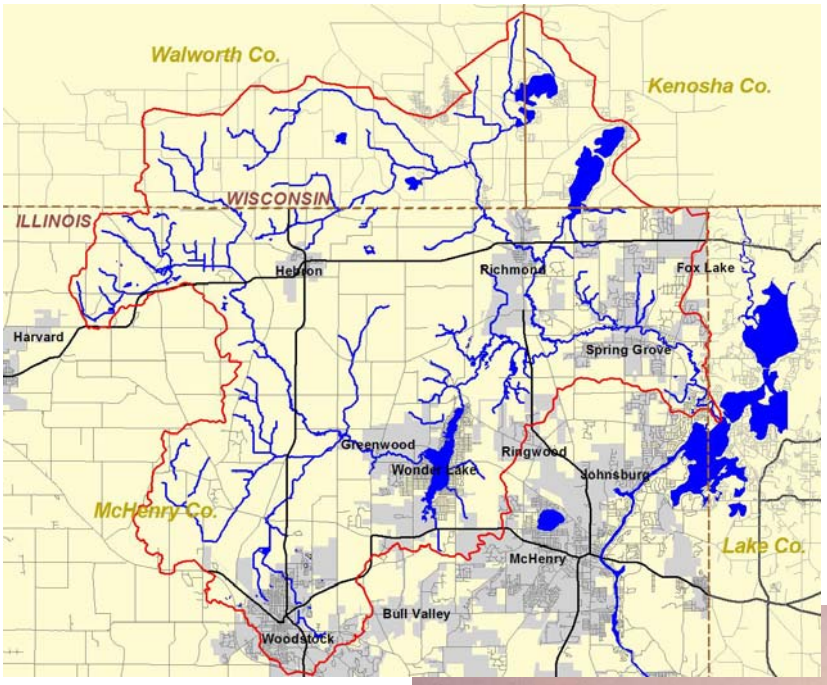
The

Nippersink Creek Watershed Plan



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&
The Nippersink Creek Watershed Planning Committee

Foreword

Read this first – then get INVOLVED!

To those who live along Nippersink Creek, enjoy its scenic beauty, or recreate in its waters, the following statement is an obvious one: **Nippersink Creek is a precious resource worth protecting**. This tributary to the Fox River connects numerous natural areas, some of which are of the highest quality in all of McHenry County. Nippersink Creek provides many benefits:

- it is the backbone of our watershed ecosystem - the fish, plants, and animals that rely on the stream for habitat and sustenance;
- it provides numerous opportunities for recreation – fishing, canoeing, hiking, bird watching;
- it accepts and conveys our stormwater runoff – carrying away runoff from our homes, streets and stormwater infrastructure;
- it receives some of our treated wastewater, further cleansing the water as it flows over and through the biologically rich substrate that lines the channel.
- its natural systems assimilate our pollution and act as conduits for groundwater recharge, protecting the Fox River from further degradation while recharging groundwater supplies. The Fox River and our groundwater are without question two of the most important natural resources in our region, and perhaps our most threatened.

Collectively, these functions can be referred to as the "green infrastructure" or network of natural systems that support the health and integrity of the Nippersink Creek Ecosystem. Unlike human designed and constructed infrastructure, Nippersink Creek and its natural features are irreplaceable. Once they are gone, the functions they naturally provided cannot be easily replaced by manmade systems.

The conversion of land to urban / suburban uses is now occurring at an alarming rate in the Nippersink Creek Watershed. It is therefore critical that stakeholders in the watershed take action now to recognize, appreciate, and protect our natural resources in the Nippersink Creek Watershed.

The Nippersink Creek Watershed Plan is intended to provide watershed stakeholders with a framework and the direction needed to protect critical areas and minimize the negative impacts of human activities to Nippersink Creek and its green infrastructure. This Plan is an advisory document to be used by all stakeholders in the watershed; from municipal officials and their staff, developers, not-for-profit land stewardship organizations, and private landowners.

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- McHenry County Defenders
- McHenry County Soil and Water Conservation District
- McHenry County Conservation District
- Sierra Club, Illinois Chapter
- Land Conservancy of McHenry County
- City of Woodstock
- Village of Wonder Lake
- Village of Richmond
- Village of Ringwood
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- U.S. Army Corps of Engineers
- Fox River Ecosystem Partnership
- Friends of the Fox River
- Illinois Department of Natural Resources
- McHenry County Department of Planning & Development

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Table of Contents

Foreword i
Acknowledgements ii

I. Introduction
1.1 Watershed Overview 1
1.2 Stream and Water Quality Ratings 2
1.3 Existing and Future Watershed Protection Challenges 3
1.4 Impetus for an Updated Watershed Plan 5
1.5 Watershed Planning – A USEPA Perspective 6
1.6 Nippersink Creek Watershed Plan Organization 7

II. Nippersink Creek Watershed Summary
2.1 Natural Resource 10
2.1.1 Landscape Resources 10
2.1.2 Biological Resources 20
2.1.3 Water Quality 23
2.2 Human Resources: Population and Land Uses 23
2.2.1 Population 23
2.2.2 Development Patterns & Land Use Changes 24
2.2.3 Land Use 25
2.3 Watershed Impacts & Impairments 26
2.3.1 Existing Impacts & Impairments 26
2.3.1.1 Watershed Impairment Causes Not Listed on the IEPA 303(d) List 27
2.3.2 Future Impacts & Impairments 32

III. Pollutant Loading Analysis
3.1 Pollutants of Concern 35
3.1.1 Pollutant Loading Analysis Approach 35
3.1.2 Pollutant Loading Analysis Methodology 36
3.2 Pollutant Loading Results and Pollutant Reduction Strategies or BMP's 39
3.2.1 Runoff Volume 39
3.2.2 Best Management Practices for Runoff Reduction 39
3.2.3 Nippersink Creek Pollutant Loading Results 39
3.3 Pollutant Load Reduction 43
3.3.1 Setting Pollutant Load Reductions Targets 43
3.3.2 Pollutant Load Reduction Strategies 44
3.4 BMP Selection 45

IV Recommendations to Protect Watershed Resources
4.1 Watershed Recommendations Overview 49
4.2 Watershed Plan Objectives 49
4.3 General Watershed Plan Recommendations 51
4.3.1 Water Quality Monitoring (GWR-1) 52
4.3.2 Nutrient Management Planning (GWR-2) 56
4.3.3 Land Acquisition / Easements (GWR-3) 56
4.3.4 Conservation Design / Green Infrastructure (GWR-4) 59
4.3.5 Changing the Way We Manage Stormwater (GWR-5) 61
4.3.6 Minimize the Impacts of Wastewater Treatment (GWR-6) 64
4.3.7 Improved Controls on Non-point Source Pollution (GWR-7) 66
4.3.8 Conducting Public Education and Outreach (GWR-8) 66
4.3.9 Implementing a Part-time Watershed Manager Position (GWR-9) 67
4.3.10 Social Science Research (GWR-10) 68
4.4 Summary of Watershed Implementation Cost 69
4.5 Project Funding / Implementation 70

V. Lower Nippersink Creek Subwatershed Assessment
5.1 Subwatershed Characteristics 73
5.1.1 Subwatershed Location 73
5.1.2 Topography and Geology 75
5.1.3 Soil Characteristics 76
5.1.4 Pre-Settlement Vegetation 77
5.1.5 Subwatershed Drainage Features 79
5.1.6 Population 80
5.1.7 Land Cover 80
5.1.8 Land Use / Existing Watershed Development 83
5.1.9 Natural Resources 85
5.2 Analysis of Subwatershed Data and Problem Identification 88
5.2.1 Water Quality Data & Identified Problems 88
5.2.2 Flooding Problems 89
5.2.3 Projected Development & Growth 89
5.2.4 Natural Area Protection / Preservation Issues 90
5.3 Subwatershed-Specific Recommendations to Protect Watershed Resources 91

VI. Glacial Park / Tamarack Farms Subwatershed Assessment
6.1 Subwatershed Characteristics 99
6.1.1 Subwatershed Location 99
6.1.2 Topography and Geology 101
6.1.3 Soil Characteristics 102
6.1.4 Pre-Settlement Vegetation 103
6.1.5 Subwatershed Drainage Features 105
6.1.6 Population 106
6.1.7 Land Cover 107

6.1.8 Land Use / Existing Watershed Development 109
6.1.9 Natural Resources 111
6.2 Analysis of Subwatershed Data and Problem Identification 114
6.2.1 Water Quality Data & Identified Problems 114
6.2.2 Flooding Problems 115
6.2.3 Projected Development & Growth 115
6.2.4 Natural Area Protection / Preservation Issues 116
6.3 Subwatershed-Specific Recommendations to Protect Watershed Resources 117

VII. Wonder Lake Subwatershed Assessment
7.1 Subwatershed Characteristics 123
7.1.1 Subwatershed Location 123
7.1.2 Topography and Geology 125
7.1.3 Soil Characteristics 126
7.1.4 Pre-Settlement Vegetation 126
7.1.5 Subwatershed Drainage Features 127
7.1.6 Population 130
7.1.7 Land Cover 130
7.1.8 Land Use / Existing Watershed Development 133
7.1.9 Natural Resources 135
7.2 Analysis of Subwatershed Data and Problem Identification 137
7.2.1 Water Quality Data 137
7.2.2 Flooding Problems 138
7.2.3 Wonder Lake Sedimentation 138
7.2.4 Shoreline Erosion 140
7.2.5 Projected Development & Growth 142
7.2.6 Natural Area Protection / Preservation Issues 145
7.3 Current Subwatershed Level Water Quality Planning Efforts 146
7.4 Subwatershed-Specific Recommendations to Protect Watershed Resources 150

VIII. Vander Karr Creek Subwatershed Assessment
8.1 Subwatershed Characteristics 157
8.1.1 Subwatershed Location 157
8.1.2 Topography and Geology 159
8.1.3 Soil Characteristics 160
8.1.4 Pre-Settlement Vegetation 161
8.1.5 Subwatershed Drainage Features 163
8.1.6 Population 164
8.1.7 Land Cover 164
8.1.8 Land Use / Existing Watershed Development 167
8.1.9 Natural Resources 169
8.2 Analysis of Subwatershed Data and Problem Identification 172
8.2.1 Water Quality Data 172
8.2.2 Flooding Problems 172

8.2.3 Projected Development & Growth 173
8.2.4 Natural Area Protection / Preservation Issues 173
8.3 Subwatershed-Specific Recommendations to Protect Watershed Resources 174

IV. Silver Creek Subwatershed Assessment
9.1 Subwatershed Characteristics 181
9.1.1 Subwatershed Location 181
9.1.2 Topography and Geology 183
9.1.3 Soil Characteristics 184
9.1.4 Pre-Settlement Vegetation 185
9.1.5 Subwatershed Drainage Features 186
9.1.6 Population 188
9.1.7 Land Cover 188
9.1.8 Land Use / Existing Watershed Development 191
9.1.9 Natural Resources 193
9.2 Analysis of Subwatershed Data and Problem Identification 196
9.2.1 Water Quality Data 196
9.2.2 Flooding Problems 196
9.2.3 Projected Development & Growth 197
9.2.4 Natural Area Protection / Preservation Issues 198
9.3 Subwatershed-Specific Recommendations to Protect Watershed Resources 198

X. Slough Creek Subwatershed Assessment
10.1 Subwatershed Characteristics 205
10.1.1 Subwatershed Location 205
10.1.2 Topography and Geology 206
10.1.3 Soil Characteristics 209
10.1.4 Pre-Settlement Vegetation 210
10.1.5 Subwatershed Drainage Features 211
10.1.6 Population 212
10.1.7 Land Cover 213
10.1.8 Land Use / Existing Watershed Development 215
10.1.9 Natural Resources 218
10.2 Analysis of Subwatershed Data and Problem Identification 220
10.2.1 Water Quality Data 220
10.2.2 Flooding Problems 220
10.2.3 Projected Development & Growth 220
10.2.4 Natural Area Protection / Preservation Issues 222
10.3 Subwatershed-Specific Recommendations to Protect Watershed Resources 223

XI. Bailey Woods Subwatershed Assessment
11.1 Subwatershed Characteristics 229
11.1.1 Subwatershed Location 229
11.1.2 Topography and Geology 231
11.1.3 Soil Characteristics 232
11.1.4 Pre-Settlement Vegetation 233
11.1.5 Subwatershed Drainage Features 234
11.1.6 Population 235
11.1.7 Land Cover 235
11.1.8 Land Use / Existing Watershed Development 238
11.1.9 Natural Resources 239
11.2 Analysis of Subwatershed Data and Problem Identification 242
11.2.1 Water Quality Data 242
11.2.2 Flooding Problems 243
11.2.3 Projected Development & Growth 243
11.2.4 Natural Area Protection / Preservation Issues 243
11.3 Subwatershed-Specific Recommendations to Protect Watershed Resources 244

XII. Nippersink Headwaters Subwatershed Assessment
12.1 Subwatershed Characteristics 249
12.1.1 Subwatershed Location 249
12.1.2 Topography and Geology 251
12.1.3 Soil Characteristics 253
12.1.4 Pre-Settlement Vegetation 254
12.1.5 Subwatershed Drainage Features 255
12.1.6 Population 256
12.1.7 Land Cover 256
12.1.8 Land Use / Existing Watershed Development 258
12.1.9 Natural Resources 261
12.2 Analysis of Subwatershed Data and Problem Identification 264
12.2.1 Water Quality Data 264
12.2.2 Flooding Problems 265
12.2.3 Projected Development & Growth 265
12.2.4 Natural Area Protection / Preservation Issues 265
12.3 Subwatershed-Specific Recommendations to Protect Watershed Resources 266

XIII. North Branch Nippersink Subwatershed Assessment
13.1 Subwatershed Characteristics 273
13.1.1 Subwatershed Location 273
13.1.2 Topography and Geology 275
13.1.3 Soil Characteristics 276
13.1.4 Pre-Settlement Vegetation 277
13.1.5 Subwatershed Drainage Features 278
13.1.6 Population 279
13.1.7 Land Cover 279
13.1.8 Land Use / Existing Watershed Development 281
13.1.9 Natural Resources 283
13.2 Analysis of Subwatershed Data and Problem Identification 287
13.2.1 Water Quality Data 287
13.2.2 Flooding Problems 288
13.2.3 Projected Development & Growth 288
13.2.4 Natural Area Protection / Preservation Issues 290
13.3 Subwatershed-Specific Recommendations to Protect Watershed Resources 292

XIV. Lower Elizabeth Lake Drain Subwatershed Assessment
14.1 Subwatershed Characteristics 299
14.1.1 Subwatershed Location 299
14.1.2 Topography and Geology 301
14.1.3 Soil Characteristics 302
14.1.4 Vegetation 303
14.1.5 Subwatershed Drainage Features 304
14.1.6 Population 305
14.1.7 Land Cover 305
14.1.8 Land Use / Existing Watershed Development 308
14.1.9 Natural Resources 310
14.2 Analysis of Subwatershed Data and Problem Identification 313
14.2.1 Water Quality Data 313
14.2.2 Flooding Problems 314
14.2.3 Projected Development & Growth 314
14.2.4 Natural Area Protection / Preservation Issues 314
14.3 Subwatershed-Specific Recommendations to Protect Watershed Resources 315

XV. Hebron Peatlands Subwatershed Assessment
15.1 Subwatershed Characteristics 321
15.1.1 Subwatershed Location 321
15.1.2 Topography and Geology 323
15.1.3 Soil Characteristics 324
15.1.4 Pre-Settlement Vegetation 325
15.1.5 Subwatershed Drainage Features 326
15.1.6 Population 327
15.1.7 Land Cover 327
15.1.8 Land Use / Existing Watershed Development 329
15.1.9 Natural Resources 330
15.2 Analysis of Subwatershed Data and Problem Identification 334
15.2.1 Water Quality Data 334
15.2.2 Flooding Problems 334
15.2.3 Projected Development & Growth 334
15.2.4 Natural Area Protection / Preservation Issues 335
15.3 Subwatershed-Specific Recommendations to Protect Watershed Resources 336

XVI. Wisconsin Subwatershed's Overview
16.1 Subwatershed Location 343
16.1.1 Zenda Headwaters Subwatershed 344
16.1.2 Upper North Branch Nippersink Creek Subwatershed 347
16.1.3 Elizabeth Lake Subwatershed 349
16.2 Wisconsin Subwatersheds Planning and Growth Issues 353
16.2.1 Point Source Discharges 354
16.3 Subwatershed-Specific Recommendations to Protect Water Resources 355

XVII. Protecting the Nippersink Creek's Green Infrastructure
17.1 What is a Green Infrastructure Plan? 359
17.2 Need for a Green Infrastructure Plan 360
17.3 Delineating the Green Infrastructure Boundary 363
17.4 Guidelines for Interfacing with and Utilizing the Green Infrastructure 368
17.5 Implementing the Green Infrastructure Plan 368
17.5.1 Suggested Ordinance & Zoning Revisions 369
17.5.2 Landowner Outreach 370
17.5.2.1 Developers 370
17.5.2.2 Private Landowners 370

XVIII Public Outreach & Education Programs
18.1 Summary of Existing Programs 371
18.1.1 Nippersink Creek Watershed Planning Committee 371
18.1.2 McHenry County Defenders 371
18.1.3 McHenry-DuPage Soil & Water Conservation District 372
18.1.4 The Land Conservancy of McHenry County 372
18.1.5 McHenry County Conservation District 374
18.1.6 Friends of the Fox River 374
18.1.7 Fox River Ecosystem Partnership 375
18.1.8 McHenry County 375
18.2 Summary of Outreach During the Watershed Plan Update 376
18.3 Education & Outreach Recommendations 377

XIX Measuring Watershed Plan Success
19.1 Evaluating Plan Performance 379
19.2 Measuring Success 381
19.3 Suggested Milestones 383

XX References
20.1 Watershed Plan References 387
20.2 Watershed Protection References & Resources 389
20.2.1 Organizations / Agencies 389
20.2.2 Publications 390
20.2.3 Internet-based References 390
20.2.4 Resources Used in Preparation of GIS Data Layers 391
20.2.5 Resources Used in Preparation of Pollutant Loading Modeling 392

XXI Appendices
21.1 Assignment of Land Use Categories for GWLF Analysis
21.2 Detailed Pollutant Loads
21.3 Meeting Minutes Of Nippersink Creek Watershed Planning Committee
21.4 Compact Disk containing watershed maps posted at www.nippersink.org

Tables

Table 2.1	Nippersink Creek Watershed Geological Summary	12
Table 2.2	Chain O' Lakes - Fox River Resource Rich Area Summary	15
Table 2.3	MCNAI Methodology	16
Table 2.4	2005 MCNAI Report Summary for Fox / Nippersink Watershed RRA	17
Table 2.5	1999 – 2001 NAQWA Fish Survey Data	21
Table 2.6	Threatened and Endangered Species of the Nippersink Watershed	22
Table 3.1	Annual Pollutant Load by Subwatershed	42
Table 3.2	Pollutant Contribution Index	43
Table 3.3	Water Quality Statistics Upstream of Wonder Lake	44

Table 4.1	IEPA Water Quality Sampling Stations in the Nippersink Creek Watershed	53
Table 4.2	Water Quality Monitoring Plan Recommendations	56
Table 4.3	Watershed Plan Implementation Cost Summary	70

Table 5.1	Pre-Settlement Land Cover Conditions	77
Table 5.2	1999 Land Cover for the Lower Nippersink Creek Subwatershed	81
Table 5.3	McHenry County 2005 Land Use in Lower Nippersink Creek Subwatershed	83
Table 5.4	Municipal Areas in the Lower Nippersink Creek Subwatershed	85
Table 5.5	MCCD Properties in the Lower Nippersink Creek Subwatershed	85
Table 5.6	Other Publicly Protected Land in the Lower Nippersink Creek Subwatershed	86
Table 5.7	McHenry County Natural Areas Inventory Sites in the Lower Nippersink Creek Subwatershed	86
Table 5.8	Mapped Wetlands in the Lower Nippersink Creek Subwatershed	86
Table 5.9	Threatened and Endangered Species in the Lower Nippersink Creek Subwatershed	87
Table 5.10	IEPA Water Quality Sampling Stations in the Lower Nippersink Creek Subwatershed	88
Table 5.11	BMP Selection & Associated Pollutant Load Reduction for the Lower Nippersink Creek Subwatershed	93
Table 5.12	Recommended Projects in the Lower Nippersink Creek Subwatershed	94

Table 6.1	Pre-Settlement Land Cover Conditions	103
Table 6.2	1999 Land Cover for the Glacial Park / Tamarack Farms Subwatershed	107
Table 6.3	McHenry County 2005 Land Use in Glacial Park / Tamarack Farms Subwatershed	109
Table 6.4	Municipal Areas in the Glacial Park / Tamarack Farms Subwatershed	111
Table 6.5	MCCD Properties in the Glacial Park / Tamarack Farms Subwatershed	111
Table 6.6	Other Publicly Protected Land in the Glacial Park / Tamarack Farms Subwatershed	112

Table 6.7 McHenry County Natural Areas Inventory Sites in the Glacial Park / Tamarack Farms Subwatershed 112
Table 6.8 Mapped Wetlands in the Glacial Park / Tamarack Farms Subwatershed 112
Table 6.9 Threatened and Endangered Species in the Glacial Park / Tamarack Farms Subwatershed 113
Table 6.10 IEPA Water Quality Sampling Stations in the Glacial Park / Tamarack Farms Subwatershed 114
Table 6.11 BMP Selection & Associated Pollutant Load Reduction for the Glacial Park / Tamarack Farms Subwatershed 120
Table 6.12 Recommended Projects in the Glacial Park / Tamarack Farms Subwatershed 121

Table 7.1 Pre-Settlement Land Cover Conditions 127
Table 7.2 1999 Land Cover for the Wonder Lake Subwatershed 131
Table 7.3 McHenry County 2005 Land Use in the Wonder Lake Subwatershed 133
Table 7.4 Municipal Areas in the Wonder Lake Subwatershed 133
Table 7.5 MCCD Properties in the Wonder Lake Subwatershed 135
Table 7.6 McHenry County Natural Areas Inventory Sites in the Wonder Lake Subwatershed 135
Table 7.7 Mapped Wetlands in the Wonder Lake Subwatershed 136
Table 7.8 Threatened and Endangered Species in the Wonder Lake Subwatershed 136
Table 7.9 IEPA Water Quality Sampling Stations near the Wonder Lake Subwatershed 137
Table 7.10 BMP Selection & Associated Pollutant Load Reduction for the Wonder Lake Subwatershed 153
Table 7.11 Recommended Projects in the Wonder Lake Subwatershed 154

Table 8.1 Pre-Settlement Land Cover Conditions of the Vander Karr Creek Subwatershed 161
Table 8.2 1999 Land Cover for the Vander Karr Creek Subwatershed 165
Table 8.3 McHenry County 2005 Land Use in the Vander Karr Creek Subwatershed 167
Table 8.4 Municipal Areas in the Vander Karr Creek Subwatershed 167
Table 8.5 MCCD Properties in the Vander Karr Creek Subwatershed 169
Table 8.6 McHenry County Natural Areas Inventory Sites in the Vander Karr Creek Subwatershed 169
Table 8.7 Other Publicly Protected Land in the Vander Karr Creek Subwatershed 170
Table 8.8 Mapped Wetlands in the Vander Karr Creek Subwatershed 170
Table 8.9 Threatened and Endangered Species in the Vander Karr Creek Subwatershed 171
Table 8.10 BMP Selection & Associated Pollutant Load Reduction for the Vander Karr Creek Subwatershed 177
Table 8.11 Recommended Projects in the Vander Karr Creek Subwatershed 178

Table 9.1 Pre-Settlement Land Cover Conditions of the Silver Creek Subwatershed 185
Table 9.2 1999 Land Cover for the Silver Creek Subwatershed 189
Table 9.3 McHenry County 2005 Land Use in the Silver Creek Subwatershed 191
Table 9.4 Municipal Areas in the Silver Creek Subwatershed 192
Table 9.5 MCCD Properties in the Silver Creek Subwatershed 193
Table 9.6 McHenry County Natural Areas Inventory Sites in the Silver Creek Subwatershed 194
Table 9.7 Mapped Wetlands in the Silver Creek Subwatershed 194
Table 9.8 Threatened and Endangered Species in the Silver Creek Subwatershed 195
Table 9.9 BMP Selection & Associated Pollutant Load Reduction for the Silver Creek Subwatershed 202
Table 9.10 Recommended Projects in the Silver Creek Subwatershed 203

Table 10.1 Pre-Settlement Land Cover Conditions of the Slough Creek Subwatershed 210
Table 10.2 1999 Land Cover for the Slough Creek Subwatershed 213
Table 10.3 McHenry County 2005 Land Use in the Slough Creek Subwatershed 215
Table 10.4 Municipal Areas in the Slough Creek Subwatershed 215
Table 10.5 MCCD Properties in the Slough Creek Subwatershed 218
Table 10.6 McHenry County Natural Areas Inventory Sites in the Slough Creek Subwatershed 218
Table 10.7 Mapped Wetlands in the Slough Creek Subwatershed 219
Table 10.8 Threatened and Endangered Species in the Slough Creek Subwatershed 219
Table 10.9 BMP Selection & Associated Pollutant Load Reduction for the Slough Creek Subwatershed 211
Table 10.10 Recommended Projects in the Slough Creek Subwatershed 212

Table 11.1 Pre-Settlement Land Cover Conditions of the Bailey Woods Subwatershed 233
Table 11.2 1999 Land Cover for the Bailey Woods Subwatershed 236
Table 11.3 McHenry County 2005 Land Use in the Bailey Woods Subwatershed 238
Table 11.4 Municipal Areas in the Bailey Woods Subwatershed 238
Table 11.5 MCCD Properties in the Bailey Woods Subwatershed 240
Table 11.6 McHenry County Natural Areas Inventory Sites in the Bailey Woods Subwatershed 240
Table 11.7 Mapped Wetlands in the Bailey Woods Subwatershed 241
Table 11.8 IEPA Water Quality Sampling Stations in the Bailey Woods Subwatershed 242
Table 11.9 BMP Selection & Associated Pollutant Load Reduction for the Bailey Woods Subwatershed 247
Table 11.10 Recommended Projects in the Bailey Woods Subwatershed 248

Table 12.1 Pre-Settlement Land Cover Conditions of the Nippersink Headwaters Subwatershed 253
Table 12.2 1999 Land Cover for the Nippersink Headwaters Subwatershed 256
Table 12.3 McHenry County 2005 Land Use in the Nippersink Headwaters Subwatershed 258
Table 12.4 Municipal Areas in the Nippersink Headwaters Subwatershed 259
Table 12.5 MCCD Properties in the Nippersink Headwaters Subwatershed 261
Table 12.6 McHenry County Natural Areas Inventory Sites in the Nippersink Headwaters Subwatershed 261
Table 12.7 Mapped Wetlands in the Nippersink Headwaters Subwatershed 263
Table 12.8 Threatened and Endangered Species in the Nippersink Headwaters Subwatershed 263
Table 12.9 BMP Selection & Associated Pollutant Load Reduction for the Nippersink Headwaters Subwatershed 254
Table 12.10 Recommended Projects in the Nippersink Headwaters Subwatershed 255

Table 13.1 Pre-Settlement Land Cover Conditions of the North Branch Nippersink Subwatershed 277
Table 13.2 1999 Land Cover for the North Branch Nippersink Subwatershed 279
Table 13.3 McHenry County 2005 Land Use in the North Branch Nippersink Subwatershed 281
Table 13.4 Municipal Areas in the North Branch Nippersink Subwatershed 283
Table 13.5 NPDES Point Source Discharges in the North Branch Nippersink Creek Subwatershed 283
Table 13.6 MCCD Properties in the North Branch Nippersink Subwatershed 284
Table 13.7 Other Publicly Protected Land in the North Branch Nippersink Creek Subwatershed 284
Table 13.8 McHenry County Natural Areas Inventory Sites in the North Branch Nippersink Subwatershed 284
Table 13.9 Mapped Wetlands in the North Branch Nippersink Subwatershed 285
Table 13.10 Threatened and Endangered Species in the North Branch Nippersink Subwatershed 285
Table 13.11 IEPA Water Quality Sampling Stations in the North Branch Nippersink Creek Subwatershed 287
Table 13.12 Summary of Village of Richmond Projected Development. 288
Table 13.13 BMP Selection & Associated Pollutant Load Reduction for the North Branch Nippersink Subwatershed 295
Table 13.14 Recommended Projects in the North Branch Nippersink Subwatershed 296

Table 14.1 Pre-Settlement Land Cover Conditions of the Lower Elizabeth Lake Drain Subwatershed 303
Table 14.2 1999 Land Cover for the Lower Elizabeth Lake Drain Subwatershed 306
Table 14.3 McHenry County 2005 Land Use in the Lower Elizabeth Lake Drain Subwatershed 308
Table 14.4 Municipal Areas in the Lower Elizabeth Lake Drain Subwatershed 310
Table 14.5 MCCD Properties in the Lower Elizabeth Lake Drain Subwatershed 310
Table 14.6 McHenry County Natural Areas Inventory Sites in the Lower Elizabeth Lake Drain Subwatershed 311
Table 14.7 Mapped Wetlands in the Lower Elizabeth Lake Drain Subwatershed 311
Table 14.8 Threatened and Endangered Species in the Lower Elizabeth Lake Drain Subwatershed 312
Table 14.9 BMP Selection & Associated Pollutant Load Reduction for the Lower Elizabeth Lake Drain Subwatershed 318
Table 14.10 Recommended Projects in the Lower Elizabeth Lake Drain Subwatershed 319

Table 15.1 Pre-Settlement Land Cover Conditions of the Hebron Peatlands Subwatershed 325
Table 15.2 1999 Land Cover for the Hebron Peatlands Subwatershed 327
Table 15.3 McHenry County 2005 Land Use in the Hebron Peatlands Subwatershed 329
Table 15.4 Municipal Areas in the Hebron Peatlands Subwatershed 331
Table 15.5 NPDES Point Source Discharges in the Hebron Peatlands Subwatershed 331
Table 15.6 Other Publicly Protected Land in the Hebron Peatlands Subwatershed 332
Table 15.7 McHenry County Natural Areas Inventory Sites in the Hebron Peatlands Subwatershed 332
Table 15.8 Mapped Wetlands in the Hebron Peatlands Subwatershed 332
Table 15.9 Threatened and Endangered Species in the Hebron Peatlands Subwatershed 333
Table 15.10 BMP Selection & Associated Pollutant Load Reduction for the Hebron Peatlands Subwatershed 339
Table 15.11 Recommended Projects in the Hebron Peatlands Subwatershed 340

Table 16.1 NPDES Point Source Discharges within the Wisconsin Subwatersheds 354
Table 16.2 BMP Selection & Associated Pollutant Load Reduction For Wisconsin Subwatersheds 357
Table 16.3 Recommended Projects within the Wisconsin Subwatersheds 358

Table 19.1 Nippersink Creek Watershed Plan Milestone Timeframes 380

Figures

Figure 1.1	Watershed Location Map	1
Figure 1.2	Subwatershed Location Map	7

Figure 2.1	Landforms of the Fox River Basin	10
Figure 2.2	Vegetation of the Nippersink Creek Watershed – Pre-European Settlement	13
Figure 2.3	Hydric Soils of the Nippersink Creek Watershed	18
Figure 2.4	Mapped Wetlands of the Nippersink Creek Watershed	19
Figure 2.5	Municipalities in the Nippersink Creek Watershed	24
Figure 2.6	1999 Land Use Cover in the Nippersink Creek Watershed	25

Figure 4.1	Water Quality Sampling Stations in the Nippersink Creek Watershed	55

Figure 5.1	Lower Nippersink Creek Subwatershed Location Map	73
Figure 5.2	Lower Nippersink Creek Subwatershed Map	74
Figure 5.3	USGS Topographic Map of the Lower Nippersink Creek Subwatershed	75
Figure 5.4	Hydric Soils Map for the Lower Nippersink Creek Subwatershed	76
Figure 5.5	Pre-settlement Vegetation for the Lower Nippersink Creek Subwatershed	78
Figure 5.6	1999-2000 Land Cover Map for Lower Nippersink Creek Subwatershed	82
Figure 5.7	2005 McHenry County Land Use Map for Lower Nippersink Creek Subwatershed	84
Figure 5.8	Future Development in the Lower Nippersink Subwatershed	89
Figure 5.9	Lower Nippersink Subwatershed Site Recommendations Map	93

Figure 6.1	Glacial Park / Tamarack Farms Subwatershed Location Map	99
Figure 6.2	Glacial Park / Tamarack Farms Subwatershed Map	100
Figure 6.3	USGS Topographic Map of the Glacial Park / Tamarack Farms Subwatershed	101
Figure 6.4	Hydric Soils Map for the Glacial Park/ Tamarack Farms Subwatershed	102
Figure 6.5	Pre-settlement Vegetation for the Glacial Park / Tamarack Farms Subwatershed	104
Figure 6.6	Tryon Creek Area of Interest	105
Figure 6.7	1999-2000 Land Cover Map for Glacial Park / Tamarack Farms Subwatershed	108
Figure 6.8	2005 McHenry County Land Use Map for Glacial Park / Tamarack Farms Subwatershed	110
Figure 6.9	Glacial Park / Tamarack Farms Subwatershed Site Recommendations Map	119

Figure 7.1 Wonder Lake Subwatershed Location Map 123
Figure 7.2 Wonder Lake Subwatershed Map 124
Figure 7.3 USGS Topographic Map of the Wonder Lake Subwatershed 125
Figure 7.4 Hydric Soils Map for the Wonder Lake Subwatershed 126
Figure 7.5 Pre-settlement Vegetation for the Wonder Lake Subwatershed 127
Figure 7.6 1999-2000 Land Cover Map for the Wonder Lake Subwatershed 132
Figure 7.7 2005 McHenry County Land Use Map for the Wonder Lake Subwatershed 134
Figure 7.8 Bathymetry of Wonder Lake (1994) 139
Figure 7.9 Wonder Lake Shoreline Erosion Inventory 141
Figure 7.10 Future Development in the Wonder Lake Subwatershed 142
Figure 7.11 Conceptual Site Plan for the Thatcher Meadows Development 143
Figure 7.12 Conceptual Phase One Plan for Dredging Wonder Lake 148
Figure 7.13 Evaluation of Potential Dredging Sediment De-Watering Sites 149
Figure 7.14 Wonder Lake Subwatershed Site Recommendations Map 151

Figure 8.1 Vander Karr Creek Subwatershed Location Map 157
Figure 8.2 Vander Karr Creek Subwatershed Map 158
Figure 8.3 USGS Topographic Map of the Vander Karr Creek Subwatershed 159
Figure 8.4 Hydric Soils Map for the Vander Karr Creek Subwatershed 160
Figure 8.5 Pre-settlement Vegetation for the Vander Karr Creek Subwatershed 162
Figure 8.6 1999-2000 Land Cover Map for Vander Karr Creek Subwatershed 166
Figure 8.7 2005 McHenry County Land Use Map for Vander Karr Creek Subwatershed 168
Figure 8.8 Vander Karr Creek Subwatershed Site Recommendations Map 176

Figure 9.1 Silver Creek Subwatershed Location Map 181
Figure 9.2 Silver Creek Subwatershed Map 182
Figure 9.3 USGS Topographic Map of the Silver Creek Subwatershed 183
Figure 9.4 Hydric Soils Map for the Silver Creek Subwatershed 184
Figure 9.5 Pre-settlement Vegetation for the Silver Creek Subwatershed 185
Figure 9.6 1999-2000 Land Cover Map for Silver Creek Subwatershed 190
Figure 9.7 2005 McHenry County Land Use Map for Silver Creek Subwatershed 192
Figure 9.8 Potential Development in the Silver Creek Subwatershed 197
Figure 9.9 Silver Creek Subwatershed Site Recommendations Map 201

Figure 10.1 Slough Creek Subwatershed Location Map 205
Figure 10.2 Slough Creek Subwatershed Map 206
Figure 10.3 USGS Topographic Map of the Slough Creek Subwatershed 208
Figure 10.4 Hydric Soils Map for the Slough Creek Subwatershed 209
Figure 10.5 Pre-settlement Vegetation for the Slough Creek Subwatershed 210
Figure 10.6 1999-2000 Land Cover Map for Slough Creek Subwatershed 214
Figure 10.7 2005 McHenry County Land Use Map for Slough Creek Subwatershed 217
Figure 10.8 Future Development in the Slough Creek Subwatershed 221
Figure 10.9 Slough Creek Subwatershed Site Recommendations Map 210

Figure 11.1 Bailey Woods Subwatershed Location Map 229
Figure 11.2 Bailey Woods Subwatershed Map 230
Figure 11.3 USGS Topographic Map of the Bailey Woods Subwatershed 231
Figure 11.4 Hydric Soils Map for the Bailey Woods Subwatershed 232
Figure 11.5 Pre-settlement Vegetation for the Bailey Woods Subwatershed 233
Figure 11.6 1999-2000 Land Cover Map for Bailey Woods Subwatershed 237
Figure 11.7 2005 McHenry County Land Use Map for Bailey Woods Subwatershed 239
Figure 11.8 Bailey Woods Subwatershed Site Recommendations Map 246

Figure 12.1 Nippersink Headwaters Subwatershed Location Map 249
Figure 12.2 Nippersink Headwaters Subwatershed Map 250
Figure 12.3 USGS Topographic Map of the Nippersink Headwaters Subwatershed 252
Figure 12.4 Hydric Soils Map for the Nippersink Headwaters Subwatershed 253
Figure 12.5 Pre-settlement Vegetation for the Nippersink Headwaters Subwatershed 254
Figure 12.6 1999-2000 Land Cover Map for Nippersink Headwaters Subwatershed 257
Figure 12.7 2005 McHenry County Land Use Map for Nippersink Headwaters Subwatershed 259
Figure 12.8 McHenry County Natural Areas Inventory Map – Alden High Point ACC 262
Figure 12.9 Nippersink Headwaters Subwatershed Site Recommendations Map 269

Figure 13.1 North Branch Nippersink Creek Subwatershed Location Map 273
Figure 13.2 North Branch Nippersink Creek Subwatershed Map 274
Figure 13.3 USGS Topographic Map of the North Branch Nippersink Creek Subwatershed 275
Figure 13.4 Hydric Soils Map for the North Branch Nippersink Creek Subwatershed 276
Figure 13.5 Pre-settlement Vegetation for the North Branch Nippersink Creek Subwatershed 277
Figure 13.6 1999-2000 Land Cover Map for North Branch Nippersink Creek Subwatershed 280
Figure 13.7 2005 McHenry County Land Use Map for North Branch Nippersink Creek Subwatershed 282
Figure 13.8 Future Development in the North Branch Nippersink Creek Subwatershed 289
Figure 13.9 North Branch Nippersink Creek Subwatershed Site Recommendations Map 294

Figure 14.1 Lower Elizabeth Lake Drain Subwatershed Location Map 299
Figure 14.2 Lower Elizabeth Lake Drain Subwatershed Map 300
Figure 14.3 USGS Topographic Map of the Lower Elizabeth Lake Drain Subwatershed 301
Figure 14.4 Hydric Soils Map for the Lower Elizabeth Lake Drain Subwatershed 302
Figure 14.5 Pre-settlement Vegetation for the Lower Elizabeth Lake Drain Subwatershed 303
Figure 14.6 1999-2000 Land Cover Map for Lower Elizabeth Lake Drain Subwatershed 307
Figure 14.7 2005 McHenry County Land Use Map for Lower Elizabeth Lake Drain Subwatershed 309
Figure 14.8 Lower Elizabeth Lake Drain Subwatershed Site Recommendations Map 317

Figure 15.1 Hebron Peatlands Subwatershed Location Map 321
Figure 15.2 Hebron Peatlands Subwatershed Map 322
Figure 15.3 USGS Topographic Map of the Hebron Peatlands Subwatershed 323
Figure 15.4 Hydric Soils Map for the Hebron Peatlands Subwatershed 324
Figure 15.5 Pre-settlement Vegetation for the Hebron Peatlands Subwatershed 325
Figure 15.6 1999-2000 Land Cover Map for Hebron Peatlands Subwatershed 328
Figure 15.7 2005 McHenry County Land Use Map for Hebron Peatlands Subwatershed 330
Figure 15.8 Hebron Peatlands Subwatershed Site Recommendations Map 338

Figure 16.1 Location of Wisconsin Subwatersheds 343
Figure 16.2 USGS Topographic Map for the Zenda Headwaters Subwatershed 344
Figure 16.3 Aerial Photograph of the Zenda Headwaters Subwatershed 345
Figure 16.4 NRCS 2006 Land Cover of the Zenda Headwaters Subwatershed 346
Figure 16.5 USGS Topographic Map for the Upper North Branch Nippersink Subwatershed 347
Figure 16.6 Aerial Photograph of the Upper North Branch Nippersink Subwatershed 348
Figure 16.7 NRCS 2006 Land Cover of the Upper North Branch Nippersink Subwatershed 349
Figure 16.8 USGS Topographic Map for the Elizabeth Lake Subwatershed 350
Figure 16.9 Aerial Photograph of the Elizabeth Lake Subwatershed 351
Figure 16.10 NRCS 2006 Land Cover of the Elizabeth Lake Subwatershed 352
Figure 16.11 List of Wisconsin Planning Documents Reviewed 353

Figure 17.1 Green Infrastructure Corridor 362
Figure 17.2 Typical Residential Development Scenario 362
Figure 17.3 Nippersink Creek Green Infrastructure Plan 364
Figure 17.4 MCCD properties and streams buffered 100 feet 365
Figure 17.5 Figure 17.4 with FEMA 100-Year Floodplain (mapped + Zone A floodplains) 366
Figure 17.6 Figure 17.5 with HQH & HFV Wetlands and HQ Lakes buffered 100 feet 366
Figure 17.7 Figure 17.6 with remaining ADID identified wetlands larger than one acre 367
Figure 17.8 Proposed Green Infrastructure Boundary created from composite GIS datasets 367

Subwatershed Maps Available on www.nippersink.org.

Lower Nippersink Creek	Lower Nippersink Creek
Glacial Park / Tamarack Farms	Glacial Park/Tamarack Farms
Wonder Lake	Wonder Lake
Vander Karr Creek	Vander Karr Creek
Silver Creek	Silver Creek
Slough Creek	Slough Creek
Bailey Woods	Bailey Woods
Nippersink Headwaters	Nippersink Headwaters
North Branch Nippersink	North Branch Nippersink Creek
Lower Elizabeth Lake Drain	Lower Elizabeth Lake Drain
Hebron Peatlands	Hebron Peatlands
Wisconsin Subwatersheds	Wisconsin Subwatersheds
Green Infrastructure Map	Green Infrastructure Plan

Subwatershed Site Recommendation Maps Available on www.nippersink.org.

Lower Nippersink Creek	Lower Nippersink Creek
Glacial Park / Tamarack Farms	Glacial Park/Tamarack Farms
Wonder Lake	Wonder Lake
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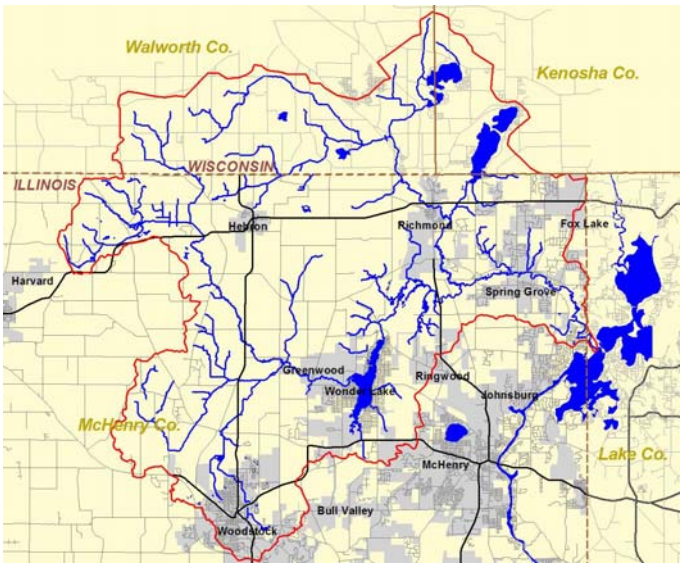
Silver Creek	Silver Creek
Slough Creek	Slough Creek
Bailey Woods	Bailey Woods
Nippersink Headwaters	Nippersink Headwaters
North Branch Nippersink	North Branch Nippersink Creek
Lower Elizabeth Lake Drain	Lower Elizabeth Lake Drain
Hebron Peatlands	Hebron Peatlands

Chapter 1
Introduction

1.1 Watershed Overview

Nippersink Creek is the largest tributary of the Fox River in the state of Illinois. The Nippersink Creek Watershed encompasses about 202 square miles, of which roughly 50 square miles are located within the State of Wisconsin. The western edge of the Nippersink Creek watershed is formed by the Marengo Ridge moraine, which forms a major watershed divide between the Fox River / Illinois River system and the Kishwaukee River / Rock River system. From its headwaters in northwest Alden Township of McHenry County, Nippersink Creek flows generally to the southeast to Wonder Lake, and then east towards the Fox River / Chain O' Lakes. Nippersink Creek joins the Chain O'Lakes near US Route 12, roughly at the point where Nippersink Lake connects with Pistakee Lake. The North Branch of Nippersink Creek drains areas of Walworth County and Kenosha County in Wisconsin before joining the main channel between Richmond and Spring Grove.

Figure 1.1 Watershed Location Map



The southeastern half of the watershed, being closest to the Chicago metropolitan area, has the longest history of urban and suburban development, and includes the communities of Woodstock, Wonder Lake, Spring Grove, Richmond, Greenwood, and Ringwood. The only municipalities in the northwest half of the watershed are the Village of Hebron in Illinois, and Genoa City in Wisconsin.

Nippersink Creek Countryside

The balance of the Nippersink watershed is still largely dominated by agricultural uses, with residential uses comprised of agricultural farmsteads and low-density (>5 acres or more) rural parcels. However, rural areas of the Nippersink watershed are beginning to urbanize. According to current municipal comprehensive land use plans, there is a potential for significant development growth over the next twenty years.

Based upon projected growth, the watershed governmental stakeholders that will have the most impact on the future of the Nippersink Creek watershed are McHenry County (in unincorporated areas), the City of Woodstock, the Village of Spring Grove, the Village of Wonder Lake, and the Village of Richmond.

It should be emphasized that while the Nippersink Creek Watershed also extends into the State of Wisconsin, significant analysis or discussion of the Wisconsin portion of the watershed was not included in this report. However, future interaction and cooperation with the stakeholders in the Wisconsin portion of the watershed is imperative, as their land use decisions will have a direct impact on the downstream portions of the watershed located in Illinois.

1.2 Stream and Water Quality Ratings

The Illinois Environmental Protection Agency (IEPA) is tasked with assessing the quality of the surface water resources of Illinois. The IEPA has determined Nippersink Creek's designated uses are:

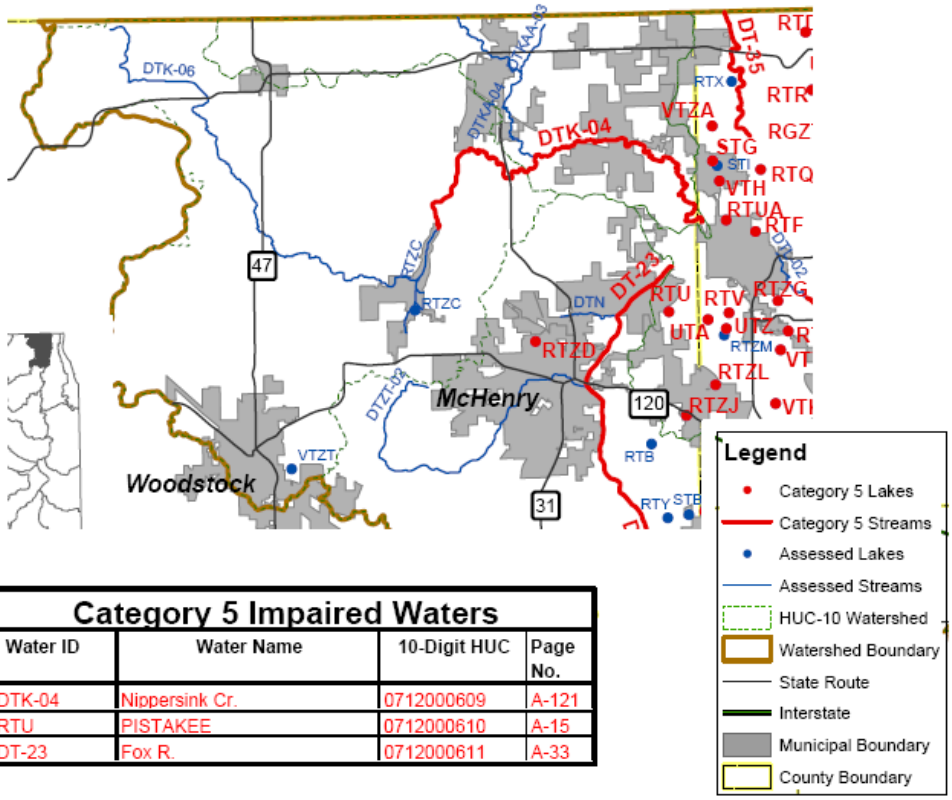
- Aquatic Life
- Fish Consumption
- Primary Contact
- Secondary Contact
- Aesthetic Quality

As discussed more extensively in Chapter 2.4, the IEPA periodically produces a 303(d) list, which identifies waterways that are not achieving targeted designated uses. The most recent IEPA 303(d) list was produced in 2006. As shown in Figure 1.2, below Wonder Lake, Nippersink Creek (Reach DTK-04) is identified as being in Full Support of its Aquatic Life and Fish Consumption Designated Uses. Above Wonder Lake, Nippersink Creek (Reach DTK-06) is identified as being in Full Support of its Aquatic Life Designated Use. These Full Support designations are notable for a stream in northeastern Illinois.

However, below Wonder Lake, Nippersink Creek (Reach DTK-04) was also determined to be Non-supporting of its Primary Contact Designated Use, due to excessive levels of fecal coliform. This pollutant, associated with human and animal waste, was listed as coming from unknown sources. The IEPA also identified secondary contact and aesthetic quality as designated uses for Nippersink Creek, although the ratings for these uses were classified as "not assessed".

Figure 1.2 IEPA 303 (d) List Impaired Waters Map (2006)

Upper Fox River Watershed



Category 5 Impaired Waters

Water ID	Water Name	10-Digit HUC	Page No.
IL_DTK-04	Nippersink Cr.	0712000609	A-121
IL_RTU	PISTAKEE	0712000610	A-15
IL_DT-23	Fox R.	0712000611	A-33

Specific Assessment Information for Streams 2006.

Name	10 Digit HUC	IEPA Basin	Assessment Unit ID	Size (miles)	Cat.	Designated Uses/Attainment	Causes	Sources
Nippersink Cr.	0712000608	3	IL_DTK-06	15.38	2	N582, F583, X585, X586, X590	N/A	N/A
Nippersink Cr.	0712000609	3	IL_DTK-04	14.91	5	F582, F583, N585, X586, X590	400	140
Fox R.	0712000611	3	IL_DT-23	7.51	5	N582, N583, F585, F586, X590	84, 319, 322, 463, 479, 348	142, 157, 38, 140

Specific Assessment Information for Inland Lakes 2006.

Name	10-Digit HUC	IEPA Basin	Assessment Unit ID	Size (acres)	Cat.	Designated Uses/Attainment	Causes	Sources
PISTAKEE	0712000610	3	IL_RTU	2048.0	5	N582, N583, X585, X586, N590	308, 313, 371, 403, 462, 479, 348	38, 92, 95, 144, 177, 181, 140

Source: Illinois Integrated Water Quality Report and Section 303(d) List – April, 2006
Illinois Environmental Protection Agency – Bureau of Water

Of equal importance is the fact that Nippersink Creek discharges into the Fox River, one of the most important natural resources in McHenry County (along with its groundwater supply). The Fox River is the primary source of drinking water for more than 236,600 residents of Aurora and Elgin (2000 US Census) in the Kane County portion of the watershed. The potential for McHenry County to someday have to rely on the Fox River as a drinking water source cannot be ignored.

The Fox River is also a heavily used resource that is subjected to a number of inputs of pollution, including point sources (storm sewers) and non-point sources (runoff from the landscape, rooftops, and roadways), as well as pollution that enters the Fox River's many tributaries, such as Nippersink Creek. For these reasons, downstream of Nippersink Creek, Nippersink Lake, and the Fox River are also listed on the IEPA 303(d) List.

As the sustainability of our local groundwater resources is increasingly questionable given the rapid rates of urban growth, and the certain unavailability of Lake Michigan water, the protection and enhancement of Fox River water quality should be a top priority of every unit of government in the entire Fox River Watershed.

1.3 Existing and Future Watershed Protection Challenges

Overall, the health of Nippersink Creek today is very good. Previous water quality and biological data collection studies over the last eight years confirm that Nippersink Creek has the water quality and biological characteristics to qualify it as a highly valued resource. McHenry County is fortunate to have in place an Advanced Identification (ADID) Wetland Study, as well as a McHenry County Natural Areas Inventory (MCNAI), that identify the remaining high quality natural areas that need to be protected to preserve environmental quality and diversity.

