

NORTHEAST OHIO FOUR COUNTY REGIONAL PLANNING AND DEVELOPMENT ORGANIZATION

Nimishillen Creek Watershed - State Action Plan Update

DRAFT REPORT

September 2011

The preparation of this report was financed in part through a water quality management planning grant provided through the State of Ohio Environmental Protection Agency under the provisions of the American Recovery and Restoration Act (ARRA), and with funds from NEFCO's dues-paying members.

This report is submitted in fulfillment of Deliverable 4, from NEFCO's Scope of Work, Exhibit 1-A of NEFCO's water quality management contract with Ohio EPA. The scope calls for NEFCO to update the Nimishillen Creek Watershed Action Plan including the addition of any urban flooding and ditch clean out projects and the assessment of current agricultural drainage needs.

Table of Contents

List of Tables.....ix

List of Figures.....xii

I. Introduction..... 1

 Purpose 1

 Fundamental Water Quality Goals 1

 Watershed Issues Overview 1

 Updates and Revisions..... 1

 Nimishillen Creek Watershed Partners..... 3

 Development of the Action Plan 3

 Education, Marketing Strategies, and Outreach Goals..... 4

II. Watershed Inventory 5

 Introduction..... 5

 Watershed Information and Map..... 5

 Physical Description 5

 Administrative Boundaries..... 6

 Districts

 Park..... 8

 Schools 11

 Colleges and Universities..... 12

 Sewer 12

 Soil and Water 14

 Resource Conservation and Development (RC&D) Program 14

 Muskingum Watershed Conservancy District..... 14

 Geology

 Topography, Land Form, and Slope 15

 Glacial History 18

 Bedrock Geology..... 18

 Mineral Resources 20

 Soils 20

 Fitchville-Sebring Soil Association 22

 Chili-Wheeling Association 22

 Ravenna-Canfield Association..... 22

 Canfield-Wooster Association 22

 Carlisle-Willette-Linwood Association..... 23

 Wadsworth-Rittman Association..... 23

 Loudonville-Wooster Association..... 23

 Latham-Keene Association..... 24

 Muskingum-Gilpin-Dekalb Association 24

 Biological Features

 Rare, Threatened, and Endangered Plant Species 24

 Invasive, Non-Native Species 25

 Wildlife 25

Table of Contents (continued)

	<u>Page</u>
Water Resources	
Climate and Precipitation.....	27
Surface Water.....	27
Flow Regime.....	28
USGS Gauging Stations.....	28
Floodplain Areas.....	28
Water Quality Improvement Efforts.....	30
Storm Water	
NPDES Storm Water Phase 2 Communities.....	32
Stark County Drainage Task Force.....	33
Wetlands.....	33
Ground Water	
Water Suppliers.....	36
Ground Water Pollution Potential.....	36
SWAP Program.....	38
Land Use.....	38
Land Cover.....	40
Status and Trends.....	42
Impervious Surfaces.....	43
Protected Lands.....	44
Agriculture.....	45
Crop Type.....	46
Tillage.....	46
Rotations.....	47
Irrigation.....	47
Livestock Inventory and Grazing.....	48
Agriculture and Economy.....	49
Socioeconomics	
Demographics.....	50
Economics.....	50
Physical Attributes	
Riparian Corridor Study.....	51
Ohio EPA's Habitat Restorability Rating.....	53
Riparian Miles with Permanent Protection.....	56
Dams.....	56
Gradient.....	56
Channelization and Other Modifications.....	57
Eroded Banks.....	58
Floodplain Connectivity.....	59
Riparian Levees.....	59
Entrenched Miles, Bankfull Discharge, and Stream Power.....	59
Recreation.....	63
Cultural Resources	
Historical Information.....	64
Historical Sites.....	65

Table of Contents (continued)

