and regular "Semi-Annual Evaluation Reports" were submitted to Ohio EPA from 1998 through 2001 for review. Please refer to these reports and point out where NEFCO and the Watershed Partners failed to follow the "Guide" when developing the watershed plan.
- Nearly 80% of the Nimishillen Creek and its tributaries are not in attainment and 40% of the stream miles have not been assessed. The assessments that have been conducted have primarily focused on point sources of pollution with little information on NPS pollution. Therefore, quantifying the sources that are causing impairments is not possible at this time. The TMDL is currently scheduled for completion in 2007 and should greatly help in this area.

B) Under this section, insert a water quality attainment table and map to document which segments are failing to meet designated uses. As it stands today, this plan focuses on potential sources of impairment instead of actual water quality impacts as documented by Ohio EPA's existing water quality data.

Response: All available water quality information from Ohio EPA is presented in Section III of the new Action Plan. It includes attainment tables for aquatic life uses, recreation, and water supply.

C) Page 22: Why are soils with "extremely high porosity and permeability" singled out as unsuitable soils, where household sewage treatment systems (HSTS) are likely to fail? The *Soil Survey of Stark County, Ohio* identifies a variety of soil properties that are associated with failed HSTS: subject to flooding, slope, seasonal high water table, depth to bedrock, and moderately slow to very slow permeability. In fact, soils with extremely high porosity and permeability in the underlying horizons or layers are generally rated in the soil survey as having slight limitations for HSTS, because they commonly have subsoil horizons that are ideal for treatment of household sewage. A footnote does recognize the hazard of "environment pollution" in the more porous soils, because the porous soils do present a greater hazard for groundwater pollution, where the moderately permeable subsoil horizons are too thin to allow complete treatment. On the other hand, soils with a seasonally high water table or a moderately slow to very slow permeability are unsuitable for uses as treatment because of saturation or slow movement of the effluent. If soils with extremely high porosity and permeability are considered unsuited, then soils that are unsuited are so common in the Nimishillen watershed that "unsuitable soils" need not be identified as one of the three elements in the identification of critical areas on Figure 6. HSTS are likely to fail in nearly all unsewered, urban areas in the watershed. Section II.2. in the Phase IV Ohio EPA Home Sewage Treatment System Plan, and particularly Figure

3 in the section, portrays the distribution of unsuitable soils much more accurately than this section in the Phase I part of the plan.
Response: This text is not included in the new Action Plan.

D) Page 25: It would be helpful if the text defined "steep sloped soils." Judging from Figure 10, it appears to be defined as soils with more than 6 percent slope. A map showing the distribution of soils with 6 to 12 percent slopes, 12 to 18 percent slopes, and more than 18 percent slopes would have been helpful. It would have demonstrated that Subwatershed 1 has the highest concentration of soils in the two steeper classes of slope. (See Figure 2 in Section II.2. in the Phase IV Ohio EPA Home Sewage Treatment System Plan.)
Response: This text is not included in the new Action Plan.

Phase III (June 2001)

A) Tables: Any objectives and action listing 319 as a possible funding source need to be measurable to achieve the numerical goals.
Response: These tables do not appear in the new action plan. However, the new action tables in Section VII include measurable goals with numerical achievement, when possible.

B) Table 4, Goal 2, Objective 2.1, Action 2.1b The "Cost Estimate" may be conservative for replacing failing systems with systems that are designed on the basis of soil characteristics observed and described on-site.
Response: Cost estimates for on-site HSTSs were reviewed by the Stark County Health Department for the new Action Plan.

C) Table 4, Goal 2, Objective 2.2, Action 2.2b
The "Cost Estimate" may be conservative for replacing failing systems with systems that are designed on the basis of soil characteristics observed and described on-site.
Response: Cost estimates for on-site HSTSs were reviewed by the Stark County Health Department for the new Action Plan.

D) Table 4, Objective 7.3 "Conduct Further Research regarding point and nonpoint source pollution. Each of these action items should already have been collected and included in the plan inventory.
Response: This objective is not included in the new Action Plan.

E) Table 5, Part D3, Local Health Departments and Ohio EPA: The average costs estimated by the local health departments may be conservative for replacing failing systems with systems that are designed on the basis of soil characteristics observed and described on-site.
Response: Cost estimates for on-site HSTSs were reviewed by the Stark County

Health Department for the new Action Plan.

Phase IV (April 2003)

A) This report draft probably incorporates soils information better than any watershed management plan Tim Gerber has reviewed so far.
Response: Phase IV is included in almost its entirety in Section VI in the new Action Plan.

B) Figures 2, 3 and 5 are excellent, and the analysis on page 4, under II.2 accurately describes the distribution of common soils with greater limitations. The plan includes a strategy to target the most critical areas to maximize water quality improvements with public funding that is limited. Page 14 and 15: The statement below should be added in the text somewhere, perhaps in association with Table 4, Goal 2, Objectives 2.1 and 2.2, Action b and Table 5, Part D3, Local Health Departments and Ohio EPA: "To assure that the on-lot systems constructed with public funds are designed to treat household sewage adequately, a site evaluation that includes a detailed soil description should be conducted by a qualified individual. A professional soil scientist certified by the Association of Ohio Pedologists, the American Society of Agronomy's ARCPACS certification program, or other professional site evaluator certification may be designated by the local health district to meet such a requirement. The design of proposed systems should be compared with documented soil characteristics to assure that public funds are used for properly designed systems."
Response: This statement may no longer be needed with the new State HSTS rules being developed. The statement can be added if these new rules do not address this issues.