Nippersink Creek Stream Corridor

Not surprisingly, the highest quality reaches of Nippersink Creek are in the rural portions of the watershed, or within the large tracts of riparian lands where the McHenry County Conservation District, the Land Conservancy of McHenry County, other agencies, or concerned landowners have been implementing stream corridor restoration or protection activities.

Nippersink Creek Stream Corridor

The fact that these high quality stream reaches are found in predominately agricultural areas demonstrates the fact that agriculture and protection of the environment are not incompatible. Properly managed row crop agricultural or pasture areas, where sediment, chemical and nutrient delivery to streams and wetlands are minimized by the implementation of Best Management Practices (BMP's), can have significant open space benefits, serve as groundwater recharge areas, and provide flood storage capacity.

Modern farming practices, and the costs associated with it, dictate that farmers run a tightly managed business. As a result, they typically only apply the minimum amount of agricultural chemicals need to grow crops, and conduct appropriate tillage operations. A farmer who excessively tills their field or over-applies agricultural chemicals will not be in business long, as the diesel fuel and fertilizer bills will bankrupt them. Farmland has a long history in the Nippersink Creek watershed, and should have a long future if steps are taken towards funding and implementing a farmland preservation program.

However, situated on the edge of the Chicago metropolitan area, changes are rapidly occurring in the Nippersink Creek watershed. Many of the municipalities in the Nippersink Creek watershed have already begun significant residential and commercial development, or are anticipating it in the near future.

As all of McHenry County is dependent on groundwater, extracted from both shallow and deep aquifer wells, as its sole source of drinking water, protection of surface water resources and groundwater recharge areas must occur in order to ensure a safe, sustainable, and adequate supply of drinking water into the future.

To protect our water resources, they must be protected from both direct and indirect impacts. Existing wetland, floodplain, stormwater and development related ordinances, if properly enforced, provide some measure of protection from direct development impacts to riparian or wetland areas. However, they are currently inadequate to address the more intangible impacts of development, such as groundwater quality degradation, loss of groundwater recharge areas, changes in flow regimes, fragmentation of wildlife habitat, and the loss of native plant communities.

As an example, the transition from undeveloped to developed land results in an increase of impervious surfaces, increasing stormwater runoff volumes as well as the speed at which it runs off. While stormwater ordinances require developers to intercept, detain, and slowly release this runoff, the net result is that over time, there is still a larger volume of water entering the stream system. The increases in total runoff and small storm peak flow frequency, which adversely impact stream stability, will have a profound impact on the remaining high quality natural areas downstream.

Development also creates additional pollutant loading into the stream system, especially nutrients such as phosphorus and nitrogen, which can fuel the growth of algae and aquatic vegetation to nuisance levels. The excessive growth of this biomass can impair water quality and recreational usage, as well as diminish the aesthetic appeal of the water.

Wastewater treatment has been, and will continue to be, a concern in the watershed. On-site wastewater septic systems, if not properly maintained, can pose a threat to both surface and groundwater resources. As the Nippersink Creek watershed continues to develop, it is likely that increasing areas will be served by municipal wastewater treatment plants (WWTP).

Significant advancements in Best Management Practice technology have occurred that can allow these WWTP to further "polish" their treated effluent to a higher standard, minimizing potential impairments to the receiving waterway. However, the inability of current WWTP technology to remove pharmaceuticals, hormone disruptors, and other household medications from their treated effluent, and prevent them from being released into the environment, is becoming an increasingly significant concern.

Another threat is the rapid spread of non-native species of vegetation into the remaining natural areas, such as wetlands, woodlands, and stream corridors. Unless properly managed, nearly every wetland, woodland, prairie, or other natural open space is being overrun with invasive, non-native herbaceous species, including Reed Canary Grass, Common Reed, and Garlic Mustard. In addition, the watershed is faced with a proliferation of weedy, low quality trees and brush, such as Box Elder, Common Buckthorn, Autumn Olive, and Honeysuckle, which chokes the stream corridor with a thick, shady canopy that exacerbates streambank erosion and sediment delivery into the stream system.

In order to address these issues, as well as other ones that will arise in the future, it is necessary to properly devise and implement appropriate land use planning concepts; revise or enact regulations that protect the environment while allowing economic vitality; and preserve and enhance the quality of life found in the Nippersink Creek Watershed.

Fortunately, earlier watershed planning and outreach efforts helped set the stage for many stakeholders becoming aware of the significant value of Nippersink Creek, and the need to protect it.

1.4 Impetus for Updated Watershed Plan

A watershed plan for Nippersink Creek was completed in 1996 by the Nippersink Creek Watershed Planning Committee. That plan provided a summary of watershed history, physical, chemical and biological characteristics of the watershed at that time, and an outline for general watershed protection guidelines, and recommendations for restoration and protection of natural resources throughout the watershed.

While a valuable document that still provides a wealth of background information, the 1996 plan has become outdated, as it:

- only provides a general "road map" to protect the natural resources of the watershed.
- only identified perceived needs in the watershed at the time (1990s – primarily agricultural issues).
- did not address the growth pressures that are present today.
- does not identify specific projects, prioritization, or the cost to implement them.
- does not clearly define responsibility for implementation or sources of funding.

Result: The 1996 Nippersink Creek watershed plan does not meet all the current requirements set by the United States Environmental Protection Agency for funding watershed projects.

1.5 Watershed Planning – A USEPA Perspective

The U.S. Environmental Protection Agency (USEPA) plans and implements non-point source management programs, under authorization granted by Section 319 of the Federal Clean Water Act. A Watershed Plan that meets USEPA guidelines are eligible to apply for Section 319 grant funds (administered through the Illinois EPA) to assist watershed stakeholders in implementing activities to help mitigate non-point source pollution in the watershed. If approved, Section 319 funding provides a 60% federal project cost share from USEPA. Other (non-federal) sources of funding must be secured by the 319 grant applicant to provide the required local 40% project cost-share match. In many circumstances, other non-federal funding sources can be tapped to provide the 40% local cost-share match.

Since the 1996 Nippersink Creek Watershed plan was published, the USEPA has updated the criteria it requires to ensure that watershed plans meet the goals and objectives of the Section 319 program. This 2008 Nippersink Creek Watershed Plan was prepared to address the following nine required components set forth by the EPA, as listed below:

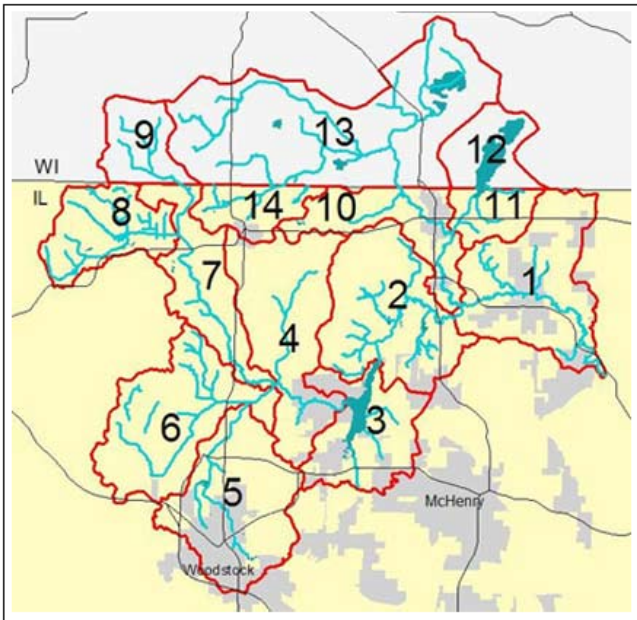
1. An identification of the causes and sources or groups of similar sources of pollution that will need to be controlled to achieve the pollutant load reductions estimated in this watershed-based plan.
2. An estimate of the pollutant load reductions expected following the implementation of the management measures described under #3 below.
3. A description of the non-point source (NPS) management measures that will need to be implemented to achieve the load reductions estimated under #2 above and an identification (using map or a description) of the critical areas in which those measures will be needed to implement this plan.
4. An estimate of the amounts of technical and financial assistance needed, associated costs, potential funding sources, and parties / governmental agencies that will be relied upon to implement this plan.
5. A public information/education component that is designed to change social behavior.
6. A plan implementation schedule.
7. A description of interim, measurable milestones.
8. A set of criteria that can be used to determine whether pollutant loading reductions are being achieved over time.
9. A monitoring component to evaluate the effectiveness of the implementation efforts over time.

1.6 Nippersink Creek Watershed Plan Organization

The hope is that this plan will serve as the reference document that watershed stakeholders will use to plan projects and measure how successful their efforts are in protecting the environmental integrity of the Nippersink Creek Watershed. More importantly, it is hoped that the Nippersink Creek Watershed Plan will be a "living" document, periodically updated to keep it current and relevant, and made available to all interested parties on the watershed website www.nippersink.org.

To facilitate easier dissemination of the findings and recommendations within the Nippersink Creek Watershed Plan (NCWP), the Nippersink Creek Watershed was divided into fourteen subwatersheds, as illustrated in Figure 1.3.

Figure 1.3 Subwatershed Location Map



Subwatershed #	Subwatershed Name
1	Lower Nippersink Creek
2	Glacial Park / Tamarack Farms
3	Wonder Lake
4	Vander Karr Creek
5	Silver Creek
6	Slough Creek
7	Bailey Woods
8	Nippersink Creek Headwaters
9	Zenda Headwaters
10	North Branch Nippersink Creek
11	Lower Elizabeth Lake Drain
12	Elizabeth Lake
13	Upper North Branch Nippersink Creek
14	Hebron Peatlands

The remainder of this watershed plan document is divided into the following chapters.

Chapter 2 provides a summary of watershed characteristics, natural resources, water quality, population, land use, existing watershed impairments, and potential future watershed impairments.

Chapter 3 details the Pollutant Loading Analysis component of this plan, as well as recommended Best Management Practices.

Chapter 4 presents the goals and objectives of the plan; recommendations to protect watershed resources; a discussion of watershed-wide recommendations; and an overview of the types of recommendations specified for each of the subwatershed units.

Chapter 5 presents a summary of features, impairments, and recommendations for the Lower Nippersink Creek Subwatershed.

Chapter 6 presents a summary of features, impairments, and recommendations for the Glacial Park / Tamarack Farms Subwatershed.

Chapter 7 presents a summary of features, impairments, and recommendations for the Wonder Lake Subwatershed.

Chapter 8 presents a summary of features, impairments, and recommendations for the Vander Karr Creek Subwatershed.

Chapter 9 presents a summary of features, impairments, and recommendations for the Silver Creek Subwatershed.

Chapter 10 presents a summary of features, impairments, and recommendations for the Slough Creek Subwatershed.

Chapter 11 presents a summary of features, impairments, and recommendations for the Bailey Woods Subwatershed.

Chapter 12 presents a summary of features, impairments, and recommendations for the Nippersink Headwaters Subwatershed.

Chapter 13 presents a summary of features, impairments, and recommendations for the North Branch Nippersink Creek Subwatershed.

Chapter 14 presents a summary of features, impairments, and recommendations for the Lower Elizabeth Lake Drain Subwatershed.

Chapter 15 presents a summary of features, impairments, and recommendations for the Hebron Peatlands Subwatershed.

Chapter 16 presents a brief summary of the three Wisconsin Subwatersheds, which include Zenda Headwaters, Upper North Branch Nippersink Creek, and Elizabeth Lake.

Chapter 17 details the components and implementation strategy for the proposed Green Infrastructure Plan.

Chapter 18 provides information on existing Public Education & Outreach Programs, as well as provides guidance for how these programs can be strengthened and utilized to effect change in watershed awareness by the local stakeholders.

Chapter 19 outlines milestones and a framework for measuring how successful the stakeholders are in implementing the actions of the Watershed Plan.

Chapter 20 lists the references used to create this document, contact information for organizations and stakeholders in the Nippersink Creek Watershed, and other publications in print and on-line that offer reference information on Best Management Practices and planning strategies that are applicable to the watershed.

Chapter 21 consists of appendices where technical information used to make this document can be found.

Nippersink Creek Prairie

Nippersink Creek Farmstead

Chapter 2
Nippersink Creek Resource Summary

This chapter provides a summary of watershed characteristics, natural resources, water quality, population, land use, existing watershed impairments, and potential future watershed impairments.

2.1 Natural Resources

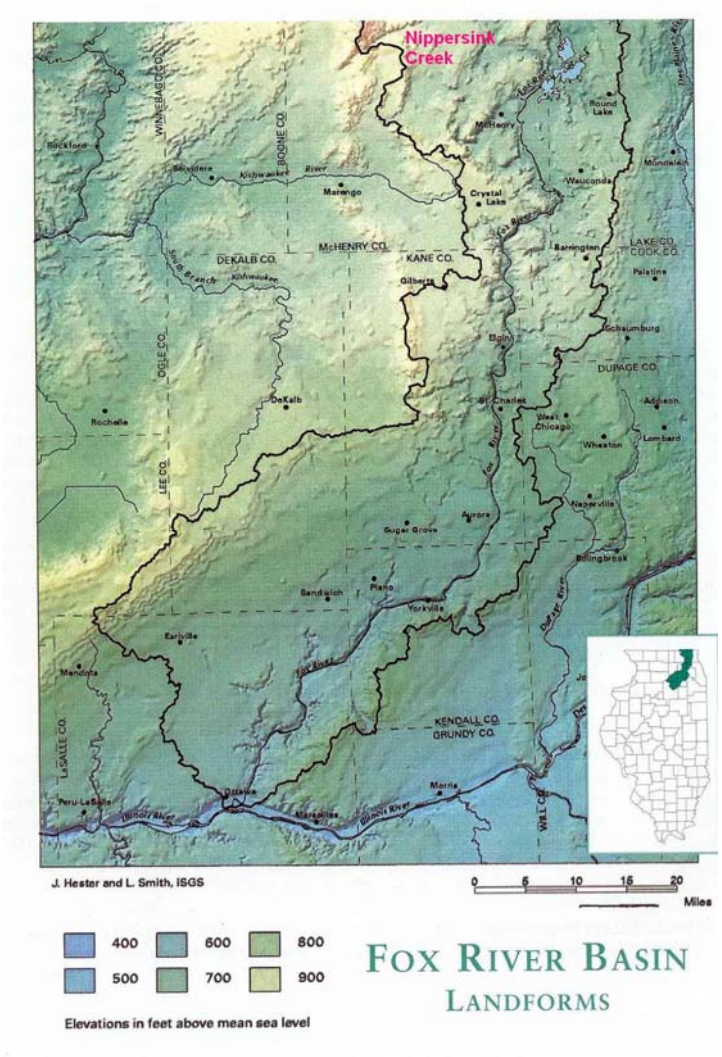
2.1.1 Landscape Resources

The numerous glacial advances across McHenry County shaped the present day topography of the Nippersink Creek Watershed. The moraines created by the glaciers formed the western edge of the Nippersink Creek watershed, as well as the entire Fox River watershed.

This moraine system forms a major watershed divide in the state of Illinois, and contains second highest point in Illinois in the headwaters of Nippersink Creek.

This high point is found in northwestern Alden Township of McHenry County, and crowns the headwaters of Nippersink Creek. From this elevation of 1,189 feet, the Nippersink Creek watershed descends to the east, reaching its low elevation of 736 feet, where the creek flows into Nippersink / Pistakee Lake. This represents a watershed elevation change of 453 feet, one the largest for a stream system in Illinois.

Figure 2.1 Landforms of the Fox River Basin



Source: Critical Trends Assessment Program Report

The two main parent soil materials (the geologic material in which soil forms) in the Nippersink Creek watershed are glacial till and glacial outwash. Other types of parent materials in the watershed include loess or silty material, organic deposits, and alluvial deposits. Glacial till is non-stratified drift transported and deposited directly by glacial ice. The majority of till deposits in McHenry County occur as a series of morainal ridges and till plains that were formed as retreating glaciers moved eastward. Glacial outwash was deposited by running water from the melting glaciers. These deposits range from loamy sediments to sand and gravel. Landforms include outwash plains, stream terraces, kames, and eskers.

Junction of Mainstem Nippersink (L) with North Branch Nippersink (R)

The geologic features of McHenry County are unique, and of interest because of their connection with other natural resource features and educational opportunities. Table 2.1 presents Nippersink Creek watershed information made available by the Geology Department of Northern Illinois University on its website, for educators who want to conduct geological field trips.

Table 2.1 Nippersink Creek Watershed Geological Summary

Geologic History

The recent geological history in McHenry County is best illustrated by its glacially sculpted landscape. The region is a great place to see the profound effects of the perhaps 2,000 feet thick Pleistocene ice sheet. The rising and rolling landscape is a geologic treasure and place of uncommon beauty. Bedrock in the area consists of Silurian dolomite that is underlain by an erosional unconformity at its contact with fossil-rich Ordovician limestone. About 22,000 years ago, the Wisconsin Glacier covered most of McHenry County. The front of the glacier pulsated back and forth for about 10,000 years before retreating from the area. Glacial deposition and erosion left behind overwhelming evidence of this glacial coverage. Glacier artifacts in the county include a series of seven moraines, some of which overrode older moraines and some with knob and kettle topography. This county has it all; outwash plains, till plains, glacial erratics, subglacial valleys, delta kames, kettles and misfit streams, eskers, glacial lakes, and former meltwater channels.

Nippersink Creek Information

Another important aspect of Glacial Park is the ongoing one-mile long dechannelization project in the Nippersink Creek. In 1951, before the park district bought the land, a 1.8-mile long section of the creek was channelized to reduce its floodplain. This allowed excess water to run off the fields so they could be used for agriculture and grazing. The Nippersink Creek is just a trickle of what it once was. This stream, a misfit or underfit stream occupies a contrasting much larger valley that once helped drain surging meltwater from the Wisconsinan Glacier. Its eastward flow is in the opposite direction of what it was during the Pleistocene Epoch. At the time, ice blocked lowlands to the east and caused the Nippersink Creek to flow to the west. Local tributaries did not obtain their present flow orientation until the master river in the region, the Fox, settled on its more eastern valley.

Dechannelization Importance

Dechannelization is important to the environment because water flowing at a quick pace through straightened streams causes more erosion on the sides of the creek bed and increases discharge down stream. This happens because there is less surface area for drag resistance and because discharge increases as a function of (width x depth x velocity). Too much material entering the stream can make it difficult for aquatic life forms to survive. Recreating original stream meanders decreases the stream current and velocity and dissipates the energy of over bank flow. It also helps to create inhabitable pools throughout the length of the stream. Furthermore, in contrast to steep banks that confine upstream floodwater and cause flooding downstream, gently sloped banks allow floodwaters to create temporary wetlands. Restored banks along the Nippersink Creek have been seeded, are watered as needed and are sloped no steeper than 3:1. Boulders have been placed along the curves where erosion is expected to be the greatest.

Stream Rating

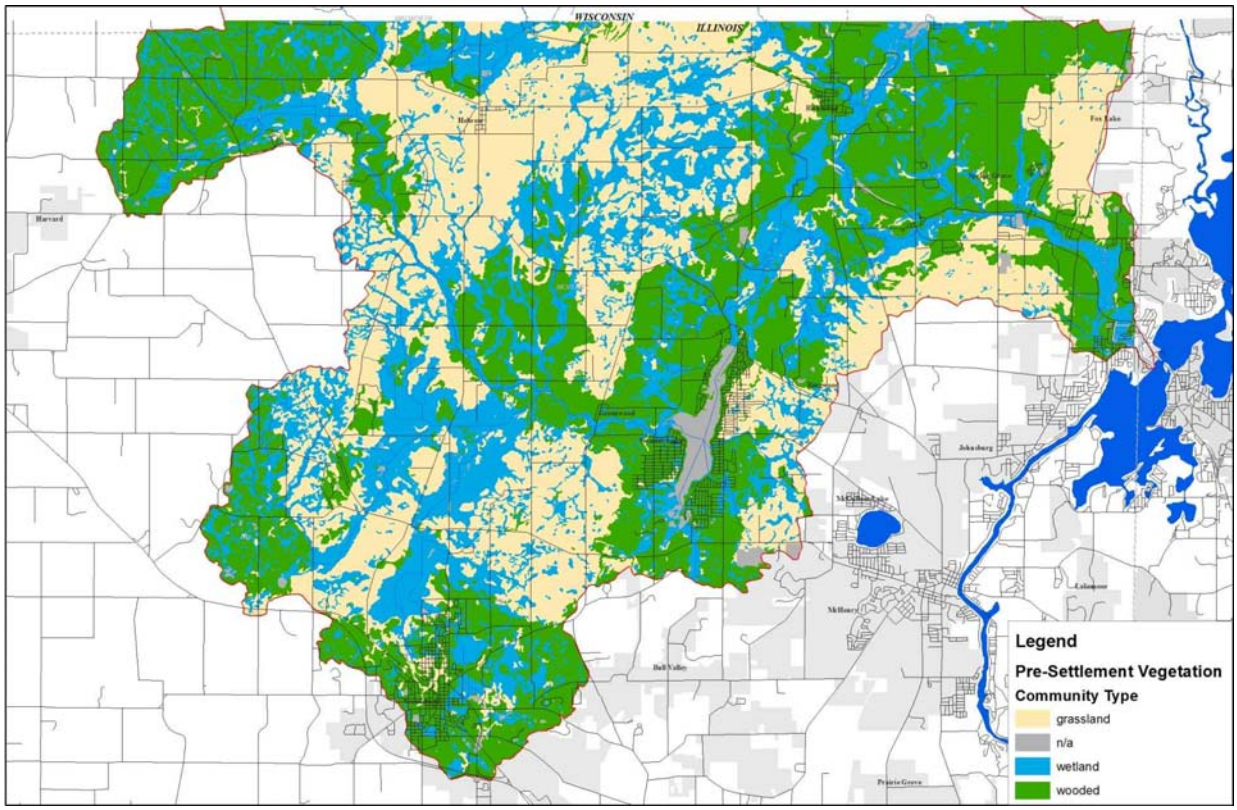
With an overall rating of "B" in 1993, the Nippersink Creek watershed contains one of Illinois' highest quality streams. This watershed is home to many endangered or threatened life forms that are sensitive to habitat change. Therefore, it is increasingly important to restore and maintain native habitat and high stream quality. Stream quality is determined by sampling the stream's fish population. The formula for assigning a stream rating is called an Index of Biotic Integrity. It is based on the number of species, the proportion of diseased fish, and the percentage of fish that are intolerant to pollution. The stream in Glacial Park is good primarily because it is rural and buffered from industrial pollution and from erosion problems, with the exception of the channelized portions that are now being restored. By 1995, the Nippersink Creek had attained an "A" rating. The removing of invasive buckthorn, Siberian Elm, and box elder, none of which have much value to wildlife, brush cutting and the planting of native oaks are done in addition to creating a healthier Nippersink Creek.

Source: **http://jove.geol.niu.edu/faculty/fischer/429_info/429trips/NIF/glacial_park.html#_Recent_History**

The highly glaciated topography of the Nippersink Creek Watershed has also had a profound impact on its historic and present day plant ecosystems. The result was, and in many areas of the watershed still is, a rich mosaic of prairie, wetland, and oak – hickory savanna.

The McHenry County Conservation District (MCCD) has conducted extensive work to determine the composition and distribution native plant communities prior to European settlement of the County. Through a review of the original records of the first surveyors in the County and evaluating the plant communities associated with specific soil types, a highly detailed map has been prepared, which is shown in Figure 2.2. Generally speaking, oak – hickory savanna (shown in green) was dominant on steeper sloped glacial features, prairie (shown in tan) was present in outwash areas between the moraines, and wet prairies or wetlands (shown in blue) occupied the drainageways and low ground.

Figure 2.2 Vegetation of the Nippersink Creek Watershed – Pre-European Settlement



Unfortunately, the agricultural productivity of the deep prairie soils was recognized early in the 18th century, and resulted in the wholesale conversion of prairie to cropland. While large wetland complexes in the flatter portions of the watershed were typically ditched and drained to improve agricultural productivity, the steeper topography found in the headwater tributary areas restricted row cropping. In these steeper portions of the watershed, dairy farming was more common, with cow pastures more prevalent than row cropped fields. While the grazing of dairy cows and cattle within stream corridors can often have detrimental impacts to water quality and habitat, these impacts can rapidly heal once the animals are removed from the stream corridor.

European settlement of McHenry County also significantly impacted the woodlands of the County. A 2007 McHenry County Conservation District study determined that in 1838, when the first surveys of the land that would become McHenry County were conducted, 143,000 acres of oak groves covered the area. Today, only 18,000 of those acres still exist, representing only of 12.6 percent of the original cover. From 1838 to 1872, oak populations plummeted by about 50 percent, from 143,000 acres to 72,000 acres. That number further fell to 26,350 acres in 1939. By 2005, the acreage had dropped to about 18,000, in a county that measures 390,685 acres.

Oak Savannah

However, the resiliency of many of these native plant communities is documented by the numerous ecological assessments that have been conducted within the Nippersink Creek watershed, as well as in the Fox River watershed.

In the mid 1990's, the Illinois Department of Natural Resources (IDNR) and Illinois Natural History Survey (INHS) conducted the Critical Trends Assessment Program (CTAP) to determine the status of ecological resources in the State of Illinois. The Nippersink Creek Watershed is located within the **Chain O'Lakes / Fox River Resource Rich Area (RRA)**, as designated by the Critical Trends Assessment Program (CTAP) of the Illinois Department of Natural Resources. Only thirty RRA sites were identified in Illinois, and two are located within McHenry County. A description of the RRA is presented in Table 2.2.

Table 2.2 Chain O' Lakes - Fox River Resource Rich Area Summary

CHAIN O' LAKES - FOX RIVER RESOURCE RICH AREA

Because of its glacial history, wetlands are particularly concentrated in northeastern Illinois. A variety of wetland types, such as marshes, sedge meadows, fens, and bogs, support a unique and sometimes rare flora and fauna. Bogs in Illinois are limited to glacial depressions in the northeastern part of the state. Acidic conditions created by the lack of drainage and accumulation of layers of peat support uniquely adapted flora, such as leatherleaf, blueberry, cranberry, ferns, orchids, pitcherplant, sundew, poison sumac, and tamarack.

The Chain O' Lakes-Fox River RRA encompasses the area of most recent glaciation in Illinois. Significant natural features in this poorly drained area include glacial landforms, natural lakes, and wetlands. Many wetland types are found in this RRA, such as bogs, fens, seeps, and shallow and deep marshes. Some rare species and community types are limited in their distribution to this area of the state. Urban expansion from the Chicago metropolitan region continues to put severe pressure on the natural resources in this region.

Size: 285,844 acres; 447 square miles

Location: Northeastern Illinois; Lake, McHenry, Cook, and McHenry counties

LANDCOVER - The predominant landcover in this RRA is urban/built-up (30%). This site has the highest urban/built-up acreage and ranks fifth in percentage of urban-built up area. Twenty percent of this site is wooded and 20% is cropland. Chain O' Lakes - Fox River has the most nonforested wetlands acreage (20,839 acres) and ranks first for percentage of nonforested wetlands among the RRAs.

NATURAL AREAS - This site has the second highest number of Natural Areas. The 72 Natural Areas include bogs, fens, seeps, marshes, sedge meadows, natural lakes, glacial features, and prairies.

BIOLOGICALLY SIGNIFICANT STREAMS - The Chain O' Lakes - Fox River RRA has 15 BSS locations, 14 of which are lakes.

HERITAGE SITES - This site has 476 Heritage occurrences, the highest number among the RRAs. There are 23 significant community types, 73 plants species, 23 animal species, and five rookeries in this area.

STATE AND FEDERAL LAND - State land in this RRA consists of two state parks: Chain O' Lakes and McHenry Dam & Lake Defiance. There is no federal land in this site.

NATURE PRESERVES - There are 34 Nature Preserves within this RRA. Principal natural features are bogs, fens, marshes, glacial lakes, sedge meadows, and prairies.

NATURAL DIVISIONS This site is entirely within the Northeastern Morainal Natural Division.

Source: Critical Trends Assessment Phase II - Inventory of Resource Rich Areas in Illinois: An Evaluation of Ecological Resources Illinois Natural History Survey, 1996

The Illinois Nature Preserves Commission has designated six sites in the Nippersink Creek Watershed as Illinois Nature Preserves (INP). These include Barber Fen, Bystricky Prairie, Elizabeth Lake, Glacial Park, Lind Forest, and Spring Grove Fen. These INP sites occur on both private and public lands.

Table 2.3 MCNAI Methodology

In 2005, the McHenry County Conservation District (MCCD) released an updated McHenry County Natural Areas Inventory (MCNAI). This study evaluated the remaining areas in McHenry that would qualify as MCNAI sites, using the assessment methodology presented in Table 2.3.

Based upon this study, the Nippersink Creek Watershed contains 46 of the 169 MCNAI sites in McHenry County, and 42 stream miles ranked as "quality". A total of 13,105 acres of MCNAI sites are found in the Nippersink Creek Watershed.

Methodology

To qualify as a McHenry County natural area, a parcel of land or water must possess at least one of the following criteria:

1. Remnant terrestrial or wetland natural communities professionally rated as possessing moderate quality (grade C) or better. Rating grades are determined by field assessment of native plant diversity, degree of disturbance by human land use practices and the subsequent effects of those impacts on the soil, hydrology and plant composition and distribution within a given natural community type.
2. Provide breeding habitat (animals) or sustainable soil/water conditions (plants) for one or more state endangered or threatened species. Records of endangered or threatened species must be reasonably extant sightings of breeding individuals or populations, or reliable written reports. The Illinois Endangered and Threatened Species List in force as of 2005 is the basis for species status assigned within this report.
3. Receive a stream classification by the Illinois Department of Natural Resources as unique (grade A) or high quality (grade B). Stream ratings are based on an evaluation of fish communities. Field survey data are used to compute an Index of Biotic Integrity (IBI), a numerically based quality system developed by aquatic ecologists at the Illinois Natural History Survey. The point values computed correspond to letter grades. Additional information taken into account for a stream's inclusion in the MCNAI includes fresh water mussel survey data.
4. Be classified as an ecologically unique area which contain natural heritage features recognized by professional geologists as outstanding examples of glacial landforms, or accepted by professional biologists as significant because they buffer or expanded habitat for these features.
5. Areas of open space currently being restored to natural communities or for which owner-approved management plans exist to facilitate and guide such restorations. In nearly all cases sites qualifying under this criteria typically meet other criteria for inclusion in the MCNAI as well, or they provide essential buffer or expanded habitat for these features.

Source: McHenry County Natural Areas Inventory - 2005

For the first time in 2005, the MCNAI study also identified two "Areas of Special Conservation Concern" (ASCC) in McHenry County. This designation identified areas where the efforts of private landowners in protecting and restoring significant ecological resources on their own properties link otherwise unconnected resource areas, which in turn support and enhance the efforts undertaken by MCCD in large-scale ecosystem restoration. One of these ASCC areas, referred to as High Point, is located in the Nippersink Creek Headwaters subwatershed in Alden Township, and contains a significant portion of the Nippersink Creek tributary area above the Alden Sedge Meadow MCNAI site.

In the 2005 MCNAI report summary, the MCCD identified a total of nine ecosystem complexes of particular interest located in the Fox / Nippersink watershed. Of these, five are located within the Nippersink Creek watershed. These critical project areas are described in Table 2.4, and should be considered integral components of this watershed plan.

Table 2.4 2005 MCNAI Report Summary for Fox / Nippersink Watershed RRA

Summary of the 2005 MCNAI

Seven years have passed since the 1998 summary portion of the MCNAI was written. In those seven years McHenry County has experienced unprecedented growth. Family farms have given way to sub-divisions; the county's population has expanded dramatically and the pressure on the natural areas identified in this report, both protected and unprotected has undergone a dramatic increase.

The slogan *wetness is wildness* still holds true for McHenry County's natural heritage and those Resource Rich Areas first identified in the MCNAI process continue to be high priorities for land protection. While much work lies ahead to insure these most important elements of our biological heritage survive into the future, great strides have been made since 1998. In the Fox/ Nippersink RRA numerous important projects have begun or been completed in many of the ecosystem complexes first delineated in the 1998 MCNAI. These include:

1. **Greenwood Fen – Greenwood West Complex**: Protection of large segments of the Greenwood Fen complex and Lind Woods areas as well as protection of a large buffer to Bystricky Prairie.

2. **Alden Sedge Meadow Complex:** Protection of the entire basin of Mud Lake, the headwaters of Nippersink Creek. Acquisition of major portions of the Bailey Woods complex and adjoining areas between the two sites. Large scale efforts by private landowners in restoration/protection of additional lands

3. **Hebron Peat Lands Complex:** Enlargement of the Goose Lake Natural Area to include almost the entire historic basin of the lake.

4. **North Branch of Nippersink Creek Complex:** Protection of much of the Genoa City Wetlands and Barrens site, as well as large segments of the South Richmond Sedge Meadow site.

8. **Glacial Park/Tamarack Farms**: Protection of several small additions to Glacial Park.

Source: McHenry County Natural Areas Inventory - MCCD 2005

The Nippersink Creek Watershed is still considered to be a rural watershed, and has retained many of its unique and irreplaceable natural areas. However, a comparison of the historic extent of Nippersink watershed hydric (wetland) soils (as shaded in green in Figure 2.3) with the present day extent of mapped wetlands (as shaded in yellow in Figure 2.4), reveals a significant loss of wetland acreage.

Figure 2.3 Hydric Soils of the Nippersink Creek Watershed

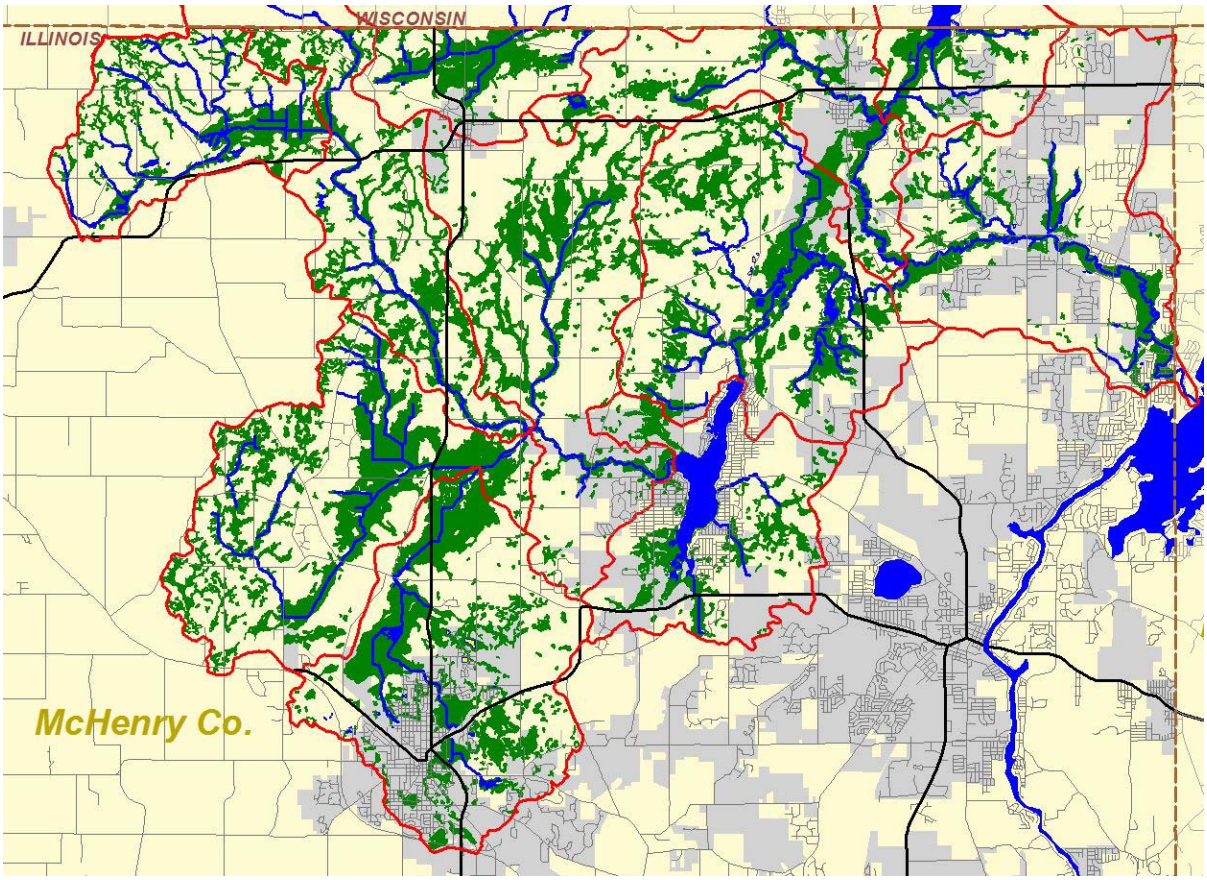
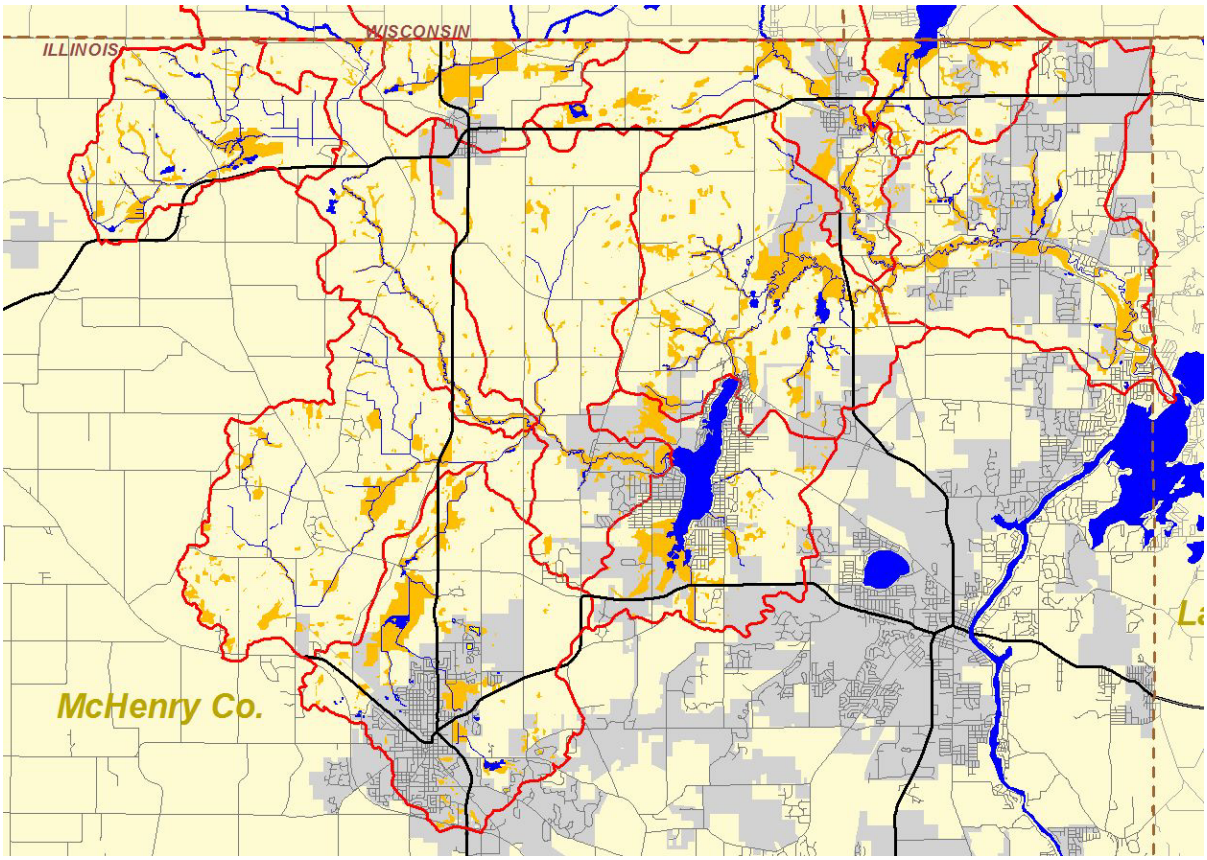


Figure 2.4 Mapped Wetlands of the Nippersink Creek Watershed



Compared to the 23,700 acres of mapped hydric soils which cover 24% of the watershed, the recent Advanced Identification (ADID) Wetland Study of McHenry County identified only 12,150 acres of wetlands in the watershed, which accounts for only 12.6% of the watershed area. This represents a roughly 50% loss in wetland acreage in the watershed.

While most of the remaining wetlands occur on private land, many have been protected through acquisition by public agencies, such as the McHenry County Conservation District, which owns 6,932 acres of watershed land, grouped into 25 managed sites.

However, the potential for large-scale wetland restoration still exists in the Nippersink watershed. This is attributable to the fact that, in contrast to more urbanized areas where most of the wetlands were actually filled to allow urban development, the majority of the lost wetland acreage in the Nippersink watershed can be attributed to wetland drainage, and not filling. In these drained wetlands, the hydric soils (and in many cases a seedbank of native wetland plant material) are still present.

If these drained areas can be placed into conservation programs or acquired, and the drainage restored or modified in a way to not cause off-site impacts, large scale wetland restoration could occur throughout many portions of the watershed.

2.1.2 Biological Resources

Biological monitoring of the Nippersink Creek watershed is done sporadically. The Illinois Department of Natural Resources fishery personnel survey the watersheds of Illinois on a rotating basis, based upon staffing resources. This results in multi-year gaps in available fishery data sets.

As part of a USGS study on Wonder Lake conducted from 1994 – 2001, fish survey work was at the Thompson Road Bridge upstream of Wonder Lake in 1999, 2000, and 2001, as shown in Table 2.5. That survey work revealed the presence of twenty species of fish.

It should be noted that fish sampling conducted downstream of the Wonder Lake Dam has a much better potential for increased fishery diversity, as fish in that reach of the Nippersink can migrate freely down into the Chain O' Lakes, and up into the Wisconsin portion of the Fox River. As a result, the consideration of implementing some type of fish passage structure around the Wonder Lake dam has occurred, and implementation of such an action should be part of the Nippersink Creek Watershed Plan.

Wonder Lake Dam

Table 2.5 1999 – 2001 NAQWA Fish Survey Data

05548105 NIPPERSINK CREEK ABOVE WONDER LAKE, IL THOMPSON ROAD BRIDGE						
		Genus / species	Common Name	Reach A 8/12/1999	Reach A 8/1/2000	Reach A 7/10/2001
Atheriniformes						
	Atherinopsidae					
		Labidesthes sicculus	brook silverside	2		
Cypriniformes						
	Catostomidae					
		Catostomus commersonii	white sucker	33	13	88
		Moxostoma erythrurum	golden redhorse	2	4	
	Cyprinidae					
		Campostoma anomalum	central stoneroller	6	14	1
		Cyprinella spiloptera	spotfin shiner	2	25	14
		Cyprinus carpio	common carp	5	6	17
		Notropis dorsalis	bigmouth shiner	38	26	
		Notropis stramineus	sand shiner		3	
		Pimephales notatus	bluntnose minnow		38	5
		Pimephales promelas	fathead minnow	1	2	5
		Rhinichthys atratulus	blacknose dace	1	1	
		Semotilus atromaculatus	creek chub	4	3	4
Esociformes						
	Umbridae					
		Umbra limi	central mudminnow		1	
Perciformes						
	Centrarchidae					
		Lepomis cyanellus	green sunfish	18	12	6
		Lepomis gibbosus	pumpkinseed		1	
		Lepomis macrochirus	bluegill	26	21	7
		Lepomis sp.	common sunfishes		1	
		Micropterus dolomieu	smallmouth bass	10		5
		Micropterus salmoides	largemouth bass	6	11	1
	Percidae					
		Etheostoma microperca	least darter	1		
		Etheostoma nigrum	johnny darter	3	2	1
		Etheostoma zonale	banded darter	6	13	18
Siluriformes						
	Ictaluridae					
		Ameiurus natalis	yellow bullhead			2
		Ictalurus punctatus	channel catfish	3		10

Source: USGS NAQWA Fish Sampling for 1999-2001

The McHenry County Conservation District (MCCD) conducts stream surveys on their properties, and typically inventory fish, mussel, and benthic invertebrate populations. Table 2.6 presents data from the MCNAI database for MCCD / MCNAI sites.

Table 2.6 Threatened and Endangered Species of the Nippersink Watershed

Common Name	Scientific Name	Type	Status	MCNAI Site
Henslow's Sparrow	Ammodramus henslowii	Bird	State Threatened	RIC06
Upland Sandpiper	Bartramia longicauda	Bird	State Endangered	RIC06
American Bittern	Botaurus lentiginosus	Bird	State Endangered	ALD02, RIC02
Black Tern	Chlidonias niger	Bird	State Endangered	RIC06, HAR08, HEB02, RIC02
Northern Harrier	Circus cyaneus	Bird	State Endangered	RIC06
Common Moorhen	Gallinula chloropus	Bird	State Threatened	RIC06, DOR02, HEB02, HEB05
Sandhill Crane	Grus Canadensis	Bird	State Threatened	RIC06, ALD02, RIC05, HEB02, HEB04, HEB05
Least Bittern	Ixobrychus exilis	Bird	State Threatened	RIC06, RIC02, HEB02
Black-Crowned Night-Heron	Nycticorax nycticorax	Bird	State Endangered	RIC06, RIC02
King Rail	Rallus elegans	Bird	State Endangered	RIC06
Forster's Tern	Stema forsteri	Bird	State Endangered	RIC06, RIC02
Yellow-Headed Blackbird	Xanthocephalus xanthocephalus	Bird	State Endangered	RIC06, DOR02, HAR08, RIC05, HEB02, HEB05
Regal Fritillary	Speyeria idalia	Butterfly	State Threatened	RIC06
Iowa Darter	Etheostoma exile	Fish	State Threatened	RIC02
Banded Killfish	Fundulus diaphanus	Fish	State Threatened	RIC02
River Redhorse	Moxostoma carinatum	Fish	State Threatened	RIC06
Pugnose Shiner	Notropis anogenus	Fish	State Endangered	RIC02
Blackchin Shiner	Notropis heterodon	Fish	State Threatened	RIC02
Blacknose Shiner	Notropis heterolepis	Fish	State Endangered	RIC06, RIC02
Slippershell Mussel	Alasmidonta viridis	Mussel	State Threatened	RIC06, ALD02
Purple Wartyback Mussel	Cyclonaias tuberculata	Mussel	State Threatened	RIC06
Spike Mussel	Elliptio dilatata	Mussel	State Threatened	RIC06
Blanding's Turtle	Emydoidea blandingii	Reptile	St Threatened	RIC06, GRE10, GRE13, HAR08, ALD02, HEB02, RIC02
Grass Pink	Calopogon tuberosus	Plant	State Endangered	ALD02
Two-Seeded Sedge	Carex disperma	Plant	State Endangered	BUR01
White Lady's Slipper	Cypripedium candidum	Plant	State Threatened	RIC06, GRE03
Small Yellow Lady's Slipper	Cypripedium parviflorum makasin	Plant	State Endangered	GRE03
Round-Leaved Sundew	Drosera rotundifolia	Plant	State Endangered	RIC06
Rusty Cotton Grass	Eriophorum virginicum	Plant	State Endangered	RIC06
Tamarack	Larix laricina	Plant	State Threatened	RIC06, HEB03
Pale Vetchling	Lathyrus ochroleucus	Plant	State Threatened	RIC06, BUR03, GRE01
Savanna Pinweed	Lechea intermedia	Plant	State Threatened	RIC06, MCNAI, GRE12
Eastern Prairie Fringed Orchid	Platanthera leucophaea	Plant	St Endangered / Fed Threatened	RIC06, GRE09
False Asphedel	Tofieldia glutinosa	Plant	State Threatened	HEB09
Nodding Trillium	Trillium cernuum	Plant	State Endangered	GRE01 GRE05
Pitcher Plant	Sarracenia purpurea	Plant	St Endangered	ALD02
Common Bog Arrow Grass	Triglochin maritime	Plant	State Threatened	ALD02, HEB03
Large Cranberry	Vaccinium macrocarpon	Plant	St Endangered	RIC06
Dog Violet	Viola conspersa	Plant	State Threatened	RIC06, MCH06

Source: McHenry County Natural Areas Inventory Database, 2005

2.1.3 Water Quality

While Nippersink Creek as a whole is faced with many challenges affecting its water quality and ecosystem health, there are several reaches of the main stem and tributaries classified as highly valued aquatic resources by various local and state agencies.

Canoeing Nippersink Creek

Nippersink Creek watershed is the largest tributary to the Fox River, draining 137 square miles in Illinois, as well as additional 50 square miles located in Walworth County, Wisconsin.

In the Algonquian language, Nippersink means "place of the **small waters**" due to the profusion of small springs feeding the creek. It is among the finest streams in Illinois with the mainstem rating a "B" Biological Stream Characterization score and the North Branch receiving an "A" rating.

2.2 Human Resources: Population and Land Uses

2.2.1 Population

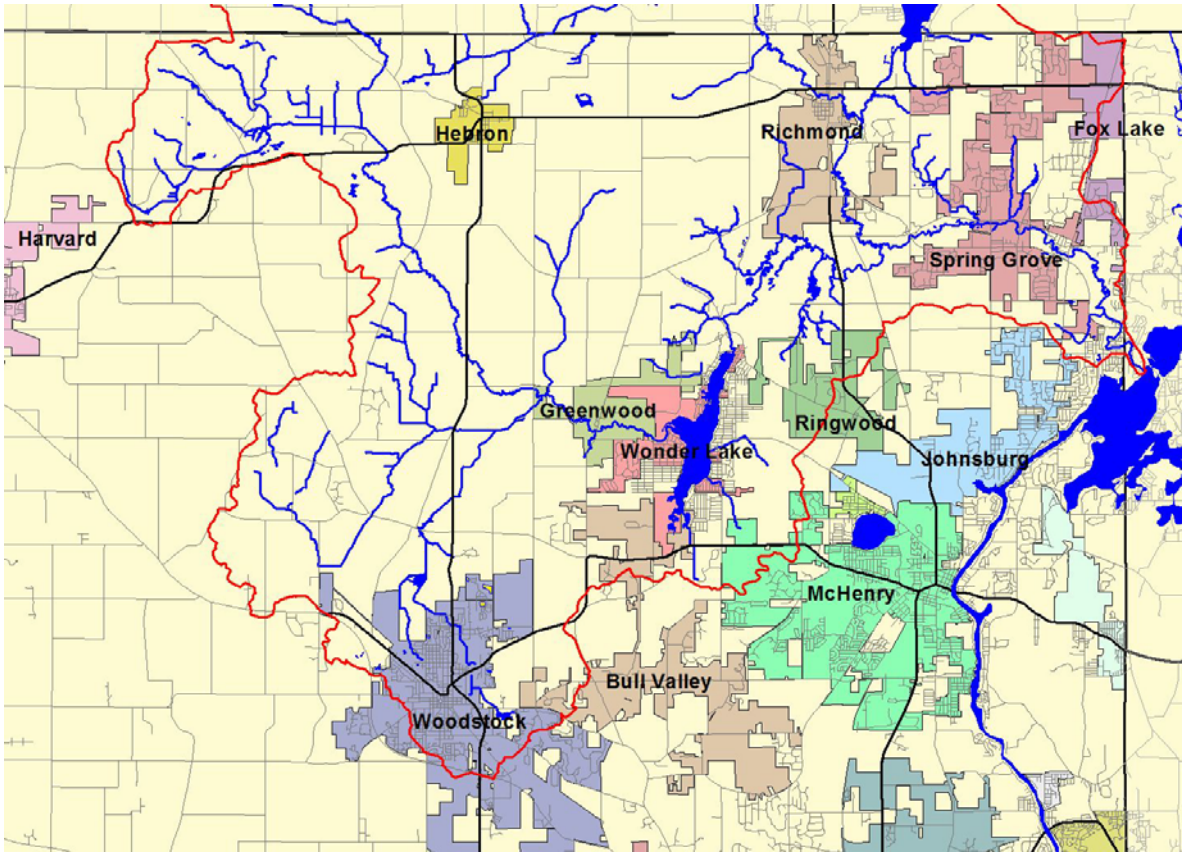
The land use of the Nippersink Watershed, like other areas in the Chicago region, has changed dramatically as more and more people have moved into the watershed. Historically, 33% of the watershed was grassland, 29% of the watershed was made up of wetlands, and 36% of the watershed was covered with woodlands. European-American trappers and traders first entered the watershed in the 1650's, however, the first permanent settlers didn't take up residence until around 1838, in what is now Greenwood Township. In 1990, the watershed's population was estimated at 32,200. That number increased nearly 29%, to a total of 41,425 persons at the last US Census in 2000.

2.2.2 Development Patterns & Land Use Changes

There are now 10 municipalities in the Nippersink Creek watershed. Three of these municipalities have entered the watershed via annexation of new development adjacent to their boundaries (Fox Lake, McHenry, and Bull Valley). Land within municipal boundaries now accounts for about 21,000 acres, or 17% of the land in the Nippersink Watershed.