	<u>Page</u>
Nimishillen and Sandy Canal	65
III. Water Resource Quality	67
Designated Uses for Ohio Surface Water Resources	67
Aquatic Life Use Designations	67
Non-Aquatic Life Use Designation - Water Supply	69
Non-Aquatic Life Use Designation - Recreation	70
Non-Aquatic Life Use Designation - State Resource Waters	71
Biological Criteria.....	71
IBI - Index of Biological Integrity.....	72
ICI - Invertebrate Community Index	72
MIwb - Modified Index of Well Being.....	72
Aquatic Life Use Attainment Status of Nimishillen Creek.....	72
QHEI - Qualitative Habitat Evaluation Index	78
Other Water Quality Studies.....	79
IV. Water Quality Issues	82
Overview of Water Quality Impairments.....	82
Point Source Pollution.....	82
Nonpoint Source Pollution.....	84
Potential Contamination Sources	85
Spills	85
General Watershed Issues.....	88
Erosion and Sedimentation	90
Urbanization/Suburbanization	91
Improperly Treated Wastewater.....	91
Riparian Corridor Segmentation and Incursion	92
Channel Modification.....	93
Flooding	94
Acid Mine Drainage.....	95
V. Load Reduction	97
Nimishillen Creek TMDL Summary	97
TMDLs Developed	98
TMDL Load Reduction	98
Pathogens	99
Habitat.....	101
Sediment	103
Nimishillen Creek TMDL Important "Fixes"	104
VI. Home Sewage Treatment System Plan	105
Purpose of the HSTS Plan	105
Key Features Affecting HSTSs in the Nimishillen Creek Watershed	
Topography and Geology.....	107

Table of Contents (continued)

	<u>Page</u>
Soils	107
Water Supply	110
Land Uses	110
Demographics, Socioeconomic, and the 2000 U.S. Census.....	111
Home Sewage Treatment System Problem Definition	113
Sewered and Unsewered Areas	113
Characterization of Existing Home Sewage Systems	113
Known Impacts on Specific Stream Segments	114
Critical Areas.....	114
Proposed Corrective Action Plan	
Current Actions	115
Proposed Actions	116
Tracking and Documenting Success	117
 VII. Subwatershed Action Plans	
East Branch Subwatershed Action Plan.....	118
Inventory	
Physical Description.....	118
Land Use.....	118
Point Source Discharges.....	121
Water Quality Data and Impairments	
Ohio EPA's Water Quality Results.....	123
Impairments	
Aquatic Life Use.....	124
Recreation	124
Fish Consumption.....	124
Ohio EPA's Causes and Sources of Impairments.....	124
Load Reduction Information.....	125
Other Water Quality Information	126
East Branch Subwatershed Issues and Actions.....	127
Issue #1 - Storm Water Runoff and Flooding.....	128
Issue #2 - Riparian Corridor Protection and Restoration.....	130
Issue #3 - Failing Home Sewage Treatment Systems	133
Issue #4 - Illegal Dumping.....	135
Issue #5 - Agricultural Runoff.....	137
 Middle Branch Subwatershed Action Plan	141
Inventory	
Physical Description.....	141
Land Use.....	141
Point Source Discharges.....	141
Water Quality Data and Impairments	
Ohio EPA's Water Quality Results - 2001	146
Impairments	
Aquatic Life Use.....	147

Table of Contents (continued)

	<u>Page</u>
Recreation	147
Fish Consumption.....	147
Ohio EPA's Causes and Sources of Impairments.....	147
Load Reduction Information	148
Other Water Quality Information	149
Middle Branch Subwatershed Issues and Actions	153
Issue #1 - Failing Home Sewage Treatment Systems	153
Issue #2 - Environmental Education	156
Issue #3 - Agriculture Runoff and Practices.....	158
Issue #4 - Riparian Corridor Restoration.....	161
Issue #5 - Storm Water Runoff from Urban and Suburban Areas	164
West Branch Subwatershed Action Plan.....	167
Inventory	
Physical Description.....	167
Land Use.....	169
Point Source Discharges.....	169
Water Quality Data and Impairments	
Ohio EPA's Water Quality Results.....	172
Impairments	
Aquatic Life Use.....	172
Recreation	172
Fish Consumption.....	173
Ohio EPA's Causes and Sources of Impairments.....	173
Load Reduction Information	173
Other Water Quality Information	175
West Branch Subwatershed Issues and Actions.....	176
Issue #1 - Environmental Education	177
Issue #2 - Storm Water Runoff from Urban and Suburban Areas	179
Issue #3 - Watershed Monitoring	182
Issue #4 - Abandoned Mine Drainage.....	183
Issue #5 - Riparian Corridor Restoration.....	185
Sherrick Run Subwatershed Action Plan.....	189
Inventory.....	189
Physical Description	189
Land Use.....	189
Point Source Discharges.....	189
Water Quality Data and Impairments	
Ohio EPA's Water Quality Results.....	194
Impairments	194
Ohio EPA's Causes and Sources of Impairments.....	194
Load Reduction Information	195
Other Water Quality Information	196
Sherrick Run Subwatershed Issues and Actions.....	197

Table of Contents (continued)