Endorsement

A) Most of this watershed plan was developed prior to the Appendix 8 Update. Eric Akin realizes that the plan needed to be updated accordingly. The TMDL for this watershed has been pushed back because of sampling difficulties in the summer of 2003. It is much more challenging to calculate necessary load reductions without the benefit of a TMDL. This watershed action plan is very strong at identifying good and poor riparian corridor areas. I would be in favor of partial endorsement, so the Nimishillen would be eligible for a 2005 /319 grant. The grant would have to focus primarily on areas needing riparian corridor improvements and conservation easements. If the Stark County Health Department develops an HSTS plan for Stark County that meets Ohio EPA approval, then we could consider approving an HSTS component in the 319 application.
Response: Many improvements have been made to the new Action Plan based on these comments from the original plan that was submitted. I appreciate your endorsement consideration for this new report.

Appendix J:
References Cited

Allan, J.D. 1995. Stream Ecology: Structure and Function of Running Waters. Chapman and Hill. New York, NY.

Antosch, Larry. 2006. Personal Communication. Ohio Farm Bureau Federation. Director of Environmental Research.

Brown, L. C. and R. P. Fynn. 1991. Irrigation in Ohio: Eight Major Factors. Fact Sheet AEX-370-91. Ohio State University Extension. Columbus, OH.

Bayham, Andy. 2006. Personal Communication. U.S. Department of Agriculture - Natural Resources and Conservation Service (NRCS). District Conservationist.

Dahl, T.E. 1990. Wetlands Losses in the United States 1780s to 1980s. U.S. Department of Interior. Fish and Wildlife Service, Washington, D.C.

Eynon, J. 2005. Pollutant Removal Efficiencies of a Constructed Storm Water Wetland in Canton, Ohio. Youngstown State University.

Karr, J.L., P.L. Angermeier, I.J. Schlosser. 1983. Habitat structure and Fish Communities of Warmwater Streams. U.S. Environmental Protection Agency, Covallis, OR.

Loomis, Linn. 1994. Here and Now - Ohio's Canals: The Sandy and Beaver Canal. Schlabach Printers. Sugarcreek, OH.

Lukens, Jan. 2006. Personal Communication. K. W. Zellers & Sons, Inc., Maintenance Manager.

Mecklenburg, D. and A. Ward. 2006. Sediment Equations - A Stream Module: Spreadsheet Tools for River Evaluation, Assessment, and Monitoring. Version 4.0. Ohio Department of Natural Resources.

Miller, G. 1988. Environmental Science an Introduction. Belmont: Wadsworth Publishing Company.

Mitsch, W.J. and J.G. Gosselink. 1993. Wetlands. 2nd ed. Van Nostrand Reinhold. New York.

Oelker, E.F., K.M. Boone and L.C. Brown. 2005. Stark County Water Resources. Fact Sheet AEX-480.76. Ohio State University Extension. Columbus, OH.

Ohio Department of Natural Resources (ODNR). 2004. 2004 Report on Ohio Mineral Industries. Columbus, OH.

Ohio Department of Natural Resources (ODNR) - Division of Natural Areas and Preserves (DNAP). 2001. The Natural Heritage Database. Columbus, OH.

Ohio Environmental Protection Agency (Ohio EPA). 2001. Biological and Aquatic Life Use Assessment Study: Lower Middle Branch Nimishillen Creek. Site Evaluation Report EAS/2001-10-4. Columbus, OH.

Ohio Environmental Protection Agency (Ohio EPA). 1997. Guide to Developing Local Watershed Action Plans in Ohio.

Ohio Environmental Protection Agency (Ohio EPA). 1995. The Ohio Comparative Risk Project (OCRP): Comparing the Risks of Ohio's Environmental Conditions.

Rankin, E.T. 1989. The Qualitative Habitat Evaluation Index (QHEI): Rationale, methods and application. Ohio Environmental Protection Agency - Division of Water Quality Planning and Assessment. Columbus, OH.

Sherwood, J.M., and Huitger, C.A. 2005. Bankfull Characteristics of Ohio Streams and Their Relation to Peak Stream-Flows. U.S. Geological Survey Investigations Report 2005-5153.

Stark County Building Industry Association (BIA). September 2006. The Splinter Newsletter. North Canton, OH.

Stark County Regional Planning Commission (RPC). 2005. SCRPC/SCATS 2030 Comprehensive/Transportation Plan. Canton, OH.

Williams, S. 1991. Ground Water Pollution Potential of Stark County, Ohio. Ohio Department of Natural Resources - Division of Water - Ground Water Resource Section. Columbus, OH.

Windus, J. 2003. Invasive Species: Aliens Among Us. Ohio Department of Natural Resources (ODNR) - Division of Wildlife. Columbus, OH.

Yoder, C.O. and G.D. Davis. 1996. The Ohio EPA Bioassessment Comparability Project: A Preliminary Analysis. Technical Bulletin MAS/1996-12-4. Ohio Environmental Protection Agency (Ohio EPA). Columbus, OH.