Urban Growth in McHenry County

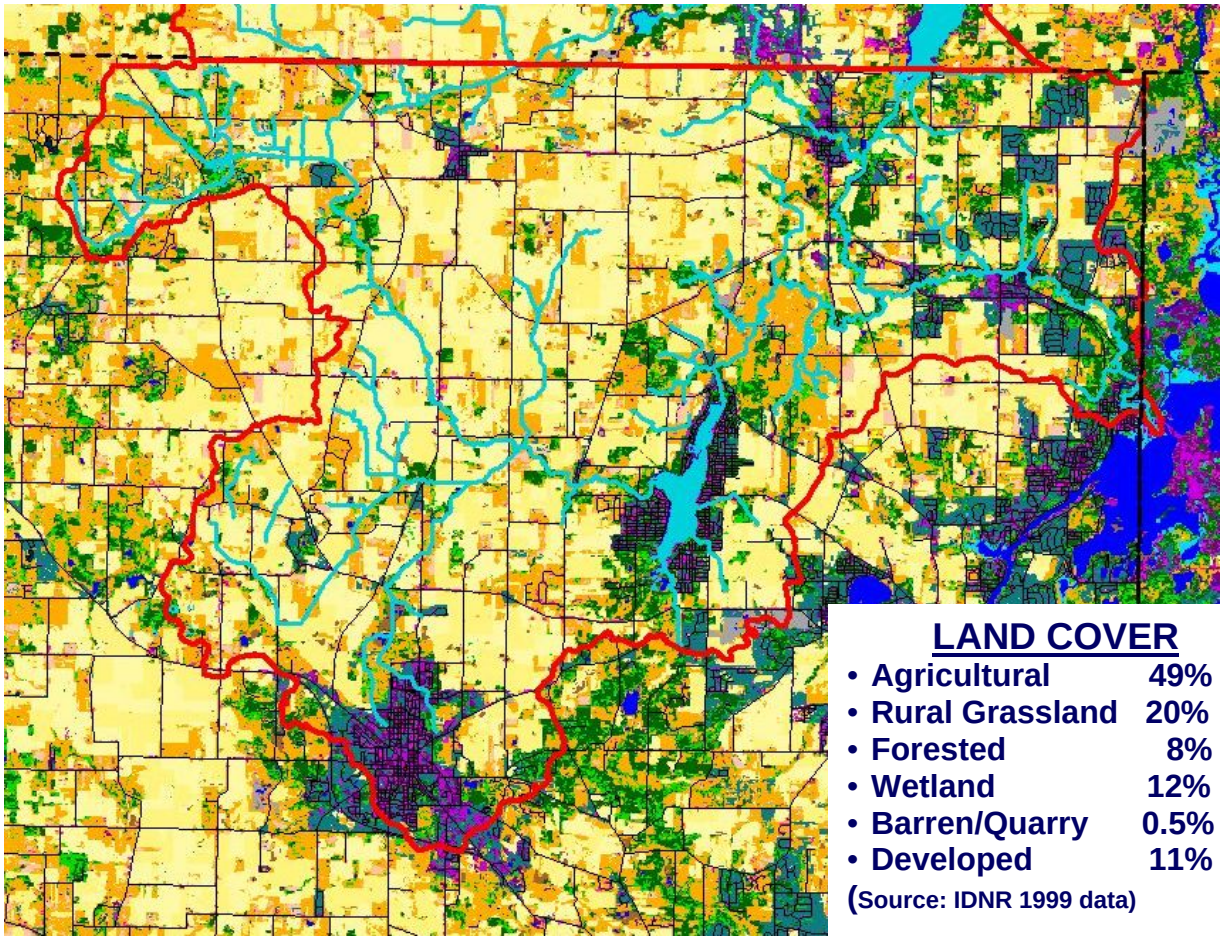
Figure 2.5 Municipalities in the Nippersink Creek Watershed



2.2.3 Land Use

Largely owing to its relative distance from the Chicago metropolitan area, the Nippersink Creek watershed still remains primarily rural and agricultural. Developed areas, shown in purple on Figure 2.6, are still concentrated within or on the fringe of established urban areas. However, significant land development activities have been underway in the southeast half of the watershed, primarily associated with the City of Woodstock, and the Village of Spring Grove. Proposals for new large scale developments are also underway in The Village of Wonder Lake.

Figure 2.6 1999 Land Use Cover in the Nippersink Creek Watershed



There are three IEPA permitted municipal point source discharges (Hebron, Richmond, and Woodstock) which discharge as much as 4 million gallons of treated wastewater effluent each day into the Nippersink Creek or one of its tributaries. There are also three other permitted discharges (Intermatic Inc, Surgipath Medical Industries & Prairie Material Sales Yard 23) which can discharge up to an additional 830,000 gallons of process water each day.

2.3 Watershed Impacts & Impairments

2.3.1 Existing Impacts & Impairments

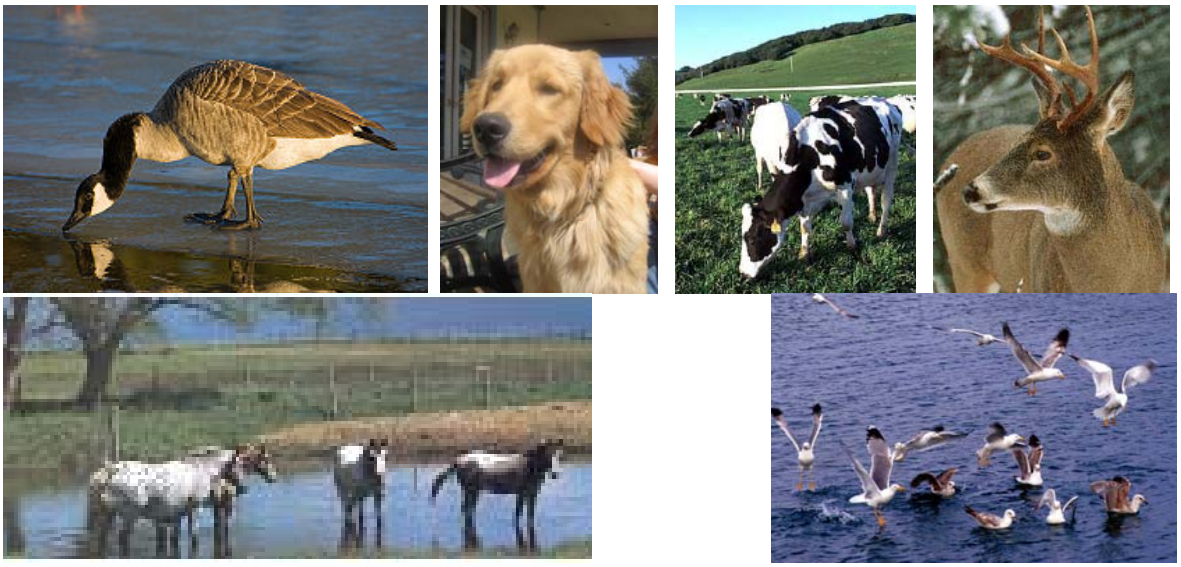
The Nippersink Creek watershed was listed as a Year 2000 high priority area identified through the Illinois EPA's Targeted Watershed Approach. The wellhead protection zones of the Village of Richmond lie entirely in the watershed and the watershed is part of the Northern Regional Groundwater Protection Region.

Upstream of Wonder Lake, Nippersink Creek was listed in the IEPA's 305(b) Report as being in Full Support of its Designated Uses, which are listed as Aquatic Life and Fish Consumption. Downstream of Wonder Lake, Nippersink Creek is listed as impaired by the IEPA due to excessive total fecal coliform bacteria.

The stream was considered in full support for its designated uses of aquatic life and fish consumption, but due to the fecal coliform, it is listed as non-support for a designated use of primary contact. The source of this fecal coliform is listed by the IEPA as "unknown". Failing septic systems serving residential properties would be the most likely source of any human fecal coliform contributions.

Potential sources of fecal coliform bacteria include all warm blooded animals (humans, pets, domesticated livestock, birds, and wildlife). More likely sources include pastures where cattle or horses have access to the stream; flocks of Canada Geese or sea gulls congregating at stream-side parks and golf courses; or even domestic pet waste washed into storm sewers. It should be noted that the Nippersink Creek watershed historically had a large number of dairy farms, but many of these are no longer in operation. The more likely source of fecal coliform in the watershed in the future will be horses, not dairy cows or cattle.

Potential "Unknown" Sources of Fecal Coliform



One of the major difficulties in developing management strategies for waters contaminated by fecal coliform bacteria is that there are numerous potential sources of bacteria, and the degree of contribution from any given source cannot be easily determined, without extensive water quality analysis. Bacterial source tracking (BST) is a recently developed technology for identifying the sources of fecal coliform bacteria and it may be helpful in targeting where water quality Best Management Practices may need to be implemented.

In 2004, the United States Geological Survey released a report *Water Quality of Nippersink Creek and Wonder Lake, McHenry County, Illinois, 1994-2001.* This report discussed the water quality impacts being experienced within Wonder Lake, an 830 acre on-line impoundment, due to the amount of nutrient and sediment entering the lake from its upstream watershed. The sediment and nutrients can cause adverse water quality impacts within the stream, as well as in Wonder Lake, and the Fox River / Chain O'Lakes into which Nippersink Creek flows.

2.3.1.1 Watershed Impairment Causes Not Listed on the IEPA 303(d) List

Although not specifically identified or listed by IEPA for Nippersink Creek, other 303(d) watershed impairment causes often cited in urban / urbanizing watersheds can include:

- Oils and Grease
- Excessive Nutrients
- Chlorides
- Low Dissolved Oxygen
- Sedimentation / Siltation
- Hydromodification

Oils and Grease, Excessive Nutrients, and Chlorides

Generally speaking, Oils and Grease, Excessive Nutrients, and Chlorides can often be associated with urban stormwater runoff, where highly efficient stormwater systems can rapidly deliver materials deposited on streets into the stream system. This potential likely exists in the older, urbanized portions of the watershed, such as Lower Nippersink, Silver Creek or Slough Creek.

Parking Lot without Stormwater BMP's

Unstabilized Streambank

Low Dissolved Oxygen, Sedimentation and Siltation

Low Dissolved Oxygen, Sedimentation and Siltation, and Excessive Nutrients can often be found in channelized stream segments, where sufficient stream gradient does not exist to allow natural re-oxygenation of the water column; eroding streambanks are delivering sediment to the channel; or where nutrients bound up in eroding soil are being washed into the stream. This potential certainly exists in the upper reaches Vander Karr Creek, and the lower reaches of Silver and Slough Creek.

However, the same impairment causes could result from sediment laden storm water discharges from a construction site with poor Soil Erosion and Sediment Control practices. To date, much of the development within the Nippersink Creek watershed has been comprised of single family residences on large lots. Mass grading is not required on these types of development project, particularly since care must be taken to avoid damaging the soil profile of the proposed septic system leachate field. In contrast, most large scale development, served by municipal wastewater treatment systems, tend to "mass grade" their sites, first stripping off the highly absorbent topsoil layer and stockpiling it for sale. Once the site grading of the underlying clay has been conducted and the site infrastructure and building pads are completed, a token amount of topsoil is respread to allow turf grass to be established. In addition to losing the stormwater storage and filtering benefits provided by an undisturbed organic soil horizon, the site is far more prone to erosion and sedimentation during grading.

Mass Grading of a Construction Site

Hydromodification

Cropland With Drain Tiles

Hydromodification is a term used to describe human induced activities that changes the dynamics of surface or subsurface water flow. In the Midwest, the most prevalent hydromodification was the historic channelization of streams to improve agricultural productivity. Early settlers recognized that the soils found in the broad expanses of wetlands and wet prairies were ideal for crop production, provided the excess water could be removed.

Channelized Stream With Drain Tile Outlets

This resulted in the installation of sub-surface drainage tiles to remove the excess groundwater and route it to a point where it could be discharged. In order to have these tiles drain by gravity flow, a receiving drainageway was needed that was at an elevation lower than the drain tile.

To achieve this, the receiving drainageway, often a natural stream channel, would be excavated to a deeper depth. As part of this channelization effort, natural stream channels were typically straightened as well, to facilitate drainage, and to allow fields to be squared off.

By removing this excess water, the areas could be successfully cropped. This gain in agricultural productivity was unfortunately at the expense of large expanses of wetlands, wet prairie, and riparian habitats. The bright side is that in many of these altered areas, if these drainage improvements are modified or removed, those lost habitats can often be restored to some degree of their former function and quality. In the Nippersink Creek watershed, this type of hydromodification occurred primarily in the Vander Karr Creek, Silver Creek, Slough Creek and lower reaches of the Nippersink Headwaters subwatershed.

Another form of hydromodification that occurred in the Nippersink Creek watershed was the filling of wetland and floodplain areas to facilitate development. The losses of these natural flood storage areas forced the receiving waterway to both store and convey the increased stormwater runoff, which became increasingly difficult as the magnitude of the flow event increased. The short-term result of this is overbank flooding; the longer-term impact is the expansion of the stream channel to accommodate the increased flow volume. This channel expansion can cause significant sediment delivery to the stream channel as the channel deepens and widens.

The deepening (incision) of the stream channel into the landscape can cause a further disconnect between the stream and its floodplain, forcing more frequent flow events to remain within the channel, increasing the scour potential. The incision of the stream channel can also cause groundwater elevations in the streambanks to drop, further stressing any remaining wetland / wet prairie plant communities. The loss of the depressional wetland and floodplain areas, and their associated pre-disturbance habitats, also served to adversely impact water quality, as these areas were no longer available to trap streamborne pollutants (suspended sediments, nutrients, etc.).

Curb and Gutter Stormwater Management

The most prevalent current day hydromodification is the result of land development. As the conversion of undeveloped ground to rooftops, pavement, and highly compacted ground, as well as highly efficient storm sewer systems, greatly reduce the potential for precipitation to infiltrate into the ground. Instead of older styled roadside drainage swales, where stormwater runoff had an opportunity to soak in, modern day stormwater management generally favors curb and gutter stormwater management to capture and route stormwater runoff to stormwater detention basins.

Roadside Swale Stormwater Management

Stormwater runoff routed to stormwater detention ponds is detained for a specific period of time (per stormwater ordinances) and is released into the receiving stream. However, the detention times mandated by stormwater ordinances are typically not long enough to allow for any significant water quality benefits to occur within the detention pond.

Typical "Dry Bottom" Stormwater Basin

The use of "dry bottom" stormwater basins, with mowed turfgrass bottoms, also prevents significant water quality benefits from being provided.

While the use of stormwater detention certainly helps reduce the risk of downstream flooding, it still results in a greater volume of water being discharged to the stream (as compared to pre-development conditions), in the period shortly after the storm is over. This is in contrast to the pre-development condition, when the vast majority of precipitation would infiltrate into the ground, and slowly move towards the receiving stream, providing a year-round source of groundwater discharge of cool, filtered water into the stream.

Invasive Species

Although not typically classified as impairment to water quality, a threat to health and diversity of the watershed's natural areas is the rapid spread of invasive species of vegetation into the remaining natural areas, such as wetlands, woodlands, and stream corridors. Nearly every stream corridor, wetland, woodland, prairie, or other natural open space is facing an onslaught of invasive species, including Reed Canary Grass, Phragmites (Common Reed), Garlic Mustard, Honey Suckle, and Buckthorn. These aggressive invaders can out-compete native species, diminishing the floristic quality and wildlife habitat quality.

Excessively Dense Woody Cover

Of particular concern are the woody species, such as Box Elder, Common Buckthorn, and Honeysuckle which can dominate unmanaged stream corridors, and create a dense shady canopy that can prevent soil stabilizing herbaceous (grassy) vegetation from establishing on the streambanks. The lack of groundcover vegetation can make the streambank soil more prone to erosion, and as the streambank erosion progresses, and the trees / brush are undermined, they can slump into the channel, causing debris blockages and flow diversion into other unstabilized streambanks.

Restored Nippersink Creek in Glacial Park

It must be noted that stream shading and woody debris are critical components of a healthy stream system. Shade cast over the surface of the stream can keep water temperatures cooler, which allows more dissolved oxygen to remain in the water column, available for use by aquatic organisms. However, in much of the upper Nippersink Creek watershed, wildfires in pre-settlement times kept much of the stream system brush- and tree-free. The dominant riparian vegetation was dense stands of prairie grasses and forbs that overhung the stream channel, providing shade and cover.

The key to proper stream corridor management is to still provide shade for water temperature moderation, but to provide it from a variety of vegetation sources, at different elevations.

Similarly, woody debris in a stream channel is the base of the food chain of a stream system, and needs to be present to allow a diversity of small aquatic organisms to prosper. Again, moderation is the key in balancing between a debris clogged channel, and one stripped of every last stick or branch.

2.3.2 Future Impacts and Impairments

Without questions, the biggest threat to the health and sustainability of the Nippersink Watershed is the rapid development of agricultural land into suburban land uses. This change in land use continues to be performed using land development methods which do not preserve the interception, infiltration, storage, and slow release of accumulated rainfall to the underlying shallow aquifers and adjacent wetlands and streams.

In early 2008, McHenry County adopted a new Conservation Design Ordinance for unincorporated portions of the County, which will trigger if certain environmental features are present on, or in proximity, to a parcel proposed for development. The City of Woodstock has also adopted Conservation Design Guidelines, as well.

Degraded Waters Quality from Development

Existing stormwater ordinances covering the Nippersink Creek watershed are not designed specifically to mitigate water pollution from development. The required stormwater retention component provides some opportunities for pollutants to settle out or be assimilated, but as the intent of stormwater management is to only store the water as long as necessary to meet detention requirements, the resulting retention times are often insufficient to achieve measurable water quality improvement.

Additional Channel Hydromodification

Current stormwater and subdivision ordinances do an adequate job of preventing an increase in peak stormwater discharges for the larger, infrequent events, such as the 100-year event, but recent studies have shown that the further you go downstream in a watershed, the peak discharges for smaller events that effect stream ecology and stream channel stability increases by as much as 66% (reference: Blackberry Creek Alternative Futures Study, 2003).

Loss of Natural Wetlands & Stream Corridor

Current regulations still allow for remaining farmed or lower quality wetlands to be filled or converted to stormwater basins. Developments are currently allowed to build their stormwater infrastructure right up to the edge of the streambank. This is especially true in upper areas of the watershed where stream corridors have long since been drained and streams ditched and channelized to maximize farmable area. The problem is that when new developments are planned, they are allowed to build up to the edge of the current day stream corridor, which today is reduced to a 30 to 60 foot wide strip. This does not reflect the previous expanse of the historic stream corridor, which was perhaps 3 to 5 times that width, when using hydric soils as an indicator. Development infrastructure this close to the existing channelized stream does not account for the possibility of the stream channel reverting to a more natural, meandering pattern, which can occur (and is desired from an environmental resource point of view) if the stream gradient is sufficient.

Reduced Groundwater Recharge

The cumulative effects of:

- new development (more impervious surfaces),
- loss of remaining wetlands (or conversion of low quality wetlands to detention basins), and
- maintaining the channelized nature of streams in the agricultural areas (which are soon to be converted to new development)

will most certainly result in a net loss of groundwater recharge to the shallow aquifers under the Nippersink Creek Watershed.

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Chapter 3
Pollutant Loading Analysis

3.1 Pollutants of Concern

As previously discussed in Chapter 2, the main pollutants of concern in the Nippersink Creek watershed include fecal coliform, nutrients and sediment. The main sources of these pollutants are non-point sources. The segment of the main channel downstream of Wonder Lake is included on the IEPA 303(d) list for fecal coliform impairment. There are also indications that low-streamflow conditions could result in seasonal dissolved oxygen (DO) problems, stressing aquatic organisms. Since the watershed is still primarily rural, the main sources of non-point pollutant loads are nutrients and sediment from agricultural runoff. Another source of sediment and nutrients is streambank erosion from within channelized or heavily shaded / poorly vegetated stream segments.

Urban runoff from the developed areas around Woodstock, Richmond, Spring Grove, Hebron and Wonder Lake also contribute significant amounts of pollutants associated with urban runoff, such as oils and grease, heavy metals, and increased water temperature. Current water quality conditions are excellent; however, rapid and poorly planned development poses the main threat to future water quality in the watershed.

3.1.1 Pollutant Loading Analysis Approach

A pollutant loading analysis was performed to identify and quantify the watershed sources of pollutants. The analysis results were then used to identify management strategies for addressing existing and future water quality concerns resulting from human activities. The results of this analysis indicated problem areas or 'hot spots' under existing and future land use conditions.

Because of the limited amount of water quality data available in the watershed, sophisticated modeling approaches were not used. A GIS-based Generalized Watershed Loading Function (GWLF) (http://www.avgwlf.psu.edu/overview.htm) model was used to estimate the pollutant loads for the 14 subwatersheds. This model uses readily available watershed specific characteristics such as land cover, topography, soil types and meteorology to estimate pollutant loads. GWLF output consists of monthly averaged pollutant loads from which seasonal trends can be discerned.

The GWLF analysis is somewhat more realistic than the commonly used "Simple Method" or export-coefficient spreadsheet based pollutant loading techniques in that the GWLF simulation incorporates seasonality, groundwater, and streambank erosion directly into the simulation.

In addition, the GWLF model uses monthly precipitation values to determine monthly runoff volumes. In this way, the model is capable of reproducing pollutant loads production in the watershed more realistically.

Another advantage of the GWLF model is that it can also be used to determine the effectiveness of either existing or proposed Best Management Practices (BMP's) in reducing future pollutant loads. This capability of the GWLF model provides some verification that the BMP's can indeed reduce pollutant load. This function was used to generate the pollutant load reductions described in the subwatershed reports.

To determine the pollutant load reduction for a particular BMP, the GWLF model aggregates similar BMP's within the subject subwatershed to calculate the total pollutant load reduction. For example, the pollutant load reduction resulting from applying nutrient management is calculated by the total number of acres included, and not by the number of individual farm units. This procedure is in accordance with the Supplemental Guidelines for the Award of Section 319 Nonpoint Source Grants to States and Territories in FY 2003. http://www.epa.gov/nps/Section319/319guide03.html.

There are a number of other procedures that the EPA has developed for determining load reductions (See: http://it.tetratech-ffx.com/stepl/STEPLmain_files/LoadReductionModels.pdf for a comprehensive description). The STEPL method was developed by USEPA and is spreadsheet based, and calculates the combined load reduction resulting from a variety of BMP's. The other commonly used model is the USEPA Region 5 spreadsheet model which calculates the load reduction for each individual BMP at the source level. The simple spreadsheet approach was used to calculate BMP fecal coliform reductions that the GWLF model cannot explicitly simulate. For some BMP's, such as outreach and regulatory programs, load reductions were assigned conservative values based on literature and professional judgment.

3.1.2 Pollutant Loading Analysis Methodology

The Illinois Department of Natural Resources (IDNR) 1999 land cover data was enhanced with a 2005 aerial photograph of the Nippersink Creek watershed and used for the GWLF analysis. The GWLF model uses nine categories of land cover. Since some of the land use data had more categories than those used in the GWLF model, some land use maps were aggregated to produce the required nine categories. Table 1 in the report appendix presents the assignment of the available land uses into these nine land uses.

The following nine land use categories were used in the analysis:

- Wetlands
- Forest
- Hay/Pasture
- Row Crops
- Low Density Development (≤ 1unit per 1.2 acres)
- High Density Development (≥ 1 unit per 1.2 acres)
- Transitional/Quarries
- Turfgrass/Golf Course
- Water

The United States Geological Survey (USGS) operates station 05550300 in Elgin, Illinois with records of precipitation from October 1, 1998 to present. Daily precipitation records from this station were used in the Nippersink Creek GWLF model. The records defined a five-year period used in estimating the averaged monthly precipitation and pollutant load for each Nippersink subwatershed.

Maximum and minimum daily temperatures are also required for GWLF models. Records from the Meteorological Site at Argonne National Laboratory, Illinois (USGS station 414204087594201) were used for the five-year period modeled. Although this site is outside the Nippersink Creek watershed, the records are representative of the temperatures over the study area.

The topography and soil types of Nippersink Creek Watershed were defined by the USGS digital Elevation Model and USDA-NRCS Soil Survey of McHenry County, respectively (USDA-NRCS, 1995).

The GWLF model was used to generate two scenarios for each subwatershed:

- the existing conditions in the watershed, and
- future year 2030 developed conditions.

Projections of future land use were generated using various sources of maps including municipal sources and information from the ***McHenry County 2030 Comprehensive Plan*** that is being developed.

The pollutants analyzed by the GWLF model are sediment and nutrients (nitrogen and phosphorus). These pollutants may be considered surrogates for a variety of pollutants generated in typical rural and urban settings. Urban runoff, however, contains additional pollutants such as oils and grease, heavy metals, and elevated temperatures. Sediment is a good surrogate for both urban and agricultural runoff because sediment particles are vehicles for transporting a variety of pollutants such as heavy metals, nutrients, oils and grease.

Fecal Coliform Loading

Fecal coliform concentrations are very variable and unless the key sources of these bacteria are known, an effective pollutant reduction strategy cannot be implemented. Fecal coliform loads may be computed by a simple export-coefficient procedure. However, such information is of little use in addressing the impairment concern if the sources of the predicted loads are not known. The IEPA Integrated Water Quality Report and Section 303(d) List (IEPA, 2006) did not identify the source of the fecal coliform bacteria. Urban runoff may be the main source of the high fecal coliform concentrations, but that cannot be conclusively established at this time. Additional monitoring is recommended to further isolate the sources. Typically such monitoring should include low-flow and wet-season sampling.

A load-duration curve approach (EPA, 2007) is a simple procedure for analyzing the monitoring data to determining whether the loads are from point sources or non-point sources associated with runoff events.

One other suspected source of fecal coliform is septic system failure. To evaluate whether failing septic systems are a significant source of fecal coliform, it is recommended that the McHenry County Health Department:

- Maintain records of complaints by residents of septic system problems
- Map or locate the location of failures
- Maintain a septic system permit database
- Review ordinance regarding setbacks
- Review soil data
- Inspect septic systems regularly

Once the sources of the elevated fecal concentrations are identified, then appropriate BMP's may be prescribed based on the characteristics of the sources. Appropriate BMP's or reduction measures can be prescribed such as:

- Establishing a septic system inspection program if problems with septics appear to be prevalent
- Establishing buffers around lakes
- Enforcing illicit discharge disconnections
- Controlling wildlife around natural water bodies and detention facilities by means of buffers or other devices
- Pet waste management in urban areas
- Animal feedlot and manure management along streams
- Eliminate sanitary overflows if any.

In interpreting and comparing model results, it is important to note several issues;

- A given amount of sediment from an urban development may contain a greater number of pollutants than the same amount from an agricultural area. In other words, urban sediment contains more pollutants (such as Oils & Grease, toxic metals) than sediment from agricultural areas.
- Seasonal patterns in pollutant movements are important because water quality violations generally occur seasonally. For this reason, the GWLF model can present a more realistic picture of pollutant movement in the watershed than simple event-based models which give annual loads.
- Although total pollutant loads are a good indicator of the overall cause of water quality impairments, water quality criteria/standards are based on concentrations. This is because the toxicity of a pollutant to the aquatic life is more dependent on concentrations than actual total loads.
- Contribution of point sources was small compared to non-point sources because of their small discharges.

In conclusion, annual pollutant loads are a good indicator of the potential for impairments but they should be interpreted with caution as they do not necessarily give a complete picture of the vulnerability of a watershed to impairments caused by a particular pollutant. Seasonality of the loadings is quite often a more important indicator of critical water quality conditions than the actual load amounts.

3.2 Pollutant Loading Results and Pollutant Reduction Strategies or BMP's

3.2.1 Runoff Volume

Runoff is the most critical component of any watershed process. Changes in a watershed physiographic conditions signal changes in runoff. Likewise, changes in runoff may cause profound changes in the dynamics of pollutant processes. As anticipated, the most noticeable change when a watershed urbanizes is an increased in the volume of runoff. The changes of total runoff volumes in the Nippersink watershed from existing conditions were less than 1% because of the small increase in imperviousness compared to the size of the watershed, which remains primarily rural. In individual subwatersheds such as the Wonder Lake and The Lower Elizabeth Lake Drain, runoff volumes could increase by more than 15% because of urbanization. For these watersheds, BMP's for mitigating increased runoff are recommended.

3.2.2 Best Management Practices for Runoff Reduction

The runoff reduction strategy must focus on upstream subwatersheds because the impacts from increased runoff are caused primarily by upstream runoff. Mitigation for increased runoff within the Nippersink Creek watershed can be achieved by preserving and restoring the floodplain, discouraging floodplain encroachment, and channel stabilization. Watershed wide BMP's for reducing runoff volumes are:

- Rain gardens to promote infiltration
- Preserving open lands to promote infiltration and groundwater recharge
- Practicing Low Impact Development (Reduction of imperviousness)
- Wetland conversion/restoration to encourage retention and infiltration
- Modification of tile systems.

3.2.3 Nippersink Creek Pollutant Loading Results

The following tables present results for the pollutant loading analysis under existing conditions in the Nippersink Creek subwatersheds. Also presented are projected changes of the loadings by Year 2030 based on the assumed future conditions scenarios described in the beginning of the Section. Detailed monthly loads for each subwatershed in both scenarios are included in the Appendix 2.

The existing conditions pollutant analysis results show that:

- The Vander Karr, Bailey Woods, and the Zenda Headwaters subwatersheds contribute more pollutant loads per acre than the other subwatersheds (Table 3.2)
- The Lower Nippersink Creek and Silver Creek, and Wonder Lake appear to be 'hot-spots' for fecal coliform loads
- Bailey Woods and Zenda Headwaters appear to be 'hot spots' for sediment and phosphorus loads.

The loading results reflect the predominant land use in the watershed which is row crop farming. The Bailey Woods watershed, portions of which are in Wisconsin, is about 90% farmland. The detailed model results by land use (Appendix 2) indicate that row crop farming generates a majority of the nutrient loads.

Groundwater is also an important source of nutrients loads compared to the other land uses included in the analysis. The contribution of groundwater is dependent on the soil characteristics and the amount of infiltration. The proportion of the total phosphorus load contributed by groundwater varied from 6% in the Bailey Woods subwatershed to as high as 16% in the Lower Nippersink Creek subwatershed. The contributions of groundwater to total phosphorus loads in the Glacial Park / Tamarack Farms and Silver Creek subwatersheds are also high, about 14 and 13% respectively.

The GWLF model uses soil properties and stream geomorphic features such as bank slopes, length and erodibility to estimate the contribution of stream bank erosion. The model results indicated that the contribution of bank erosion to the total sediment load varied among the subwatershed from 2% in the Zenda Headwaters to about 25% in the Lower Nippersink Creek subwatershed. About 24% of the sediment load in the Silver Creek watershed comes from stream bank erosion. Stream bank erosion in the Glacial Park / Tamarack Farms and Bailey Woods watersheds contributes about 15% and 10% respectively. These results emphasize the importance of BMP's targeted at restoring and protecting stream banks in the watershed.

The Lower Nippersink Creek, the Wonder Lake, and Silver Creek subwatersheds appear to be 'hot-spots' for fecal coliform, based on the results of the simple spreadsheet analysis. Urban runoff is suspected be the main source of fecal coliform bacteria for the Lower Nippersink Creek and Wonder Lake watersheds. Septic systems and wild life are also probable contributors for the Silver Creek watershed.

A future scenario land cover was analyzed using the GWLF model. This scenario combines the proposed comprehensive land use data from McHenry County and municipalities within Nippersink Creek was used to project a future land cover. The following assumptions were made to create this scenario:

- Assume that existing wetland will be preserved.
- Areas defined as open area in the McHenry County data will retain their existing land cover,
- Area defined as resource management area in the McHenry County data will become low density development in the future.

In general, pollutant loads remain unchanged except for the Lower Nippersink Creek, Wonder Lake, and the Lower Elizabeth Lake Drain. The results indicate reductions of total nutrient loads primarily because of the replacement of row crop with low density development. It is sometimes assumed that residential development contributes higher nutrient loads per acre than farmland, however, this is not necessarily the case (CWP, Art 4, 2002).

Based on this scenario, management strategies must focus on these future 'hot spots'. Water quality degradation would most likely occur faster in these watersheds than in the other ones.

Table 3.1: Annual Pollutant Load by Subwatershed

No.	Subwatershed	Area (acres)	Sediment		Total N		Total P		Fecal coliform	
			Existing Load (tons)	Future Trend** (%)	Existing Load (lbs)	Future Trend (%)	Existing Load (lbs)	Future Trend (%)	Existing Load (10^9 FCU)	Future Trend (%)
1	**Lower Nippersink***	**12,426**	**1,684**	**-1.2**	**49,372**	**-21.4**	**2,322**	**-40.3**	**78,152**	**+1.4**
2	Glacial Park/Tamarack	12,583	1,788	-0.6	51,666	-4.9	2,731	-8.3	70,049	+0.3
3	**Wonder Lake**	**7,881**	**1,193**	**-41.5**	**21,932**	**-29.5**	**1,791**	**-50.0**	**46,817**	**+0.9**
4	Vander Karr Creek	12,226	2,395	+1.2	45,569	-0.4	3,643	-0.3	67,289	+0.2
5	Silver Creek	12,005	1,723	+0.7	41,728	0.0	2,320	0.0	76,146	+1.5
6	Slough Creek	11,871	2,185	+1.2	46,769	0.0	3,371	0.0	65,752	+0.2
7	Bailey Woods	7,281	1,600	+1.3	31,571	0.0	2,562	0.0	39,952	+0.1
8	Nippersink Headwaters	6,594	916	+4.2	27,624	0.0	1,496	0.0	36,495	+0.2
9	Zenda Headwaters	4,315	2,495	+1.7	23,049	0.0	3,647	0.0	24,961	+0.7
10	North Branch Nippersink	6,754	1,143	+1.0	24,015	-5.3	1,713	-7.8	39,526	+0.8
11	Elizabeth Lake	3,078	463	-35.7	11,384	-29.9	733	-49.1	17,474	+0.5
12	Upper North Branch Nippersink	4,493	541	+8.6	7,662	0.0	819	0.0	18,348	+0.9
13	**Lower Elizabeth Lake Drain**	**24,540**	**4,582**	**+8.9**	**65,483**	**0.0**	**6,804**	**0.0**	**45,797**	**+2.0**
14	Hebron Peatlands	3,750	615	+2.4	15,992	0.0	993	0.0	21,360	+0.5
Total		129,797	23,324	-0.2	463,815	-5.3	34,943	-7.3	648,117	+0.8

* Subwatersheds in bold show the greatest change in pollutant loads.

Table 3.2 Pollutant Contribution Index

#	Subwatershed ID	Area (acres)	Contribution Index*			
			Sediment	Total N	Total P	FC**
1	**Lower Nippersink**	12,426	75	111	69	**126**
2	Glacial Park/Tamarack	12,583	79	115	81	111
3	**Wonder Lake**	7,881	84	78	84	**119**
4	**Vander Karr Creek**	12,226	109	104	111	110
5	**Silver Creek**	12,005	80	97	72	**127**
6	Slough Creek	11,871	102	110	105	111
7	**Bailey Woods**	**7,281**	122	**121**	**131**	110
8	Nippersink Headwaters	6,594	77	117	84	111
9	**Zenda Headwaters (Wisconsin)**	**4,315**	**322**	**149**	**314**	116
10	North Nippersink	6,754	94	100	94	117
11	Lower Elizabeth Lake Drain	3,078	84	104	88	114
12	Elizabeth Lake	4,493	67	48	68	82
13	Upper North Branch Nippersink (Wisconsin)	24,540	104	75	103	37
14	Hebron Peatlands	3,750	91	119	98	114
Total		129,797				

* Contribution index = (Percent of total watershed load coming from subwatershed ÷ Percent of watershed area that subwatershed comprises) × 100. Index above 100 indicates subwatershed produces disproportionately large pollutant load. (This metric was adopted from Poplar Creek Watershed Action Plan, CMAP, 2006)
** FC = Fecal coliform; FCU = Fecal coliform Unit

3.3. Pollutant Load Reduction

3.3.1 Setting Pollutant Load Reductions Targets

Once a pollutant has been linked to a known impairment, management strategies are needed to reduce those loads to bring the impaired water bodies to compliance (i.e. to meet their designated uses). Procedures for estimating the desired load reductions range from simple to complex models, depending on the objectives of the management strategy. If planning level estimates are needed for purposes of selecting suitable BMP's or policy decisions, then simple approaches are appropriate. Complex approaches are needed when accurate estimates are needed for implementing strict pollution controls such as wastewater treatment plant upgrades.

For the purposes of this study, a simple procedure based on previous monitoring data or literature values from similar watersheds appears appropriate. Table 3.3 shows typical water quality statistics for total phosphorus and suspended sediment upstream of Wonder Lake. These values may be assumed to represent the concentration of the inflow into the lake. The mean suspended sediment concentrations are below the Illinois EPA guideline of 113 mg/L.

Phosphorus loads are the most critical for the lake because the mean concentrations are significantly above the water quality standard for Lakes (WQS) of 0.05 mg/L. To bring

the lake into compliance, the phosphorus concentrations would need to be reduced by 68.5%. Since a significant portion of phosphorus loads is transported by sediment, reducing sediment loads by the same amount would be expected to reduce phosphorus loads significantly.

The target reduction will be achieved by a combination of BMP's and appropriate land use policies as discussed below. Even though other pollutants associated with rural or urban runoff were not modeled, most BMP's do remove multiple pollutants. Therefore, successful implementation of BMP's will result in reducing most other pollutants, with the exceptions of chlorides. The Nippersink watershed plan includes a monitoring plan and criteria for assessing the effectiveness of the BMP's in reducing pollutant loads.

Table 3.3 Water Quality Statistics Upstream of Wonder Lake

Statistic or Standard Water Quality Statistic	Total Phosphorus Concentrations mg/L	Suspended Sediment Concentrations. mg/L
Maximum	1.16	808
Minimum	0.02	1.2
50 Percentile of samples	0.1	63
Mean	0.159	89.3
Standard Deviation	0.177	75.6
Illinois Water Quality Standard (IWQS) or Guideline	0.05**	113*

Source: USGS, 2001 Study
mg/L =milligrams per Liter
* A guideline, not an IWQS
** IWQS for lakes.

3.3.2 Pollutant Load Reduction Strategies

Effective strategies of reducing pollutant load are based on the characteristics of the pollutants sources and the nature of the impairments. In the Nippersink watershed, the predominant sources of the pollutants are non-point sources that are primarily a result of agricultural practices. As the watershed is developed, management strategies for reducing pollutants must take into account the changing mix of pollutants. Post development pollutants could be contributed by both point and non-point sources that include a wider array of pollutants. Post-development pollutants of concern may no longer be just nutrients. They may consist of other pollutants typical of urbanized watersheds such as metals, PCBs, habitat alteration, temperature or pH.

The Nippersink watershed is a large watershed that is going to remain predominantly agricultural for years into the future. Based on the pollutant load analysis results, the most reasonable strategy should concentrate on:

- Agricultural BMP's to reduce nutrient loads from the mostly rural areas. In Table 3.1, nine watersheds remain relatively unchanged.

- A mixture of Agricultural and urban BMP's targeted at the rapidly developing subwatersheds or 'hot spots' such as Wonder Lake, Silver Lake, the Lower Elizabeth Drain Lake and the Lower Nippersink subwatersheds.

- BMP's that protect subwatersheds with the highest quality natural resources

The removal efficiencies of urban and BMP's such as detention basins, rain gardens, swales, and low impact design are widely documented. The American Society of Civil Engineers (ASCE) in cooperation with the EPA (http://www.bmpdatabase.org/) now maintains a database of field data on actual performance of various BMP's across the country. Removal efficiencies of BMP's in the field vary from 10 to 70 percent of pollutant loads depending on specific site and storm conditions. The GWLF model indicated that agricultural BMP's such as nutrient management and land conversion to forest were very effective in reducing pollutant loads. The BMP's selected for the subwatersheds in the Nippersink watershed are presented in the following sections.

3.4 BMP Selection

The EPA in cooperation with the NCRS and other governmental agencies has created two resource centers which describe variety of BMP's resources for addressing a range of pollutants in both agricultural and urban settings. Comprehensive menus of BMP's for addressing urban runoff are available at (http://cfpub.epa.gov/npdes/stormwater/menuofBMP's/index.cfm). These BMP's were intended to assist municipalities prepare effective programs for implementing the Stormwater Phase II was first released in October 2000.

BMP's targeted at reducing non-point pollution from agricultural practices are available at the Conservation Technology Information Center (CTIC): http://www.conservationinformation.org) for the USDA Natural Resources Conservation Service (NCRS) and THE EPA. Agricultural BMP's are particularly important because the Nippersink Creek watershed is still predominantly agricultural. Two categories of BMP's were considered for addressing pollutant loads in the Nippersink watersheds. Programmatic or BMP's are those that apply to the whole watershed. Site specific BMP's were developed to address pollutant sources at specific or localized areas.

A selection of programmatic BMP's recommended for the Nippersink watershed include:

- **Regulatory BMP:** Regulatory BMP's include ordinances, regulations, and enforcement procedures that are applicable throughout the watershed and which have a cumulative effect of preventing water quality degradation. Examples include NPDES Phase II pre- and post-construction pollution prevention regulations, zoning codes and regulations countywide stormwater regulations, soil-erosion and sediment control regulations and permitting, and disposal of hazardous wastes. Their effectiveness in reducing pollutant loads vary depending on the degree of enforcement. Regulation-driven pollution prevention controls can reduce pollution significantly (Lori S., Bear, 2007). For purposes of estimating pollutant reduction or removal efficiency of regulatory programs, conservative reduction rates of 2 to 5% have been assumed.

- Street sweeping: The effectiveness of street sweeping in removing pollutants varies greatly depending on frequency and the sophistication of the equipment. Modern vacuum dryer sweepers can reduce annual sediment loads by 55 to 88% and nutrients by 0 to 15% (Stormwater Managers Resource Center: http://www.stormwatercenter.net/Pollution_Prevention_Factsheets/ParkingLotandStreetCleaning.htm)

- Practicing Low Impact Development (LID): LID's goal is to mimic a site's predevelopment hydrology by using design techniques that infiltrate, filter, store, evaporate, and detain runoff close to its source. Instead of conveying and managing / treating stormwater in large, costly end-of-pipe facilities located at the bottom of drainage areas, LID addresses stormwater through small, cost-effective landscape features located at the lot level. This includes not only open space, but also rooftops, streetscapes, parking lots, sidewalks, and medians. LID is a versatile approach that can be applied equally well to new development, urban retrofits, and redevelopment / revitalization projects.

- Nutrient Management: Nutrient management is an effective measure for reducing nutrient loads from agriculture. Nutrient management involves managing the amount, source, placement, form and timing of the application of plant nutrients and soil amendment. Nutrient management also applies to farm animal operations. The McHenry County NRCS might already be conducting such a program in the watershed and its success might even be the reason why pollutant loads although elevated are not as high as in comparable watersheds in the country. It is recommended that the program be continued or expanded because of its effectiveness.

- Education and Outreach Programs: The primary goals of watershed education include increasing community awareness, preserving local water resources, and gradually changing resident behaviors to reduce the amount of pollutants from stormwater runoff. Education programs may focus outreach on a single behavior on a broad basis, or concentrate their efforts at the subwatershed level. The most effective watershed education programs focus on key pollutants or behaviors, carefully target their audiences, and survey residents to understand their attitudes before designing education campaigns. Examples include proper disposal of household chemicals, fertilizer applications, and road salt applications.

- Pet waste management: Pet waste management can be regarded as an example of and outreach program. Such a program however may be supplemented by local laws which enforcement actions. According to the 'The Practice of Watershed Protection, Art 17', the presence of pet waste in stormwater runoff has a number of implications for urban stream water quality with perhaps the greatest impact from fecal bacteria (for more information see. According to recent research, non-human waste represents a significant source of bacterial contamination in urban watersheds. Genetic studies by Alderiso *et al*. (1996) and Trial *et al*. (1993) both concluded that 95 percent of the fecal coliform bacteria found in urban stormwater was of non-human origin. Bacterial source tracking studies in a watershed in the Seattle, Washington area also found that nearly 20% of the bacteria isolates that could be matched with host animals were matched with dogs. Pet waste management is therefore could be an important component of reducing fecal coliform bacterial loads in urban runoff.

A selection of site-specific BMP's have recommended at specific locations in the watershed. Specific information about these BMP's such as location, costs and responsibilities about these BMP's is provided in Chapter 5.3 through 16.3. The BMP's are effective in reducing nutrients, fecal coliform and sediment loads. The BMP's include:

- Preserving open lands to promote infiltration
- Wetland conversion/restoration to encourage retention and infiltration
- Removal/abandonment of agricultural tile systems.
- Riparian Buffers: A riparian buffer is an area of trees and/or shrubs or native vegetation located adjacent to and up-gradient from water bodies and water courses. The location, layout, width, length and plant density are designed to accomplish a specific purpose and function. Riparian buffers enhance bank stability, provide (1) A source of detritus and woody debris for fish and other aquatic organisms, (2) Provide wildlife corridors, and (4) Reduce excess amounts of sediment, organic material, nutrients, and pesticides and other pollutants in surface runoff and reduce excess nutrients and other chemicals in shallow ground water flow. In the Nippersink Creek watershed, riparian buffers are useful in all streams, particularly those running through farmland and in steep channels banks such as those located in the Bailey Woods subwatershed.

- Retrofitting existing ponds, restoration of wetland systems
- Retrofitting outfalls, shoreline stabilization
- Stormwater Management/Wetland Systems: Stormwater management facilities that utilize a wet pond cell leading to a wetland cell have been reported to be very effective in removing pollutants from urban runoff (WERF, 2007). The wet pond cell is apparently very effective in pre-treating the incoming runoff; it also reduces its velocity and distributes it more evenly across the marsh.
- **Sand filters** are a relatively new technique for treating storm water, whereby the first flush of runoff is diverted into a self-contained bed of sand. The runoff is then strained through the sand, collected in underground pipes and returned back to the stream or channel. More detailed information such as typical layouts, performance and design of sand filters is available from the EPA at http://www.epa.gov/owm/mtb/sandfltr.pdf.
- **Filter Strips:** These are vegetated sections of land designed to accept runoff as overland sheet flow from upstream development. They may adopt any natural vegetated form, from grassy meadow to small forest. The dense vegetative cover facilitates pollutant removal. Filter strips cannot treat high velocity flows; therefore, they have generally been recommended for use in agriculture and low density development.
- A **Water Quality Inlet** is a three-stage underground retention system designed to remove heavy particulates and small amounts of petroleum products from storm water runoff. Also known as an **Oil/grit Separator** or an **Oil-water Separator**. As water flows through the three chambers, oils and grease separate either to the surface or to sediments and are skimmed off and held in the catch basin or storage tank. The storm water then passes on to the sanitary sewer, storm sewer.
- **Streambank Stabilization** controls erosion through management of water velocity and/or stream bank stability by natural and manmade controls to decrease bank erosion and sediment loading in waterways. Structural or vegetative means may be used separately or together.

Each of these BMP's may be applied individually or in combination to meet desired pollutant load reduction targets for each subwatershed as presented in each subwatershed report (Chapters 5 through 16). The sizes of the BMP's provide a general indication of the potential land available for implementing the BMP's. Priority watersheds for reducing fecal coliform bacteria loads are the Lower Nippersink and Silver Creek watersheds. The BMP's recommended for the remaining watersheds may also reduce fecal coliform bacteria loads but additional monitoring will provided better information about which watershed to target as the plan is implemented over the years. As previously discussed, the actual success of the BMP's will need to be monitored by sampling for both chemical constituents and biological indicators. A recommended sampling program is discussed in Chapter 19.

Chapter 4
Watershed Plan Recommendations

4.1 Watershed Plan Recommendations Overview

The recommendations presented in the Nippersink Creek Watershed Plan are divided into two basic categories:

- General Watershed Plan Recommendations that are applicable to the entire Nippersink Creek watershed or large regions of the watershed and,
- Recommendations that are site-specific to the eleven Nippersink Creek subwatersheds located in the Illinois portion of the Nippersink Creek Watershed.

The actual site-specific recommendations for each subwatershed are contained in Chapters:

5.3	Lower Nippersink Creek	11.3	Bailey Woods
6.3	Glacial Park/Tamarack Farms	12.3	Nippersink Headwaters
7.3	Wonder Lake	13.3	North Branch Nippersink
8.3	Silver Creek	14.3	Elizabeth Lake Drain
9.3	Slough Creek	15.3	Hebron Peatlands
10.3	Vander Karr Creek	16.3	Wisconsin Subwatersheds

4.2 Watershed Plan Objectives

In order to begin to implement the Nippersink Creek Watershed Plan, objectives must be established to help identify specific research, implementation projects, or educational outreach activities that need to be accomplished. As the watershed planning process continues, these objectives may evolve. At this point in time, these are the objectives for Nippersink Creek.

Watershed Protection Objectives:

Objective 1:	Maintain, enhance, and promote the environmental quality of Nippersink Creek, and the high quality natural resources it links.
Objective 2:	Protect, through acquisition or conservation easements, existing High Quality and High Functional Value Advanced Identification (ADID) Wetlands.
Objective 3:	Protect, through acquisition or conservation easements, any McHenry County Natural Area Inventory (MCNAI) sites.

Objective 4:	Encourage watershed units of government to adopt a Green Infrastructure Plan to help guide future land use decisions, and reduce the potential for adverse water quality impacts resulting from poorly planned development.
Objective 5:	Encourage watershed units of government to require the implementation of Conservation Design land planning concepts.
Objective 6:	Encourage watershed units of government to update and strengthen existing stormwater, zoning, land use, and/or subdivision ordinances to allow seamless integration of regulations, creating a streamlined process for developers pursuing Conservation Design projects.
Objective 7:	Maximize the effectiveness of the portions of the McHenry County Stormwater Ordinance (MCSWO) that require riparian / wetland buffers, conservation easements, and stormwater Best Management Practices by encouraging McHenry County and local units of governments to adopt and implement a MCSWO enforcement audit / review process.
Objective 8:	Identify, design, fund, and implement Best Management Practices (BMP's) that can address the existing fecal coliform water quality impairment identified downstream of Wonder Lake, as well as those BMP's that will minimize the potential for future water quality impairments to occur as the watershed develops.
Objective 9:	Obtain funding sources to allow watershed units of government to implement stormwater outfall water quality Best Management Practices in developed portions of the watershed, or as part of the reconstruction of major bridge crossings of Nippersink Creek.
Objective 10:	Reduce soil erosion and sediment delivery to Wonder Lake and the Fox Chain of Lakes by encouraging riparian land owners to participate in available conservation cost-share programs.
Objective 11:	Fund and implement an enhanced water quality and biological monitoring program throughout the watershed.
Objective 12:	Pursue the rehabilitation of Wonder Lake by dredging of up to 3 million cubic yards of accumulated sediment; transition to more environmentally shoreline stabilization practices; and obtain regional wastewater treatment capacity for homes within Wonder Lake.
Objective 13:	Initiate discussions with units of governments within the Wisconsin portion of the watershed on jointly developing, funding, and implementing watershed protection / enhancement projects.
Objective 14:	Work with NPDES Phase I dischargers to insure that the highest quality treatment is achieved before wastewater effluent is discharged to any water course in the watershed.
Objective 15:	Prevent further negative impacts of land use change on the watershed's natural resources by minimizing increases in stormwater runoff flow rates and total runoff volume for new developments.

Objective 16: Identify and quantify existing nutrient management planning efforts already implemented by Natural Resource Conservation Service, McHenry County Conservation District, and other agencies.

Objective 17: Provide multiple opportunities for assessing measurable watershed plan implementation milestones, such as whether pollutant loading reductions are being achieved over time; evaluating the effectiveness of proactive watershed protection measures; and whether social behavior has changed because of the implementation of the plan.

4.3 General Watershed Plan Recommendations

Many watersheds that are included on the IEPA 303(d) list as a result of having numerous water quality impairments, typically associated with years of urbanization, poor land use planning, or inadequate environmental protection regulations. In contrast, the Nippersink Creek watershed has only one identified impairment (fecal coliform) in the lower half of the watershed. Identified as coming from an unknown source, this fecal coliform impairment could be the result of wildlife or livestock as easily as it could be from a human related source. An absence of documented impairments typically associated with more urban watersheds signals that Nippersink Creek is still in good shape, largely owing to its largely undeveloped watershed. Simply stated, a potential exists to protect the watershed from future development related impacts before they occur.

It is for this reason that the Nippersink Creek watershed has a significant opportunity to implement a watershed plan that focuses much more on prevention, rather than on having to retrofit a watershed already heavily impacted by development. Efforts to acquire, permanently protect, and restore the stream corridors, wetlands, and other natural features (collectively referred to as Green Infrastructure – see Chapter 17) of the Nippersink Creek watershed will provide perpetual environmental, water quality, and open space benefits to watershed stakeholders.

To implement this strategy, there will be ten main areas of effort:

- Expand water quality and biological monitoring to help better understand the resource, its stressors, and identify both positive and negative trends.
- Identify / quantify existing Nutrient Management Planning efforts.
- Protect / enhance stream corridors and wetlands through acquisitions / easements
- Encourage watershed municipalities to implement Conservation Design
- Change the way we manage stormwater
- Improve effluent quality at existing / expanding / proposed Wastewater Treatment Plants
- Improve controls on Non-Point Source pollution
- Conduct public education and outreach
- Implement a Watershed Manager position
- Measure / Influence Social Behavior

The following section contains General Watershed Recommendations (GWR) that should be implemented throughout the entire Nippersink Creek watershed.