	<u>Page</u>
Issue #1 - Acid Mine Drainage	198
Issue #2 - Failing Home Sewage Treatment Systems	201
Issue #3 - Illegal Dumping.....	204
Issue #4 - Environmental Education and Monitoring.....	205
 Hurford Run Subwatershed Action Plan.....	 208
Inventory	
Physical Description.....	208
Land Use.....	208
Point Source Discharges.....	208
Water Quality Data and Impairments	
Ohio EPA's Water Quality Results	212
Impairments	
Aquatic Life Use.....	212
Recreation	212
Fish Consumption.....	212
Ohio EPA's Causes and Sources of Impairments.....	212
Load Reduction Information	213
Other Water Quality Information	213
Hurford Run Subwatershed Issues and Actions.....	214
Issue #1 - Industrial Site Runoff	215
Issue #2 - Environmental Education	217
Issue #3 - Riparian Corridor Restoration.....	220
Issue #4 - Failing Home Sewage Treatment Systems	223
 Mainstem Subwatershed Action Plan.....	 226
Inventory	
Physical Description.....	226
Land Use.....	226
Point Source Discharges.....	226
Water Quality Data and Impairments	
Ohio EPA's Water Quality Results	231
Impairments	
Aquatic Life Use.....	232
Recreation	232
Fish Consumption.....	232
Ohio EPA's Causes and Sources of Impairments.....	232
Load Reduction Information	233
Other Water Quality Information	234
Mainstem Subwatershed Issues and Actions.....	237
Issue #1 - Riparian Corridor Restoration and Protection.....	237
Issue #2 - Soil Erosion and Sedimentation	240
Issue #3 - Acid Mine Drainage (AMD).....	244
Issue #4 - Environmental Education	246
Issue #5 - Storm Water Runoff and Flooding.....	249

Table of Contents (continued)

	<u>Page</u>
VIII. Water Quality Monitoring	253
IX. Evaluation and Funding	254
X. Appendices.....	255
Appendix A - Acronyms	255
Appendix B - Nimishillen Creek Watershed Partners' By-Laws.....	257
Appendix C - Stark County Trail and Greenway Master Plan Map.....	261
Appendix D - 2000-2001 Ohio Natural Heritage Database for Rare Plant Species in Stark County.....	263
Appendix E - Lakes Greater Than Five Acres in the Nimishillen Creek Watershed.....	265
Appendix F - Stark County "Dedicated" Ditches.....	267
Appendix G - Point Source Dischargers in the Nimishillen Creek Watershed	269
Appendix H - Spills in the Nimishillen Creek Watershed Responded to by Ohio EPA Division of Emergency and Remedial Response Since 1990	276
Appendix I - Nimishillen Creek Comprehensive Watershed Management Plan Comments	283
Appendix J - References Cited.....	296

List of Tables

<u>Table</u>		<u>Page</u>
II-1	12-Digit Hydrologic Unit Code (HUC) Subwatershed in the Nimishillen Creek Watershed.....	5
II-2	Parks Adjacent to Nimishillen Creek and its Tributaries.....	9
II-3	School Districts Serving the Nimishillen Creek Watershed's Communities ..	11
II-4	Land Use/Land Cover by Subwatershed for the Nimishillen Creek Watershed	40
II-5	Future Road and Bridge Construction and Maintenance Projects in the Nimishillen Creek Watershed.....	44
II-6	Known Protected Land in the Nimishillen Creek Watershed	45
II-7	2010 Crop Production for Stark County, Ohio.....	46
II-8	Summary of Tillage Statistics in Stark County, Ohio.....	47
II-9	2010 Livestock Inventory for Stark County, Ohio	49
II-10	2002 Cash Receipts from Marketing of Farm Commodities in Stark County, Ohio	49
II-11	Stark County's Decennial Population Since 1860	50
II-12	Nimishillen Creek Watershed Percentage of Low, Moderate and High Quality Riparian Habitat.....	52
II-13	Ohio EPA Restorability Rating Factor for Aquatic Life Based on Stream Habitat Quality Index for Nimishillen Creek	55
II-14	Nimishillen Creek Watershed Average Stream Gradient and Percent of Slope	57
II-15	Large Ditches in the Nimishillen Creek Watershed.....	58
II-16	Estimated Bankfull Discharge for Selected Nimishillen Creek Segments	60
II-17	Estimated Unit Stream Power for Selected Nimishillen Creek Segments.....	62
III-1	Aquatic Life Use Designations for Nimishillen Creek and Tributaries	69

List of Tables (continued)