Each General Watershed Recommendation contains the following information:

- **Type:** Education/Outreach; Regulatory; Site Restoration; Monitoring; Permanent Habitat Protection, Water Quality
- **Target Objectives:** Which watershed objective(s) the recommendation addresses.
- **Initial Implementation Cost:** the initial cost, in 2007 dollars to initiate the recommended action, if applicable.
- **Annual Cost:** the long term expected annual cost (in 2007 dollars) to successfully implementation of the recommendation
- **Responsible Party:** Identifies the LEAD agency, entity, or landowner who will ultimately have to execute the recommendation. SUPPORTING parties, such as government agencies, grant sources, etc. may also be identified here.
- **Priority:** A ranking of High, Medium, or Low, where High is represents a recommendation of utmost importance to be pursued immediately and Low represents those recommendations which may take more time and are less critical in terms their impact on meeting the watershed plan goals.

4.3.1 Water Quality Monitoring (GWR-1)

One of the challenges in assessing current water quality conditions, or more importantly, assessing longer–term trends in water quality, is the lack of water quality data from representative portions of the watershed. There are indications that there are could be low-flow problem reaches in the tributaries, especially those which contain point sources such as wastewater treatment plants, or large concentrations of livestock. It is important that such locations be monitored and assessed for impairments, and corrective action taken, if necessary.

Biological Monitoring

Biological monitoring of the watershed, identifying and assessing the diversity, health, and abundance of aquatic organisms, such as fish, mussels, and aquatic invertebrates, typically only occurred when Illinois Department of Natural Resource (IDNR) fishery biologists conducted basin surveys. The timeframe between these IDNR surveys in a particular watershed could be three to five years, or longer. Due to budget and staffing limitations, only a limited number of locations could be sampled in each survey.

Fortunately, as the McHenry County Conservation District (MCCD) continues to acquire riparian parcels, their biologists have been conducting biological surveys, which are allowing a more comprehensive baseline of biological data to be established. However, there are still many non-MCCD owned stream reaches in the watershed, for which no biological data exists.

The only other major source of biological data in the Nippersink Creek watershed comes from "Anti-Degradation Studies", prepared by wastewater treatment operators seeking to modify or expand their discharge of treated effluent into the creek. While the biological data gathered in these anti-degradation studies adds to the biological database, the lack of any earlier baseline biological data makes it difficult to assess any trends in biotic integrity of the study area in the period leading up to the anti-degradation study.

Water Quality Monitoring

The Illinois Environmental Protection Agency operates seven water quality monitoring stations in the Nippersink Creek watershed, as shown in Table 4.1.

Table 4.1

IEPA Water Quality Sampling Stations in the Nippersink Creek Watershed

Subwatershed	Station	Stream	Location
Lower Nippersink	DTK01	Nippersink Creek	Nippersink Creek at US Route 12
Lower Nippersink	DTK04	Nippersink Creek	Nippersink Creek at Winn Road
Subwatershed	**Station**	**Stream**	**Location**
Glacial Park / Tamarack Farms	DTK02	Nippersink Creek	Nippersink Creek at Barnard Mill Road
Subwatershed	**Station**	**Stream**	**Location**
Bailey Woods	DTK 06	Nippersink Cr.	Nippersink Creek at Allendale Road
Bailey Woods	DTK 03	Nippersink Cr.	Nippersink Creek at IL Route 47
Subwatershed	**Station**	**Stream**	**Location**
North Branch Nippersink	DTKA04	North Branch Nippersink Creek	N. Br. Nippersink at Hill Road
North Branch Nippersink	DTKA03	North Branch Nippersink Creek	N. Br. Nippersink at IL Route 173

In 2004, the United States Geological Survey (USGS), in cooperation with the McHenry County Soil & Water Conservation District, prepared a report on the water quality of Wonder Lake and Nippersink Creek immediately upstream and downstream of Wonder Lake. Two streamflow monitoring stations were installed on Nippersink Creek in 1994, one above (05548105) and one below (055841110)Wonder Lake, to monitor stage and establish a discharge rating using standard USGS protocols. These stations were in operation from July 1994 through June 1997. The USGS National Water-Quality Assessment Program (NAWQA) Program operated the station upstream of Wonder Lake during from 1999 to September 2001. The USGS did not operate the downstream station after 1997.

The Friends of the Fox River (FOFR) conducts a volunteer based water quality monitoring program. Over 600 concerned citizens, teachers, and youth group leaders are members of the FOFR's Watershed Monitoring Network. Members volunteer to collect water quality data, assist at education events, and / or offer their individual expertise or talents. All members are active stewards of the Fox River Watershed.

The hallmark of the Monitoring Network is their water quality monitoring program. Once a year, Network volunteers monitor the water quality of the Fox River and its tributaries at stream monitoring sites throughout the watershed. They collect physical, chemical, and biological data used to assess water quality trends. This data can be the first warning sign of problems in the watershed. The Friends of the Fox River Monitoring Network has six sites in the Nippersink Creek Watershed.

The location of IEPA, USGS, and FOFR water quality sampling sites are shown in Figure 4.1.

An upgraded monitoring program, with a number of additional sampling sites, for the Nippersink watershed is important in providing the following information:

- Base line data-both biological and chemical indicators where there are none. The data would be useful for identifying changes in the watershed and the success of Best Management Plan (BMP) implementation
- To provide data for updating the Fox River Study Group (FRSG) modeling effort for the Nippersink Creek subwatershed. The product of this effort is intended to be a long-term planning tool for evaluating various water resource initiatives in the watershed-including flooding, land use conservation, stormwater management, and evaluation of point-sources.

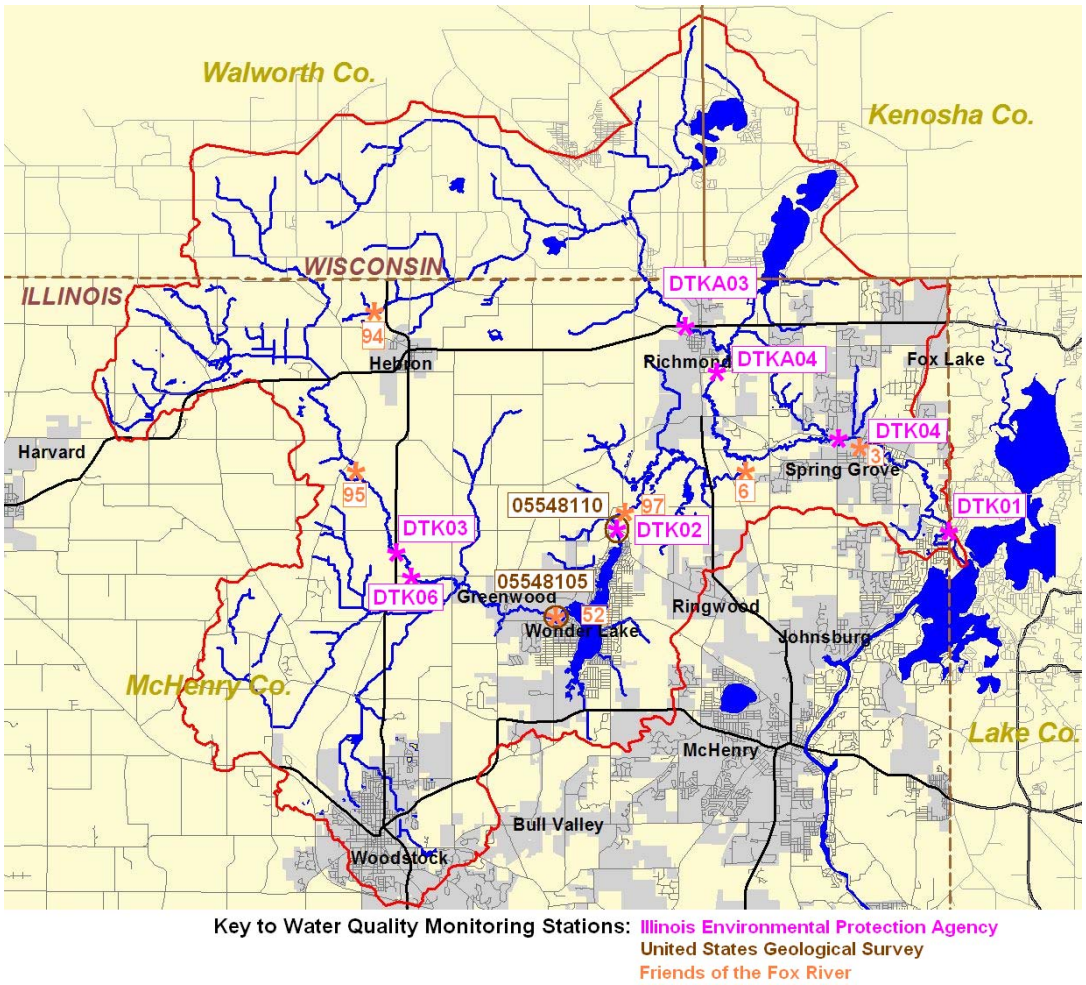
The review of the current water quality and biological monitoring in the watershed suggests that an enhanced monitoring effort driven by the objectives of the watershed plan would complement decision making, plan implementation and updating both in the short term and in the future. Biological monitoring enables realistic assessment of what biota is present, and whether the impaired water bodies are recovering.

The focus of the monitoring plan is to identify trends in pollutant loadings resulting from BMP implementation. The main pollutants of concern were fecal coliform, nutrient, and sediment loads. The proposed monitoring plan includes these parameters in addition to biological indicators. Depending on the available resources, modeling using monitoring data is the most comprehensive procedure for determining pollutant load reductions.

Trends in pollutant load reductions can be detected by factors such as:

- Reduction of stream bank erosion
- Reduction in frequency of exceedences or concentration of fecal coliform bacteria
- Reduction of algae blooms indicating reduced nutrient enrichment, lower turbidity
- Reduction of Total Suspended Solids (TSS) concentrations, signaling reduced sediment loads
- Reduction of phosphorus and nitrogen concentrations
- Improvement in biological indicators

Figure 4.1 Water Quality Sampling Stations in the Nippersink Creek Watershed



Sediment is by far the most critical parameter for assessing BMP performance. Monitoring eroding stream banks or lake shorelines provide an indirect means of quantifying sediment loads. The review of historical aerial photographs can allow a comparison between lateral channel migration / sinuosity at discrete points in time. These changes can be quantified into an average annual rate of the rate of sediment loading due to instream sources. Reduction in TSS is an indicator of decreasing sediment loads, which is in turn an indicator of reductions in nutrient loads, since sediments carry significant amounts of nutrients.

These sediment-bound nutrients can result in algae blooms and excessive growth in streams and lakes. Absence or reduction of extent of algae blooms is an indirect indicator of nutrient loads reductions. Hyperspectral imaging, a newly evolving remote sensing technology, can collect and analyze very narrow bands of light spectrum identify abundance of algae / aquatic vegetation, point source pollution, and turbidity. Real time analysis of the images allows field checks in the rapidly changing water conditions.

Based on the above considerations, Table 4.2 summarizes the recommended minimum monitoring program for the watershed.

Table 4.2 Water Quality Monitoring Plan Recommendations

EXISTING PROGRAMS

Location	Type of Monitoring	Resources & Programs	Objectives & Recommendations	Monitoring Costs
DTK01 Nippersink @ Route 12 DTK02 Nippersink @ Spring Grove DTK03 Nippersink @ Route 47 DTK06 Nippersink @ Allendale DTKA04 N. Br. Nippersink @ Hill DTKA03 N. Br. Nippersink @ Rt.173	Existing water quality stations.	IEPA	**Increase frequency of monitoring to include dry and wet weather.** **Monitor Fecal Coliform to confirm impairments, to localize sources, and to develop a fecal coliform TMDL.** **Monitor 5 storm events per year, for 4-6 hour monitoring period**	IEPA funds this monitoring.
FRWMN Sites: 3, 6, 52, 94, 95, 97	Existing water quality stations.	FRWMN	Continue Volunteer Montoring	Volunteer Effort
Wonder Lake	Continue Tier 3 Monitoring	VLMP / MPOA	Evaluate nutrient enrichment in Lake	IEPA funds this monitoring.

PROGRAM EXPANSIONS	Proposed Monitoring	Resources & Program	Objectives & Recommendations	Monitoring Costs
Fecal Coliform DNA Testing	Ten (10) Grab Samples taken at 5 locations downstream of Wonder Lake: Two samples each site (1 Low Flow Event, 1 High Flow	NCWPC	Identify "unknown" source of 303(d) list Fecal Coliform Impairment	$ 1,500 annually
Add FRWMN Sites at: North Branch Nippersink, Lower Elizabeth Lake Drain Silver Creek Slough Creek Nippersink Headwaters	Follow FRWMN Protocol for Chemistry / Benthics	FRWMN	Begin Volunteer Montoring at New Sites	$ 500 annual total for all new sites (Volunteer supplies)
Create New Stream Sampling Site: Silver Creek @ Route 47, Slough Creek @ Route 47 Nippersink Creek @ Route 173 Nippersink Creek @ Alden Road Vander Karr Creek @ Allendale N. Branch Nippersink @ White St.	Grab samples taken at: Low Flow; High Flow. Nutrients, DO, TSS, Chlorides, Fecal. Minimum of Five Composite samples - 4 hour sampling event/storm/season. Biological Monitoring twice per year	NCWPC	Identify impacts of agriculture / development and low-flow conditions	Water Chemistry: $ 1,500 per site / year, Biological Monitoring: $ 1,000 per site / year
Wonder Lake	Sediment Analysis	VLMP / MPOA	Evaluate sediment in Lake	$ 3,000 Total
Reestablish USGS / NAQWA Sream Gaging Stations US & DS of Wonder Lake	Stream Gaging, TSS, Nutrients	USGS / MPOA	Continue Extensive Baseline of WQ data established between 1994 and 2001	$ 15,000 / year
Hyperspectral Imaging	TSS / Algae Levels, Point Source Detection	NCWPC	Create Baseline of HS imagery	$ 5,000 / year

General Watershed Recommendation GWR-1: Implement an expanded water quality and biological monitoring program throughout the Nippersink Creek Watershed

Type: Monitoring

Target Objectives (from Section 4.2): 1, 8, 9, 11, 14, 15, 16

Initial Cost: $ 25,000 (not including USGS gages) / $ 40,000 (including USGS gages)

Annual Cost: $ 20,000

Responsible Party: Nippersink Creek Watershed Planning Committee (NCWPC), Illinois Environmental Protection Agency (IEPA) Fox River Watershed Monitoring Network (FRWMN)

Priority: Highest

4.3.2 Nutrient Management Planning (GWR-2)

Nutrient management involves managing the amount, source, placement, form and timing of the application of plant nutrients and soil amendments. Nutrient management also applies to farm animal operations. The McHenry County Natural Resource Conservation Service (NRCS) already administers such a program, however, a compilation of the extent, specifics, and locations where Nutrient Management Plans have been prepared or implemented in the Nippersink Creek watershed was not available.

The preparation of a database and/or Geographic Information System (GIS) data layer, showing the location and extent of existing Nutrient Management Plans in the Nippersink Creek watershed should be implemented as a recommendation of this plan.

General Watershed Recommendation GWR-2: The preparation of a database and/or Geographic Information System (GIS) data layer, showing the location and extent of existing Nutrient Management Plans in the Nippersink Creek watershed should be implemented as a recommendation of this plan.

Type: Monitoring

Target Objectives (from Section 4.2): 1, 8, 9, 11, 14, 15, 16

Initial Cost: $ 5,000

Annual Cost: $ 500

Responsible Party: USDA Natural Resources Conservation Service (NRCS), McHenry Soil & Water Conservation District (MCSWCD), Nippersink Creek Watershed Planning Committee (NCWPC)

Priority: Highest

4.3.3 Land Acquisition / Easements (GWR-3)

The protection of critical environmental corridors and linkages can be accomplished by protecting the stream corridors, wetlands, and floodplain areas, and linking them with existing open space areas, county parks, and privately owned natural areas. These areas can collectively be referred to as the "Green Infrastructure" of the watershed.

The two primary mechanisms for Land Acquisition and Easements are the ***McHenry County Conservation District***, and ***The Land Conservancy of McHenry County***, respectively. Both of these groups have made a point of focusing on protecting and improving the Green Infrastructure of McHenry County. The McHenry County Conservation District has a long history of recognizing the value and importance of preserving stream corridors and their associated wetlands. This approach is complemented by the efforts of the Land Conservancy of McHenry County in seeking conservation easements on sensitive properties. This approach is the basis of the Green Infrastructure Plan discussed elsewhere in this report. These groups should continue to focus on acquiring and maintaining the riparian corridors of the Nippersink Creek Watershed.

The McHenry County Conservation District (MCCD) currently owns or manages 21,000 acres of land in McHenry County, which equals roughly 5.4% of the County. Of this acreage, 6,283 acres of MCCD land are located within the Nippersink Creek Watershed. In April 2007, McHenry County voters approved a $ 73 million dollar bond referendum to allow MCCD to purchase another 4,500 acres of land.

The Land Conservancy (TLC) of McHenry County is a 501(c)3 not-for-profit land trust that currently owns or holds conservation easements on 1,415 acres of land in McHenry County. While most of the TLC holdings are not located within the Nippersink Creek watershed, the TLC has recently been working with the Village of Spring Grove to identify and protect sensitive natural areas on parcels undergoing development. The TLC also received an Illinois Department of Natural Resources C-2000 grant to prepare an open space management plan for private landowners within the Alden Area of Conservation Concern, a McHenry County Natural Areas Inventory "mega-site", located in the Nippersink Headwaters subwatershed.

Both of these groups should be considered critical partners in implementing the Nippersink Creek Watershed Plan, and any land acquisition / easement / restoration activities they undertake in the Nippersink Creek watershed, even if not specifically identified in the recommendations section of this report, should still be considered as watershed plan implementation projects, and be eligible for Section 319 funding.

General Watershed Recommendation GWR-3: Coordinate with the McHenry County Conservation District, The Land Conservancy of McHenry County, units of government and landowners to ensure permanent protection of environmentally sensitive parcels, and the acquisition of stream corridors and MCNAI / ADID designated sites from willing sellers.

Type: Outreach
Target Objectives (from Section 4.2): 1, 2, 3, 13
Initial Cost: $ 5,000
Annual Cost: $ 1,500
Responsible Party: MCCD, TLC, NCWPC, McHenry County, Municipalities
Priority: High

4.3.4 Conservation Design / Green Infrastructure (GWR-4)

A growing trend in land use planning across the United States is based upon the concept of "land first", which dictates that the natural features of an area of land should be the primary determinant in what type of land use is appropriate for that ground. Under this premise, if a parcel contains sensitive natural areas, stream corridors, wetlands, or woodlands, collectively referred to as "Green Infrastructure", development should be completely avoided within those areas, with adequate buffers provided. As a trade-off, portions of the parcel that are not sensitive can have a higher density. The intent is to minimize the footprint of development, mitigate any potential impacts, and create permanently protected, properly managed open space areas.

This land use planning approach is now routinely called "Conservation Design", "Smart Growth" or "Low Impact Development". Stakeholders in the Nippersink Creek watershed are fortunate in that McHenry County adopted a Conservation Design ordinance in early 2008. This Ordinance incorporates many of the planning concepts need to protect the Green Infrastructure of Nippersink Creek, as discussed in Chapter 17 of this report.

The stated purpose and benefits of the McHenry County Conservation Design Ordinance is:

- Preserve the integrity of the land and its natural functions
- Protect water resources
- Enhance community character and connectivity
- Provide greater design flexibility and affordability

This ordinance will require Conservation Design on any proposed development in unincorporated portions of the County if certain "triggers" are present. Conservation development is allowed everywhere; however, conservation development is <u>required</u> when the site contains sensitive natural resources.

Automatic triggers

- High quality streams, rivers, and lakes
- Designated McHenry Natural Area Inventory Sites

Cumulative triggers

20% or more of the site is covered by:

- Sensitive soils and steep slopes
- Wetlands
- Floodplains
- Native woodlands, savannas, or prairies
- Adjacent to publicly owned natural open spaces, preserves, or trails

Open Space Requirements

Minimum open space percentages for residential development shall vary depending on underlying zoning.

- Ranges from 40% for R1 to 70% for E5
- Common open space is preferred.
- Deed restricted open space also is allowed.

Density bonuses may be offered for designs that exceed minimum standards (not to exceed 20%):

- Open space beyond minimum percentage
- Creative access and trail linkages
- Innovative wastewater reclamation system
- Restoration of degraded habitats
- Preservation of historic buildings
- Mix of housing types, especially affordable housing

The adoption of this ordinance by McHenry County will make a significant difference in how development occurs in the unincorporated portions of the Nippersink Creek watershed. It correlates well with many of the Objectives of this plan, and the implementation strategies.

However, a concern remains that this ordinance only applies to unincorporated (non-municipal) portions of the watershed. If watershed municipalities do not move towards implementing Conservation Design or Green Infrastructure Planning, a potential exists for traditional land use development to radiate outwards from existing municipalities, as developers choose to annex rather than comply with the County Conservation Design Ordinance.

Fortunately, the City of Woodstock has adopted Conservation Design Standards under its Unified Development Ordinance. These standards, available on the City website http://www.woodstockil.gov/, could provide a template for other Nippersink Creek watershed municipalities wishing to move in this direction.

General Watershed Recommendation GWR-4: Coordinate with municipal governments to mandate Conservation Design practices / Green Infrastructure concepts for land use planning.

Type: Outreach / Regulatory
Target Objectives (from Section 4.2): 1, 2, 3, 4, 5, 6, 7, 15
Initial Cost: $ 5,000
Annual Cost: $ 1,500
Responsible Party: Nippersink Creek Watershed Planning Committee, McHenry County Defenders, McHenry County. Nippersink Municipalities
Priority: High

4.3.5 Changing the Way We Manage Stormwater (GWR-5)

In addition to the permanent protection of the stream corridor along Nippersink Creek through the implementation of Smart Growth / Conservation Design / Low Impact Development, the other issue, no less critical, will be to preserve the quality and quantity of the water flowing in the stream. To accomplish this, a fundamental change must occur in the way stormwater management is designed and constructed for developments in the Nippersink Creek Watershed.

In short, current stormwater and development standards are intended to simplify the design, construction and maintenance of stormwater facilities and control peak flows for only the large storm events, such as the 100-year storm. A study completed by Kane County in 2003 concluded that at the watershed scale, the 0.15 cubic feet per second (cfs) per acre release rate required by the Kane County Stormwater Ordinance does an adequate job of protecting downstream properties from floods with a 5- through 100-year frequency.

However, a watershed developing using traditional stormwater management design in its developments would actually experience up to a 66% increase in peak flows for the more frequent floods (1- to 2-year events). The science of fluvial geomorphology has demonstrated that it is these flood events, which occur on average every 1 to 2 years that effectively control the stability of a stream channel (physical characteristics). Thus, a 60+% increase in these channel forming peak flows, as will occur under the current regulatory environment, has the potential to do considerable harm to the channel stability of high-quality reaches of Nippersink Creek, and particularly to steeper gradient headwater streams.

To mitigate the effects of increases in stormwater discharges resulting from land development, it is recommended that new developments implement stormwater conservation techniques into their design. Conservation Design, a major component of Low Impact Development (LID), includes a wide range of stormwater design elements. This approach to stormwater is fairly straight forward:

- collect stormwater runoff as close to its point of origin as possible, and
- retain it for infiltration into the soil or evapotranspiration by the site's vegetation.

Examples include: green roofs, rain gardens, rain barrels or cisterns, bio-swales, infiltration trenches, and native vegetative buffers on undisturbed soil. A secondary benefit to this type of approach is that water quality of the remaining runoff that is discharged is usually improved without the need for structural BMP devices at development stormwater outlets. This is because the distributed stormwater system approach can be designed to treat the "first flush" of runoff, which is the first 0.5 – 0.75 inch of stormwater runoff that contains the highest concentration of pollutants. The result is that developments utilizing this type of stormwater management usually discharge little, if any, runoff to the receiving stream for the most frequent storm events (1 inch or less).

Detention Basin Retrofits

A majority of the detention facilities in the Nippersink Creek watershed were constructed as either dry bottom detention basins or traditional wet "ponds". Both are typically characterized by mowed turf grass on steep side slopes. Dry bottom ponds frequently feature a concrete low-flow channel to carry so called "nuisance" flow from the storm outfall directly to the detention basin outlet structure. Dry-bottom basins that do not have this concrete low flow structure are typically landscaped with turf grass in the bottom. Mowed turf grass does not usually hold up to frequent wetting and drying caused by runoff from upstream impervious areas and the result is that the bottom of the turf grass detention basin becomes an unsightly and "mud hole". Neither of the concrete low flow design nor the "mud hole" design provide any significant water quality benefits and are generally unappealing in terms of aesthetics.

Dry bottom basins are good candidates for retrofitting with native vegetation and micro-topography, which will improve water quality, increase stormwater residence times, provide wetland / riparian habitat functions, and improve the economic and aesthetic value of land designated for stormwater management. These dry bottom detention basins should be reconstructed to include wetland micro- pools and native wet prairie and/or wetland vegetation in the bottom to increase pollutant removal efficiency through increase settling and pollutant uptake by the vegetation.

Traditional stormwater "wet ponds" can also be modified to provide wetland / riparian habitat and improve aesthetic value through the installation of native vegetation along the side slopes and shoreline edge. One common problem with traditional wet ponds is that over time the shoreline edge become eroded due to wave action against unnaturally steep slopes with turf grass ground cover. Even ponds with shoreline rip-rap usually experience shoreline erosion over time, as the ponds are almost always constructed on structurally weak hydric soils that cause rip-rap shore protection to slide or settle into the basin, leaving the pond edge exposed to erosion. A solution to fix these problems in existing ponds is to install and propagate native emergent wetland vegetation along the pond shoreline to dissipate the energy of wave action.

Installation of Structural BMP Devices in the Existing Storm Sewer Network

Urban impervious surfaces, such as parking lots and streets, contribute the most concentrated pollutant loads in the watershed. This is especially true in urban areas that were developed without stormwater detention or water quality facilities to temporarily detain runoff or treat it prior to discharge into the stream. These older storm sewer system networks were designed as a series of concrete inlets and catch basins connected together by a system of pipes which increased in size from upstream to downstream to carry additional stormwater runoff as the areas draining into the sewers increased.

Historically, these systems offered virtually no water quality benefits except for a modest amount of small fines removal, if the catch basins were cleaned on a frequent basis. In other parts of the U.S. where urban areas are located directly adjacent to high quality water resources such as the Great Lakes, self-contained, structural water quality devices have been installed to capture pollutants before they are discharged into the receiving water body. The same practices should be implemented in the Nippersink Creek Watershed. There are numerous water quality devices developed in recent years that have been specifically designed for installation within an existing storm sewer network. These are typically installed near the downstream end of the sewer network, just above the sewer outfall to the receiving stream. Larger storm sewer networks may require several structures distributed throughout the sewer network.

Encourage the Installation of Rain Gardens and Rain Barrels

Rain Gardens are simple, easy to build, landscape features that can be implemented as components of a large scale development, or individually by private landowners. Rain Gardens are created in existing or excavated depressions and planted with deep-rooted, native vegetation. Properly constructed and maintained, these small stormwater features can effectively trap and retain as much as 99% of the pollutants associated with urban stormwater runoff. There are many resources available both on-line and in the greater Chicagoland area to help homeowners design and install their own rain garden landscapes. Individually, these systems can provide localized pollutant removal, but if installed in large enough numbers, have the potential to reduce peak storm flows and total runoff volumes on a subwatershed scale as well. These drainage features can be an attractive amenity to any residence while providing incremental benefits in stormwater pollutant and runoff volume reduction.

Stakeholder municipalities in the Nippersink Creek watershed should develop a public outreach plan to encourage private landowners to install rain gardens on their properties and provide technical assistance & information to assist landowners with designing such features or finding a knowledgeable landscape professional who can design & build one for them.

Another valuable BMP is the use of rain barrels or cisterns to capture rainwater from roof tops and storing it in containers for future uses, such as water for landscaping. While the rain barrel concept can be very effective with residential landowners, it could even be applied to much larger applications such as existing commercial buildings. In these cases, a large tank could be attached to the side of a building and collect all or part of the rain falling on the roof. This tank could then be attached to an underground landscape sprinkler system and used to water the property's landscaping instead of using valuable drinking water. Many cities across the United States have successfully implemented rain garden or rain barrel programs and if implemented aggressively, they can have a measurable positive impact on runoff and pollutant load reduction in existing developed areas. The City of Woodstock initiated a bid process to construct rain gardens in the summer of 2007.

General Watershed Recommendation GWR-5: Encourage units of governments and developers to implement stormwater management design in all new developments to maximize groundwater recharge and maintain water quality in the watershed's streams.

Type: Outreach / Regulatory
Target Objectives (from Section 4.2): 1, 4, 6, 8, 9, 15
Initial Cost: $ 5,000
Annual Cost: $ 1,500
Responsible Party: Nippersink Creek Watershed Planning Committee, McHenry County, Nippersink Municipalities
Priority: High

4.3.6 Minimize the Impacts of Wastewater Treatment (GWR-6)

As the population of the Nippersink Creek watershed continues to grow, the need to provide wastewater service for new residents will increase. The Illinois Environmental Protection Agency (IEPA) has stated "***Any discharge of treated wastewater to surface waters has the potential to cause the quality of the receiving water to become degraded. Therefore, systems that do not discharge should be considered and must be deemed not feasible before a discharging system can be considered.***"
Examples of non-discharging systems are golf course, agricultural land and other types of spray irrigation. Increases in direct discharges of wastewater into Nippersink Creek and its tributaries should be avoided or minimized to prevent degradation of this high quality stream. The following hierarchy of wastewater treatment alternatives is therefore recommended:

No-Discharge Wastewater Treatment Systems - Systems which utilize land treatment of wastewater are preferred.

- In areas of low density development and suitable soils (neither too tight nor too permeable), homes on individual or combined septics with sufficiently-sized septic fields are appropriate.
- For denser subdivision developments, wastewater treatment followed by land application of wastewater should be employed. Sufficient land must be set aside for proper wastewater application rates given the soil permeability, slope and depth to the water table. These types of systems are currently being employed by two developments on the west side of Wonder Lake.
- These systems provide the benefit of groundwater recharge, important in this watershed where residents are entirely dependent on groundwater as a drinking water source. These systems preserve the open land needed for wastewater application. This land can exist as golf courses; private or common open space; agricultural lands or natural lands.

Improved Wastewater Treatment at Discharging Sewage Treatment Plants - Systems should be designed to minimize the discharge of oxygen-demanding waste (BOD), total suspended solids, ammonia, total phosphorus and total nitrogen. Given the presence of sensitive fish and mussels in Nippersink Creek, ammonia is of special concern. **Municipalities in the watershed should go beyond the minimum effluent standards established by the Illinois EPA for all pollutants, if advanced treatment is technically and economically feasible.** For example, the Villages of Richmond and Hebron were among the first treatment plants in the state discharging to a stream that agreed to install treatment processes to remove phosphorus from their effluent. **To their credit, this was done prior to the establishment of the state's current interim effluent standard for phosphorus.**

- Systems should include treatment that addresses the presence of organic wastewater contaminants (OWC's) such as drugs, hormones, detergents and disinfectants. New science indicates that relatively small concentrations of these types of chemicals can interfere with the development of fish and other aquatic life. Activated carbon has been shown to have a high rate of removal of endocrine disrupting compounds, and UV, ozone treatment and membrane systems are being studied in Europe.
- The addition of created wetlands to which wastewater is discharged prior to its ultimate flow into a stream is recommended to add time to the treatment process which would help in the further breakdown of OWCs, the uptake of nutrients and equilibration to ambient temperature. The Village of Wonder Lake's proposed new sewage treatment plant (at the Thatcher Meadows development) will include a constructed wetland prior to discharge to Dutch Creek.

Offsets to Any Increase in Loading of Pollutants from Expanded Wastewater Discharges - Any increases in wastewater discharges should be offset by other efforts to limit pollution entering Nippersink Creek. These could include:

- **Wastewater Reuse -** Opportunities to divert treated wastewater from discharge include wastewater reuse for irrigation needs during the growing season (on golf courses, parks, farmland, etc), for industrial uses and for non-potable uses. The Village of Richmond's Reuse Ordinance is an example that should be emulated by other communities in the watershed.

General Watershed Recommendation GWR-6: Encourage the use of appropriate alternative wastewater treatment technologies, and encourage the creative re-use of treated wastewater effluent.

Type: Outreach / Regulatory
Target Objectives (from Section 4.2): 1, 14
Initial Cost: $ 5,000
Annual Cost: $ 1,500
Responsible Party: Nippersink Creek Watershed Planning Committee, Nippersink Municipalities, Illinois Environmental Protection Agency, Sierra Club
Priority: High

4.3.7 Improved Controls on Non-point Source Pollution (GWR-7)

Units of government within the watershed can aim to offset increases in wastewater effluent discharge by better controlling non-point pollution reaching the creek from their area. Among the controls towns can employ are:

- a ban on the use of phosphorus-containing fertilizer
- efforts to minimize road salt usage including deicing measures, calibrated spreaders, alternative deicers
- retrofits of storm drain outlets to capture pollutants (biological or mechanical)
- repair of problematic streambank erosion
- installation of streamside buffers of native vegetation
- restoration efforts which enhance habitat in the riparian corridor via wetland restorations, stream de-channelization, riffle and pool restoration, etc.

General Watershed Recommendation GWR-7: Conduct outreach to encourage the implementation of Water Quality Best Management Practices throughout the watershed.

Type: Outreach / Regulatory
Target Objectives (from Section 4.2): 1, 8, 10, 15
Initial Cost: $ 5,000
Annual Cost: $ 1,500
Responsible Party: Nippersink Creek Watershed Planning Committee, McHenry County, Nippersink Municipalities. McHenry County Division of Transportation, Illinois Department of Transportation, Township Highway Departments.
Priority: High

4.3.8 Conducting Public Education and Outreach (GWR-8)

Given the proactive nature of this plan, much of the implementation will be focused on protecting and enhancing stream buffers, wetlands, and other sensitive natural areas that help protect Nippersink Creek. Most of these recommended projects are located on private lands, meaning there will need to be extensive outreach and education to the private landowners. Other opportunities exist to build on existing environmental curriculum in area schools.

General Watershed Recommendation GWR-8: Expand existing watershed public awareness / educational curriculum programs in the Nippersink Watershed.

Type: Regulatory
Target Objectives (from Section 4.2): 1, 8, 10, 15
Initial Cost: $ 10,000
Annual Cost: $ 2,500
Responsible Party: McHenry County Defenders, Friends of the Fox River, School Districts, McHenry County Soil & Water Conservation District
Priority: High

4.3.9 Implementing a Part-time Watershed Manager Position (GWR-9)

To successfully implement a large scale watershed plan, a significant amount of time and effort must be spent on working with watershed stakeholders to gain buy-in, finalizing specific project designs, preparing and submitting grant applications and regulatory permits, and overseeing the actual implementation of the project.

Very often, watershed planning efforts make assumptions that the actual coordination and implementation of the watershed plan will be undertaken by existing government units, agencies, not-for-profit groups, or committed volunteers. The reality is that due to budget, staffing, and workload constraints, most government, agency, and not-for-profit employees are already hard pressed to complete their normal work duties. Expecting this level of effort from volunteers, who are often exhausted from their efforts in helping prepare the watershed plan, is not likely.

The Nippersink Creek watershed, at 200 square miles overall, is at the larger of watershed implementation efforts Combined with this size is the fact that the vast majority of the watershed is rural, the normal complement of municipal planners, public works engineers, and other professionals who could normally be counted on to provide technical assistance and oversight, cannot occur. With over 155 recommended projects in the Illinois portion of the watershed, it will be necessary to implement numerous projects during every Section 319 grant cycle. For these reasons, it is recommended that funding be secured to allow a part-time Watershed Manager position to be established.

The duties of a watershed manager would include:

- Conducting initial outreach with landowners / stakeholders who have been targeted with Best Management Practices
- Coordinating with project partners to ensure coordination between local cost-share match revenue timing and grant submittal / contract approval.
- Preparing Grant Applications for implementation projects
- Coordinating with regulatory agencies to facilitate permitting
- Overseeing implementation of BMP projects
- Managing grant paperwork / submittal of progress reports
- Collecting water quality / biological data as part of expanded monitoring program.

General Watershed Recommendation GWR-9: Hire a P/T watershed manager.

Type: Education / Outreach / Implementation
Target Objectives (from Section 4.2): 1, 8, 10, 15
Initial Cost: $ 40,000
Annual Cost: $ 40,000
Responsible Party: Nippersink Creek Watershed Planning Committee, McHenry County Soil & Water Conservation District
Priority: Highest

4.3.10 Social Science Research (GWR-10)

Social science research should be conducted within the Wonder Lake watershed to examine social factors relevant to efforts to maintain water quality. The efforts should be conducted in three stages. The first stage should involve a survey of watershed residents to determine baseline information on values, attitudes, knowledge, and behaviors of watershed residents. The second stage should utilize these findings to assist in the implementation of the watershed master plan, as well as the design and delivery of education and outreach programs. The third stage of the research should again utilize a survey of watershed residents and additional information to evaluate outcomes of the outreach and educational efforts.

General Watershed Recommendation GWR-10: Conduct a university administered watershed survey / social science study to assess watershed implementation efforts.

Type: Education / Outreach / Implementation

Target Objectives (from Section 4.2): 1, 17

Initial Cost: $ 75,000 ($ 25,000 annually for 3 years – before / during / after watershed plan implementation.)

Annual Cost: $ 0

Responsible Party: Nippersink Creek Watershed Planning Committee, Illinois State University

Priority: Highest

4.4 Summary of Watershed Implementation Cost

Table 4.3 contains a summary of the watershed plan implementation cost, including the costs identified in the preceding General Watershed Recommendations (Section 4.3), as well as the subwatershed specific projects identified in each subwatershed report.

Table 4.3 Watershed Plan Implementation Cost Summary

General Watershed Recommendation Costs

	Initial	Outreach	Annual
GWR 1 - Monitoring	$45,000		$20,000
GWR 2 - Nutrient Management Planning	$5,000		$500
GWR 3 - Land Acquisition / Easements	$5,000		$1,500
GWR 4 - Conservation Design	$5,000		$1,500
GWR 5 - Stormwater	$5,000		$1,500
GWR 6 - Wastewater	$5,000		$1,500
GWR 7 - Non-Point	$5,000		$1,500
GWR 8 - Education / Outreach	$10,000		$2,500
GWR 9 - Watershed Manager	*		*
GWR 10 - Social Science Research	$75,000		$0
General Watershed Recommendation Cost Total	**$160,000**	**$0**	**$30,500**

* Watershed Manager Cost accounted for in SW Outreach Cost Total

SubWatershed Specific Costs

Subwatershed	SW Acres	SW Acres Treated	% of SW Treated	Initial Cost	Outreach Cost	Annual Cost
Lower Nippersink	12,432	1,118.4	9.0%	$1,960,371	$22,500	$51,860
Glacial Park / Tamarack Farms	12,588	404.6	3.2%	$1,183,656	$10,000	$38,448
Wonder Lake	7,884	79.0	1.0%	$9,626,931	$10,500	$178,722
VanderKarr Creek	12,231	285.2	2.3%	$695,847	$9,000	$26,767
Silver Creek	12,010	678.3	5.6%	$1,931,427	$11,500	$45,348
Slough Creek	11,876	714.6	6.0%	$1,444,415	$7,500	$69,910
Bailey Woods	7,283	460.5	6.3%	$621,177	$6,000	$36,670
Nippersink Headwaters	6,600	1,398.7	21.2%	$2,111,817	$10,000	$33,861
North Branch Nippersink	6,757	1,003.3	14.8%	$1,883,207	$19,500	$29,650
Lower Elizabeth Lake Drain	3,080	172.0	5.6%	$260,571	$4,500	$14,143
Hebron Peatlands	3,751	371.4	9.9%	$903,640	$5,500	$49,600
Wisconsin Subwatershed				$0	$5,000	$0
	96,492	**6,686.0**	**6.9%**			
Subwatersheds Cost Total				**$22,623,057**	**$121,500**	**$574,979**
TOTAL WATERSHED PLAN IMPLEMENTATION COST				**$22,783,057**	**$121,500**	**$605,479**

4.5 Project Funding / Implementation

Funding

By virtue of its relatively undeveloped watershed, and the existence of a county-wide Stormwater Management Ordinance and a Conservation Design Ordinance for unincorporated areas, much of the stream buffer / wetland protection endorsed by this plan will, by virtue of these ordinances, occur as development occurs. The potential also exists for progressive developers to recognize the potential of restored / managed natural areas within their developments as an attractive marketing tool, and fund that type of work as part of their site development activities.

For watershed recommendations in existing developed areas (such as in Lower Nippersink Creek or Silver Creek, for example), municipalities should strive to establish a budget for implementing the recommendations, ideally according to their prioritization ranking and the milestones set forth in the watershed plan.

By and large, the majority of funding for watershed protection must be a local effort. While the plan acknowledges that municipal and private funding sources in the watershed are limited and already stretched thin to address gray infrastructure costs and other municipal needs (police, fire, etc.), stakeholders must realize that the funding needed to implement the recommendations herein is really an investment in the environmental resources that will be needed to sustain their quality of life for the future. The costs for watershed protection and the small number of remedial activities now will certainly be less than the costs that will be incurred in the future, when delayed actions will create the need for more numerous and expensive remedial measures.

There are several state and federal grant programs that could be used to maximize the effectiveness of local funds. For example, the Illinois EPA 319 Grant Program provides up to 60% matching funds for the design and implementation of non-point source pollution control projects, such as the water quality projects identified in this watershed plan. The grant cycle for this program requires project applications be completed and submitted to the IEPA by August 1st of each year, and if the project is selected, funds usually become available the spring of the following year.

Another grant program available is the Illinois Department of Natural Resource's C-2000 Grant Program. This grant program is geared toward the preservation and restoration of the watershed's natural resources, such as streams, wetlands, woodlands and prairies. The C-2000 program (or its equivalent DNR grant program in the future) provides up to 100% match for projects fitting its criteria. The ecological restoration projects identified in the watershed plan would be prime candidates for IDNR C-2000 funding. This program requires grant application submittals in February and, if awarded, funding usually becomes available in the following November/December each year.

Implementation

The critical path in moving from planning watershed projects to actually implementing them is, like so many other things, money. Having a USEPA /.IEPA approved watershed plan that identifies existing and potential future water quality impairments, as well as identifies appropriate watershed management Best Management Practices, creates the possibility of applying for, and hopefully, receiving funding from the USEPA Section 319 program.

The major impediment that often stands in the way of watershed plans moving towards successful implementation is generating the 40% local match required for USEPA Section 319 grants. However, in the Nippersink Creek Watershed, a number of unique factors currently exist that could provide a significant source of the 40% local match.

1) As the updated Nippersink Creek watershed plan was being finalized in February 2008, an effort was underway with the Village of Wonder Lake and McHenry County to create a Special Service Area (SSA) taxing District to fund a $ 5.9 million Phase 1 restoration project for Wonder Lake. This proposed Wonder Lake restoration project, identified within this plan as Subwatershed Recommendation 6-5, would remove approximately one million cubic yards of accumulated sediment from Wonder Lake. This Phase 1 effort to remove the 1 million cubic yards of sediment would be the only phase funded by an SSA.
2) The outcome of the SSA process should be determined by June 2008. If the SSA is approved, the lake restoration project would likely follow this approximate timeline:
    - Regulatory permit process / engineering – Summer 2008
    - Receipt of regulatory permits – Fall / Winter 2008
    - Preparation of project bidding documents & project bidding - Fall / Winter 2008
    - Construction of Sediment Dewatering Facility – Spring 2009
    - Start of Dredging Project – Summer 2009
    - Completion of Phase 1 Dredging – Fall 2011
3) As part of the investigations undertaken to prepare the Wonder Lake Restoration Plan, it was determined that a total volume of 3 million cubic yards of sediment has been deposited in Wonder Lake since it was formed in 1929. To fully restore the lake, as much of this accumulated volume should be removed from the lake as possible. To move beyond the one million cubic yards of sediment dredging that would be funded by the creation of the SSA; additional (non-SSA) funding sources would need to be found to fund subsequent phases.
4) One potentially viable means of generating additional dredging revenue would be to develop a resale potential for the dried sediment generated by the Phase 1 dredging. Preliminary testing of Wonder Lake sediments by the University of Illinois has confirmed a high degree of sediment fertility, and a suitable composition of organics, sand, and peat, all characteristics identified with a marketable topsoil / soil amendment product.

5) If a resale market is established for the dewatered sediment, the intent would be to use the revenue from those sales to conduct additional dredging, moving towards the ultimate goal of three million yards of sediment removal from Wonder Lake. Using the same unit costs assigned to the proposed Phase 1 dredging, removing all three million yards of sediment from Wonder Lake could result in a local cost of roughly $ 17.7 million ($ 5.9 million from the SSA for Phase 1, and $ 11.8 million from sediment sales.) over the next ten years.
6) Properly timed and coordinated, these locally derived funds could potentially be matched (at 40%) to up to $ 26 million (at 60%) in Federal USEPA 319 funds to implement virtually the entire watershed plan, both upstream and downstream of Wonder Lake.
7) Having an identified, potentially long-term source of local cost-share match provides the ability to implement Nippersink Creek Watershed Plan identified Best Management Plan practices at little or no out-of-pocket expense for the landowner of the target area. This would be expected to be a significant selling point in gaining stakeholder / landowner acceptance.

Chapter 5
Lower Nippersink Creek Subwatershed Assessment

This section presents a summary of the characteristics of the Lower Nippersink Creek Subwatershed, as well as specific issues and challenges in this subwatershed that must be addressed in the Nippersink Creek Watershed Management Plan.

5.1 Subwatershed Characteristics

The following section provides an overview of the physical characteristics of the subwatershed.

5.1.1 Subwatershed Location

As shown in Figure 5.1, Lower Nippersink Creek is the subwatershed area located furthest downstream, in the eastern portion of the Nippersink Creek Watershed. This subwatershed has a drainage area of 12,432 acres, (19.43 square miles), comprising about 9.6% of the overall Nippersink Creek watershed. Virtually the entire subwatershed is contained in McHenry County, within Richmond, Burton and McHenry Townships, however, approximately 120 acres at the downstream end of the subwatershed is located within Lake County. The subwatershed is roughly bordered by Ringwood Road on the south, Pioneer Road on the west, the McHenry-Lake County line on the east, and the Illinois-Wisconsin State Line on the north.

Figure 5.1 Lower Nippersink Creek Subwatershed Location Map

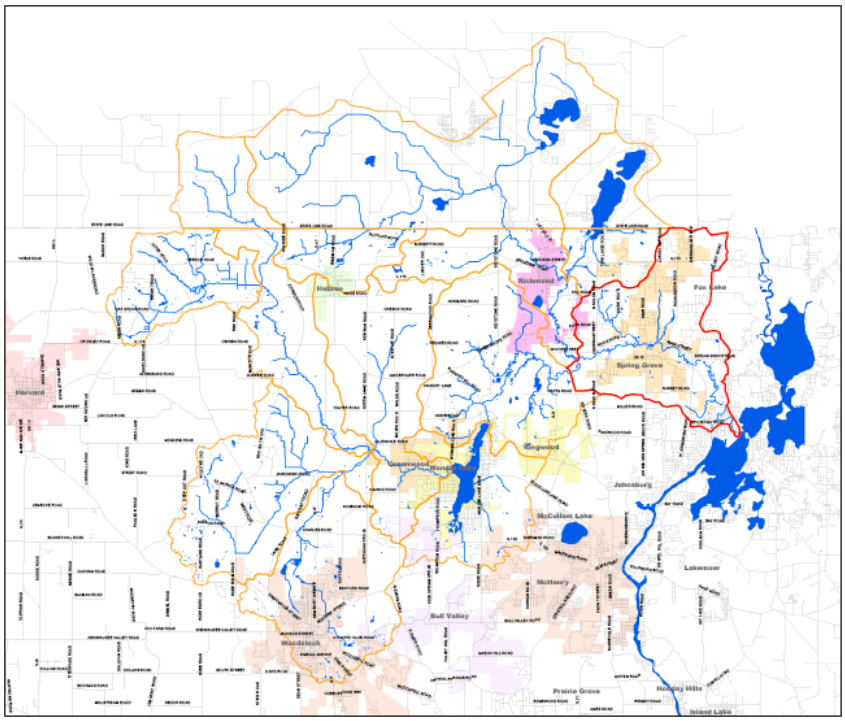
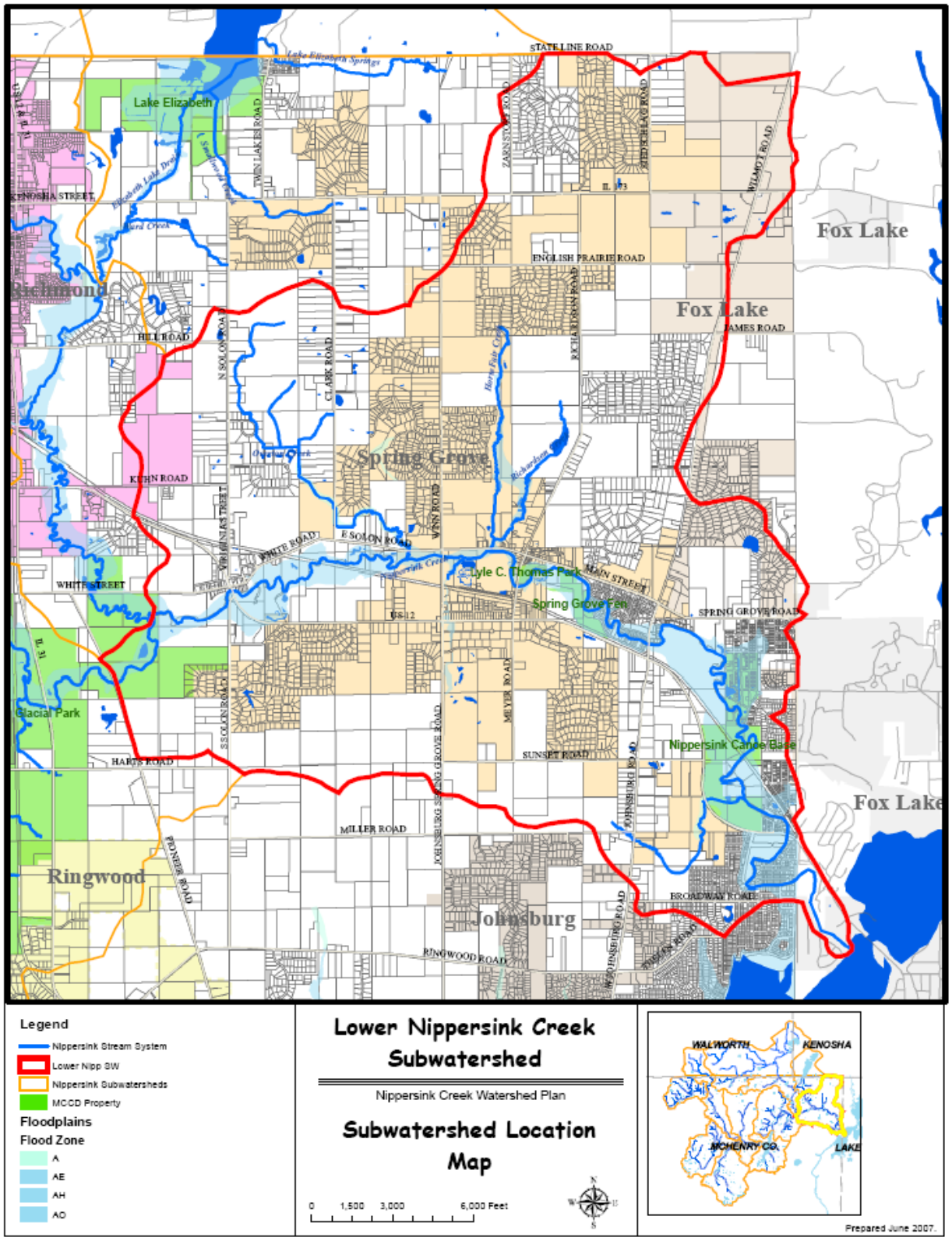


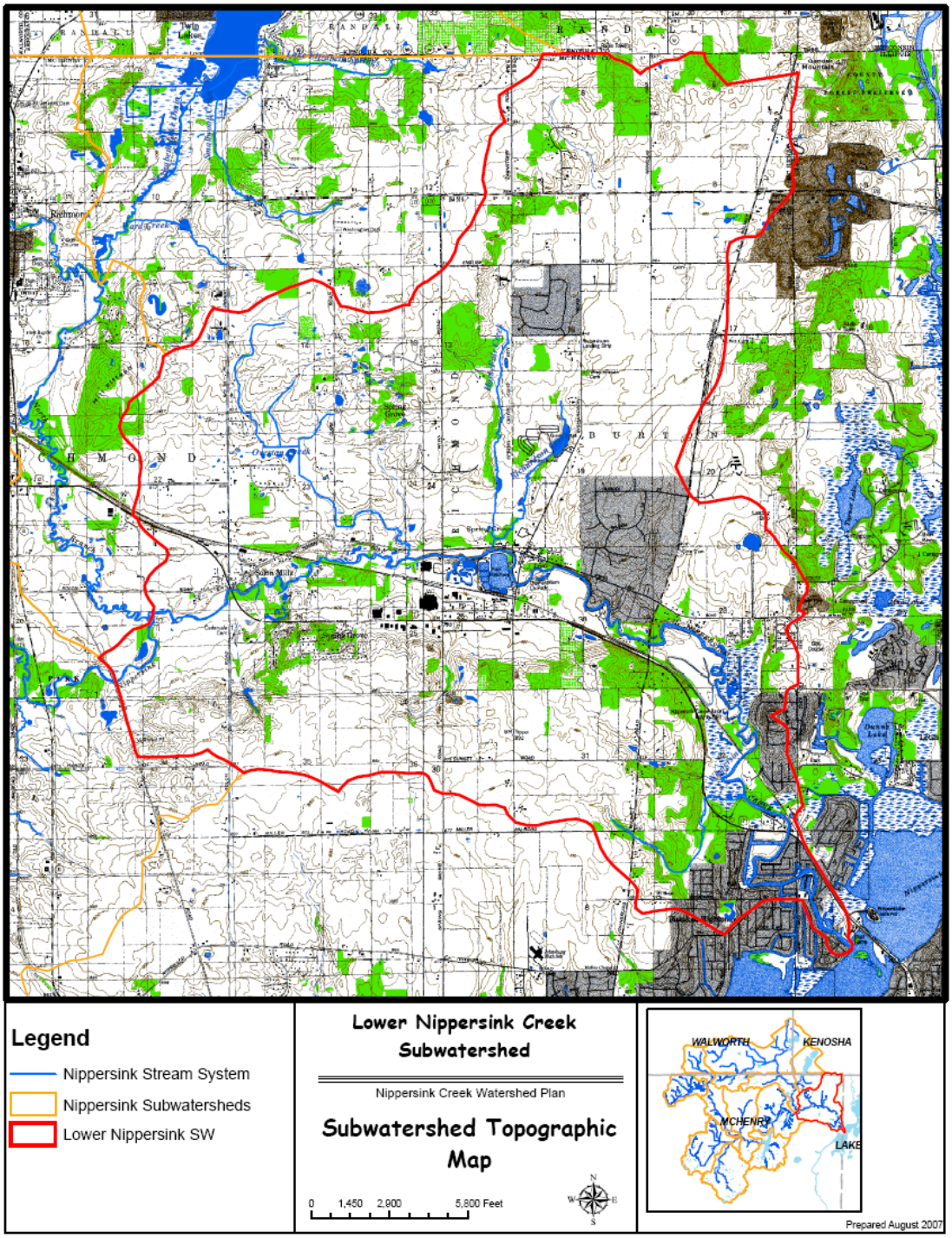
Figure 5.2 Lower Nippersink Creek Subwatershed Map



5.1.2 Topography & Geology

The topography of the Lower Nippersink subwatershed is moderately sloping, generally between 2% and 4%, with a maximum elevation of 972 feet and a minimum elevation of 736 feet, where Nippersink Creek joins the Fox River at the Chain O'Lakes.

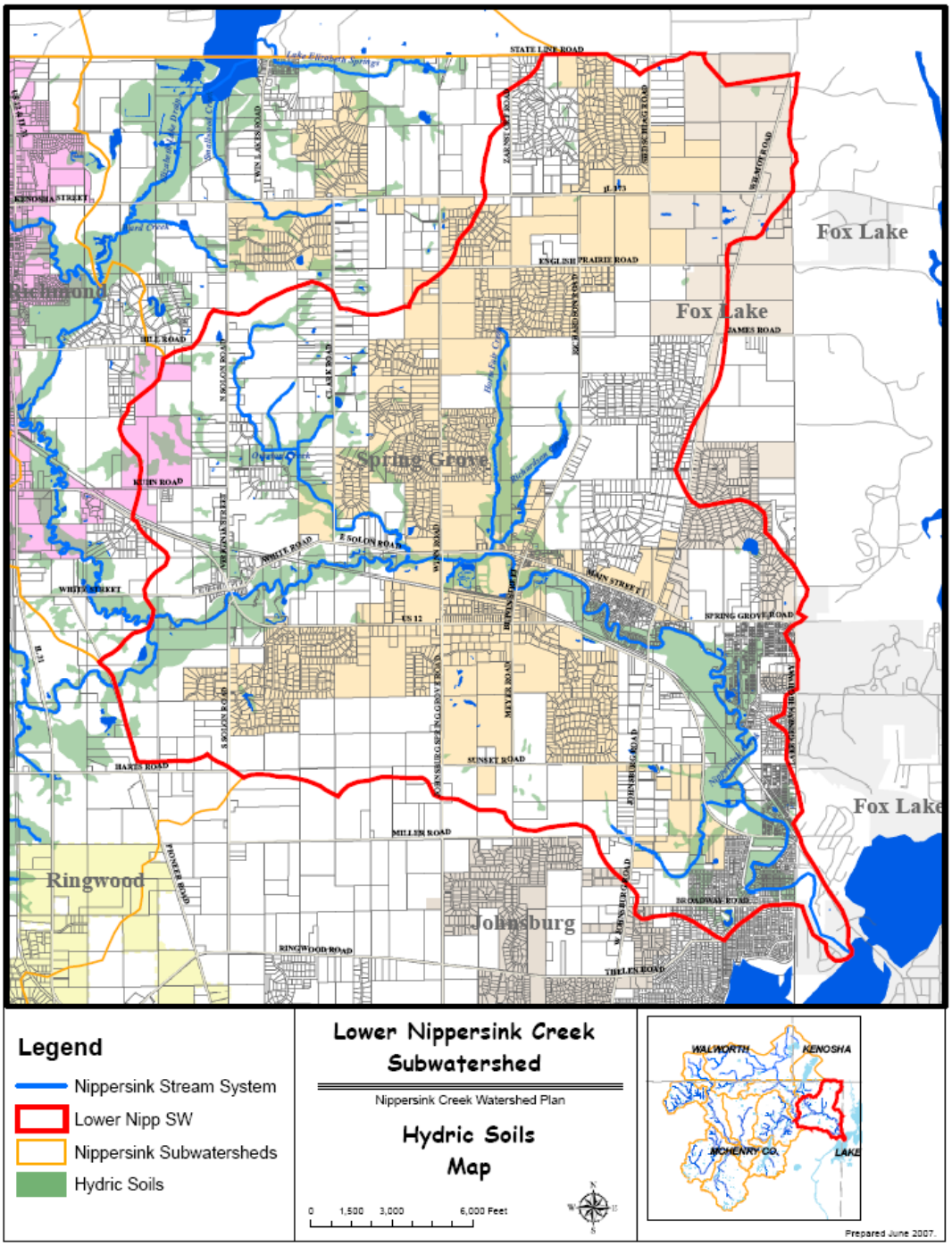
Figure 5.3 USGS Topographic Map for Lower Nippersink Creek Subwatershed



5.1.3 Soil Characteristics

The glacial advances across McHenry County resulted in a wide variety of soil associations. The soils in the subwatershed consist of mainly silty loams soil units on 0% - 2% slopes. Each major grouping of soil associations has potential impacts on current and future land uses within the subwatershed. For example, hydric (wetland) soils constitute 1,670 acres, or 13.4% of the 12,432 acre subwatershed. Hydric soils are poorly suited for urban development, but also contain functional wetlands, or former / degraded wetland areas that could be restored or enhanced.

Figure 5.4 Hydric Soils in the Lower Nippersink Creek Subwatershed



5.1.4 Pre-Settlement Vegetation

To guide future land management or restoration efforts, it is important to recognize the native plant communities that naturally evolved subsequent to the last glacial advances. Prior to European settlement in the 1830's, the Lower Nippersink Creek Subwatershed was predominantly comprised of woodland, as depicted in Figure 5.5. These woodlands, largely comprised of oak / hickory woodland and savannah, were bisected with wetlands and grassland along the drainageways, as shown in Table 5.1.

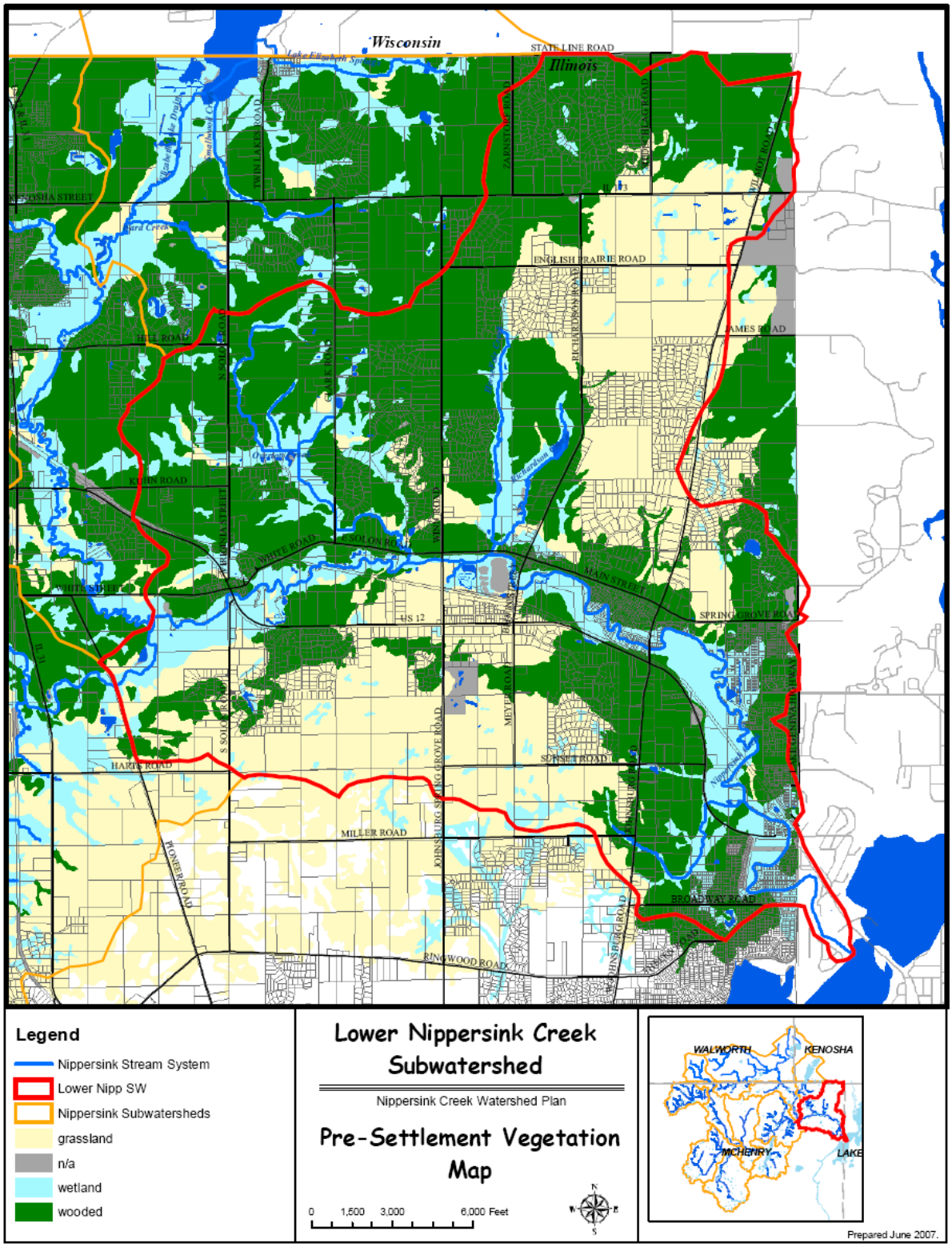
Table 5.1 Pre-Settlement Land Cover Conditions

Cover Type	Area	Percent of Subwatershed
Grasslands	4,140.9 acres	33 %
Wooded	6,079.6 acres	48 %
Wetlands	1,857.5 acres	15 %
n/a	233.7 acres	2 %

Note: 120 acre portion of the subwatershed located in Lake County not included

Source: MCCD Soils Analysis using GIS data

Figure 5.5 **Pre-settlement Vegetation Map in the Lower Nippersink Creek Subwatershed**



5.1.5 Subwatershed Drainage Features

Streams

The streams in the Lower Nippersink Creek subwatershed consist of the main stem of Nippersink and four small tributaries (Horse Fair Creek, Richardson Creek; Overton Creek, and one unnamed creek). This section describes the physical conditions of the streams in this subwatershed, including the stream corridor though which they flow.

The main stem of Nippersink Creek is a significant feature of the local landscape. Heavily used by canoeists and kayakers enjoying a water trail originating below Wonder Lake and extending downstream almost 16 miles, it also provides numerous fishing opportunities.

Horse Fair Creek is a small tributary stream extending almost straight north from Nippersink Creek in the approximate center of the subwatershed. Horse Fair Creek drains about 1,400 acres, roughly comprising the area between Winn Road and Richardson Road, and between Solon Road and the Illinois State Line. The stream channel begins in a rural subdivision near Bonner Lane and joins the Nippersink about one quarter west of Blivin Street in Spring Grove. The lower one-third of the stream appears to be channelized, however, the upper two-thirds of the stream channel is not. This upper section also contains the Horse Fair Springs Fen, a McHenry County Natural Area Inventory (MCNAI) site identified by the McHenry County Conservation District.

Richardson Creek drains 1,700 acres in the northeast section of the subwatershed, including much of the land between Richardson Road and Wilmot Road. The stream has one on-line impoundment at the upstream end, located on private property. This stream is also contained within the Horse Fair Springs Fen (MCNAI BUR01). Richardson Creek flows into Horse Fair Creek just north of East Solon Road.

Overton Creek drains about 1,400 acres in the northwest section of the subwatershed, and is comprised of agricultural and rural residential land between the municipalities of Richmond and Spring Grove. The headwaters of Overton Creek are located in the farmed wetland east of the intersection of Clark Road and Hill Road. Overton Creek joins the Nippersink just south of Solon Road, about one quarter mile upstream of the Winn Road bridge. The stream is about 83% channelized.

The unnamed tributary is located in the southeastern portion of the subwatershed, and drains an area extending east from Johnsburg and Miller Roads. Virtually the entire length of this tributary is located within Pease Fen, a McHenry County Natural Area Inventory site identified by the McHenry County Conservation District. This tributary flows into Nippersink Creek about one half mile upstream of Route 12.

Manmade Drainage Systems

Analysis of land uses and aerial photography indicates that nearly all (90 %+) of the developed land is drained by a system of open channel turf grass swales and culverts. Limited field investigations suggest that existing man-made stormwater systems were not designed or constructed to treat the runoff from developed areas prior to discharge to the sensitive streams and wetlands in the subwatershed.

Agricultural Tile Systems

Due to the increasingly urbanized nature of this subwatershed, it is unlikely that there many functioning underground drain tile systems remaining in the subwatershed, particularly in the eastern two-third's of the subwatershed. The western one-third may contain some tile systems, as this region has yet to be fully developed and contains many areas of gently sloping to nearly flat hydric soil complexes. Historically, these were the areas that had poor drainage characteristics, but that farmers could successfully convert to agricultural usage by the installation of agricultural drain tile systems.

Identifying agricultural drain tile networks is important in watershed planning because current local flooding and drainage problems can often be linked to damage or age-related failure of drain tile systems. From a watershed preservation / restoration perspective, it is important to identify functional drain tile systems to determine opportunities for their removal or reconfiguration for the purposes of restoring valuable wetland habitat, and water quality benefits. It is probable that many of the depressional and low lying areas in the subwatershed that are now drained by tile systems were once wetland and wet prairie ecosystems that supported very diverse habitats.

5.1.6 Population

The use and analysis of population data in watershed planning is critical because of there is a direct correlation between the number of people residing in a watershed and the degree of impacts to the quality and quantity of the watershed's natural resources. In 1990, the population in the subwatershed was estimated at 4006, or 208 persons per square mile. According to the 2000 US Census, the population in the Lower Nippersink subwatershed was about 6,620 people, or about 343 persons per square mile, a 65% increase.

5.1.7 Land Cover

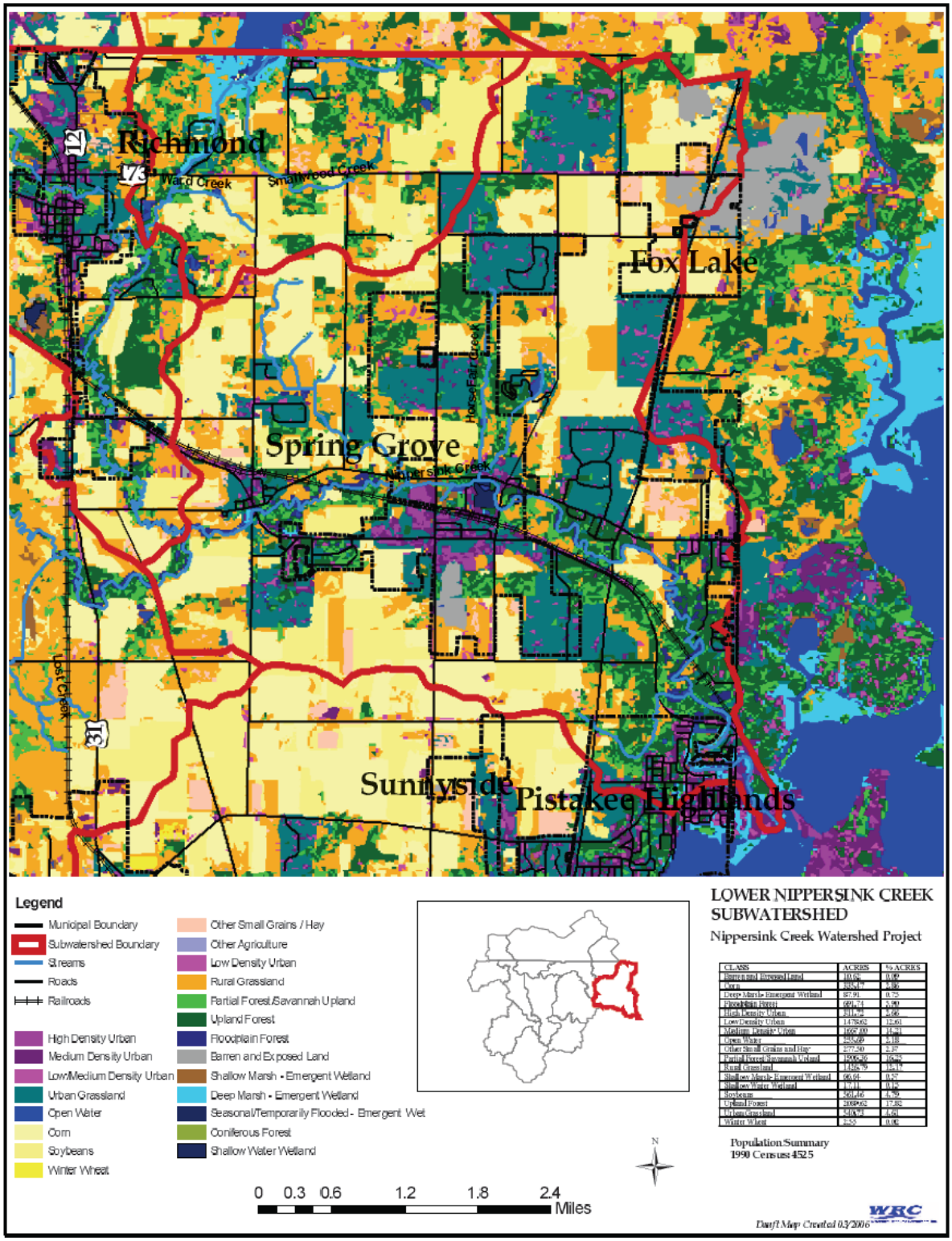
Often, the terms Land Cover and Land Use are used interchangeably. However, there are differences. Land Cover refers to the vegetation, structures, or other features that cover the land. On the other hand, Land Use (as discussed in Section 5.1.8) refers to how land is used by humans.

Land Cover data for the Nippersink Creek Watershed is available from the Illinois Department of Natural Resources using LANDSAT data collected between 1998 and 1999. The dominant land cover, according to this data, was rural grasslands and agricultural row crops, comprising about 51% of the subwatershed. Urban landscapes accounted for an additional 27%, while wooded areas and wetlands account for the remaining 22% of the subwatershed.

Table 5.2 1999 Land Cover for the Lower Nippersink Creek Subwatershed

Land Cover Description	Total Acres	Percent of Subwatershed
Barren & Exposed Land	205.8	1.7%
Corn, Soybeans, Other Small Grains & Hay	3,992.9	32.1%
Winter Wheat	2.1	0.0%
Rural Grassland	2,349.9	18.9%
Low Density Urban	304.3	2.4%
Medium Density Urban	405.8	3.3%
High Density Urban	113.6	0.9%
Urban Grassland	2,360.4	19.0%
Shallow Marsh – Emergent Wetland	56.1	0.5%
Shallow Water Wetland	31.4	0.3%
Partial Forest / Savannah Upland	775.1	6.2%
Upland Forest	1,531.8	12.3%
Floodplain Forest	183.6	1.5%
Coniferous Forest	0	0.0%
Deep Marsh / Emergent Wetland	54.9	0.4%
Open Water	65.1	0.5%
TOTAL	**12,432.8**	**100.0%**

Figure 5.6 1999-2000 Land Cover Map for Lower Nippersink Creek Subwatershed



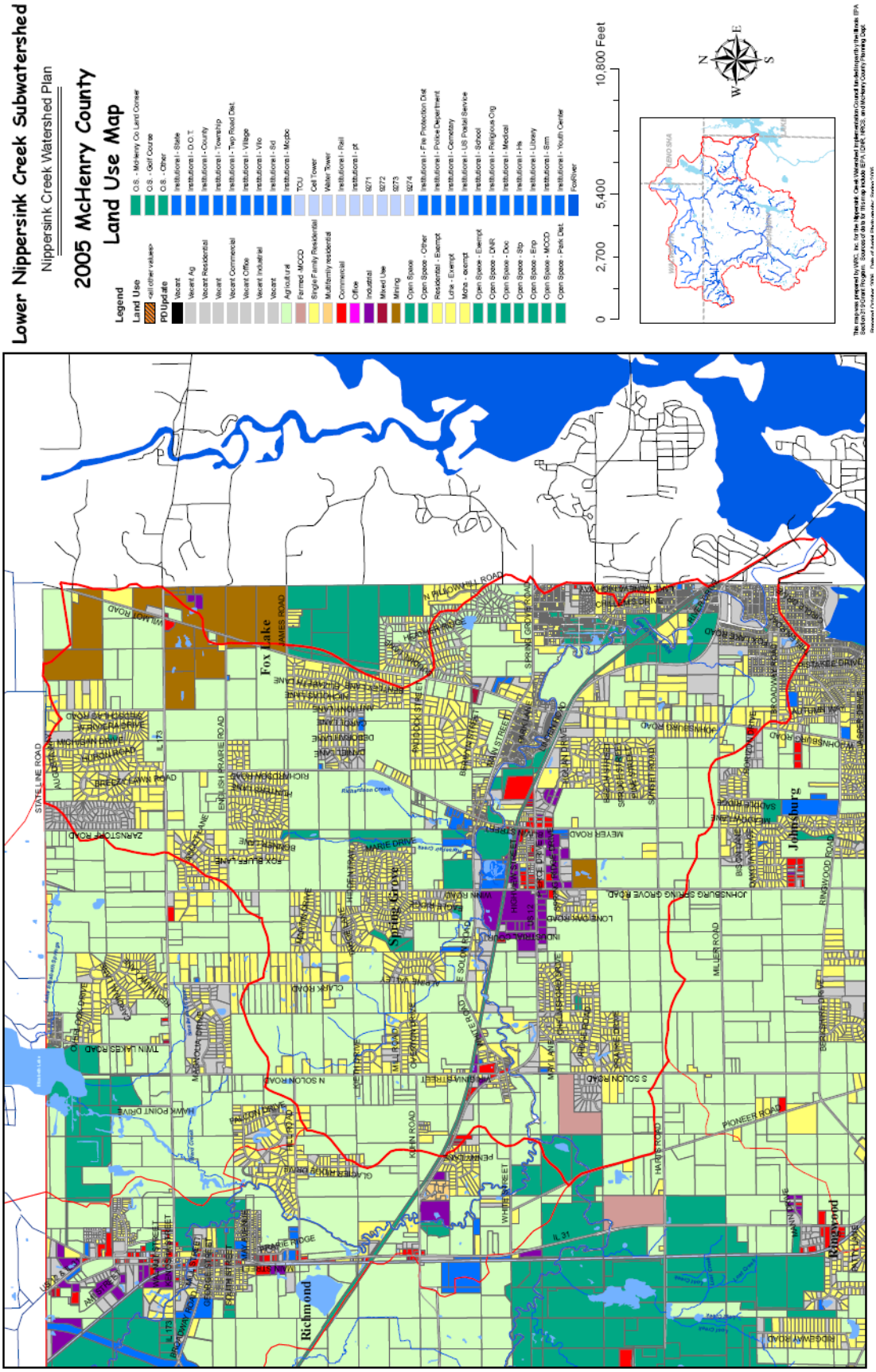
5.1.8 Land Use / Existing Watershed Development

According to the 2005 McHenry County Land Use / Zoning map, 49% of the subwatershed is zoned for agricultural use, while about 46% is either already developed or zoned for development in the future. Almost 5% is classified as open space.

Table 5.3 McHenry County 2005 Land Use in Lower Nippersink Creek Subwatershed

Land Use	Total Acres	Percent of Subwatershed
Vacant	10.8	0.1%
Vacant; Zoned Residential	952.8	7.8%
Vacant; Zoned Commercial	30.3	0.2%
Vacant; Zoned Office	0	0.0%
Vacant; Zoned Industrial	39.2	0.3%
Agricultural	5,902.8	48.6%
Single Family Residential	3,101.9	25.5%
Multi-Family Residential	0.6	0.0%
Commercial	81.3	0.7%
Office	0	0.0%
Industrial	197.8	1.6%
Mixed Use	8.9	0.1%
Mining	395.9	3.3%
Open Space	587.1	4.8%
Institutional	89.8	0.7%
Right of Way	750.0	6.2%
TOTAL	**12,149.2**	**100.0%**

Figure 5.7 2005 McHenry County Land Use Map for Lower Nippersink Creek Subwatershed



To date, development in the subwatershed has occurred principally through municipal annexation, in the form of low density development (1/2 to 1 acre lots).

Table 5.4 Municipal Areas in the Lower Nippersink Creek Subwatershed

Municipality	Area (acres)	Percent of Subwatershed
Village of Spring Grove	4,204.6	33.8%
Village of Fox Lake	933.0	7.5%
Village of Richmond	182.2	1.5%
Village of Johnsburg	13.4	0.1%
Unincorporated McHenry County	7,099.0	57.1%

There are 90.3 miles of roads in the subwatershed, which equates to more than 300 acres of impervious cover (roadway pavement only – excludes parking lots, sidewalks, and driveways).

Point Source Discharges

There are three permitted point sources that discharge into Nippersink Creek in the Lower Nippersink Subwatershed. Intermatic, a factory located just upstream of Winn Road in Spring Grove, is permitted by the IEPA to discharge up to 783,000 gallons of treated industrial wastewater into Nippersink Creek. Scot Forge recently received an NPDES permit to discharge an average of 235,000 gallons per day of groundwater, stormwater and forged metal quench water into the creek. The Village of Spring Grove also has a currently permitted discharge of 75,000 gallons per day of treated wastewater into the creek; the Village is also making plans to increase its wastewater treatment capabilities to over 2 million gallons per day.

5.1.9 Natural Resources

McHenry County Conservation District Properties

There are four McHenry County Conservation District (MCCD) properties in the subwatershed, totaling about 435 acres, or 3.5% of the Lower Nippersink subwatershed area.

Table 5.5 MCCD Properties in the Lower Nippersink Creek Subwatershed

Name	Area in SW (acres)	Total MCCD Property (acres)
Spring Grove Fen	35.5	35.5
Nippersink Canoe Base	206.1	206.1
Glacial Park	184.6	3264
Lyle C. Thomas Park	9.0	9.0
Total	**435.2**	

Table 5.6 Other Publicly Protected Land in the Lower Nippersink Creek Subwatershed

Name	Area (acres)	# of Parcels
IDNR – Chain O' Lakes State Park	28.1	5
Village of Spring Grove	50.9	11
McHenry County Conservation District	1.9	8
Wisconsin River Rail Transit Commission	49.8	11
Total	**130.7**	

McHenry County Natural Areas Inventory

There are eight McHenry County Natural Area Inventory (MCNAI) sites within the subwatershed, representing about 7% of the entire subwatershed.

Table 5.7 McHenry County Natural Areas Inventory Sites in the Lower Nippersink Creek Subwatershed

MCNAI ID	Name	Area in SW (acres)	Total NAI Site Area (acres)	Ownership
BUR01	Horse Fair Springs Fen	177.2	177.2	Private
BUR02	Lotus Pond*	16.3	16.3	Private
BUR03	Nippersink Canoe Base Wetlands	303.6	303.6	MCCD
BUR04	Pease Fen	174.9	174.9	Private
BUR05	Spring Grove Fen	38.7	38.7	MCCD
RIC06	Glacial Park / Tamarack Farms	102.8	4,673.8	MCCD / Private
RIC10	Solon Mills Fen	78.8	78.8	Private
RIC11	Solon Mills Prairie	3.9	3.9	Private
	TOTAL	**896.2**		

* Lotus Pond MCNAI appears to have been destroyed due to conversion to a residential stormwater pond.

Wetlands

McHenry County completed an Advanced Identification (ADID) Wetland Study in 2003. This study identified a total of 96 wetlands, totaling 1,300.4 acres, or 10% of the Lower Nippersink subwatershed. Of these wetlands, 911 acres (70%) were determined to be of High Quality.

Table 5.8 Mapped Wetlands in the Lower Nippersink Creek Subwatershed

ADID Code	Wetland Type	Number of Wetlands	Total Area (acres)
HFV	High Functional Value	4	86.0
HQW	High Quality Wetland	7	911.4
FW	Farmed Wetland	30	66.7
W	Other Wetlands (lower quality)	55	236.3
	TOTAL	**96**	**1,300.4**

The wetlands classified as High Quality are located along the Nippersink stream corridor upstream of US Route 12, and along the Horse Fair and Richardson Creek stream corridors.

Threatened & Endangered Species

Threatened and Endangered (T&E) species data were extracted from T&E data records documented in the McHenry County Natural Areas Inventory (MCNAI) Database. The data were collected by the McHenry County Conservation District during field studies undertaken at subwatershed Natural Area Inventory Sites. The data indicate that there are at least two threatened or endangered species living in the subwatershed. T&E Species information from the Glacial Park / Tamarack Farms MCNAI is not included in this total, given that only about 2% of that site is in the LNCSW, although it is worth noting that that large MCNAI on the western edge of the subwatershed is habitat for more than 27 state threatened or endangered species of fish, mussels, plants, insects and reptiles.

Table 5.9 Threatened and Endangered Species in the Lower Nippersink Creek Subwatershed

Common Name	Scientific Name	Type	Status	MCNAI Site
Two-Seeded Sedge	Carex disperma	Plant	IL Endangered	BUR01
Pale Vetchling	Lathyrus ochroleucus	Plant	IL Threatened	BUR03

Source: McHenry County Natural Areas Inventory Database, 2005

Existing Greenways

There are no formal greenways established in the Lower Nippersink subwatershed, although Nippersink Creek functions as a water trail throughout this area, with landings at Lyle Thomas Park and Nippersink Canoe Base.

5.2 Analysis of Subwatershed Data and Problem Identification

5.2.1 Water Quality Data & Identified Problems

The Illinois Environmental Protection Agency (IEPA) is tasked with assessing the quality of the surface water resources of Illinois. The IEPA has determined Nippersink Creek's designated uses are:

- Aquatic Life
- Fish Consumption
- Primary Contact
- Secondary Contact
- Aesthetic Quality

The IEPA periodically produces a 303(d) list, which identifies waterways that are not achieving certain designated uses. In the 2006 IEPA 303(d) list, Nippersink Creek is identified as being in Full Support of its Aquatic Life Designated Use, which is notable for a stream in northeastern Illinois.

However, Nippersink Creek was also determined to be Non-supporting of its Primary Contact Designated Use, due to excessive levels of fecal coliform. This pollutant, associated with human and animal waste, was listed as coming from an unknown source. The IEPA also identified fish consumption, secondary contact and aesthetic quality as designated uses for Nippersink Creek, although the ratings for these uses were classified as "not assessed".

The Illinois Environmental Protection Agency maintains two water quality sampling stations in the Lower Nippersink Creek. They are listed in the Table 5.10.

Table 5.10 IEPA Water Quality Sampling Stations in the Lower Nippersink Creek Subwatershed

Station	Stream	Location
DTK01	Nippersink Creek	Nippersink Creek at US Route 12
DTK04	Nippersink Creek	Nippersink Creek at Winn Road

The Fox River Watershed Monitoring Network (FRWMN), administered by the not-for-profit group, *Friends of the Fox River*, maintains four volunteer stream monitoring sites on Nippersink Creek; one is located in the Lower Nippersink subwatershed at Lyle C. Thomas Park near Richardson Road. During 2005 and 2006 monitoring periods, FRWMN volunteers in the subwatershed reported water quality index values (based on macroinvertebrate sampling) as Good (Taxa rating between 24 and 30).

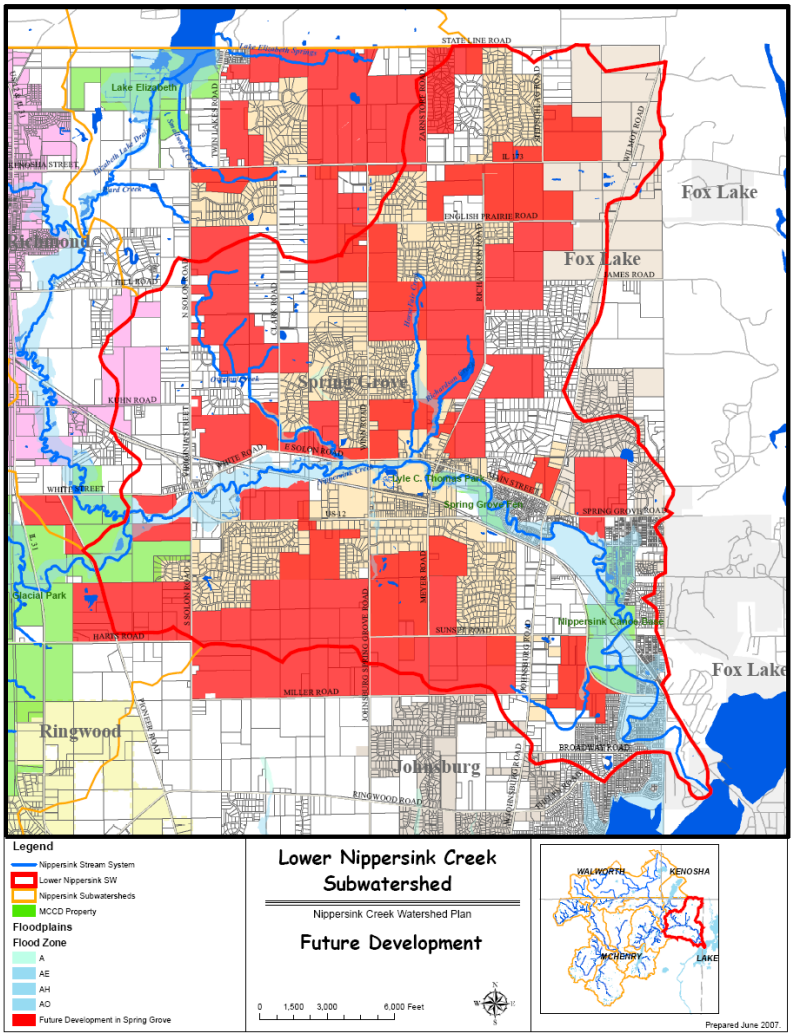
5.2.2 Flooding Problems

At the time of this report, no data were provided by the County or municipalities regarding existing flooding problems. Analysis of available floodplain information suggests that there may be as many as 100 homes in the FEMA 100-year Floodplain. The majority of these homes are located near the stream's outlet into the Chain O' Lakes, near US Route 12 and Lake Road.

5.2.3 Projected Development & Growth

Development in the Lower Nippersink Creek Subwatershed is likely to occur as part of construction within existing municipal jurisdictions, as well as future annexations by Spring Grove, Fox Lake, and Richmond. The current Spring Grove Land Use Map suggests that an additional 4,500 acres of development will occur in and contiguous to the Village of Spring Grove. The current Richmond Land Use Map suggests that an additional 350 acres of development will occur in and contiguous to the Village of Richmond. No future land use data were available for the Village of Fox Lake at the time of this writing.

Figure 5.8 Future Development in the Lower Nippersink Subwatershed



5.2.4 Natural Area Protection / Preservation Issues

McHenry County Natural Area Inventory Sites

In the subwatershed, about 41% of the high quality McHenry County Natural Area Inventory (MCNAI) sites are protected through public ownership (MCCD or Village of Spring Grove).

Horse Fair Springs Fen (MCNAI BUR01) is a 177 acre wetland containing a calcareous seep and spring, graminoid fen, and sedge meadow. Located north of Nippersink Creek between Richardson Road and Winn Road, the wetland was identified as being threatened by water table alterations associated with the upstream impoundment, brush encroachment, invasive aquatic species, and Reed Canary Grass. About 32 acres (18%) of this natural area is protected by the Village of Spring Grove.

Nippersink Canoe Base Wetlands (MCNAI BUR03) is a 303 acre natural area located along the north side of US Route 12 between State Park Road and Johnsburg Road. The site contains a high quality section of Nippersink Creek, a bluff / ravine system, a graminoid fen, sedge meadows, streamside marshes, and mesic silt loam woodland. This natural area is under threat from invasive species (Reed Canary Grass, Purple Loosestrife, and brush encroachment), artificial pond, water table alteration, and grazing. About 70% of this natural area is protected by the MCCD.

Pease Fen (MCNAI BUR04) located between US Route 12 and Johnsburg Road, just south of Sunset Road, is a 175 acre high quality wetland containing a graminoid fen and sedge meadow. The MCNAI database identified this site as being threatened by aquatic invasive species, brush encroachment, siltation, water table alteration, and development.

Spring Grove Fen (MCNAI BUR05) located along Nippersink Creek north of US Route 12, between Johnsburg Road and Blivin Street. This 39 acre wetland contains a high quality section of Nippersink Creek, and graminoid fens and sedge meadows. MCCD identified threats to the integrity of this natural area as invasive species (Cattails, Purple Loosestrife, and brush encroachment), dumping, filing, water table alteration, and siltation. About 75% of this natural area is protected by the MCCD, and 33.4 acres were dedicated as an Illinois Nature Preserve in 1988.

Solon Mills Fen (MCNAI RIC10) a 79 acre wetland complex located north of US Route 12 near South Solon Road contains a high quality section of Nippersink Creek, a graminoid fen, and a sedge meadow. This natural area is currently unprotected from development and appears to be lacking natural area management needed to preserve the high quality plant community. The MCNAI database lists the site as being threatened by brush encroachment, siltation, and development, and degraded to some degree by the artificial pond constructed in the wetland.

Solon Mills Prairie (MCNAI RIC11) is a 4 acre prairie complex located west of South Solon Road about 1 mile south of US Route 12. This natural area is a high quality dry gravel prairie (very few remain in Illinois) on private property. The MCNAI database suggests that this natural area is facing challenges with future development as well as encroachment by weedy and non-native brush species.

There are seven High Quality Wetland areas in the subwatershed totaling about 911 acres. Many of these wetlands area also identified within McHenry County Natural Area Inventory sites, which were addressed above. There are about 260 acres of high-quality wetland along Nippersink Creek between the North Branch Nippersink confluence (west of South Solon Road) and Johnsburg Road that are not protected from future land disturbance (agriculture, development, or otherwise). Most of the 260 acres is also in need of restoration and land management to preserve the natural integrity of the stream corridor.

5.3 Subwatershed-Specific Recommendations to Protect Water Resources

The following section discusses the Best Management Practices (BMP's) identified for this subwatershed that should be implemented to address existing or potential water quality impairments. The location of each recommended BMP project is presented in Figure 5.9

Pollutant Loading Modeling, as discussed in Chapter 3, identified current and future pollutant loadings, based upon land use, soils, slopes, etc., and quantified these loadings. The results of this Pollutant Loading modeling were then used to identify the types of BMP's that should be implemented to create a loading reduction of those pollutants. Table 5.11 presents a summary of the recommended BMP projects, as well as the expected pollutant loading reductions expected if the BMP's are implemented, and function as intended.

Table 5.12 presents detailed cost and logistical information on each of the recommended BMP projects. Below is a summary list of recommendations for the subwatershed to help stakeholders and decision makers meet the Goals and Objectives set forth for Nippersink Creek. Background information regarding how each type of recommendation addresses watershed concerns and/or impairments (existing or future) can be found in Chapter 4.

Type:	Education / Outreach; Regulatory; Site Restoration; Monitoring; Permanent Habitat Protection, Water Quality
Target Goals:	Which watershed plan goals the recommendation is intended to address.
Initial Implementation Cost:	The initial cost, in 2007 dollars to initiate the recommended action, if applicable.
Initial Outreach Cost:	The initial cost, in 2007 dollars to initiate the recommended action, if applicable.

Annual Cost:	The long term expected annual cost (in 2007 dollars) to successfully implementation of the recommendation
Responsible Party:	Identifies the LEAD agency, entity, or landowner who will ultimately have to execute the recommendation. SUPPORTING parties, such as government agencies, grant sources, etc. may also be identified here.
Priority:	A ranking of the BMP recommendations, based upon the nature / urgency of the existing / potential impairment; the availability of willing landowners)/ partners; short-term vs. long-term development pressure; and whether the project is a new effort, or a retrofit of an existing practice.

The project cost estimates contained in this report should be considered preliminary, and are only presented to identify the potential magnitude of cost, from a watershed scale perspective. No site-specific investigation, analysis, or design of any recommended project, from which accurate cost information could be obtained, was completed as part of the preparation of the 2008 Nippersink Creek Watershed Plan. If a watershed stakeholder decides to apply for grant funding assistance to implement any of the recommended projects presented in this report, they should first undertake any additional studies / research needed to determine an updated / accurate project cost. They should not solely rely on the cost estimates presented in the NCWP report as the basis for their grant request.

Note: The following acronyms for responsible parties identified in Table 5.12 are presented below:

NCWPC	Nippersink Creek Watershed Planning Committee
NRCS	Natural Resource Conservation Service
SWCD	McHenry County Soil and Water Conservation District
MCCD	McHenry County Water Conservation District
TLC	The Land Conservancy of McHenry County
IDOT	Illinois Department of Transportation
IEPA	Illinois Environmental Protection Agency
MCDOT	McHenry County Department of Transportation
MCDEF	McHenry County Defenders

Figure 5.9 Lower Nippersink Subwatershed Site Recommendations Map

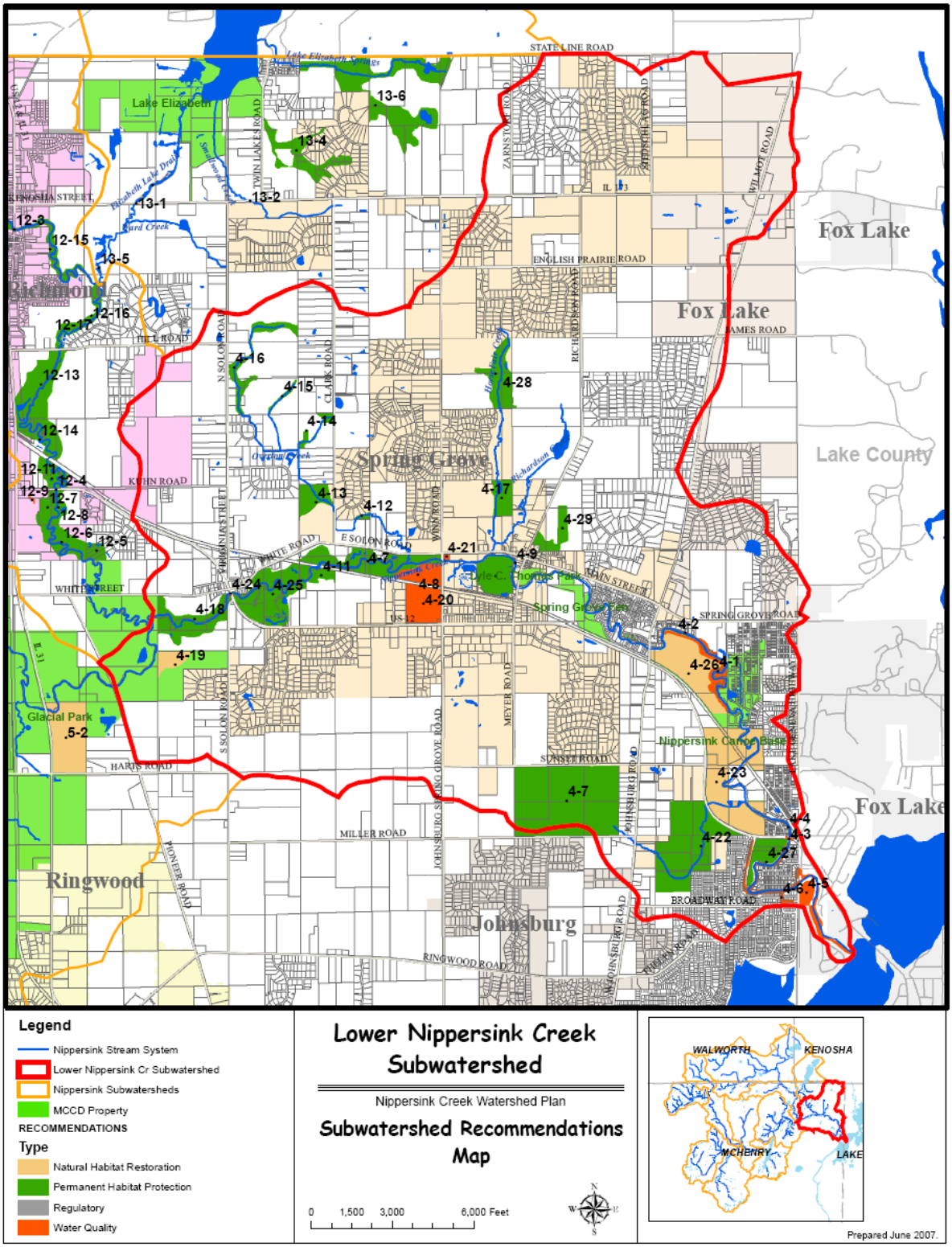


Table 5.11 BMP Selection & Associated Pollutant Load Reduction for the Lower Nippersink Creek Subwatershed

BMP	BMP Type**	Project Locations***	BMP		Removal Efficiency****				Pollutant Load Reduction (lbs/year)*****				Percentage Reduction			
			Size	Unit	TN	TP	TSS	FC	TN	TP	TSS	FC	TN	TP	TSS	FC
Natural Habitat Protection	SS	4-9, 4-19, 4-23, 4-26	16	acres	30%	35%	60%	-	95	5	7	-	0.2	0.2	0.4	-
Conservation Development Practices	SS	4-7, 4-27, 4-28, 4-29	234	acres	52%	58%	64%	-	2,417	127	101	-	4.9	5.5	6	-
Permanent Habitat Protection	SS	4-7, 4-10, 4-12 to 4-17, 4-19, 4-20, 4-22, 4-23, 4-25	900	acres	53%	51%	88%	78%	9,476	429	537	22,076	19.2	18.5	31.9	28.2
Wetland Restoration	SS	4-18, 4-19, 4-24	496	acres	53%	51%	88%	78%	5,222	236	296	12,166	10.6	10.2	17.6	15.6
Stream Buffers	SS	4-1, 4-2, 4-4, 4-6, 4-9, 4-11	238	acres	36%	95%	95%	75%	1,702	211	153	5,613	3.4	9.1	9.1	7.2
Point Source Control/Monitoring	SS	4-20, 4-21	2	each	0%	0%	0%	0%	0	0	0	0	0	0	0	0
Regulatory*	WS	Subwatershed	1	water-shed	5%	5%	5%	5%	2,469	116	84	3,908	5	5	5	5
Nutrient Management	WS	Subwatershed wide	25	acres	70%	28%	-	-	348	7	-	-	0.7	0.3	-	-
Stormwater BMPs	SS	4-3, 4-5, 4-8, 4-24	3	each	36%	95%	95%	75%	651	81	59	2,146	1.3	3.5	3.5	2.7
Street Sweeping (bi-weekly)	WS	City wide	90.3	curb miles	-	-	-	2%	-	-	-	189	-	-	-	0.2
Sand Filters	SS	4-8, 4-19, 4-24	50	each	-	-	83%	37%	-	-	336	5,771	-	-	20	7.4
Pet Waste Management	WS	Subwatershed wide	1	water-shed	-	-	-	90%	-	-	-	3,285	-	-	-	4.2
Education and Outreach	WS	Residential areas	1	each	3%	3%	3%	3%	1,234	58	42	1,954	2.5	2.5	2.5	2.5
Total									23,615	1,270	1,615	57,107	47.8	54.7	95.9	73.1

*Regulatory programs are assumed to have nominal pollutant reduction rates of 5%; "Education and Outreach" programs are assumed to have 2.5%.