<u>Table</u>		<u>Page</u>
III-2	Water Supply Use Designation for Nimishillen Creek and Tributaries	70
III-3	Recreation Use Designation for Nimishillen Creek and Tributaries	71
III-4	Ecoregion Biocriteria for the Erie/Ontario Lake Plain (EOLP) and the Western Allegheny Plateau (WAP)	74
III-5	Summary of Designated Aquatic Life Uses and Attainment Status for Nimishillen Creek and Tributaries	76
III-6	Relationship between Ohio’s Aquatic Life Uses and the QHEI	78
III-7	Summary of QHEI Scores for Nimishillen Creek and Tributaries	79
IV-1	Ranking of 25 Land Uses in the Watershed and Land Use Characterization Rating for each Subwatershed	86
IV-2	Abandoned Underground Coal Mines in the Nimishillen Creek Watershed	96
V-1	TMDL and Allocation of Total Phosphorus.....	99
V-2	Total Existing Load, TMDL, and Allocation of Fecal Coliform Loads	100
V-3	Point Source Fecal Coliform Loads.....	100
V-4	Nonpoint Source Fecal Coliform Loads	101
V-5	QHEI Modified Attributes.....	102
V-6	Habitat TMDL	103
V-7	Sediment TMDL	104
VI-1	2000 U.S. Census Information for Areas in the Nimishillen Creek Watershed Containing Poor Soils in Unsewered Areas	113
VI-2	Sewer Priority List for Stark County, Ohio	115
VII-1	Point Source Discharging Operations in the East Branch Watershed	121
VII-2	East Branch Nimishillen Creek Aquatic Life Use Attainment Status, Biological Criteria Scores, and QHEI Scores	124

List of Tables (continued)

<u>Table</u>		<u>Page</u>
VII-3	Nimishillen Creek TMDL's Causes and Sources of Impairments for the East Branch of Nimishillen Creek.....	125
VII-4	TMDL and Allocation of Total Phosphorus for East Branch.....	125
VII-5	Total Existing Load, TMDL, and Allocation of Fecal Coliform Loads for the East Branch Nimishillen Creek.....	126
VII-6	Habitat TMDL.....	126
VII-7	Mean Cumulative Index Values* (CIV) for the East Branch of Nimishillen Creek Based on NEFCO's Macroinvertebrate Surveys	127
VII-8	Point Source Discharging Operations in the Middle Branch Subwatershed	145
VII-9	Middle Branch Nimishillen Creek Aquatic Life Use Attainment Status, Biological Criteria Scores, and QHEI Scores	146
VII-10	Nimishillen Creek TMDL's Causes and Sources of Impairments for the Middle Branch of Nimishillen Creek	148
VII-11	Sediment TMDL of the Middle Branch Nimishillen Creek	148
VII-12	Total Existing Load, TMDL, and Allocation of Fecal Coliform Loads for the Upper Middle Branch Nimishillen Creek.....	149
VII-13	Habitat TMDL for the Upper Middle Branch Nimishillen Creek	149
VII-14	Mean Cumulative Index Values* (CIV) for the Middle Branch of Nimishillen Creek Based on NEFCO's Macroinvertebrate Surveys	150
VII-15	Mean Cumulative Index Values (CIV) and Stream Segment Conditions Based on Macroinvertebrate Surveys at Reifsynder Park in Canton, Ohio	151
VII-16	Pollutant Removal Efficiencies from the Constructed Storm Water Treatment Wetland at Reifsynder Park in Canton, Ohio.....	152
VII-17	Ohio EPA 2011 Biological and Aquatic Life Use Sampling Results from the Middle Branch of Nimishillen Creek	152
VII-18	Point Source Discharging Operations in the West Branch Subwatershed	171

List of Tables (continued)