**SS = Site-specific; WS = Watershed-specific.

*** Project locations and details are described in the corresponding chapter.

**** TN = total Nitrogen; TP = total Phosphate; TSS = total suspended solids or Sediment; FC = Fecal coliform.

***** Units of "TSS" and "FC" are "Tons/year" and "FCU/year", respectively.

Table 5.12 Recommended Projects in the Lower Nippersink Creek Subwatershed

SUB WATERSHED	RECOMMENDATION #	TARGET GOAL	DESCRIPTION	RESPONSIBLE PARTY	ACRES	UNIT COST	INITIAL IMPLEMENTATION COST	INITIAL OUTREACH COST	ANNUAL MAINTENANCE COST	PRIORITY
Lower Nippersink	4-1	Water Quality	Landowner Outreach to install minimum 100 foot vegetative Stream Buffer on agricultural property	NCWPC / NRCS / SWCD	26.9	$3,000	$80,757	$1,000	$2,692	D
Lower Nippersink	4-2	Water Quality	Landowner Outreach along north bank of Nippersink Creek east of Johnsburg Road to re-establish a native Stream Buffer; create Conservation Easements	NCWPC / TLC / MCDEF	1.9	$3,000	$5,706	$500	$190	D
Lower Nippersink	4-3	Water Quality	Government Outreach to install Stormwater BMP's along US 12 at Nippersink Creek to treat roadway runoff prior to discharge to the stream	NCWPC / IDOT			$50,000	$1,000	$2,500	F
Lower Nippersink	4-4	Water Quality	Landowner Outreach along Nippersink Creek north of US 12 to re-establish Stream Buffer; create Conservation Easement	NCWPC / TLC / MCDEF	1.8	$3,000	$5,430	$500	$181	D
Lower Nippersink	4-5	Water Quality	Landowner Outreach to develop a Stormwater BMP plan for marina at Nippersink Creek mouth on Broadway Road	NCWPC			$25,000	$500		F
Lower Nippersink	4-6	Water Quality	Landowner Outreach along Nippersink Creek south of US 12 to re-establish a Stream Buffer, create Conservation Easement	NCWPC / TLC / MCDEF	38.9	$3,000	$116,664	$1,000	$3,889	D
Lower Nippersink	4-7	Permanent Habitat Protection	Require Conservation Design practices for future development planned at Miller and Meyer Roads; parcel is headwaters of small, sensitive tributary	NCWPC / TLC / VILLAGE OF SPRING GROVE	230.9	$500	$115,429	$1,000	$5,771	B
Lower Nippersink	4-7	Permanent Habitat Protection	Landowner Outreach to establish Conservation Easements to protect existing high quality wetlands and stream corridor	NCWPC / TLC / MCDEF	69.3	$3,000	$207,756	$1,000	$6,925	D
Lower Nippersink	4-8	Water Quality	Landowner Outreach to plan / implement Stormwater BMP to be implemented by industrial landowners (Scot Forge) to treat runoff before discharge to Nippersink Creek	NCWPC			$50,000	$1,000		F

Table 5.12 Recommended Projects in the Lower Nippersink Creek Subwatershed

SUB WATERSHED	RECOMMENDATION #	TARGET GOAL	DESCRIPTION	RESPONSIBLE PARTY	ACRES	UNIT COST	INITIAL IMPLEMENTATION COST	INITIAL OUTREACH COST	ANNUAL MAINTENANCE COST	PRIORITY
Lower Nippersink	4-9	Natural Habitat Restoration	Landowner Outreach along Nippersink Creek east of Blivin Street to re-establish a Stream Buffer, create Conservation Easement	NCWPC / TLC / MCDEF	0.6	$3,000	$1,764	$500	$59	D
Lower Nippersink	4-10	Permanent Habitat Protection	Government Outreach to protect, restore, and enhance high quality ADID N87 on former IDNR fish hatchery property	NCWPC / TLC / VILLAGE OF SPRING GROVE	40.9	$3,000	$122,574	$1,000	$4,086	D
Lower Nippersink	4-11	Permanent Habitat Protection	Landowner Outreach landowner to expand buffer between stream and crops. Pursue conversion of low-lying portions of ag field to floodplain wetland	NCWPC / NRCS	9.6	$5,000	$47,765	$500	$955	D
Lower Nippersink	4-12	Permanent Habitat Protection	Landowner Outreach on Saint Moritz Drive to restore ADID Wetland N261 and establish a Conservation Easement to protect wetland and segment of Overton Creek	NCWPC / TLC / MCDEF	2.6	$3,000	$7,695	$500	$257	D
Lower Nippersink	4-13	Permanent Habitat Protection	Encourage Conservation Design for land development on parcel west of Clark Road to protect Overton Creek and ADID Wetland N261	NCWPC / TLC / VILLAGE OF SPRING GROVE	23.5	$500	$11,760	$1,000	$588	B
Lower Nippersink	4-14	Permanent Habitat Protection	Encourage Conservation Design for land development on parcel west of Clark Road to protect Overton Creek and ADID Wetland N281	NCWPC / TLC / VILLAGE OF SPRING GROVE	8.9	$500	$4,448	$500	$222	B
Lower Nippersink	4-15	Permanent Habitat Protection	Encourage Conservation Design for land development on parcel west of Clark Road to protect Overton Creek and ADID Wetland N251	NCWPC / TLC / VILLAGE OF SPRING GROVE	4.6	$500	$2,293	$500	$115	B
Lower Nippersink	4-16	Permanent Habitat Protection	Encourage Conservation Design for land development on parcel west of Clark Road to protect Overton Creek and ADID Wetland N225	NCWPC / TLC / VILLAGE OF SPRING GROVE	31.5	$500	$15,762	$1,000	$788	B

Table 5.12 Recommended Projects in the Lower Nippersink Creek Subwatershed

SUB WATERSHED	RECOMMENDATION #	TARGET GOAL	DESCRIPTION	RESPONSIBLE PARTY	ACRES	UNIT COST	INITIAL IMPLEMENTATION COST	INITIAL OUTREACH COST	ANNUAL MAINTENANCE COST	PRIORITY
Lower Nippersink	4-17	Permanent Habitat Protection	Encourage Conservation Design for land development on parcel east of Winn Road to protect Horsefair Creek and Horse Fair Springs Fen MCNAI Site	NCWPC / TLC / VILLAGE OF SPRING GROVE	22.0	$500	$10,996	$1,000	$550	B
Lower Nippersink	4-18	Permanent Habitat Protection	Protect high-quality wetland ADID N87 from adjacent agricultural impacts (row crop runoff, animal grazing in stream, etc.)	NCWPC / NRCS / SWCD	54.4	$3,000	$163,275	$1,000	$5,443	D
Lower Nippersink	4-19	Natural Habitat Restoration	**MCCD Glacial Park** Restore historic wetland in hydric soils on MCCD parcel northwest of South Solon Road and Northgate Drive; habitat benefits plus increases pollutant removal from upstream residential development	MCCD	15.9	$2,000	$31,876			A
Lower Nippersink	4-20	Water Quality	Agency Outreach to develop and implement a monitoring plan to insure no future pollutant discharges (such as TCE) to Nippersink Creek or shallow groundwater aquifer	VILLAGE OF SPRING GROVE / MCHENRY COUNTY HEALTH DEPARTMENT / IEPA			$5,000	$1,000		F
Lower Nippersink	4-21	Water Quality	Agency Outreach to develop and implement a monitoring plan to insure no pollutant discharges to Nippersink Creek or shallow groundwater aquifer for former gas station site	VILLAGE OF SPRING GROVE / MCHENRY COUNTY HEALTH DEPARTMENT / IEPA			$5,000	$1,000		F
Lower Nippersink	4-22	Permanent Habitat Protection	Encourage Conservation Design for proposed development on parcel south of US 12 containing Pease Fen MCNAI site	NCWPC / TLC / VILLAGE OF SPRING GROVE	135.6	$500	$67,790	$1,000	$3,389	B
Lower Nippersink	4-23	Natural Habitat Restoration	**MCCD Nippersink Canoe Base** Wetland, prairie, and woodland restoration on property	MCCD	139.1	$2,000	$278,134			A

Table 5.12 Recommended Projects in the Lower Nippersink Creek Subwatershed

SUB WATERSHED	RECOMMENDATION #	TARGET GOAL	DESCRIPTION	RESPONSIBLE PARTY	ACRES	UNIT COST	INITIAL IMPLEMENTATION COST	INITIAL OUTREACH COST	ANNUAL MAINTENANCE COST	PRIORITY
Lower Nippersink	4-24	Water Quality	Government Outreach to install Stormwater BMP's to treat roadway runoff at US 12 and South Solon Road prior to discharge into Nippersink Creek	NCWPC / IDOT			$50,000	$1,000	$2,500	E
Lower Nippersink	4-25	Permanent Habitat Protection	Landowner Outreach to establish Conservation Easements to protect existing high quality wetlands and stream corridor	NCWPC / TLC / MCDEF	91.9	$3,000	$275,643	$1,000	$9,188	D
Lower Nippersink	4-26	Natural Habitat Restoration	**MCCD Kattner Parcel (Nippersink Canoe Base)** tile removal and ditch closure, marsh / sedge meadow / wet prairie restoration (MCNAI Site BUR03)	MCCD	78.6	$2,000	$157,270			A
Lower Nippersink	4-27	Permanent Habitat Protection	Landowner Outreach landowner to correct wetland filling violations and implement Conservation design practices for future developments on the parcel	USACE / MCHENRY COUNTY / TLC / MCCD	26.3	$500	$13,145	$500		F
Lower Nippersink	4-28	Permanent Habitat Protection	Landowner / Government Outreach for Conservation Design for proposed development on parcels containing headwaters of Horse Fair Creek and Horse Fair Springs Fen MCNAI site	NCWPC / TLC / VILLAGE OF SPRING GROVE	42.0	$500	$20,978	$1,000	$1,049	B
Lower Nippersink	4-29	Permanent Habitat Protection	Landowner / Government Outreach for Conservation Design for proposed development on parcels northeast of Richardson Road and Main Street to protect ADID wetland N340	NCWPC / TLC / VILLAGE OF SPRING GROVE	20.9	$500	$10,464	$1,000	$523	B
				SW TOTALS	**1,118.4**		**$1,960,371**	**$22,500**	**$51,860**	

PRIORITY

- **A Projects that have cooperating partners, can move to implementation quickly. Implementation Timeframe 1 to 3 years**
- **B Projects subject to imminent development pressure, Implementation Timeframe 1 to 2 years**
- **C Projects needed to protect sensitive areas. Timeframe 1 to 2 years**
- **D Restoration projects, Timeframe 1 to 5 years**
- **E Retrofit Projects, Timeframe 1 to 5 years**
- **F Existing Pollution Potential, Timeframe 1 to 2 years**
- **G Policy / Opportunity Review Project, Timeframe 1 to 3 years**

Chapter 6
Glacial Park / Tamarack Farms Subwatershed Assessment

This section presents a summary of the characteristics of the Glacial Park / Tamarack Farms Subwatershed, as well as specific issues and challenges in this subwatershed that must be addressed in the Nippersink Creek Watershed Management Plan.

6.1 Subwatershed Characteristics

The following section provides an overview of the physical characteristics of the subwatershed.

6.1.1 Subwatershed Location

The Glacial Park / Tamarack Farms subwatershed is located downstream of Wonder Lake, in the eastern portion of the Nippersink Creek Watershed. This subwatershed has an area of 12,588 acres (19.67 square miles), comprising about 9.7% of the overall Nippersink Creek watershed. The boundary of the subwatershed is shown in Figure 6.1. The subwatershed is located within Richmond, McHenry, Hebron, and Greenwood Townships, and is roughly bordered by Wonder Lake on the south, Greenwood Road on the west, Illinois Route 173 on the north, and South Solon Road on the east.

Figure 6.1

Glacial Park / Tamarack Farms Subwatershed Location Map

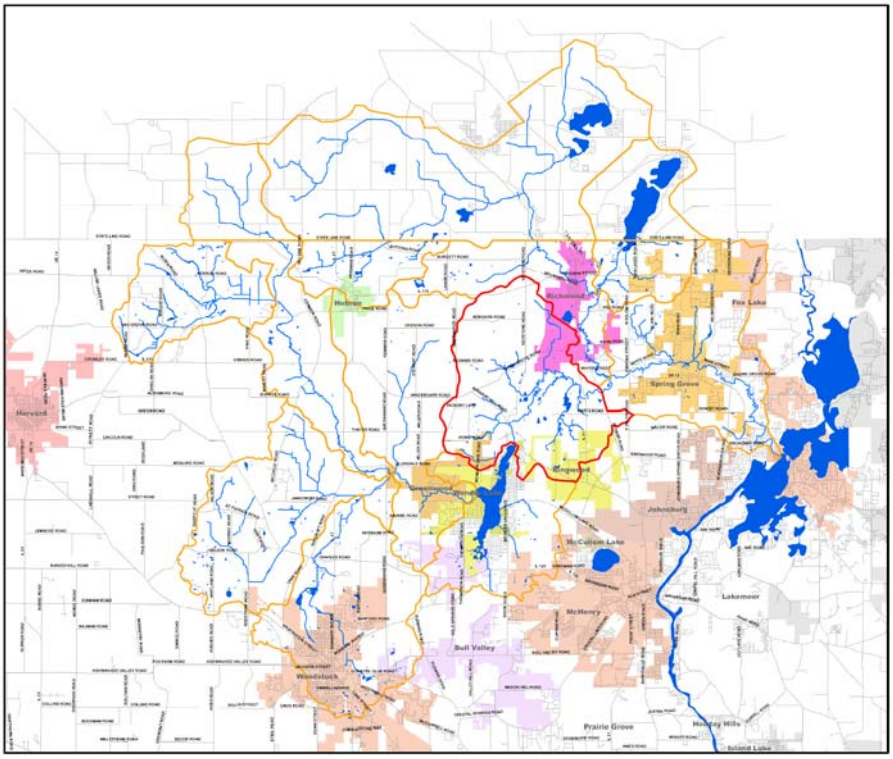
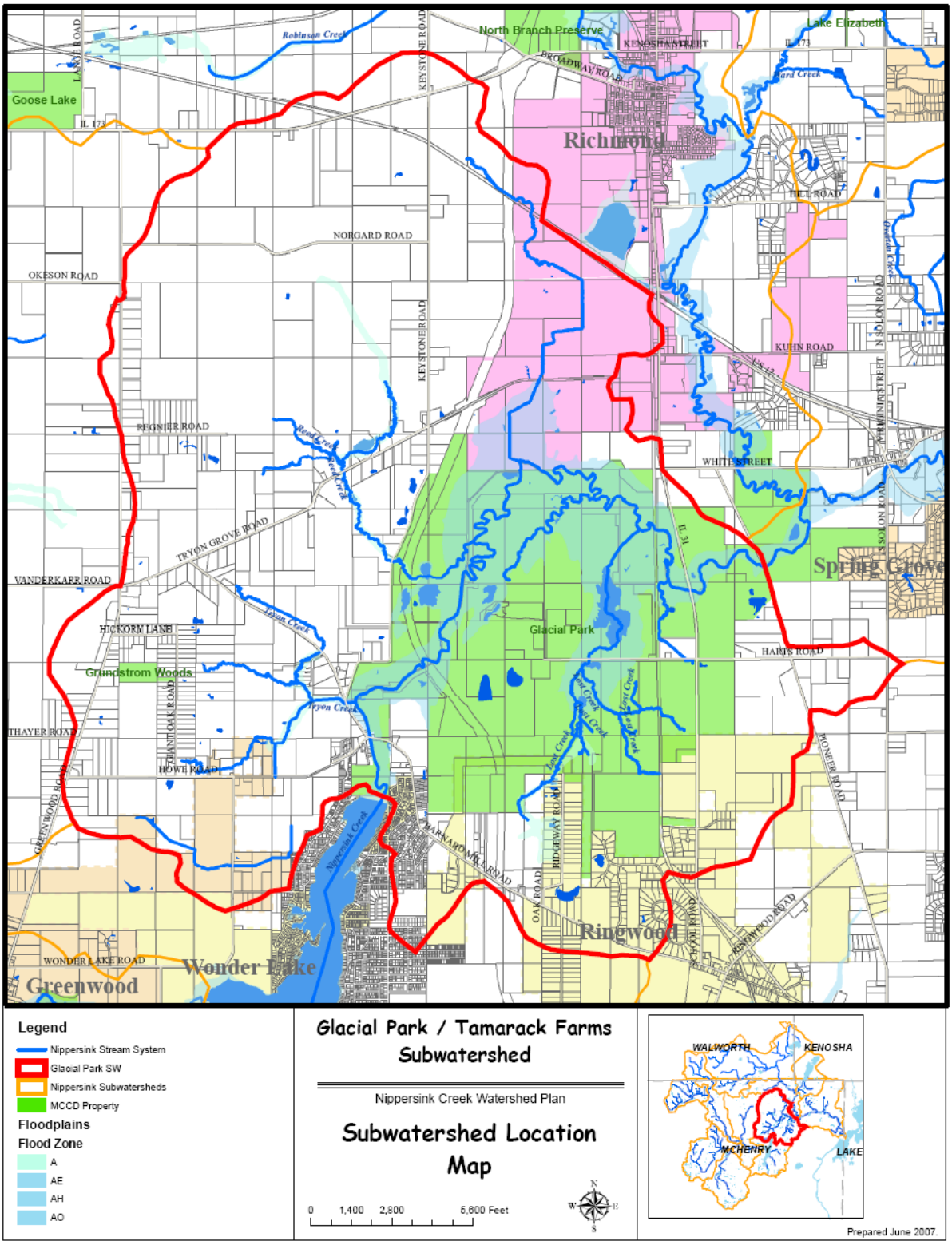


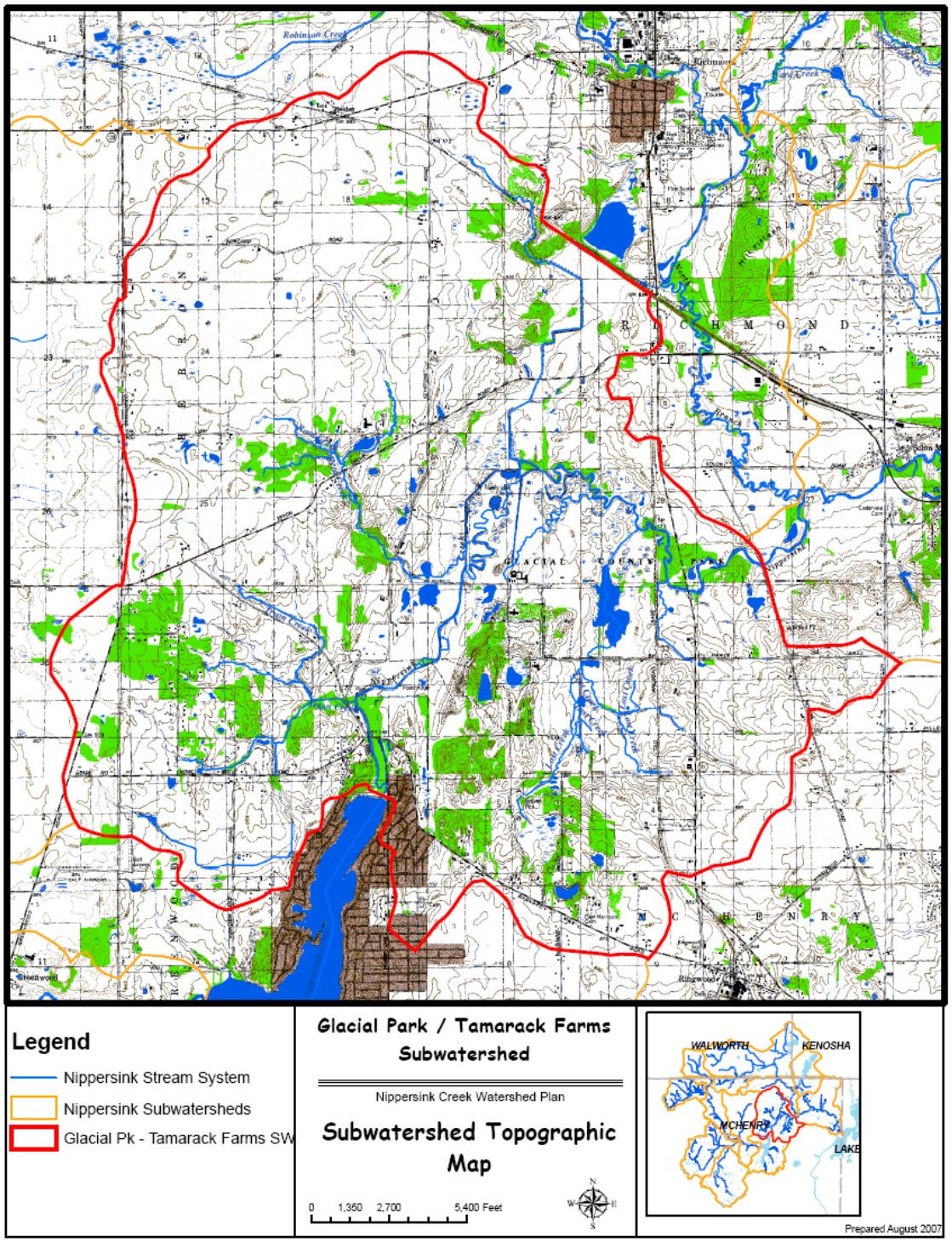
Figure 6.2 Glacial Park / Tamarack Farms Subwatershed Map



6.1.2 Topography & Geology

The topography of the Glacial Park / Tamarack Farms subwatershed is moderately sloping, generally between 2% and 4%, with a maximum elevation of 928 feet near Greenwood and Vander Karr Road, and a minimum elevation of 764 feet at the subwatershed outlet near Pioneer Road.

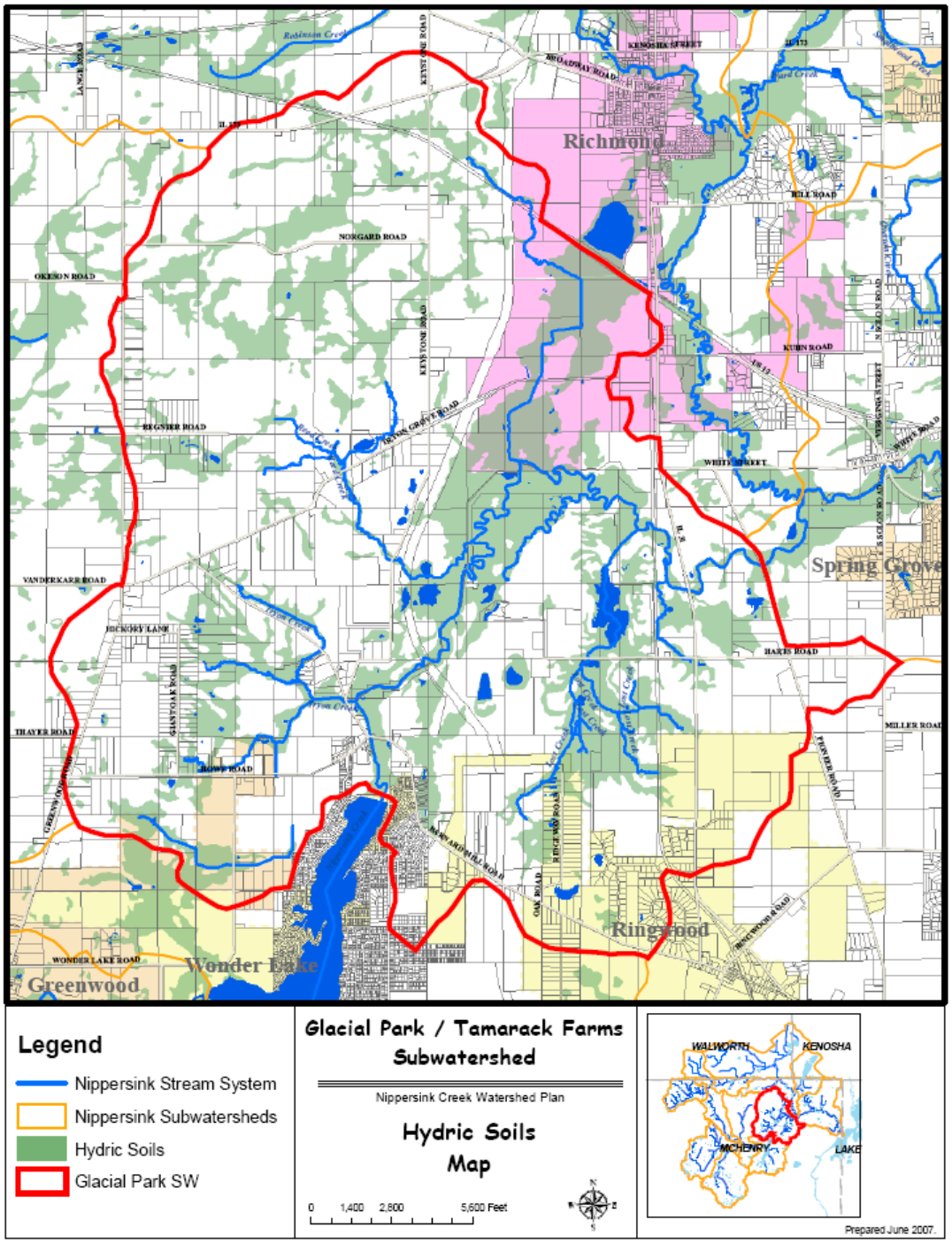
Figure 6.3 USGS Topographic Map of Glacial Park / Tamarack Farms Subwatershed



6.1.3 Soil Characteristics

The glacial advances across McHenry County resulted in a wide variety of soil associations. Each major grouping of soil associations has potential impact on current and future land uses within the subwatershed. For example, hydric (wetland) soils constitute 3,579 acres, or 34.3% of the 12,588 acre subwatershed, and indicate those areas that contain functional wetlands, or former / degraded wetland areas that could be restored or enhanced.

Figure 6.4 Hydric Soils of the Glacial Park / Tamarack Farms Subwatershed



6.1.4 Pre-Settlement Vegetation

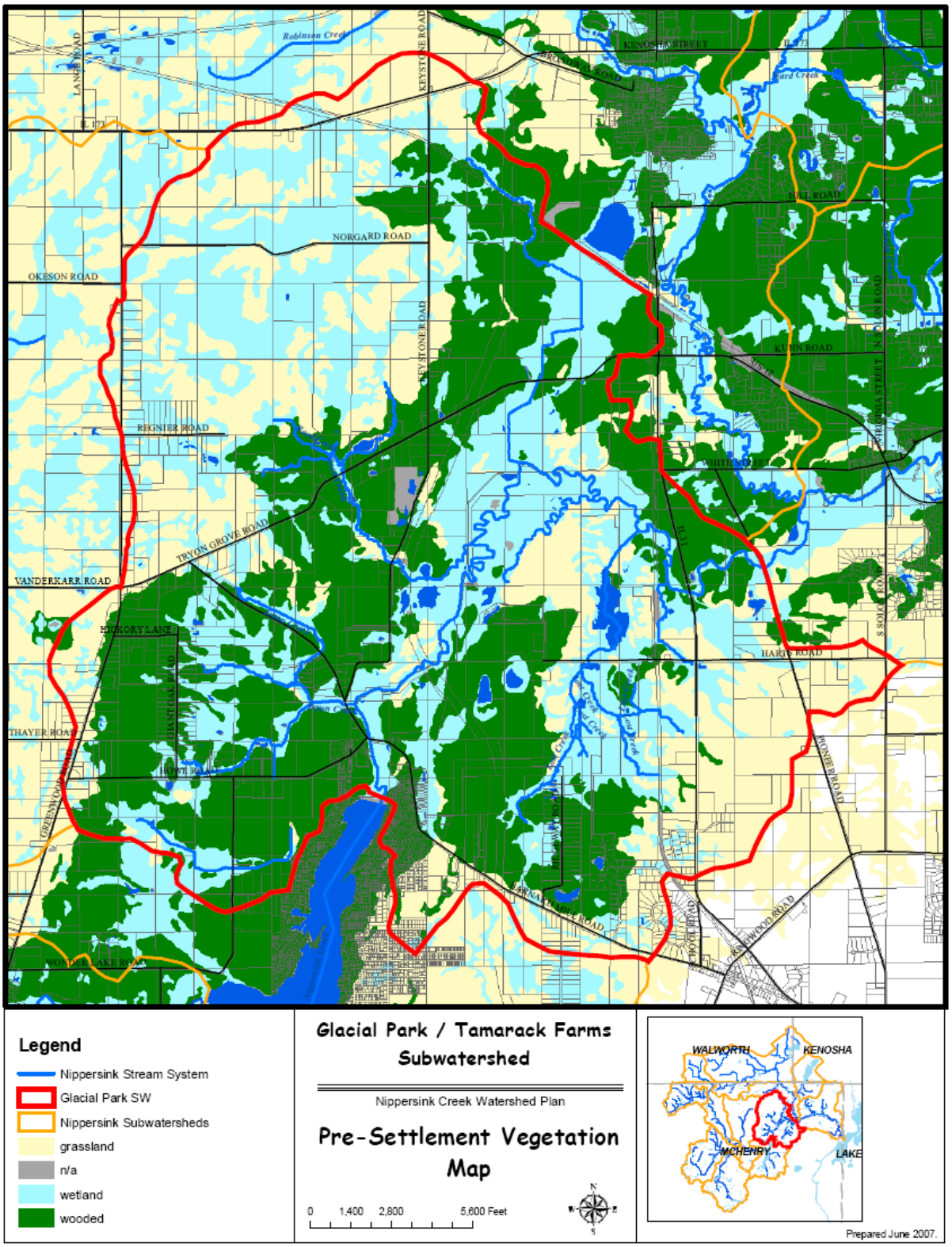
To guide future land management or restoration efforts, it is important to recognize the native plant communities that naturally evolved subsequent to the last glacial advances. Prior to European settlement in the 1830's, the Glacial Park / Tamarack Farms Subwatershed was roughly divided between grassland, woodlands, and wetlands, as depicted in Figure 6.5, The woodlands, largely comprised of oak / hickory woodland and savannah, were bisected with wetlands and grassland along the drainageways as shown in Table 6.1.

Table 6.1 Pre-Settlement Land Cover Conditions

Cover Type	Area	Percent of Subwatershed
Grasslands	3,475.0 acres	28 %
Wooded	4,542.5 acres	36 %
Wetlands	4,472.6 acres	36 %
n/a	97.9 acres	1 %

Source: MCCD Soils Analysis using GIS data

Figure 6.5 **Pre-settlement Vegetation Map in the Glacial Park / Tamarack Farms Subwatershed**



6.1.5 Subwatershed Drainage Features

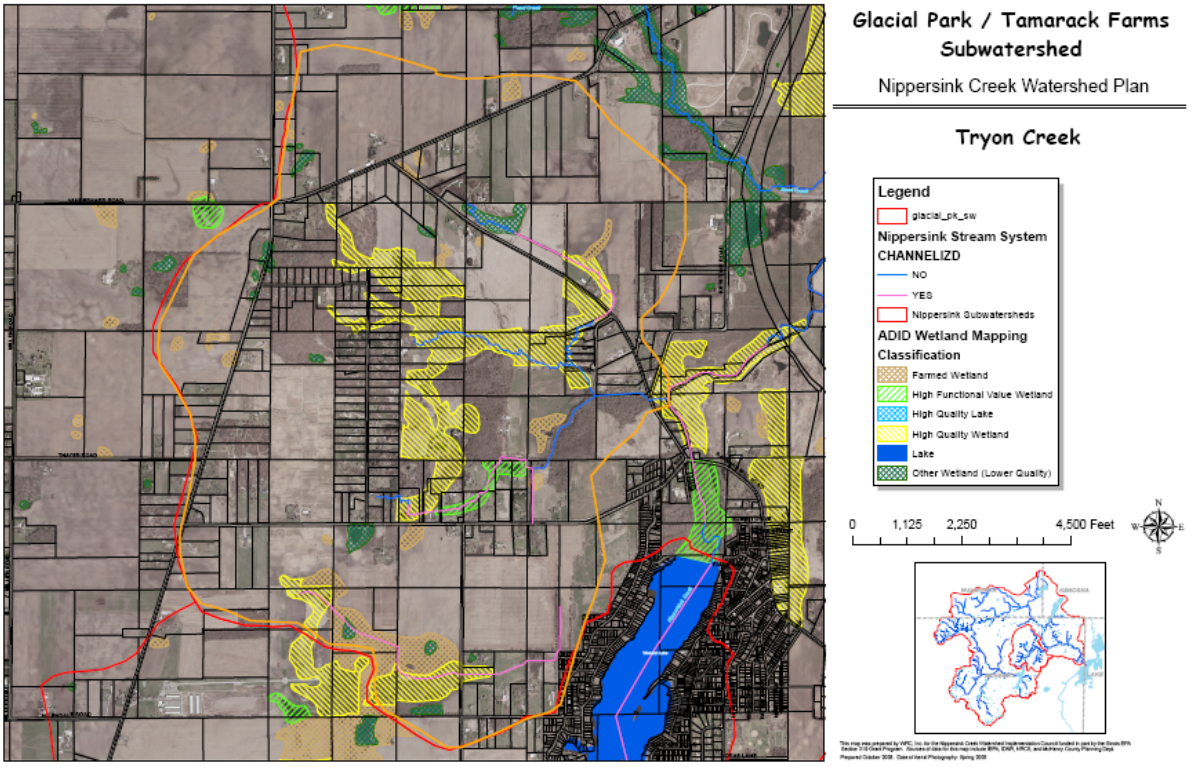
Streams

The principal stream in the Glacial Park / Tamarack Farms subwatershed is Nippersink Creek. There are four tributaries in the subwatershed: Lost Creek, Reed Creek and Tryon Creek, as well as two unnamed tributaries. This section describes the physical conditions of the streams in this subwatershed, including the stream corridor through which they flow.

In this subwatershed, Nippersink Creek flows for about 7.5 miles between the Wonder Lake Dam and Pioneer Road. Nearly the entire length of Nippersink Creek in this subwatershed is contained within the McHenry County Conservation District's (MCCD) 3,200 acre Glacial Park property. Historically, this stream had been subjected to extensive channelization to improve agricultural productivity, but in 2001, MCCD de-channelized and re-meandered several miles of the Nippersink. Most of the remaining channelization is located immediately upstream and downstream of Barnard Mill Road at the upstream end of the subwatershed.

Tryon Creek drains an area of 2,500 acres in the southwest region of the subwatershed. Tryon Creek originates in the agricultural field east of Greenwood Road, north of Tryon Grove Road. Tryon Creek has two tributaries which also drain the land south of Barnard Mill Road down to the farm fields on the south side of Howe Road.

Figure 6.6 Tryon Creek Area of Interest



Lost Creek, located in the eastern half of the subwatershed, drains about 1,900 acres north of the Village of Ringwood (west of Pioneer Road).

Reed Creek drains about 2,400 acres in the northwestern section of the subwatershed; generally the area between Greenwood Road, Tryon Grove Road, and Keystone Road. The stream corridor along Reed Creek is primarily wooded, except for the first mile which bordered by wetland and prairie on the Glacial Park property.

Manmade Drainage Systems

Analysis of land uses and aerial photography indicates that nearly all (90 %+) of the developed land is drained by a system of open channel turf grass swales and culverts. Limited field investigations suggest that the existing man-made storm water system was not designed or constructed to treat the runoff from developed areas prior to discharge to the sensitive streams and wetlands in the subwatershed.

Agricultural Tile Systems

Due to the predominantly agricultural nature of the subwatershed, it is likely that there many functioning underground drain tile systems remaining in the subwatershed, particularly in the western half of the subwatershed. Historically, these were the areas that had poor drainage characteristics, but that farmers could successfully convert to agricultural usage by the installation of agricultural drain tile systems.

Identifying agricultural drain tile networks is important in watershed planning because current local flooding and drainage problems can often be linked to damage or age-related failure of drain tile systems. From a watershed preservation / restoration perspective, it is important to identify functional drain tile systems to determine opportunities for their removal or reconfiguration for the purposes of restoring valuable wetland habitat, and water quality benefits.

It is probable that many of the depressional and low lying areas in the subwatershed that are now drained by tile systems were once wetland and wet prairie ecosystems that supported very diverse habitats.

6.1.6 Population

The use and analysis of population data in watershed planning is critical because there is a direct correlation between the number of people residing in a watershed and the degree of impacts to the quality and quantity of the watershed natural resources. In 1990, the population in the subwatershed was estimated at 2,235, or 115 persons per square mile.

According to the 2000 US Census, the population in the Glacial Park subwatershed was about 2,550 people, or about 131 persons per square mile. This represents a 14% increase in population over 10 years.

6.1.7 Land Cover

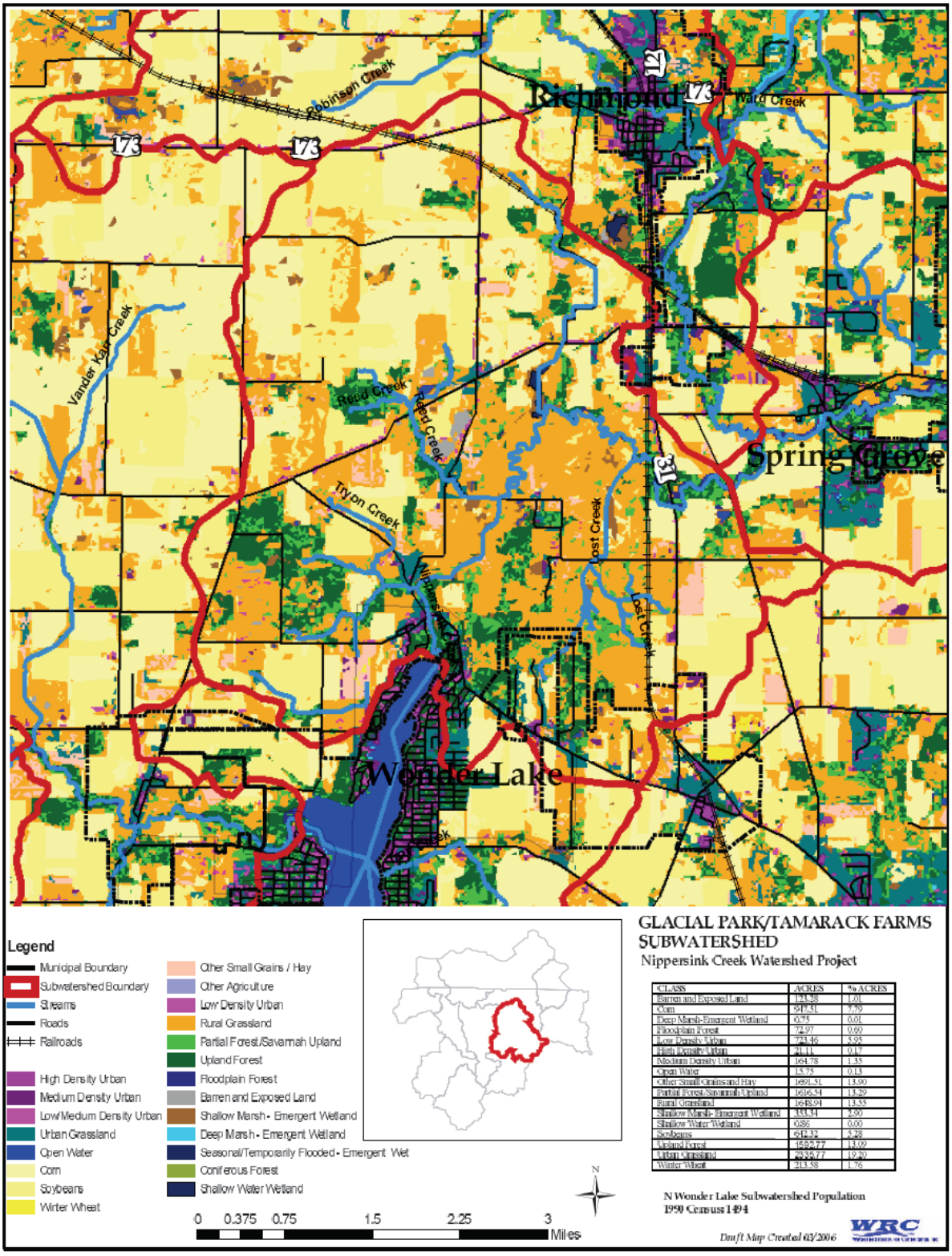
Often, the terms Land Cover and Land Use are used interchangeably. However, there are differences. Land Cover refers to the vegetation, structures, or other features that cover the land. On the other hand, Land Use (as discussed in Section 6.1.8) refers to how land is used by humans.

Land cover data for the Nippersink Creek Watershed are available from the Illinois Department of Natural Resources using LANDSAT data collected between 1998 and 1999. The dominant land cover, according to this data, was rural grasslands and agricultural row crops (78%). Urban landscapes accounted for roughly 4.5% of the Glacial Park / Tamarack Farms subwatershed area while wooded areas and wetlands account for an additional 7.5% of the subwatershed.

Table 6.2 1999 Land Cover for the Glacial Park / Tamarack Farms Subwatershed

Land Cover Description	Total Acres	Percent of Subwatershed
Barren & Exposed Land	54.1	0.4%
Corn, Soybeans, Other Small Grains & Hay	5,296.9	42.1%
Winter Wheat	7.2	0.1%
Rural Grassland	4,533.3	36.0%
Low Density Urban	131.6	1.0%
Medium Density Urban	93.9	0.7%
High Density Urban	11.7	0.1%
Urban Grassland	339.6	2.7%
Shallow Marsh – Emergent Wetland	180.2	1.4%
Shallow Water Wetland	18.8	0.1%
Partial Forest / Savanna Upland	681.2	5.4%
Upland Forest	1,182.5	9.4%
Floodplain Forest	36.1	0.3%
Deep Marsh / Emergent Wetland	2	0.0%
Open Water	19.1	0.2%
TOTAL	**12,588.2**	**100.0%**

Figure 6.7 1999-2000 Land Cover Map for Glacial Park / Tamarack Farms Subwatershed



CLASS	ACRES	% ACRES
Barren and Exposed Land	123.28	1.01
Corn	947.51	7.79
Deep Marsh-Emergent Wetland	0.75	0.01
Floodplain Forest	72.97	0.60
Low Density Urban	723.46	5.95
High Density Urban	21.11	0.17
Medium Density Urban	164.78	1.35
Open Water	15.75	0.13
Other Small Grains and Hay	1691.51	13.90
Partial Forest/Savannah Upland	1616.54	13.29
Rural Grassland	1648.94	13.55
Shallow Marsh- Emergent Wetland	333.34	2.90
Shallow Water Wetland	0.86	0.00
Soybeans	642.32	5.28
Upland Forest	1592.77	13.09
Urban Grassland	2335.77	19.20
Winter Wheat	213.58	1.76

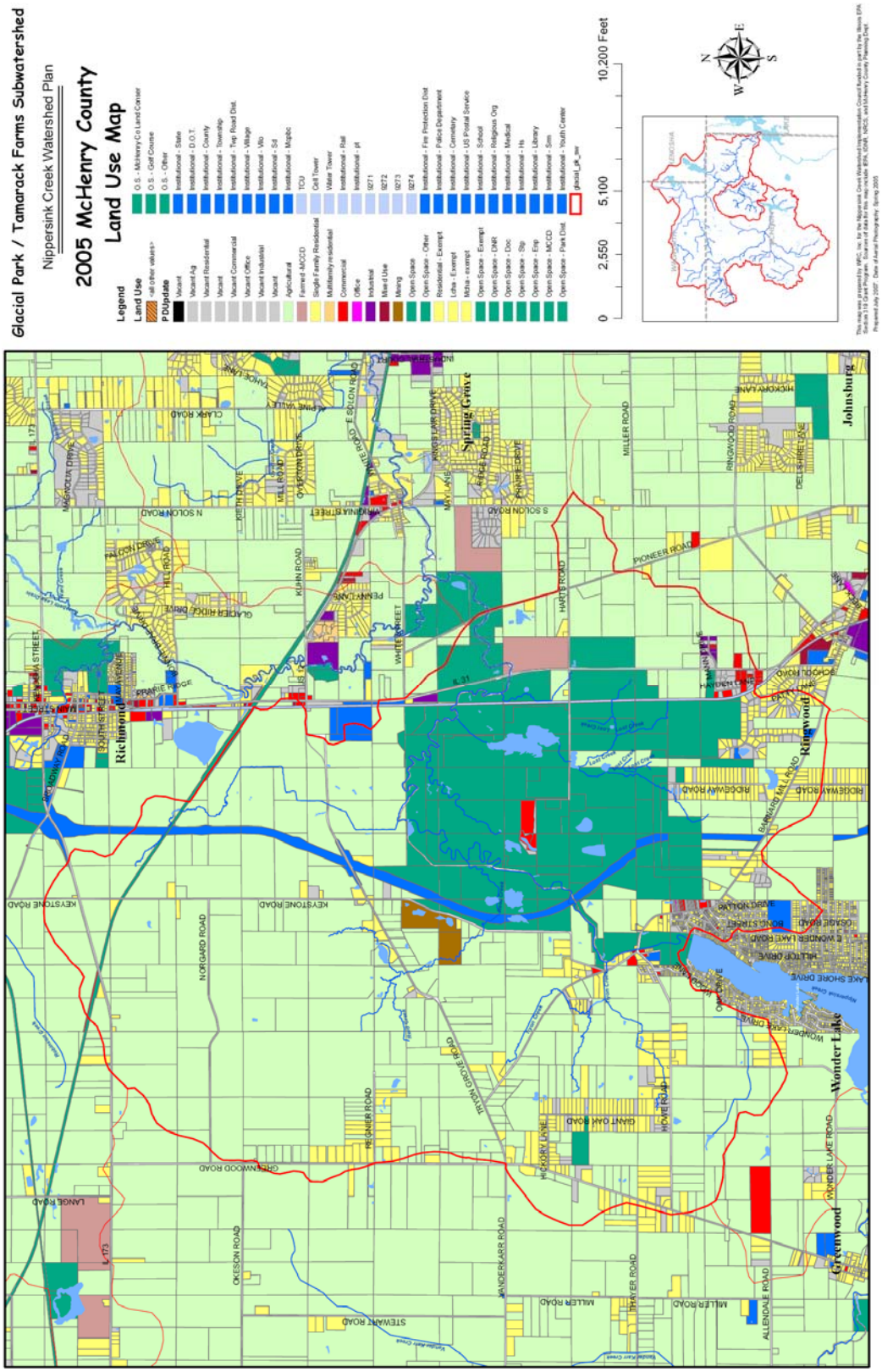
6.1.8 Land Use / Existing Watershed Development

According to the 2005 McHenry County Land Use / Zoning map, 63% of the subwatershed is zoned for agricultural use, while about 16% is either already developed or zoned for development in the future. Almost 21% is classified as open space.

Table 6.3 McHenry County 2005 Land Use for the Glacial Park / Tamarack Farms Subwatershed

Land Use	Total Acres	Percent of Subwatershed
Vacant	0.15	0.0%
Vacant; Zoned Residential	226.4	1.8%
Vacant; Zoned Commercial	31	0.2%
Vacant; Zoned Office	0.6	0.0%
Vacant; Zoned Industrial	9.1	0.1%
Agricultural	7,939.2	63.1%
Single Family Residential	982.8	7.8%
Multi-Family Residential	0	0.0%
Commercial	60.6	0.5%
Office	0.9	0.0%
Industrial	13.3	0.1%
Mixed Use	1.5	0.0%
Mining	69.7	0.6%
Open Space	2611	20.7%
Institutional	284.1	2.3%
Right of Way	357.8	2.8%
TOTAL	**12,588.2**	**100.0%**

Figure 6.8 **2005 McHenry County Land Use Map for Glacial Park / Tamarack Farms Subwatershed**



Development in the subwatershed has occurred principally through municipal annexation, in the form of low density development (1/2 acre to 1 acre lots).

Table 6.4 Municipal Areas in the Glacial Park / Tamarack Farms Subwatershed

Municipality	Area (acres)	Percent of SW
Village of Ringwood	946	7.5%
Village of Richmond	875	7.0%
Village of Greenwood	286	2.3%
Village of Wonder Lake	46	0.4%
Unincorporated McHenry County	10,435	82.9%

There are 40.2 miles of roads in the subwatershed, which equates to more than 135 acres of impervious cover (roadway pavement only – excludes parking lots, sidewalks, and driveways).

Point Source Discharges

There is no point source discharges into Nippersink Creek in the Glacial Park / Tamarack Farms Subwatershed.

6.1.9 Natural Resources

McHenry County Conservation District Properties

There are four McHenry County Conservation District properties in the subwatershed, totaling about 2,955 acres, or 23% of the Glacial Park / Tamarack Farms subwatershed area.

Table 6.5 MCCD Properties in the Glacial Park / Tamarack Farms Subwatershed

Name	Area in SW (acres)	Total MCCD Property Area
Glacial Park	2,932.5	3,264.2
Gunderstrom Woods	22.8	22.8
Total	**2,955.3**	

Other Publicly Protected Land

There is a proposed roadway alignment running north-south through the center of the subwatershed that was assembled to allow a divided highway linkage to Route 12 at the Wisconsin state line. Much of this alignment, owned by the State of Illinois, passes through Glacial Park.

Table 6.6 Other Publicly Protected Land in the Glacial Park / Tamarack Farms Subwatershed

Name	Area (acres)	# of Parcels
State of Illinois	182.5	8

McHenry County Natural Areas Inventory

There are four McHenry County Natural Area Inventory Sites within the subwatershed, representing about 35% of the entire subwatershed.

Table 6.7 McHenry County Natural Areas Inventory Sites in the Glacial Park / Tamarack Farms Subwatershed

MCNAI Site ID	Name	Area in SW (acres)	Total NAI Site Area	Ownership
GRE02	Blanding's Turtle Meadow	28.9	28.9	Private
GRE04	Galt Airport Sedge Meadow	15.8	47.9	Private
HEB07	Tryon Creek Wetlands	186.4	186.4	Private
RIC01	Cowpie Creek Fen	12.5	12.5	Private
RIC06	Glacial Park	4,153.7	4,673.8	Public / Private
	TOTAL	**4,397.3**		

Wetlands

McHenry County completed an Advanced Identification (ADID) Wetland Study in 2003. This study identified a total of 129 wetlands, totaling 1,725 acres, or 13.7% of the Glacial Park / Tamarack subwatershed. Of these wetlands, 1,310 acres (76%) were determined to be of High Quality.

Table 6.8 Mapped Wetland Summary for Glacial Park / Tamarack Farms Subwatershed

ADID Code	Wetland Type	Number of Wetlands	Total Area (acres)
HFV	High Functional Value	11	190.3
HQW	High Quality Wetland	12	1,309.8
FW	Farmed Wetland	56	190.3
W	Other Wetlands (lower quality)	50	225.3
	TOTAL	**129**	**1,725.4**

Threatened & Endangered Species

Threatened and Endangered (T&E) species data were extracted from T&E data records documented in the McHenry County Natural Areas Inventory Database. The data were collected by the McHenry County Conservation District during field studies undertaken at subwatershed Natural Area Inventory Sites. The data indicate that there are at least eighteen threatened or endangered animal species living in the subwatershed and at least nine different T&E plant species.

Table 6.9 Threatened and Endangered Species in the Glacial Park / Tamarack Farms Subwatershed

Common Name	Scientific Name	Type	Status	MCNAI Site
Henslow's Sparrow	Ammodramus henslowii	Bird	St Threatened	RIC06
Upland Sandpiper	Bartramia longicauda	Bird	St Endangered	RIC06
Black Tern	Chlidonias niger	Bird	St Endangered	RIC06
Northern Harrier	Circus cyaneus	Bird	St Endangered	RIC06
Common Moorhen	Gallinula chloropus	Bird	St Threatened	RIC06
Sandhill Crane	Grus Canadensis	Bird	St Threatened	RIC06
Least Bittern	Ixobrychus exilis	Bird	St Threatened	RIC06
Black-Crowned Night-Heron	Nycticorax nycticorax	Bird	St Endangered	RIC06
King Rail	Rallus elegans	Bird	St Endangered	RIC06
Forster's Tern	Stema forsteri	Bird	St Endangered	RIC06
Yellow-Headed Blackbird	Xanthocephalus xanthocephalus	Bird	St Endangered	RIC06
Regal Fritillary	Speyeria idalia	Butterfly	St Threatened	RIC06
River Redhorse	Moxostoma carinatum	Fish	St Threatened	RIC06
Blacknose Shiner	Notropis heterolepis	Fish	St Endangered	RIC06
Slippershell Mussel	Alasmidonta viridis	Mussel	St Threatened	RIC06
Purple Wartyback Mussel	Cyclonaias tuberculata	Mussel	St Threatened	RIC06
Spike Mussel	Elliptio dilatata	Mussel	St Threatened	RIC06
Blanding's Turtle	Emydoidea blandingii	Reptile	St Threatened	RIC06
White Lady's Slipper	Cypripedium candidum	Plant	St Threatened	RIC06
Round-Leaved Sundew	Drosera rotundifolia	Plant	St Endangered	RIC06
Rusty Cotton Grass	Eriophorum virginicum	Plant	St Endangered	RIC06
Tamarack	Larix laricina	Plant	St Threatened	RIC06
Pale Vetchling	Lathyrus ochroleucus	Plant	St Threatened	RIC06
Savanna Pinweed	Lechea intermedia	Plant	St Threatened	RIC06
Eastern Prairie Fringed Orchid	Platanthera leucophaea	Plant	St Endangered / Fed Threatened	RIC06
Large Cranberry	Vaccinium macrocarpon	Plant	St Endangered	RIC06
Dog Violet	Viola conspersa	Plant	St Threatened	RIC06

Source: McHenry County Natural Areas Inventory Database, 2005

Existing Greenways

Although there are no formal greenways in the Glacial Park Subwatershed, more than 13 miles of Nippersink Creek and its tributaries are protected from disturbance due to acquisition by the McHenry County Conservation District. There is also a regional bicycle trail created from a former railroad alignment that runs roughly parallel to Route 31. Called the "Prairie Trail", this path extends across McHenry County from Kane County on the south to Wisconsin on the north. This trail connects eight McHenry County communities, and links to over 100 mile of other trails.

6.2 Analysis of Subwatershed Data and Problem Identification

6.2.1 Water Quality Data & Identified Problems

The Illinois Environmental Protection Agency (IEPA) is tasked with assessing the quality of the surface water resources of Illinois. The IEPA has determined Nippersink Creek's designated uses are:

- Aquatic Life
- Fish Consumption
- Primary Contact
- Secondary Contact
- Aesthetic Quality

The IEPA periodically produces a 303(d) list, which identifies waterways that are not achieving certain designated uses. In the 2006 IEPA 303(d) list, Nippersink Creek is identified as being in Full Support of its Aquatic Life Designated Use, which is notable for a stream in northeastern Illinois.

However, Nippersink Creek was also determined to be Non-supporting of its Primary Contact Designated Use, due to excessive levels of fecal coliform. This pollutant, associated with human and animal waste, was listed as coming from an unknown source. The IEPA also identified fish consumption, secondary contact and aesthetic quality as designated uses for Nippersink Creek, although the ratings for these uses were classified as "not assessed".

The Illinois Environmental Protection Agency maintains one water quality sampling station in the Glacial Park / Tamarack Farms subwatershed.

Table 6.10 IEPA Water Quality Sampling Stations in the Glacial Park / Tamarack Farms Subwatershed

Station	Stream	Location
DTK02	Nippersink Creek	Nippersink Creek at Barnard Mill Road

The Fox River Watershed Monitoring Network (FRWMN), administered by the not-for-profit group, *Friends of the Fox River*, maintains four volunteer stream monitoring sites on Nippersink Creek; one is located in the Glacial Park / Tamarack Farms subwatershed at the Keystone Landing on the southwest side of Glacial Park. During 2005 and 2006 monitoring periods, FRWMN volunteers reported water quality index values (based on macroinvertebrate sampling) as Fair (Taxa rating between 14 and 20).

6.2.2 Flooding Problems

At the time of this writing, no data were provided by the County or municipalities regarding existing flooding problems. Analysis of available floodplain information suggests that there may be as many as six homes in the FEMA 100-year Floodplain. The majority of these homes are located along Barnard Mill Road, at the upstream end of the subwatershed.

6.2.3 Projected Development & Growth

Development in the Glacial Park / Tamarack Farms subwatershed is expected to increase from 4.5% in 2000 to at least 15% in the near future. The Village of Greenwood has about 150 acres of undeveloped land within its current municipal boundary. The Village of Richmond has more than 860 acres of undeveloped land within its current boundaries in the subwatershed. The Village of Ringwood has more than 380 acres of undeveloped land within its borders in the subwatershed. This additional 1,400 acres represents about 11% of the subwatershed that is currently in agricultural use.

NIPC population projections for 2030 indicate that Ringwood's population will increase from 471 (2000 census) to 1,890 (300% increase). Richmond's population is expected to increase from 1,091 to 15,059 (1,280% increase). It is reasonable to expect that at least one-third of the additional 15,387 future residents of these municipalities will reside within the subwatershed.

6.2.4 Natural Area Protection / Preservation Issues

McHenry County Natural Area Inventory Sites

In the Glacial Park / Tamarack Farms subwatershed, about 60% of the high quality ADID wetlands are protected through public ownership (791 of 1,308 acres on MCCD property). In addition, a 330 acre parcel within the MCCD property was dedicated as an Illinois Nature Preserve in 1992.

Glacial Park / Tamarack Farms (MCNAI RIC06) is the largest MCNAI site in the Nippersink Watershed. About 90% of this 4,674 acre site is in the subwatershed; however, only 58% of the MCNAI site is protected within the MCCD Glacial Park property. This site has natural features such as mesic, dry mesic, and wet silt loam prairies; silt loam barrens; basin and streamside marshes; graminoid fens; sedge meadows; a low shrub bog; and a dry mesic silt loam woodland.

The MCNAI database indicates that the Glacial Park / Tamarack Farms NAI site is currently impaired by bank erosion along Nippersink Creek and its tributaries; siltation; carp; water table alteration; brush encroachment; invasive species (Garlic Mustard, Purple Loosestrife and Reed Canary Grass) and development – particularly on the north end of the MCNAI site.

Cowpie Creek Fen (MCNAI RIC01) is a 12.5 acre, privately owned graminoid fen located near Tryon Grove Road in Richmond Township. The MCNAI database indicates that this natural area is being degraded due to water table alteration, siltation, and brush encroachment.

The Galt Airport Sedge Meadow (MCNAI GRE04) is 48 acre sedge meadow located at the east end of the Galt Airport in Greenwood Township. About 16 acres of this MCNAI site is in the subwatershed and none of the MCNAI site has any type of permanent protection from future disturbances. The MCNAI database lists this wetland as being impacted by water table alteration and brush encroachment.

Blanding's Turtle Meadow (MCNAI GRE02), is a 29 acre wetland just east of the Galt Airport Sedge Meadow. This MCNAI site is on private property and is listed as being degraded due to water table alteration and brush encroachment.

Tryon Creek Wetlands (MCNAI HEB07) is a 186 acre sedge meadow complex that spans the stream corridors of Tyron Creek and its tributaries near Giant Oak Road. The natural areas at this site are located on private property (mostly large-lot / rural residential) and according to the MCNAI database are not actively managed and therefore are being overgrown with brush. Water table alteration was also listed as an on-going management problem at this site.

6.3 Subwatershed-Specific Recommendations to Protect Water Resources

The following section discusses the Best Management Practices (BMP's) identified for this subwatershed that should be implemented to address existing or potential water quality impairments. The location of each recommended BMP project is presented in Figure 6.9

Pollutant Loading Modeling, as discussed in Chapter 3, identified current and future pollutant loadings, based upon land use, soils, slopes, etc., and quantified these loadings. The results of this Pollutant Loading modeling were then used to identify the types of BMP's that should be implemented to create a loading reduction of those pollutants. Table 6.11 presents a summary of the recommended BMP projects, as well as the expected pollutant loading reductions expected if the BMP's are implemented, and function as intended.

Table 6.12 presents detailed cost and logistical information on each of the recommended BMP projects. Below is a summary list of recommendations for the subwatershed to help stakeholders and decision makers meet the Goals and Objectives set forth for Nippersink Creek. Background information regarding how each type of recommendation addresses watershed concerns and/or impairments (existing or future) can be found in Chapter 4.

Type:	Education / Outreach; Regulatory; Site Restoration; Monitoring; Permanent Habitat Protection, Water Quality
Target Goals:	Which watershed plan goals the recommendation is intended to address.
Initial Implementation Cost:	The initial cost, in 2007 dollars to initiate the recommended action, if applicable.
Initial Outreach Cost:	The initial cost, in 2007 dollars to initiate the recommended action, if applicable.
Annual Cost:	The long term expected annual cost (in 2007 dollars) to successfully implementation of the recommendation
Responsible Party:	Identifies the LEAD agency, entity, or landowner who will ultimately have to execute the recommendation. SUPPORTING parties, such as government agencies, grant sources, etc. may also be identified here.
Priority:	A ranking of the BMP recommendations, based upon the nature / urgency of the existing / potential impairment; the availability of willing landowners)/ partners; short-term vs. long-term development pressure; and whether the project is a new effort, or a retrofit of an existing practice.

The project cost estimates contained in this report should be considered preliminary, and are only presented to identify the potential magnitude of cost, from a watershed scale perspective. No site-specific investigation, analysis, or design of any recommended project, from which accurate cost information could be obtained, was completed as part of the preparation of the 2008 Nippersink Creek Watershed Plan.

If a watershed stakeholder decides to apply for grant funding assistance to implement any of the recommended projects presented in this report, they should first undertake any additional studies / research needed to determine an updated / accurate project cost. They should not solely rely on the cost estimates presented in the NCWP report as the basis for their grant request.

Note: The following acronyms for responsible parties identified in Table 6.12 are presented below:

NCWPC	Nippersink Creek Watershed Planning Committee
NRCS	Natural Resource Conservation Service
SWCD	McHenry County Soil and Water Conservation District
MCCD	McHenry County Water Conservation District
TLC	The Land Conservancy of McHenry County
MCDEF	McHenry County Defenders
MPOA	Wonder Lake Master Property Owners Association
USFWS	U.S. Fish and Wildlife Service
NPS	National Park Service

Figure 6.9 Glacial Park / Tamarack Farms Subwatershed Site Recommendations Map

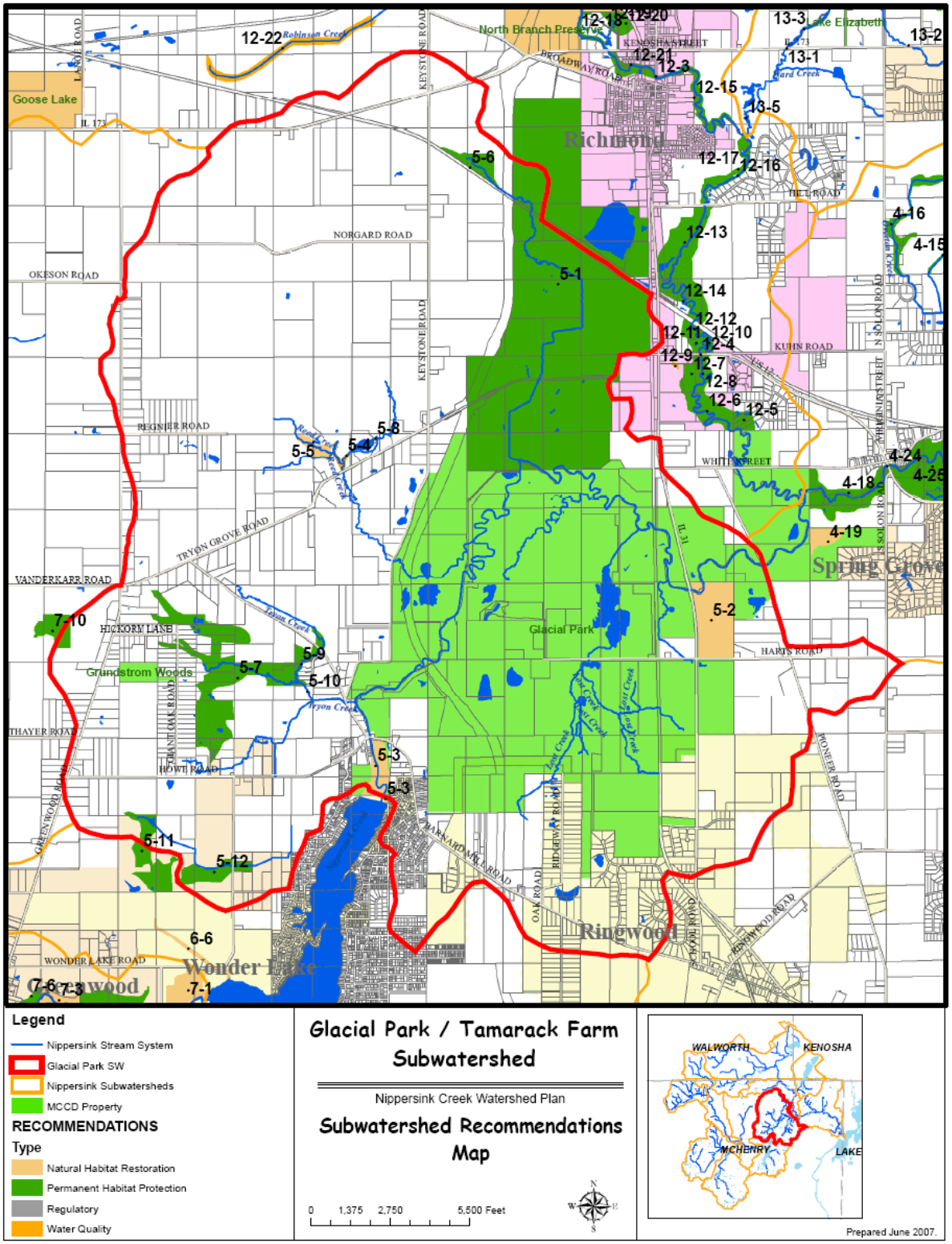


Table 6.11 BMP Selection & Associated Pollutant Load Reduction for the Glacial Park / Tamarack Farms Subwatershed

BMP	Type of BMP	Project Locations**	BMP		Removal Efficiency***			(lbs/year)****			Percentage Reduction		
			Size	Unit	TN	TP	TSS	TN	TP	TSS	TN	TP	TSS
Natural Habitat Protection	Watershed-specific	5-2, 5-3, 5-5, 5-8, 5-10	121	acres	30%	35%	60%	745	46	52	1.4	1.7	2.9
Dam Removal / Modification	Site-specific	5-3, 5-8, 5-10	1	lump sum	0%	0%	0%	0	0	0	0	0	0
Permanent Habitat Protection	Site-specific	5-1, 5-6, 5-7, 5-9, 5-11, 5-12	1,238	acres	53%	51%	88%	13,470	685	774	26.1	25.1	43.3
Regulatory*	Watershed-specific	Subwatershed	1	Water-shed	5%	5%	5%	2,583	137	89	5	5	5
Nutrient Management	Watershed-specific	Subwatershed wide	100	acres	70%	28%	-	1,437	30	-	2.8	1.1	-
Stream Corridor Restoration	Sub-watershed	5-4, 5-6, 5-8, 5-9	27	acres	53%	51%	88%	294	15	17	0.6	0.5	0.9
Total								18,530	913	932	35.9	33.4	52.1

*Regulatory programs are assumed to have nominal pollutant reduction rates of 5%.

** Project locations and details are described in the corresponding chapter.

*** TN = total Nitrogen; TP = total Phosphate; TSS = total suspended solids or Sediment.

**** The unit of “TSS” is “Tons/year”.

***** The cost indicates the review/investigation fee only.

Table 6.12 Recommended Projects in the Glacial Park / Tamarack Farms Subwatershed

SUB WATERSHED	RECOMMENDATION #	TARGET GOAL	DESCRIPTION	RESPONSIBLE PARTY	ACRES	UNIT COST	INITIAL IMPLEMENTATION COST	INITIAL OUTREACH COST	ANNUAL MAINTENANCE COST	PRIORITY
Glacial / Tamarack	5-1	Permanent Habitat Protection	Possible land acquisition for proposed Hack-ma-Tack National Wildlife Refuge (also may extend into WI part of watershed)	USFWS / NPS						G
Glacial / Tamarack	5-2	Natural Habitat Restoration	**MCCD Glacial Park (Stade Parcel)** ditch closure, brush removal, tile removal, seeding 80 acres	MCCD	79.5	$2,500	$198,745			A
Glacial / Tamarack	5-3	Natural Habitat Restoration	Install fish passage structure at Wonder Lake Dam	NCWPC / MPOA / MCCD			$175,000	$1,500	$8,750	E
Glacial / Tamarack	5-3	Natural Habitat Restoration	**MCCD Glacial Park** Restore the wetlands / stream below the spillway of Wonder Lake dam to Barnard Mill Road.	MCCD	26.4	$2,500	$65,945			A
Glacial / Tamarack	5-4	Water Quality	Landowner Outreach to prevent livestock intrusion into streams and develop a Manure Management Plan	NCWPC / NRCS / SWCD	5.2	$1,500	$7,820	$500		F
Glacial / Tamarack	5-5	Natural Habitat Restoration	Landowner Outreach to manage siltation and brush encroachment at Cowpie Creek Fen (MCNAI RIC01)	NCWPC / TLC / MCDEF	12.7	$3,000	$38,214	$1,000	$1,274	D
Glacial / Tamarack	5-6	Permanent Habitat Protection	Landowner / Government Outreach for Conservation Design for parcel to protect headwater stream corridor	NCWPC / TLC / VILLAGE OF RICHMOND	22.1	$500	$11,049	$1,000	$552	B
Glacial / Tamarack	5-7	Permanent Habitat Protection	Landowner Outreach to protect and restore 186 acre Tryon Creek Wetland (MCNAI HEB07)	NCWPC / TLC / MCDEF	183.2	$2,500	$457,920	$1,500	$18,317	C
Glacial / Tamarack	5-8	Natural Habitat Restoration	Landowner Outreach to identify possible on-stream dam and investigate feasibility of modifying it for fish passage, create Stream Buffer and Conservation Easement	NCWPC			$20,000	$1,000	$1,000	E
Glacial / Tamarack	5-9	Permanent Habitat Protection	Landowner Outreach to create Conservation Easement to protect High Quality ADID Wetland and restore Stream Buffer	NCWPC / TLC	0.2	$3,000	$579	$500	$19	D

Table 6.12 Recommended Projects in the Glacial Park / Tamarack Farms Subwatershed

SUB WATERSHED	RECOMMENDATION #	TARGET GOAL	DESCRIPTION	RESPONSIBLE PARTY	ACRES	UNIT COST	INITIAL IMPLEMENTATION COST	INITIAL OUTREACH COST	ANNUAL MAINTENANCE COST	PRIORITY
Glacial / Tamarack	5-10	Natural Habitat Restoration	Landowner Outreach to identify possible on-stream dam and investigate feasibility of modifying it for fish passage, create Stream Buffer and Conservation Easement	NCWPC / TLC			$20,000	$1,000	$1,000	E
Glacial / Tamarack	5-11	Permanent Habitat Protection	Landowner / Government Outreach to protect and restore 48 acre Galt Airport Sedge Meadow MCNAI GRE04 site	NCWPC / VILLAGE OF GREENWOOD / TLC / MCDEF	47.1	$2,500	$117,798	$1,000	$4,712	C
Glacial / Tamarack	5-12	Permanent Habitat Protection	Landowner / Government Outreach to protect and restore 29 acre Blandings Turtle Meadow MCNAI GRE02 site	NCWPC / VILLAGE OF GREENWOOD / TLC / MCDEF	28.2	$2,500	$70,588	$1,000	$2,824	C
				SW TOTALS	**404.6**		**$1,183,656**	**$10,000**	**$38,448**	

PRIORITY

- **A Projects that have cooperating partners, can move to implementation quickly. Implementation Timeframe 1 to 3 years**
- **B Projects subject to imminent development pressure, Implementation Timeframe 1 to 2 years**
- **C Projects needed to protect sensitive areas. Timeframe 1 to 2 years**
- **D Restoration projects, Timeframe 1 to 5 years**
- **E Retrofit Projects, Timeframe 1 to 5 years**
- **F Existing Pollution Potential, Timeframe 1 to 2 years**
- **G Policy / Opportunity Review Project, Timeframe 1 to 3 years**

Chapter 7
Wonder Lake Subwatershed Assessment

This section presents a summary of the characteristics of the Wonder Lake Subwatershed, as well as specific issues and challenges in this subwatershed that must be addressed in the Nippersink Creek Watershed Management Plan.

7.1 Subwatershed Characteristics

The following section provides an overview of the physical characteristics of the subwatershed.

7.1.1 Subwatershed Location

The Wonder Lake Subwatershed is located in the southeastern portion of the Nippersink Creek Watershed, and has a drainage area of 7,884 acres (12.3 square miles). The boundary of the subwatershed shown in Figure 7.1, and includes all land that drains directly into Wonder Lake. The subwatershed is centered on the north-south border between Greenwood Township and McHenry Township. The northern boundary of the subwatershed is located at the dam embankment at the north end of Wonder Lake. The southern boundary is roughly parallel with Illinois Route 120, ranging from ½ mile to one mile south of Route 120. The eastern boundary is just west of Ringwood Road and the western boundary is just east of Greenwood Road.

Figure 7.1

Wonder Lake Subwatershed Location Map

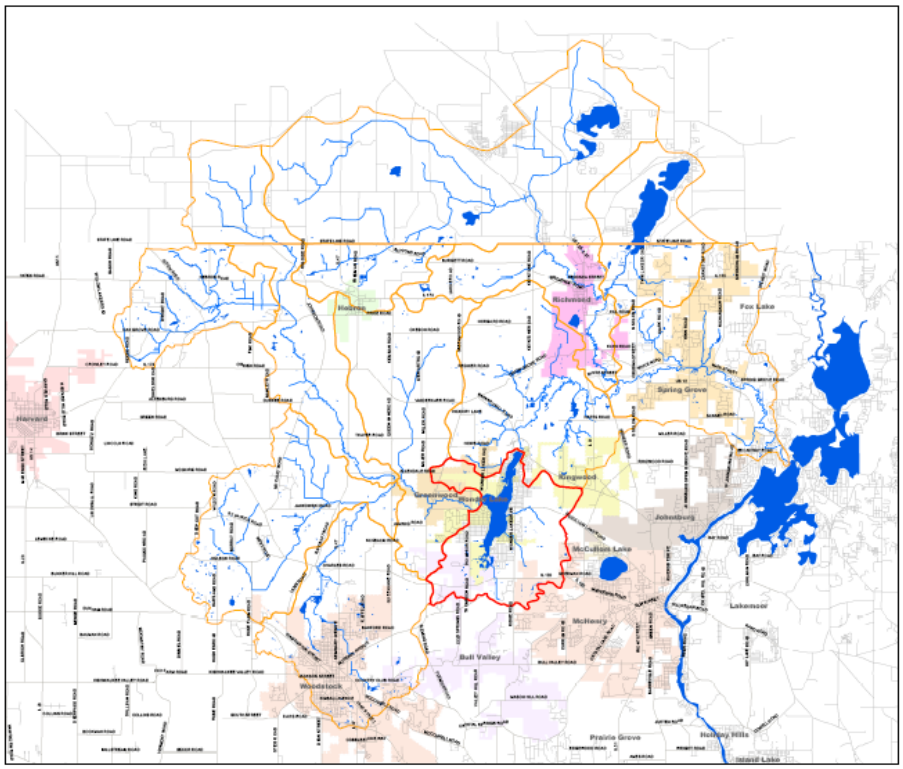
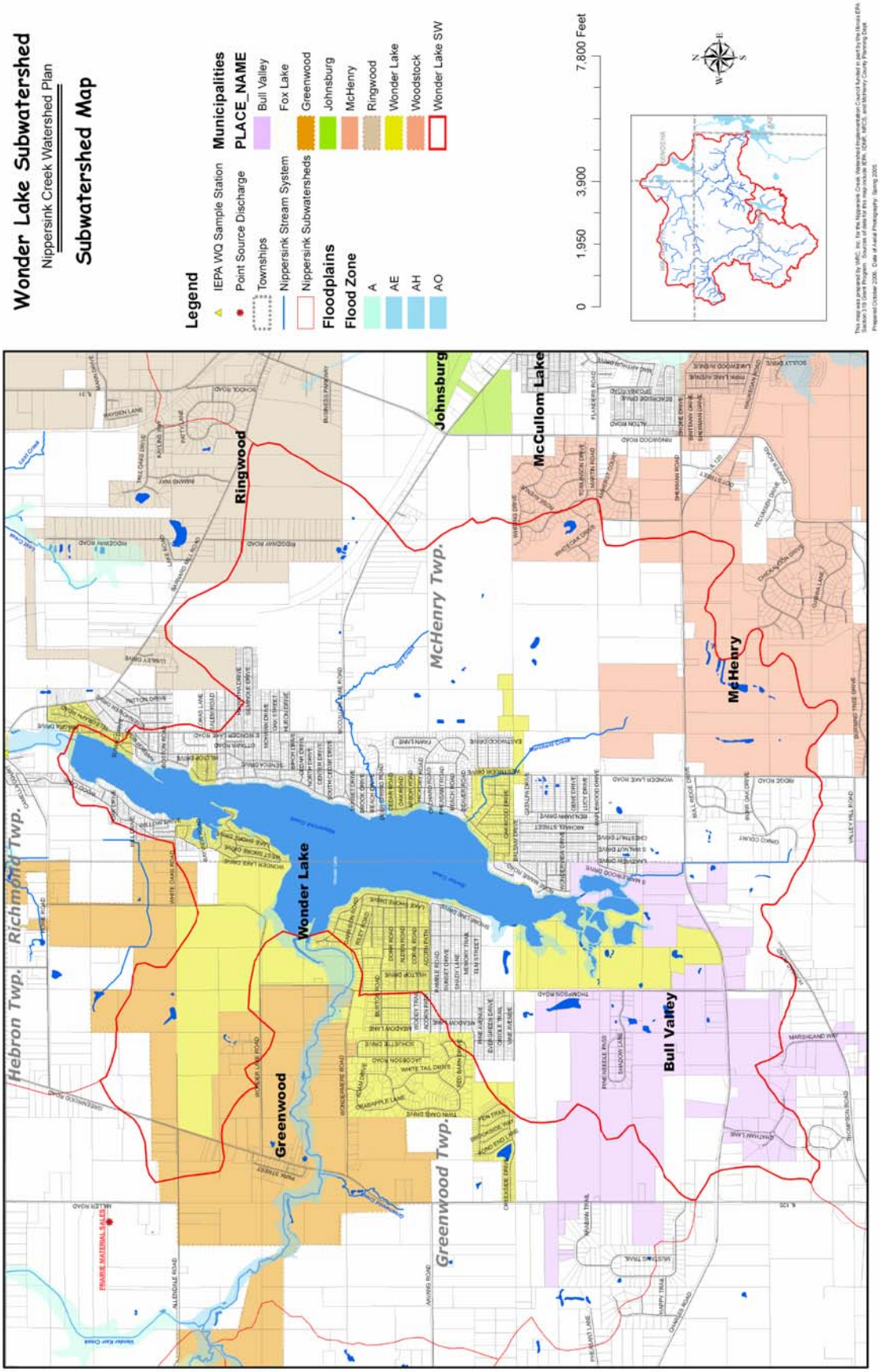


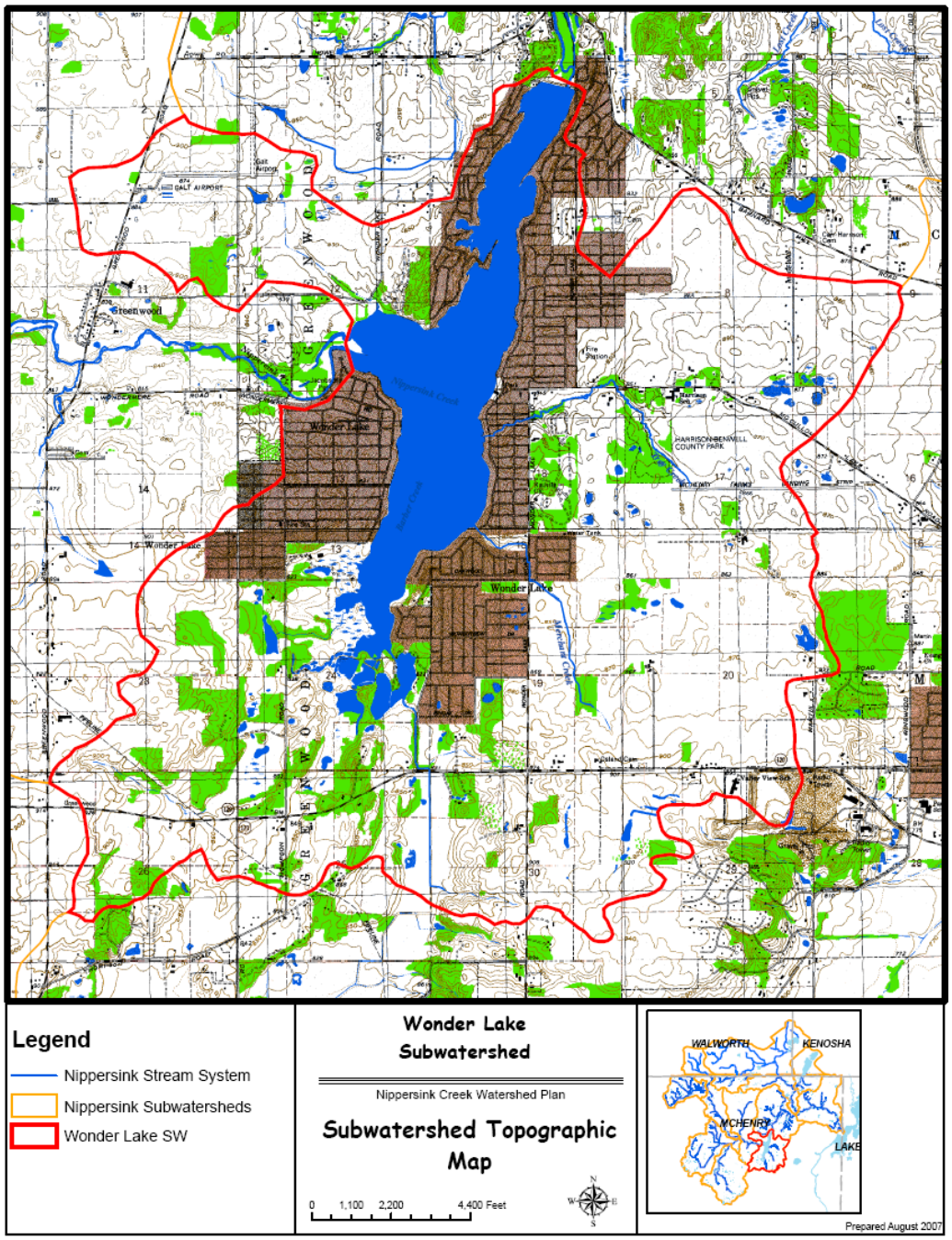
Figure 7.2 Wonder Lake Subwatershed Map



7.1.2 Topography & Geology

The topography of the subwatershed is somewhat unique in that it slopes to the center of the subwatershed, which has been dammed to create Wonder Lake. Slopes are generally steep, ranging from 3% to 5% along much of the valley that slopes towards the lake. The land east of Wonder Lake is considerably more flat, with 1% - 2% slopes east of Wonder Lake Road. The maximum elevation in the subwatershed is around 940 feet above MSL near the intersection of Ridge Road and Valley Hill Road, and the minimum elevation is 804 at the subwatershed outlet at the Wonder Lake Dam.

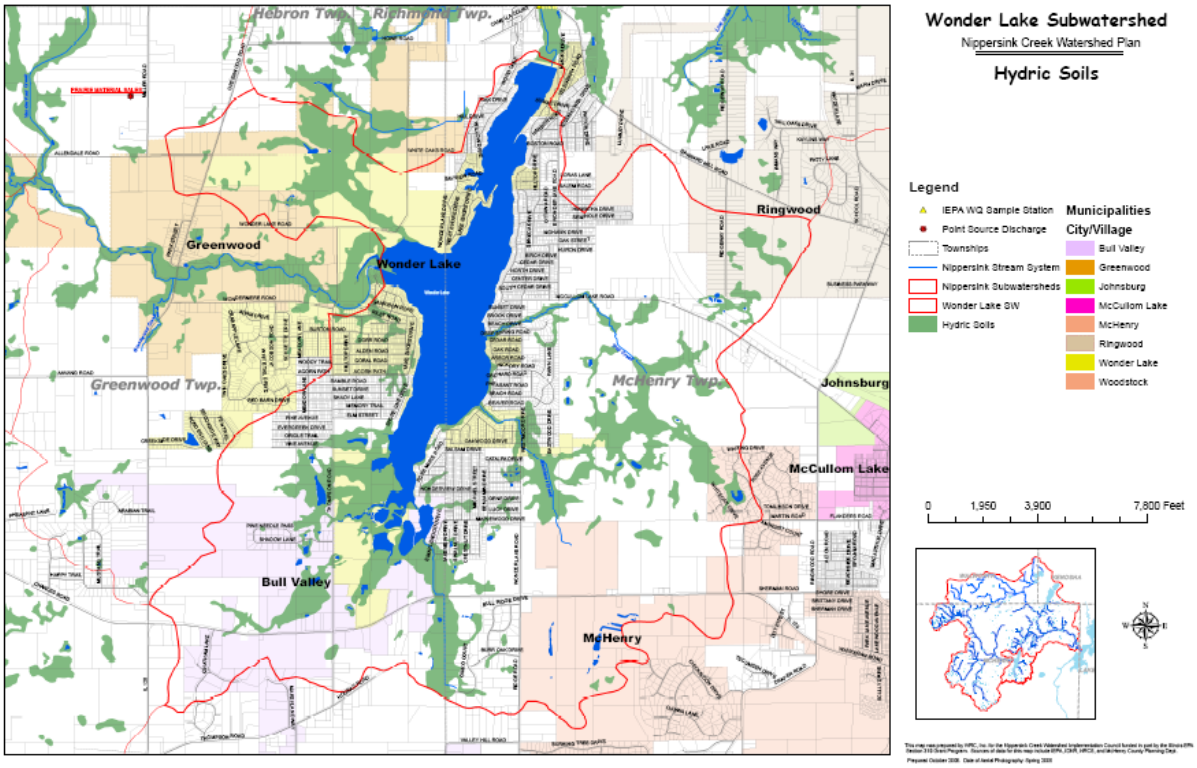
Figure 7.3 USGS Topographic Map of the Wonder Lake Subwatershed



7.1.3 Soil Characteristics

The glacial advances across McHenry County resulted in a wide variety of soil associations. The soils in the subwatershed consist of mostly silty and silty loams soil units on 2% - 5% slopes. Each major grouping of soil associations has potential impact on current and future land uses within the subwatershed. For example, hydric (wetland) soils constitute 1,207 acres, or 15% of the 7,884 acre subwatershed, and indicate those areas that contain functional wetlands, or former / degraded wetland areas that could be restored or enhanced.

Figure 7.4 Hydric Soils Map for the Wonder Lake Subwatershed



7.1.4 Pre-Settlement Vegetation

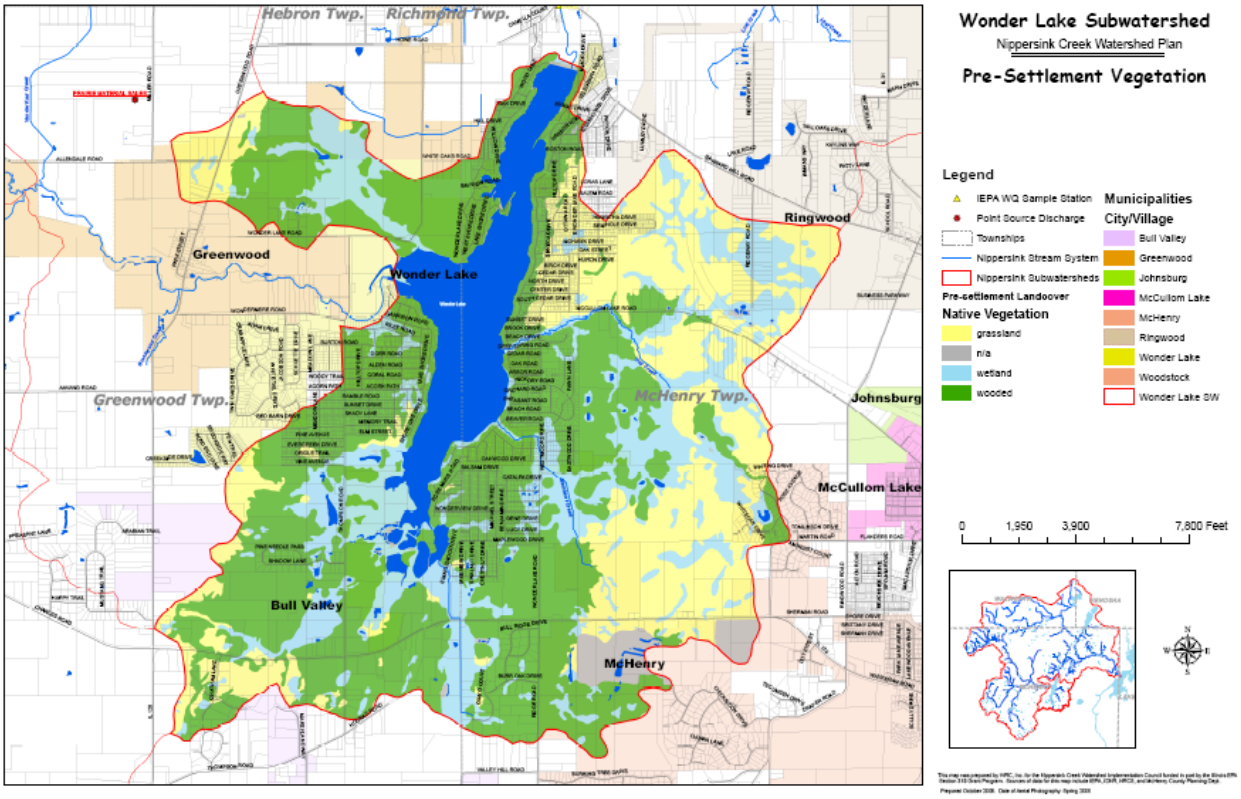
To guide future land management or restoration efforts, it is important to recognize the native plant communities that naturally evolved subsequent to the last glacial advances. Prior to European settlement in the 1830's, the Wonder Lake Subwatershed was fairly evenly divided between grasslands, woodlands, and wetlands, as described in Table 7.1, and depicted in Figure 7.5. Woodlands dominated the southern half of the subwatershed; wetlands the northwestern portion, and prairies communities thrived in the northeastern portion of the subwatershed.

Table 7.1 Pre-Settlement Land Cover Conditions

Cover Type	Area	Percent of Subwatershed
Grasslands	3,430 acres	29%
Wooded	4,460 acres	37%
Wetlands	3,978 acres	33%
n/a	141 acres	1%

Source: MCCD Soils Analysis using GIS data

Figure 7.5 Pre-settlement Vegetation for the Wonder Lake Subwatershed



7.1.5 Subwatershed Drainage Features

Streams

The principal stream in the Wonder Lake Subwatershed is Nippersink Creek, which was dammed in 1929 to form Wonder Lake.

There are four tributary streams in the Wonder Lake subwatershed; three of these drain the southern and eastern portions of the subwatershed. Barber Creek drains the low-lying area south of Wonder Lake. This area is relatively low-lying up to the subwatershed boundary, and may have provided an interconnection between Nippersink Creek and Boone Creek.

The second tributary is Merchant Creek. This stream originates in the 15+ acre woodland northeast of the Wonder Lake Road / Illinois Route 120 intersection. The upper 60% of the stream is not maintained and flows through a large farmed wetland complex before entering a highly urbanized area on the edge of Wonder Lake. The stream channel is extensively channelized along Wonder Lake Road.

The third tributary is Troy Creek. Troy Creek originates at a drain tile outlet in the farm field just southeast of the MCCD Harrison-Benwell property. The stream travels northwest and crosses under McCullom Lake Road twice before flowing west into Wonder Lake. The first ¼ mile of the stream east of Wonder Lake passes through an older, high-density residential area and urban encroachment has taken a significant toll on the integrity of the stream's condition. Upstream of Wonder Lake Drive, the stream corridor is fairly well preserved and flows through the Harrison-Benwell McHenry County Natural Area Inventory (MCNAI) Site.

The fourth tributary is Galt Creek. Galt Creek originates between Galt Airport and West Wonder Lake Road, and flows southeast, entering the West Bay of Wonder Lake.

Channelization Analysis of aerial photography indicates that the streams in the Wonder Lake SW have been subjected to extensive channelization. Of the 9.37 miles of stream channels in the subwatershed, about 83% have been ditched and channelized.

Stream Channel Condition There is no documented information regarding stream conditions in the Wonder Lake Subwatershed.

Impoundments The major impoundment in the subwatershed is Wonder Lake. Wonder Lake is an 830 acre, man-made reservoir built by constructing a dam across Nippersink Creek near Barnard Mill Road in 1929. The lake is considered part of the Village of Wonder Lake and there are more than 6,000+ residents who live around the lake, making it, without a doubt, the focal point and major surface water resource of the region. The lake has been the subject of numerous studies over the years to attempt to solve the sediment and nutrient loading problems that have caused the water quality of the lake to decline.

Excluding Wonder Lake itself, there are 90 impoundments or open water features (ponds, lakes, or wetlands) within the subwatershed, ranging in size from less than a 1/10th acre to about 13 acres. About half of the impoundments appear to have been manmade ponds or small lakes constructed for either landowner recreation or for agricultural purposes. Many of them may have been isolated wetland pockets that were excavated to create a permanent open water feature.

Manmade Drainage Systems

Although storm sewer information was not available from the municipalities in the subwatershed, the age and density of several developed areas in the subwatershed suggest that storm sewers are in place and play a critical role in the collection and conveyance of runoff into Wonder Lake and its tributaries. The Village of Wonder Lake, as well as the unincorporated developments along the east side of Wonder Lake, contains several storm sewer networks. In 2005, the Village of Wonder Lake conducted a storm sewer inventory, and identified numerous storm sewer outfalls draining directly into Wonder Lake, or its tributary streams. None of these storm sewer systems were designed to provide any type of water quality treatment benefits to improve water quality draining to the lake. This is not surprising given the age of these systems.

Agricultural Tile Systems

There are likely extensive underground drain tile systems in the northern and western portions of the subwatershed, as these areas are largely agricultural in nature. These systems, installed to increase the productivity of the regions rich soils, were likely installed more than fifty years ago by private property owners and therefore there is little documented information about there size and exact location, although their distribution can be general determined by inspection of a combination of aerial photographs, hydric soils and topography. Based on preliminary observations as part of this subwatershed assessment, it appears that there are several small to medium size agricultural drain tile networks that provide subsurface drainage to many farmed parcels that are adjacent to the tributary streams in the subwatershed.

Identifying agricultural drain tile networks is important in watershed planning because current local flooding and drainage problems can often be linked to damage or age-related failure of drain tile systems. From a watershed preservation / restoration perspective, it is important to identify functional drain tile systems to determine opportunities for their removal or reconfiguration for the purposes of restoring valuable wetland habitat, and water quality benefits. No doubt many of the depressional and low lying areas in the subwatershed that are serviced by drain tiles today for agriculture were once wetland habitats that supported a very diverse ecosystem.

Floodplains

The 100-year Floodplain for Wonder Lake and Nippersink Creek was calculated and mapped during the 1980s. The regulatory floodway has also been determined for the Lake and stream. The floodplain for the four tributary streams (Troy, Merchant, Barber, and Galt) has not been calculated and, therefore, exact floodplain elevations for these streams are unknown.

7.1.6 Population

Population data in watershed planning is critical because there is a direct correlation between the number of people residing in a watershed and the degree of impacts to the quality and quantity of the watershed's natural resources. Using US Census data compiled by the Fox River Study Group for the Nippersink Creek subwatershed, past population data are available for the Wonder Lake Subwatershed. This data indicated that in 1990 about 5,300 people lived in the subwatershed, which equated to 439 persons per square mile. According to the 2000 US Census, the population increased to more than 6,800 people, or about 560 persons per square mile. This represents an increase of about 28% in 10 years. The actual population in the subwatershed in 2007 has likely increased by several hundred residents, as residential development on the east side of the subwatershed has continued at a steady rate since the last population census in 2000.

As an example, the Village of Wonder Lake had a population of 1,345 in the 2000 US Census. A special census, conducted by the Village in 2005, identified a population of 2,725. Another special census of the Village is proposed in 2008, for which a population approaching 4,000 is anticipated. It should be noted that some of this population increase can be attributed to the annexation of unincorporated subdivisions, but some is also attributed to new residential development.

7.1.7 Land Cover

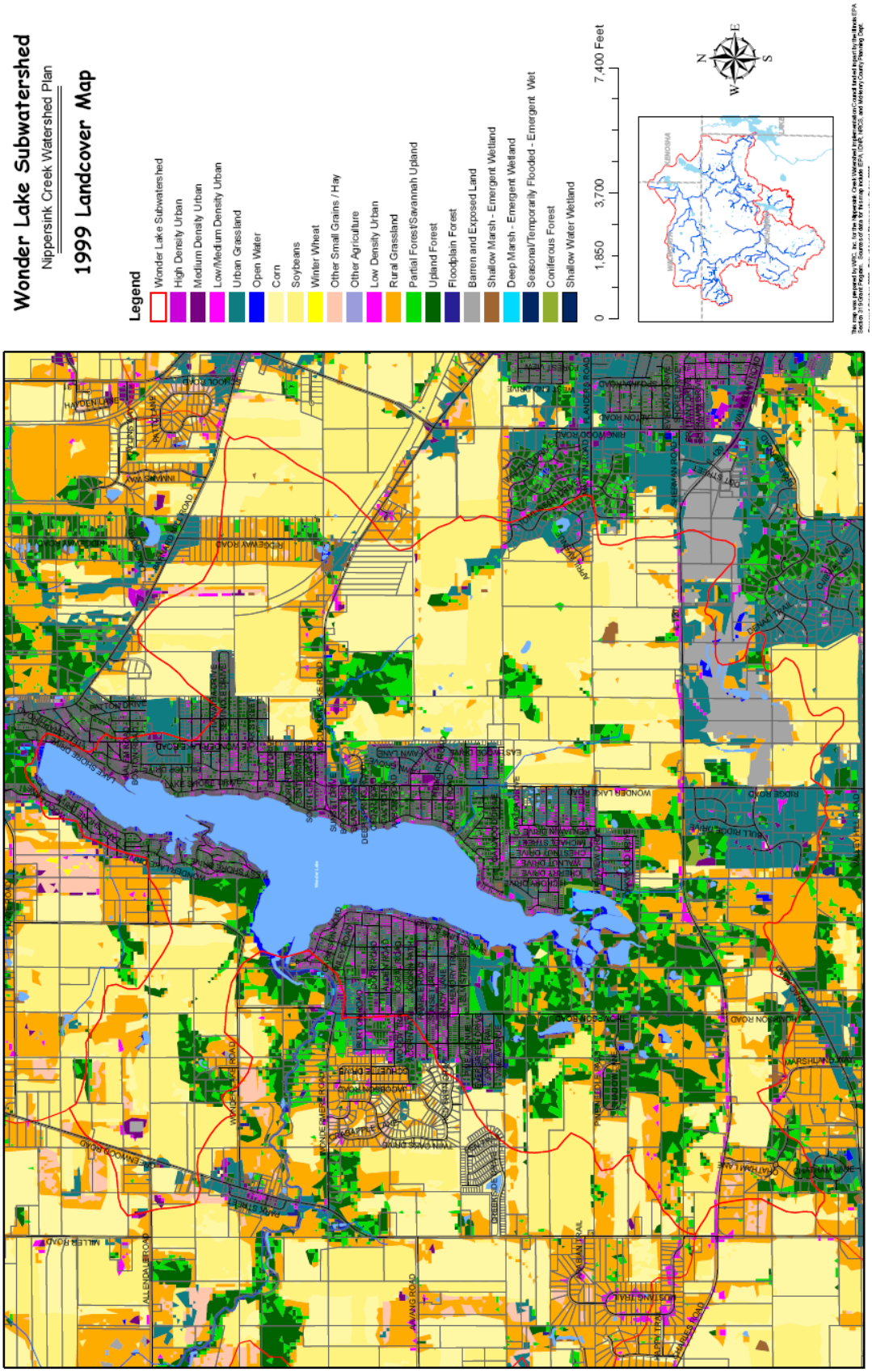
Often, the terms Land Use and Land Cover are used interchangeably. However there are differences. Land use refers to how land is used by humans. On the other hand, Land Cover refers to the vegetation, structures, or other features that cover the land.

Land cover data for the Wonder Lake Subwatershed is available from the Illinois Department of Natural Resources using LANDSAT data collected in 1999. The dominant land cover, according to this data, was row crop agriculture, which accounted for roughly 36% of the subwatershed area. Rural grasslands, including pasture lands and nurseries accounted for another 12% of the subwatershed. These two land cover categories account for 48% of the subwatershed. Developed land (urban & urban grasslands) accounted for 15.5% of the subwatershed area in 1999-2000. New development has occurred since then in the subwatershed, increasing the total amount of developed area at this time to around 20%.

Table 7.2 1999 Land Cover for the Wonder Lake Subwatershed

Land Cover Description	Total Acres	Percent of Subwatershed
Barren & Exposed Land	174.9	2.2%
Corn, Soybeans, Other Small Grains & Hay (row crop)	2,831.0	35.9%
Rural Grassland	973.6	12.4%
Low Density Urban	329.1	4.2%
Medium Density Urban	255.9	3.2%
High Density Urban	11.2	0.1%
Urban Grassland	629.7	8.0%
Shallow Marsh – Emergent Wetland	92.0	1.2%
Partial Forest /Savannah Upland	479.6	6.1%
Upland Forest	1,270.5	16.1%
Floodplain Forest	30.0	0.4%
Coniferous Forest	10.7	0.1%
Deep Marsh / Emergent Wetland	10.9	0.1%
Open Water	781.2	9.9%
TOTAL	**7,880.3**	**100.0%**

Figure 7.6 1999-2000 Land Cover Map for the Wonder Lake Subwatershed



7.1.8 Existing Land Use / Watershed Development

According to the 2005 McHenry County Land Use / Zoning map, 49% of the subwatershed is zoned agriculture, while about 32% is either already developed or zoned for development in the near future. Approximately 10% is classified as open space

Table 7.3 McHenry County 2005 Land Use in the Wonder Lake Subwatershed

Land Use	Total Acres	Percent of Subwatershed
Vacant	2.2	0.0%
Vacant; Zoned Residential	753.0	9.6%
Vacant; Zoned Commercial	8.3	0.1%
Agricultural	3,862.5	49.0%
Single Family Residential	1,646.7	20.9%
Multi-Family Residential	0.16	0.0%
Commercial	77.9	1.0%
Office	0.23	0.0%
Industrial	0.36	0.0%
Mixed Use	0.65	0.0%
Mining	183.7	2.3%
Open Space	793.9	10.1%
Institutional	64.8	0.8%
Right of Way	489.7	6.2%
TOTAL	**7,884.1**	**100.0%**

Source: 2005 McHenry County Land Use Zoning Data

Developed land accounted for about 27% of the subwatershed, consisting mostly of medium density urban lands and adjacent urban grasslands (lawns). To date, municipal expansion and annexation accounts for 50% of the total subwatershed area, although Wonder Lake is in the process of annexing a 1,400+ acre development on the east side of Wonder Lake between Wonder Lake Road, McCullom Lake Road and IL Route 120. This annexation will nearly double the Village of Wonder Lake's boundary area within the subwatershed and increase the total municipally controlled land in the subwatershed to more than 65%.

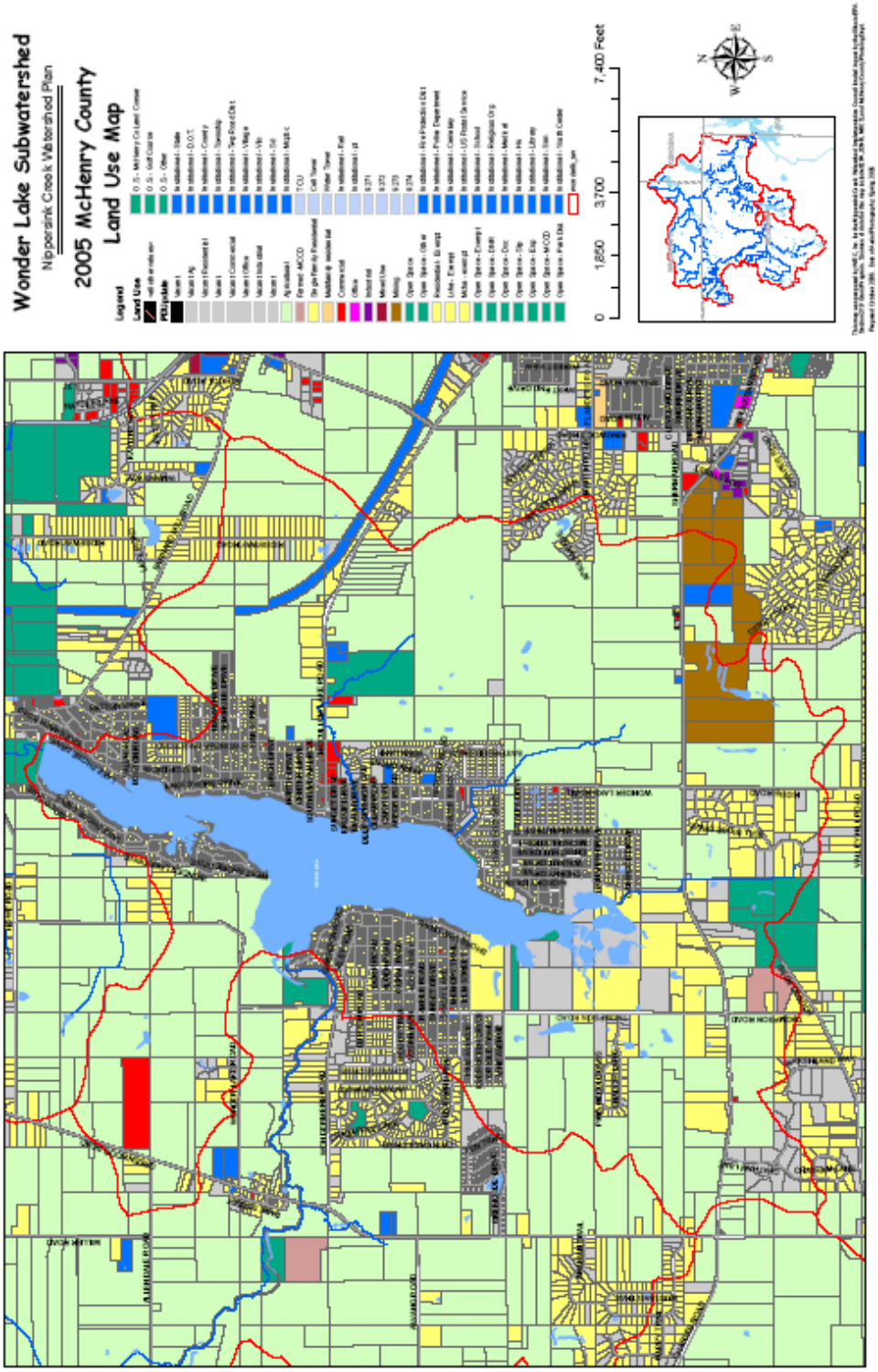
Table 7.4 Municipal Areas in the Wonder Lake Subwatershed

Municipality	Area (acres)	Percent of Subwatershed
Village of Bull Valley	891.3	11.3%
Village of Greenwood	300.3	3.8%
City of McHenry	699.1	8.9%
Village of Ringwood	281.8	3.6%
Village of Wonder Lake	1,769.1	22.4%
Unincorporated	3,942.5	50%

Permit Point Source Discharges There are no permitted discharges in the Wonder Lake Subwatershed, according to the IEPA NPDES database.

Road Network An analysis of GIS roadway data indicates that there are 65.7 miles of roads in the subwatershed. This is approximately 223 acres of pavement.

Figure 7.7 2005 McHenry County Land Use Map for the Wonder Lake Subwatershed



7.1.9 Natural Resources

McHenry County Conservation District Property

The McHenry County Conservation District (MCCD) owns five natural area properties within the Wonder Lake Subwatershed. These properties account for about 2% of the subwatershed area.

Table 7.5 MCCD Properties in the Wonder Lake Subwatershed

Name	Area in Subwatershed (acres)	Total MCCD Site Acreage
Boone Creek	104.5	391.0
Harrison-Benwell	74.8	74.8
Glacial Park	3.4	3,264.2
Total	**182.7**	

McHenry County Natural Areas Inventory

There are eight McHenry County Natural Area Inventory (MCNAI) Sites within the subwatershed, representing nearly 8% of the subwatershed area.

Table 7.6 McHenry County Natural Areas Inventory Sites in the Wonder Lake Subwatershed

MCNAI Site ID #	Name	Area in Subwatershed (acres)	Total NAI Site Acreage
GRE10	South Wonder Lake Wetland	423.3	423.3
GRE13	Wonder Lake Sedge Meadow	48.5	79.0
GRE04	Galt Airport Sedge Meadow	33.1	47.9
GRE11	Thompson Road Meadow	6.8	85.3
GRE12	Wonder Lake Prairie	34.4	34.4
MCH05	Harrison-Benwell Two	33.0	33.0
MCH06	Harrison-Benwell Wetland	13.4	13.4
MCH04	East Wonder Lake Sedge Meadow	25.7	25.7
RIC06	Glacial Park / Tamarack Farms	4.3	4,673.8
	Total	**623.0**	

These natural areas contain several significant natural features, including sedge meadows, a graminoid fen, a dry gravel prairie, and wet silt loam prairie.