<u>Table</u>	<u>Page</u>
VII-19	West Branch Nimishillen Creek Aquatic Life Use Attainment Status, Biological Criteria Scores, and QHEI Scores 172
VII-20	Nimishillen Creek TMDL’s Causes and Sources of Impairments for the West Branch of Nimishillen Creek 173
VII-21	Sediment TMDL of the West Branch Nimishillen Creek..... 174
VII-22	Total Existing Load, TMDL, and Allocation of Fecal Coliform Loads for the West Branch Nimishillen Creek..... 174
VII-23	Habitat TMDL for the West Branch Nimishillen Creek 174
VII-24	Mean Cumulative Index Values* (CIV) for the West Branch from NEFCO’s Macroinvertebrate Surveys 175
VII-25	Point Source Discharging Operations in the Sherrick Run Subwatershed 193
VII-26	Sherrick Run Aquatic Life Attainment Status, Biological Criteria Scores and QHEI Scores 194
VII-27	Nimishillen Creek TMDL’s Causes and Sources of Impairments for Sherrick Run 195
VII-28	Total Existing Load, TMDL, and Allocation of Fecal Coliform Loads for Sherrick Run 195
VII-29	Habitat TMDL for Sherrick Run 195
VII-30	Mean Cumulative Index Values* (CIV) for Sherrick Run Based on NEFCO’s Macroinvertebrate Surveys 196
VII-31	Selected Water Chemistry Results from Grab Sample at the Acid Mine Drainage Discharge Point (RM 3.1) on Sherrick Run 197
VII-32	Point Source Discharging Operations in the Hurford Run Subwatershed..... 211
VII-33	Hurford Run Aquatic Life Use Status Biological Criteria Scores, and QHEI Scores 212
VII-34	Nimishillen Creek TMDL’s Causes and Sources of Impairments for Hurford Run 213

List of Tables (continued)

<u>Table</u>		<u>Page</u>
VII-35	Mean Cumulative Index Values* (CIV) for Hurford Run Based on NEFCO's Macroinvertebrate Surveys	213
VII-36	Point Source Discharging Operations in the Nimishillen Creek Mainstem Watershed	231
VII-37	Mainstem Nimishillen Creek Aquatic Life Use Status Biological Criteria Scores, and QHEI Scores	232
VII-38	Nimishillen Creek TMDL's Causes and Sources of Impairments for Nimishillen Creek Mainstem.....	233
VII-39	Mainstem's TMDL and Allocation of Total Phosphorus	233
VII-40	Total Existing Load, TMDL, and Allocations of Fecal Coliform Loads for the Mainstem Nimishillen Creek.....	234
VII-41	Habitat TMDL for Mainstem Nimishillen Creek	234
VII-42	Mean Cumulative Index Values* (CIV) for the Nimishillen Creek Mainstem Based on NEFCO's Macroinvertebrate Surveys	235
VII-43	Ohio EPA 1998 Aquatic Life Use Sampling Results from the Nimishillen Creek Mainstem	236

List of Figures

<u>Figure</u>		<u>Page</u>
I-1	Nimishillen Creek Subwatersheds, 2005.....	2
II-2	Government Jurisdictions.....	7
II-3	Creek-Side Parks.....	10
II-4	Sewered Areas.....	13
II-5	Glaciated/Unglaciated.....	16
II-6	Slopes >6%.....	17
II-7	Bedrock Geology.....	19
II-8	Abandoned Mines.....	21
II-9	USGS Stream Gages.....	29
II-10	100-Year Floodplain.....	31
II-11	1987 Ohio Wetlands Inventory.....	35
II-12	Ground Water Pollution Potential.....	37
II-13	Source Water Assessment and Protection (SWAP) Areas.....	39
II-14	Nimishillen Creek Land Cover, 1977 and 1994.....	41
II-15	Riparian Habitat Quality, 1999.....	54
II-16	Nimishillen Creek Stream Segments with Estimated Bankfull Discharge Calculations.....	61
III-1	Ohio Ecoregions.....	73
III-2	Aquatic Life Use Attainment Status.....	75
IV-1	Point Source Dischargers.....	83
IV-2	Oil and Gas Wells, 1997.....	87
IV-3	Report Spills in Nimishillen Creek Watershed, 1990-2006.....	89
VI-1	Nimishillen Creek Subwatersheds.....	106

DRAFT REPORT - September 30, 2011

VI-2	Slopes > 6%.....	108
VI-3	HSTS Limiting Soils in Unsewered Areas	109
VI-4	U.S. Census Tracts and Unsewered Areas.....	112
VII-1	East Branch Subwatershed.....	119
VII-2	East Branch Riparian Habitat Quality.....	120
VII-3	Middle Branch Subwatershed	142
VII-4	Middle Branch Riparian Habitat Quality	144
VII-5	West Branch Subwatershed	168
VII-6	West Branch Riparian Habitat Quality.....	170
VII-7	Sherrick Run Subwatershed	190
VII-8	Sherrick Run Abandoned Mines	191
VII-9	Sherrick Run Riparian Habitat Quality.....	192
VII-10	Hurford Run Subwatershed.....	209
VII-11	Hurford Run Riparian Habitat Quality.....	210
VII-12	Mainstem Subwatershed.....	227
VII-13	Mainstem Riparian Habitat Quality.....	228
VII-14	Mainstem Abandoned Mines.....	229