Of the 623 acres of identified Natural Area Inventory Sites, only portions of the Harrison-Benwell MCNAI sites are protected through public ownership. These total only 13 acres. These protected properties represent only about 2% of MCNAI sites in the subwatershed.

Wetlands

McHenry County completed an Advanced Identification (ADID) Wetland Study in 1998. This study identified a total of 1,608.3 acres of wetlands, or 20.4% of the subwatershed. Of these wetlands, 620.4 acres (38%) were determined to be of High Quality or High Functional Value, rating an ADID classification.

Table 7.7 Mapped Wetlands in the Wonder Lake Subwatershed

ADID Code	Wetland Type	# of Wetlands	Total Area
FW	Farmed Wetlands	28	172.2
HFVW	High Functional Value Wetlands	8	101.4
HQL	High Quality Lakes	0	0
HQW	High Quality Wetlands	13	519.0
L	Lakes	1	689.9
W	Other Wetlands (lower quality)	49	125.8
	TOTAL	**99**	**1,608.3**

The most significant wetland in the subwatershed is the 603 acre high quality wetland found within the Wonder Lake Marsh Fen NAI site. Currently considered a high-quality wetland complex, this wetland is threatened by invasive species intrusion (reed canary grass, cattails), artificially maintained water levels, siltation, and encroachment by development.

Threatened & Endangered Species

The McHenry County Natural Area Inventory database has identified at least three threatened species of plants and animals that inhabit the remaining natural areas of the subwatershed.

Table 7.8 Threatened and Endangered Species in the Wonder Lake Subwatershed

Common Name	Scientific Name	Type	Status	Source
Savanna Pinweed	Lechea intermedia	Plant	St Threatened	GRE12
Dog Violet	Viola conspersa	Plant	St Threatened	MCH06
Blanding's Turtle	Emydoidea blandingii	Reptile	St Threatened	GRE10

Existing Greenways

There are no formal greenways established in the subwatershed. Wonder Lake is almost completely encircled with residential development up to the lake's shoreline. Barber Creek is protected for about one-third of its length on one side of the stream channel, where the stream borders the Boone Creek MCCD property south of IL Route 120. Merchant Creek is not protected at all over its 1.5 mile stream length. The upper one-third of Troy Creek is protected, as it flows through the Harrison-Benwell MCCD property.

7.2 Watershed Analysis and Problem Identification

7.2.1 Water Quality Data

The Illinois Environmental Protection Agency (IEPA) is tasked with assessing the quality of the surface water resources of Illinois. The IEPA has determined Nippersink Creek's designated uses are:

- Aquatic Life
- Fish Consumption
- Primary Contact
- Secondary Contact
- Aesthetic Quality

Below Wonder Lake, Nippersink Creek is identified as being in Full Support of its Aquatic Life and Fish Consumption Designated Uses, which is notable for a stream in northeastern Illinois. Upstream of Wonder Lake, Nippersink Creek is identified as being in Full Support of its Fish Consumption Designated Use; however, the Aquatic Life Designated Use was not assessed. This information, obtained from the 2006 IEPA 303(d) list, also identifies waterways that are not achieving certain designated uses.

Nippersink Creek, upstream of Wonder Lake, as well as the segment of the Creek that flows through Wonder Lake, was not listed as impaired. However, the reach of Nippersink Creek downstream of Wonder Lake, extending all the way downstream to its confluence with the Fox River, is listed as "impaired" due to fecal coliform entering the stream water from an as yet unidentified source.

The Illinois Environmental Protection Agency does not maintain any water quality sampling stations on Wonder Lake, however, there is water quality monitoring data collected on Nippersink Creek just upstream and downstream of the subwatershed border.

Table 7.9 IEPA Water Quality Sampling Stations near the Wonder Lake Subwatershed

Station	Stream	Location
DTK 06	Nippersink Cr.	Nippersink Creek at Allendale Road
DTK 02	Nippersink Cr.	Nippersink Creek at Barnard Mill Road

The Fox River Watershed Monitoring Network (FRMN), administered by the not-for-profit Friends of the Fox River, also has two monitoring stations immediately upstream and downstream of Wonder Lake The FRMN has not established any volunteer stream monitoring sites on Wonder Lake as of 2006.

In 2004, the United States Geological Survey (USGS), in cooperation with the McHenry County Soil & Water Conservation District, prepared a report on the water quality of Wonder Lake and Nippersink Creek immediately upstream and downstream of Wonder

Lake. The report *Water Quality of Nippersink Creek and Wonder Lake, McHenry County, Illinois, 1994-2001* utilized water quality and sediment data collected above and below the lake from 1994 – 2001. The findings of the report indicated that lake trapped a significant portion (75%) of the incoming sediment load from the upstream watershed area, and that excessive nutrient loading from upstream also creates highly eutrophic conditions in the lake. The result is a decrease in the navigability of the lake by recreational boaters, as well as a decrease in fish diversity attributed to low dissolved oxygen levels and poor water clarity.

7.2.2 Flooding Problems

There are no known flooding problems in the subwatershed. The existing FEMA 100-year Floodplain Map suggests that many of the residents along Wonder Lake may be in the 100-year floodplain, however, the horizontal boundaries shown on the floodplain maps may be inaccurate as the 100-year flood profiles have not been overlaid onto the County 2-foot topographic mapping now available. There is no floodplain mapping for any of the three tributaries in the subwatershed.

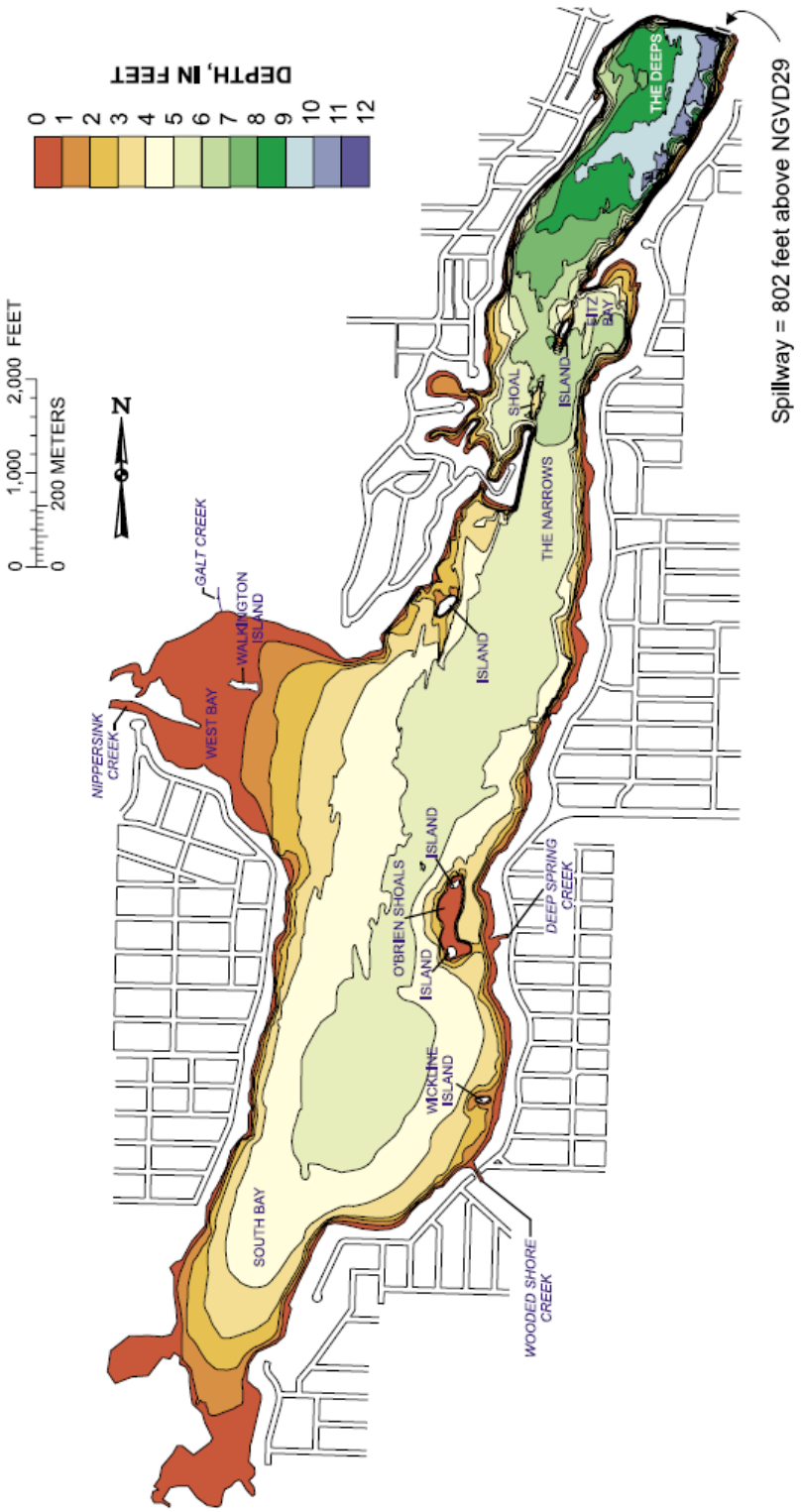
7.2.3 Wonder Lake Sedimentation

Wonder Lake was created in 1929 by constructing a dam across Nippersink Creek, and has accumulated 3 million cubic yards of sediment over that last 78 years. This has significantly reduced the lake water depths, as shown in Figure 7.8. Coming off of a predominantly agricultural watershed, the sediment is large comprised of organic and mineral soils, and in some areas, is 4 to 6 feet thick. However, various government agencies have analyzed the sediment quality over the years, and have found no evidence of hazardous contaminants.

West Bay of Wonder Lake with two foot drawdown (Fall 2007)

Wonder Lake residents recognized the accumulation and adverse impacts of sedimentation, and first started proposing a dredging program in 1964. While wide-scale dredging has not taken place to date, the Wonder Lake community has been actively involved in helping to plan for, and implement, watershed management efforts. As documented by the United States Geological Survey in its 2004 study, ***Water Quality of Nippersink Creek and Wonder Lake, McHenry County, Illinois, 1994-2001,*** watershed planning efforts over the last 15 years have reduced the annual sediment load from Nippersink Creek to Wonder Lake from 33,000 to 12,000 cubic yards. The Wonder Lake Master Property Owners Association (WLMPOA), owner of Wonder Lake, also has been working with a dredging consultant since 1996.

Figure 7.8 Bathymetry of Wonder Lake (1994)



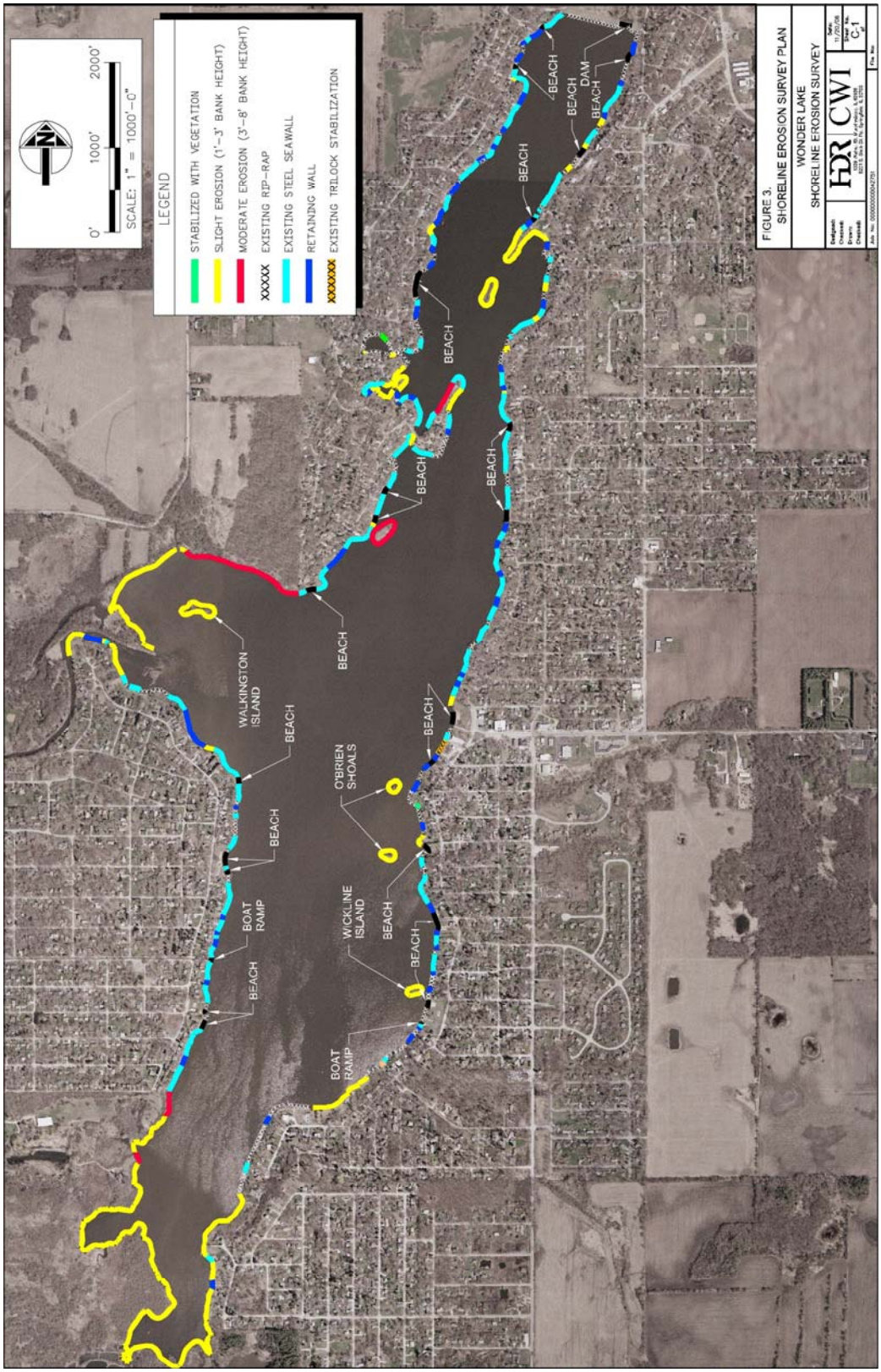
Source: ***Water Quality of Nippersink Creek and Wonder Lake, McHenry County, Illinois, 1994-2001*** **United States Geological Survey**

7.2.4 Shoreline Erosion

As an impoundment lake with heavy recreational boating use, shoreline erosion has been an ongoing problem on Wonder Lake. In 2006, the Wonder Lake Master Property Owners Association (MPOA), the owners of Wonder Lake, commissioned an update to an existing 1996 study *"Wonder Lake Feasibility Study and Restoration Plan"*. The updated study, released in January 2007 also contained a shoreline erosion inventory (Figure 7.9) categorizing shoreline conditions in 2006. This study, conducted by HDR/CWI, first determined that Wonder Lake has a total shoreline perimeter of 52,565 linear feet of shoreline. Of that distance, 31,108 linear feet was classified as protected / non-eroding. Of this distance roughly 8,000 linear feet has been treated with rip-rap; roughly 14,750 linear feet has seawalls; roughly 6,000 linear feet has wood or concrete retaining walls; and 230 linear feet has established vegetation.

Of the 21,457 linear feet of Wonder Lake shoreline classified as eroded and unprotected, 16,600 linear feet was classified as "slight", with 1 to 3 foot bank heights, and 4,797 linear feet was classified as "moderate", with 3 to 8 foot bank heights.

Figure 7.9 Wonder Lake Shoreline Erosion Inventory

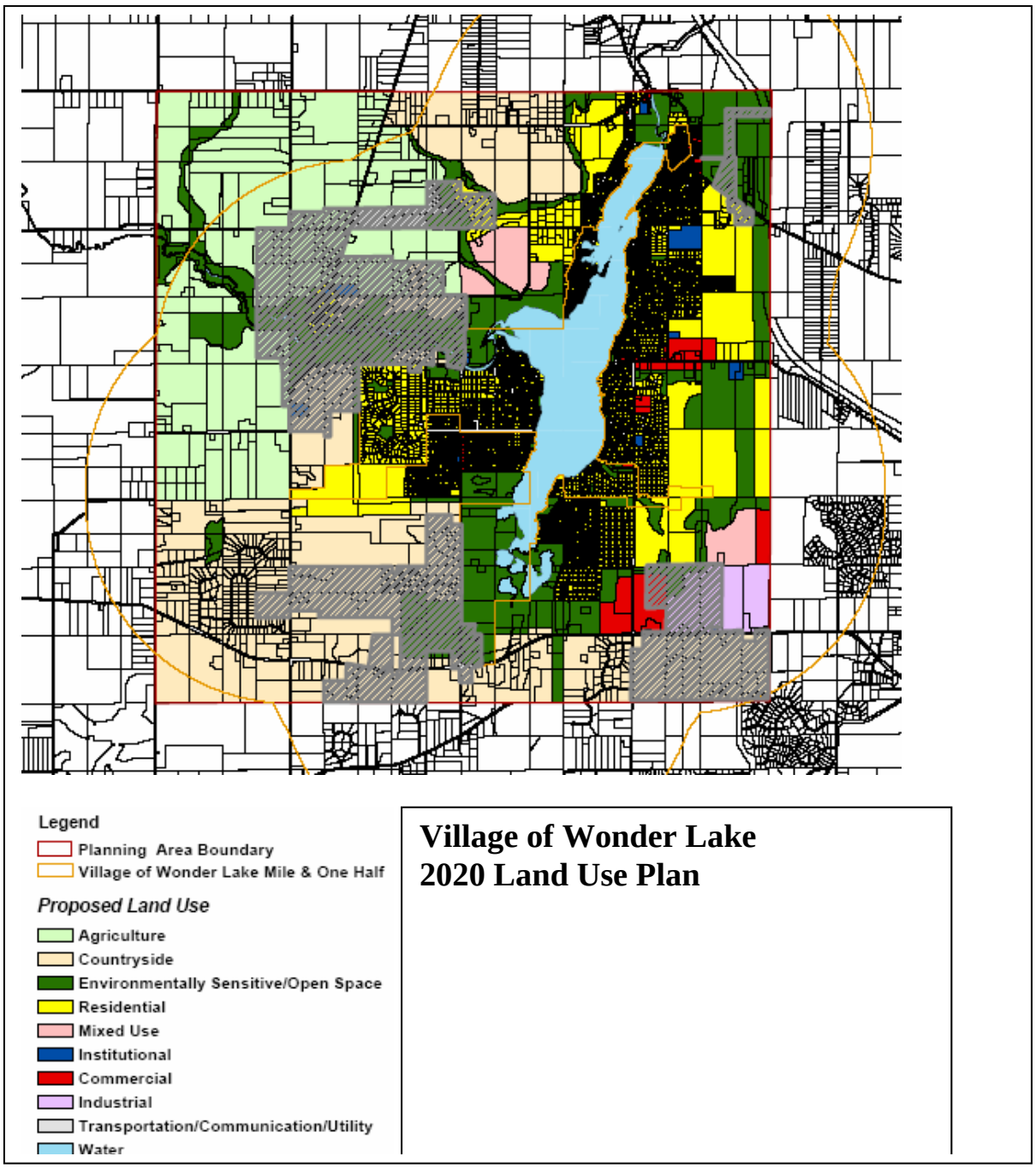


Source: *An Updated Feasibility Study and Restoration Plan for Wonder Lake* **January 2007, HDR-CWI**

7.2.3 Projected Growth & Development

The Village of Wonder Lake has prepared a 2020 Land Use Plan, which anticipates significant residential growth, and lesser amounts of commercial growth. It also designates large areas as environmentally sensitive.

Figure 7.10 Future Development in the Wonder Lake Subwatershed

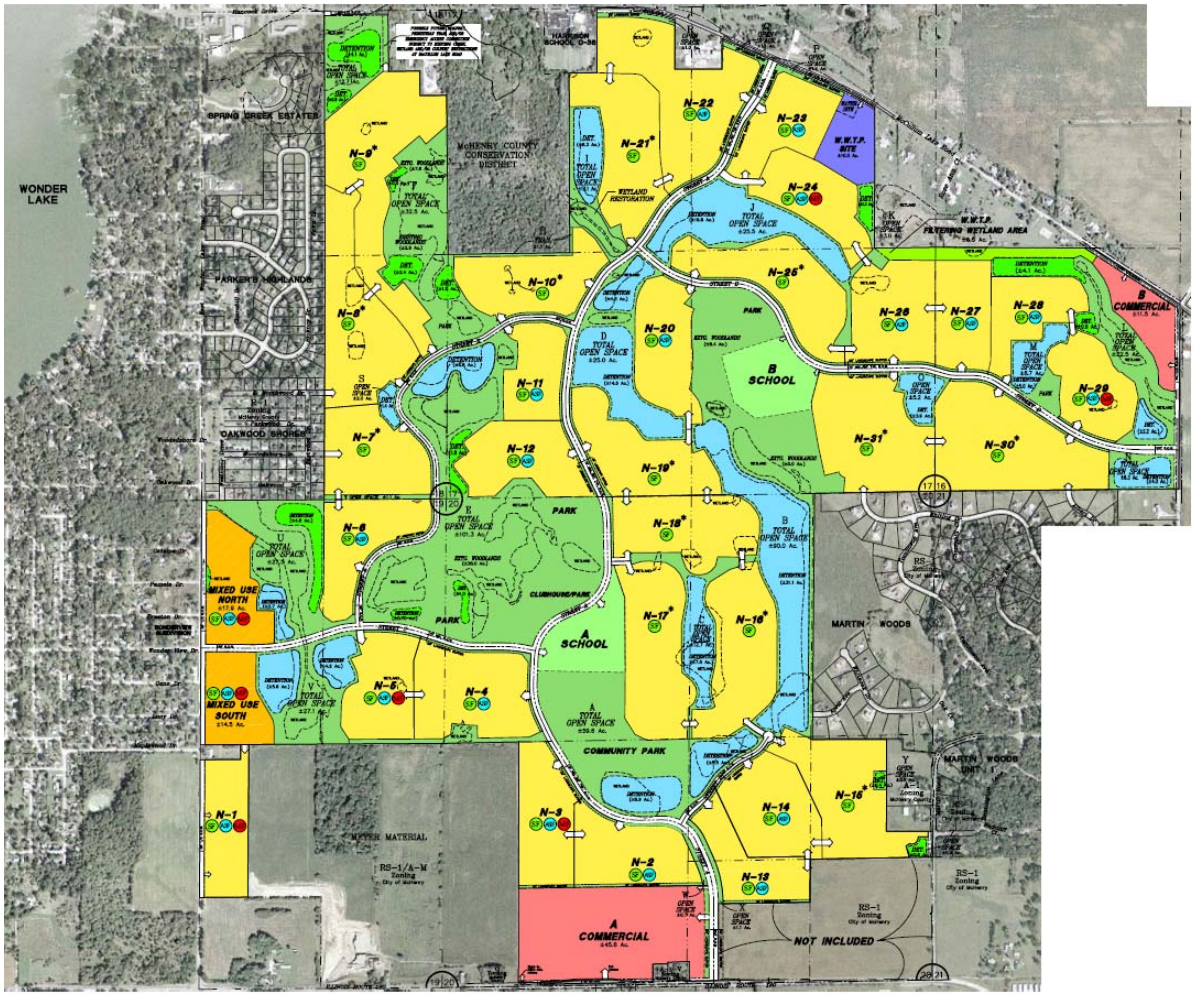


Source: Village of Wonder Lake

Two major residential developments are occurring within the Wonder Lake Subwatershed. The first, The Meadows of West Bay, is already underway on the northwest side of Wonder Lake. This development features over 500 homesites, and is served by a spray irrigation wastewater system. This development is located within the Village of Wonder Lake.

A second development, still in the planning phases, is Thatcher Meadows, located east of Wonder Lake, as shown in Figure 7.11. This development, 1,400 acres in size, will contain a mix of land uses encompassing roughly 3,700 housing units, and will contain approximately 485 acres of open space. Residential areas are shown in yellow, commercial areas in pink, and open space areas in green.

Figure 7.11 Conceptual Site Plan for the Thatcher Meadows Development



Source: NRB Land, LLC

One of the most significant aspects of this project is the planned construction of a Wastewater Treatment Plant (WWTP) to serve the proposed development. The WWTP, which has permitted by the Illinois Environmental Protection Agency (IEPA), will provide one million gallons per day (mgd) of wastewater treatment. This capacity will serve the Thatcher Meadows development, as well as portions of the existing residential subdivisions found along the east shore of Wonder Lake. A second phase, providing an additional one million gallons per day, will be available to serve the balance of the west shore of Wonder Lake, as well as additional future development around Wonder Lake.

The provision of wastewater treatment capacity to the existing residential subdivisions surrounding Wonder Lake is a significant step forward in protecting and enhancing the water quality of Wonder Lake, as well as Nippersink Creek. Much of the existing Wonder Lake community developed as summer cottages in the period after the lake was created in 1929. These cottages, on relatively small lots, featured very small on-site septic system wastewater treatment, sized for seasonal use / loadings. Over the course of time, Wonder Lake became a largely year-round community, which caused the seasonally sized septic systems to handle a year-round waste flow. On most lots, sufficient area does not exist to allow a new septic system to be installed to replace a failed or undersized system. The transition from undersized septic systems to wastewater treatment in a regional WWTP will be a very positive step forward.

The intent is that the Thatcher Meadows development will be annexed into the Village of Wonder Lake, which would potentially take over operation of the proposed WWTP. At the request of the Thatcher Meadows developer, the IEPA permit is written to be more restrictive for nitrogen and phosphorus than current IEPA standards. Also, plant will discharge into a six acre constructed wetland to further treat the water prior to reaching the headwaters of Dutch Creek.

Another benefit of this proposed Thatcher Meadows development is the stated interest of the developer to allow a portion of their development site to be used for up to 10 years as sediment storage basins for the proposed dredging of Wonder Lake. This is a critical element to the rehabilitation of Wonder Lake, as the dredging needs to occur while undeveloped sediment storage areas are still available in a rapidly developing area.

Finally, the developer has had discussions with the McHenry County Conservation District on having them manage Thatcher Meadow open space areas that are directly contiguous to the MCCD Harrison- Benwell site.

7.2.4 Natural Area Protection / Preservation Issues

McHenry County Natural Area Inventory Sites

The South Wonder Lake Wetland (MCNAI GRE10) is identified as suffering from siltation, water table alterations, brush encroachment, and invasive species (Cattails, Reed Canary Grass, Purple Loosestrife).

The Galt Airport Sedge Meadow (MCNAI GRE04) is documented as being threatened by water table alteration and brush encroachment.

The Wonder Lake Sedge Meadow (MCNAI GRE13) located north of Wonder Lake Road near the intersection with Thompson road, has been identified as being impacted by water table alterations and invasive species (Reed Canary Grass).

The Harrison-Benwell Two (MCNAI MCH05) site, located along Troy Creek near McCullom Lake Road, has been identified as being impacted by water table alterations, brush encroachment, aquatic invasive species, and terrestrial invasive species (Reed Canary Grass).

The Harrison-Benwell (MCNAI MCH06) site, located partially on the Harrison-Benwell MCCD property, south of McCullom Lake Road, has been identified as being threatened by brush encroachment, new development (either encroachment or discharge of poor quality runoff) and invasive species (Reed Canary Grass).

Wetlands

Wetlands are complex ecosystems that provide many ecological functions that are valued by society. The valuable ecological functions of wetlands and the open space they provide help to enhance the quality of life for local residents and visitors to the watershed. When discussing the importance of wetlands, the terms wetland functions and wetland values are often used. Wetland functions, such as sediment control and flood storage, are natural processes that continue regardless of their perceived value. Society does not necessarily attach value to all wetland functions. Value is usually associated with goods and services that wetlands provide. For this reason, wetland values, such as water quality maintenance and flood protection, are the goods and services that wetlands provide.

Excluding Wonder Lake, there are about 900 acres of wetlands remaining in the subwatershed, compared to 1,200 acres of hydric soils. This means that about 75% of the historic wetlands are still present, although most are significantly degraded compared to their quality prior to settlement in the subwatershed.

There are four High Habitat Quality wetland complexes in the Wonder Lake subwatershed, ranging in size from 24 acres to more than 380 acres.

ADID Wetland N757 is an isolated 24 acre high-quality wetland that contains a remnant sedge meadow which is currently degraded due to siltation and agricultural runoff. This wetland is located on parcels slated for development after a recent annexation by the Village of Wonder Lake.

ADID Wetland #N668, located partially on the MCCD Harrison-Benwell property, is only partially protected and not managed to allow it to reach its full ecological potential. The wetland is being overrun with Reed Canary Grass.

ADID Wetland #N741, located within the South Wonder Lake Wetland NAI site, is a 381 acre high-quality wetland containing sedge meadow and fen remnants. This wetland is being degraded by invasive species (shrubs & Purple Loosestrife) and by conversion to a marsh community brought about by influence of the water table created by Wonder Lake.

7.3 Current Subwatershed Level Water Quality Planning Efforts

As previously mentioned in Section 7.2.3, the Wonder Lake Master Property Owners Association (MPOA) Directors authorized their consultant to review and revise an existing 1996 Wonder Lake Dredging Feasibility Study. The intent of updating the 1996 study was to reflect current lake restoration needs and costs, as well as to recommend activities that will protect and enhance Wonder Lake.

In January, 2007, the MPOA Lake Maintenance Commission received the updated recommendation plan from our consultant, and began a review process. The consultant estimated that a complete lake restoration option would require the removal 2.0 to 2.5 million cubic yards of accumulated sediment, at an estimated total cost of $ 12,960,000. Given site constraints, and desire to minimize impacts on recreational use of the lake, it was determined that hydraulic dredging would be the most cost-effective means of removing the sediment.

Recognizing that the potential burden a $ 12,960,000 project could place on the MPOA membership, the MPOA Lake Maintenance and Finance Commissions worked over the next several months to identify potential ways to reduce the cost, and to develop a "more affordable" plan. To obtain community input, the Commissions and the Directors conducted meetings with subdivisions and the owner of potential sediment storage sites, organized "open house" presentations, and conducted a summer Lake Fest, featuring a number of speakers on lake restoration, water quality, and shoreline stabilization.

During these meetings, MPOA members were provided several opportunities to participate in the planning process and to voice their concerns over the cost of lake restoration, lake access problems and thoughts on enhancement and protection activities. Incorporating that input, the MPOA has continuously been working on developing the more affordable plan, primarily by focusing on reducing the amount of sediment removal from 2.5 million to

about 1 million cubic yards, and concentrating on the most significantly impacted portions of the lake.

After months of review, meetings with consultants and land owners, crunching numbers and reviewing sediment depths, the MPOA presented the community with a $ 5.9 million lake restoration plan. This plan would target specific areas of Wonder Lake most impacted by sedimentation, as shown in Figure 7.12, and work to restore eroded islands within the lake. For the purposes of this update, potential sediment storage sites located east of East Wonder Lake Road and north of Route 120 were identified (Figure 7.13).

In July 2007, the Wonder Lake MPOA hired its first professional lake manager. The MPOA Board of Directors and the lake manager are currently working with the Village of Wonder Lake and McHenry County to create a Special Service Area (SSA) taxing district to fund the first phase of lake restoration efforts. Any parcel contiguous to, or that has lake access / lake rights, is proposed to be in included in this SSA district. A decision as to the success of this effort will likely be known by the Spring of 2008.

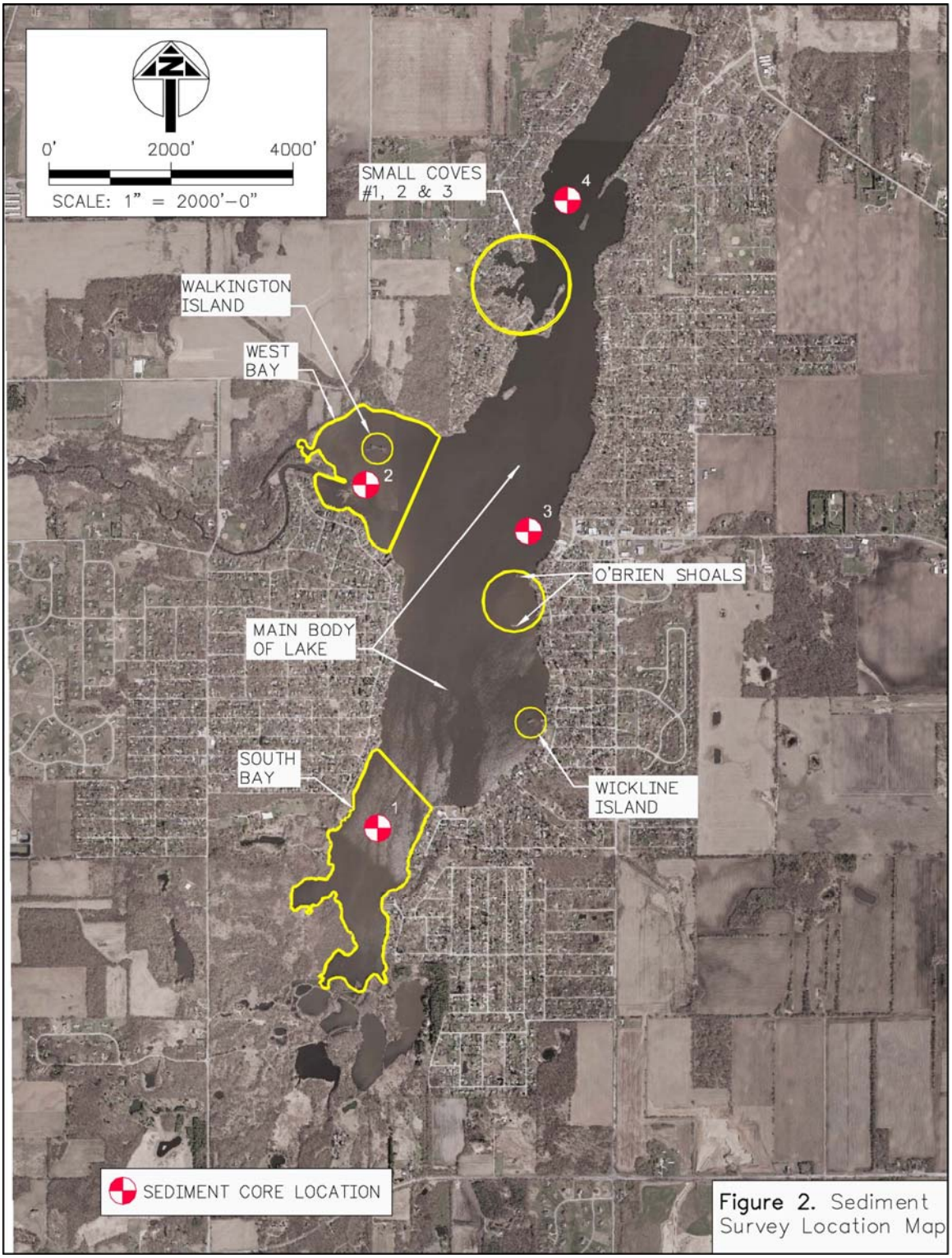
One of the critical aspects of this proposed Phase One lake restoration effort, to be funded by the proposed SSA, is the nature of the sediments to be dredged from Wonder Lake. Testing has determined that the in-lake sediment is composed of highly organic material, with a very high degree of fertility. Sediment samples have been tested by the University of Illinois to help determine the potential marketability of the dried dredged sediments. It is hoped that if a resale market can be established, the revenue proceeds from these sales could be used to fund future phases of lake dredging.

One of the other goals of the MPOA and the lake manager is to develop a large scale shoreline stabilization effort for those waterfront landowners with unprotected shorelines, or those with failing stabilization practices. Educational outreach will be performed to encourage landowners to consider more environmentally friendly shoreline stabilization practices, shoreline buffers, and other residential scale stormwater Best Management Practices.

However, given the wind and wave action that can occur with an 830 acre lake, coupled with the heavy recreational boating traffic, it is recognized that strictly biological / vegetative shoreline stabilization practices may not be sufficient. Instead, a combination of structural and vegetative practices will likely be required.

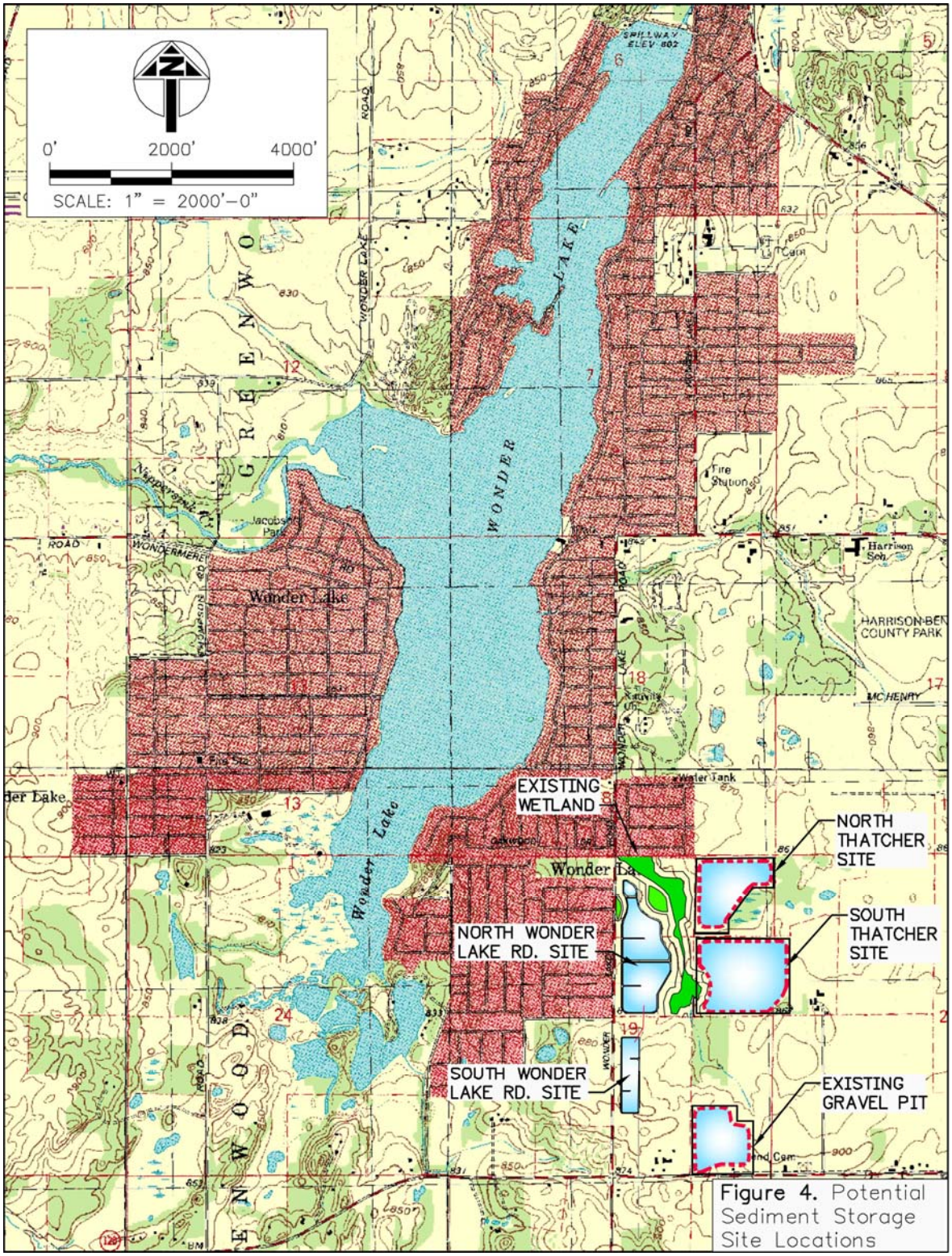
It is hoped that by finding a means to help cost-share the installation of environmentally friendly shoreline practices; encouraging enough landowners participate to generate a financial "economy of scale", and by providing technical assistance in applying for regulatory permits, the MPOA will be able to encourage many Wonder Lake shoreline owners to participate in this effort.

Figure 7.12 Conceptual Phase One Plan for Dredging Wonder Lake



Source: ***An Updated Feasibility Study and Restoration Plan for Wonder Lake*** **January 2007, HDR-CWI**

Figure 7.13 Evaluation of Potential Dredging Sediment De-Watering Sites



Source: ***An Updated Feasibility Study and Restoration Plan for Wonder Lake*** **January 2007, HDR-CWI**

7.4 Subwatershed-Specific Recommendations to Protect Water Resources

The following section discusses the Best Management Practices (BMP's) identified for this subwatershed that should be implemented to address existing or potential water quality impairments. The location of each recommended BMP project is presented in Figure 7.14

Pollutant Loading Modeling, as discussed in Chapter 3, identified current and future pollutant loadings, based upon land use, soils, slopes, etc., and quantified these loadings. The results of this Pollutant Loading modeling were then used to identify the types of BMP's that should be implemented to create a loading reduction of those pollutants. Table 7.10 presents a summary of the recommended BMP projects, as well as the expected pollutant loading reductions expected if the BMP's are implemented, and function as intended.

Table 7.11 presents detailed cost and logistical information on each of the recommended BMP projects. Below is a summary list of recommendations for the subwatershed to help stakeholders and decision makers meet the Goals and Objectives set forth for Nippersink Creek. Background information regarding how each type of recommendation addresses watershed concerns and/or impairments (existing or future) can be found in Chapter 4.

Type:	Education / Outreach; Regulatory; Site Restoration; Monitoring; Permanent Habitat Protection, Water Quality
Target Goals:	Which watershed plan goals the recommendation is intended to address.
Initial Implementation Cost:	The initial cost, in 2007 dollars to initiate the recommended action, if applicable.
Initial Outreach Cost:	The initial cost, in 2007 dollars to initiate the recommended action, if applicable.
Annual Cost:	The long term expected annual cost (in 2007 dollars) to successfully implementation of the recommendation
Responsible Party:	Identifies the LEAD agency, entity, or landowner who will ultimately have to execute the recommendation. SUPPORTING parties, such as government agencies, grant sources, etc. may also be identified here.
Priority:	A ranking of the BMP recommendations, based upon the nature / urgency of the existing / potential impairment; the availability of willing landowners)/ partners; short-term vs. long-term development pressure; and whether the project is a new effort, or a retrofit of an existing practice.

The project cost estimates contained in this report should be considered preliminary, and are only presented to identify the potential magnitude of cost, from a watershed scale perspective. No site-specific investigation, analysis, or design of any recommended project, from which accurate cost information could be obtained, was completed as part of the preparation of the 2008 Nippersink Creek Watershed Plan.

If a watershed stakeholder decides to apply for grant funding assistance to implement any of the recommended projects presented in this report, they should first undertake any additional studies / research needed to determine an updated / accurate project cost. They should not solely rely on the cost estimates presented in the NCWP report as the basis for their grant request.

Note: The following acronyms for responsible parties identified in Table 7.11 are presented below:

NCWPC	Nippersink Creek Watershed Planning Committee
NRCS	Natural Resource Conservation Service
SWCD	McHenry County Soil and Water Conservation District
MCCD	McHenry County Water Conservation District
TLC	The Land Conservancy of McHenry County
IDOT	Illinois Department of Transportation
IEPA	Illinois Environmental Protection Agency
MCDOT	McHenry County Department of Transportation
MCDEF	McHenry County Defenders
MPOA	Wonder Lake Master Property Owners Association
NRB LAND	NRB Land LLC (Private Developer)
HOA	Homeowners Association

Figure 7.14 Wonder Lake Subwatershed Site Recommendations Map

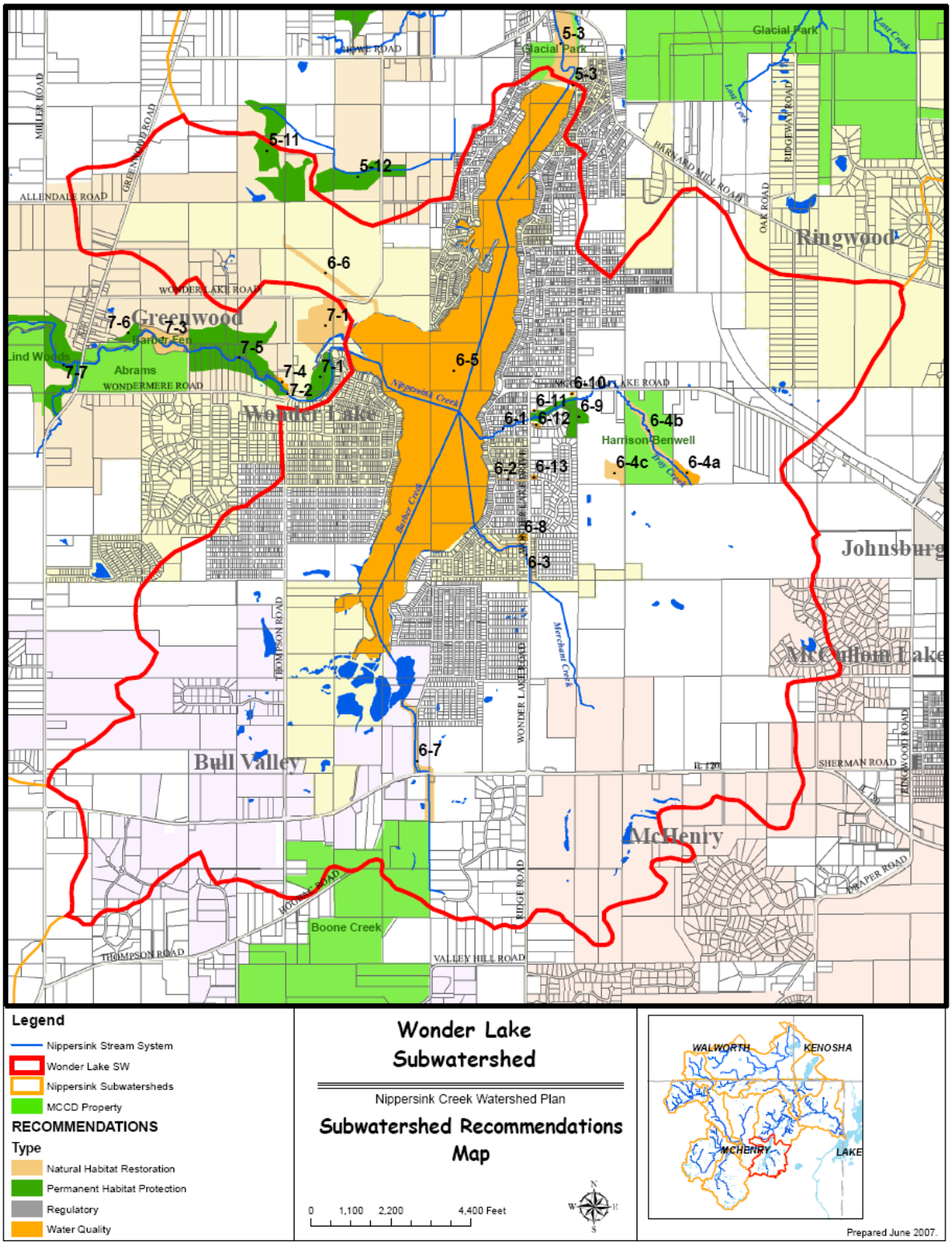


Table 7.10 BMP Selection & Associated Pollutant Load Reduction for the Wonder Lake Subwatershed

BMP	Type of BMP	Project Locations**	BMP		Removal Efficiency***			(lbs/year)****			Percentage Reduction		
			Size	Unit	TN	TP	TSS	TN	TP	TSS	TN	TP	TSS
Natural Habitat Protection	Site-specific	6-1, 6-2, 6-3, 6-4 b&c, 6-6, 6-7	47	acres	30%	35%	60%	196	19	21	0.9	1	1.8
Stream Corridor Restoration	Site-specific	6-1, 6-2, 6-3, 6-4b, 6-6, 6-7, 6-9	711	acres	53%	51%	88%	5,244	283	474	23.9	15.8	39.7
Wetland Restoration	Site-specific	6-4a & c	20	acres	53%	51%	88%	148	8	13	0.7	0.4	1.1
Detention Basin Retrofit	Site-specific	6-10, 6-11, 6-12, 6-13	9	acres	32%	55%	68%	40	4	5	0.2	0.2	0.4
Point Source Control/Monitoring	Site-specific	6-8	1	lump sum	0%	0%	0%	0	0	0	0	0	0
Nutrient Management	Watershed-specific	Subwatershed wide	788	acres	70%	28%	-	7,676	313	24	35	17.5	2
Regulatory*	Watershed-Specific	Subwatershed	1	Water-shed	5%	5%	5%	1,097	90	60	5	5	5
Shoreline Stabilization	Site-specific	6-5	21,457	linear feet	65%	78%	76%	2,138	210	136	9.8	11.7	11.4
Wonder Lake Dredging *****	Site-specific	6-5	1	lump sum	1.10%	1.10%	1.10%	250	20	14	1.1	1.1	1.1
Total								17,227	982	770	78.5	54.8	64.5

*Regulatory programs are assumed to have nominal pollutant reduction rates of 5%.

** Project locations and details are described in the corresponding chapter.

*** TN = total Nitrogen; TP = total Phosphate; TSS = total suspended solids or Sediment.

**** The unit of "TSS" is "Tons/year".

***** This BMP contributes to the entire watershed pollutant load reductions. In terms of the sediment load trapped within Wonder Lake (Source: USGS 2004. Water quality of Nippersink Creek and Wonder Lake, McHenry County, Illinois, 1994-2001. Scientific Investigation Report 2004-5085".), this BMP can annually reduce 6800 tons sediments load (assuming a 75% trapping-rate of the annual total loads of 9,145 tons,). For this subwatershed, the pollutant load reductions by this BMP are assumed to be 1.1% of the total subwatershed pollutant loads.

Table 7.11 Recommended Projects in the Wonder Lake Subwatershed

SUB WATERSHED	RECOMMENDATION #	TARGET GOAL	DESCRIPTION	RESPONSIBLE PARTY	ACRES	UNIT COST	INITIAL IMPLEMENTATION COST	INITIAL OUTREACH COST	ANNUAL MAINTENANCE COST	PRIORITY
Wonder Lake	6-1	Natural Habitat Restoration	Landowner / Government Outreach to develop and implement a Stream Corridor Enhancement project along Troy Creek between Wonder Lake and Wonder Lake Drive	NCWPC / MPOA / VILLAGE OF WONDER LAKE / TLC	1.7	$50,000	$83,300	$1,000	$4,165	D
Wonder Lake	6-2	Natural Habitat Restoration	Landowner / Government Outreach to develop and implement a Stream Corridor Enhancement project along unnamed tributary to Wonder Lake along Hickory Road - 1000 LF	NCWPC / MPOA / VILLAGE OF WONDER LAKE / TLC	1.3	$50,000	$63,600	$1,000	$3,180	D
Wonder Lake	6-3	Natural Habitat Restoration	Landowner / Government Outreach to develop and implement a Stream Corridor Enhancement project along Merchant Creek from Wonder Lake to east side of Wonder Lake Road; establish Conservation Easements; monitor for possible e-coli; illegal dump site	NCWPC / MPOA / VILLAGE OF WONDER LAKE / TLC	8.5	$50,000	$423,450	$1,500	$21,173	D
Wonder Lake	6-4a	Water Quality	Landowner Outreach developer to implement a 5-6 acre constructed wetland Stormwater BMP to filter runoff from future development	NCWPC / VILLAGE OF WONDER LAKE / NRB LAND	7.1	$3,000	$21,324	$500	$178	D
Wonder Lake	6-4b	Natural Habitat Restoration	**MCCD Harrison Benwell** - Stream Corridor Enhancement - Brush Clearing - Grade Control - Streambank Stabilization	MCCD	10.8	$15,000	$162,225			A
Wonder Lake	6-4c	Natural Habitat Restoration	Landowner / Government Outreach landowner to restore wetland on southwest end of Harrison-Benwell MCNAI Site	NCWPC / VILLAGE OF WONDER LAKE / NRB LAND	6.3	$3,000	$19,032	$500	$952	D
Wonder Lake	6-5	Water Quality	Implement Wonder Lake Dredging Project (1 million CY dredging);	MPOA			$5,900,000			A

Table 7.11 Recommended Projects in the Wonder Lake Subwatershed

SUB WATERSHED	RECOMMENDATION #	TARGET GOAL	DESCRIPTION	RESPONSIBLE PARTY	ACRES	UNIT COST	INITIAL IMPLEMENTATION COST	INITIAL OUTREACH COST	ANNUAL MAINTENANCE COST	PRIORITY
Wonder Lake	6-5	Natural Habitat Restoration	Establish Cost-Share Program for Wonder Lake shoreline stabilization projects (25,000 LF)	MPOA			$675,000		$33,750	A
Wonder Lake	6-5	Natural Habitat Restoration	Implement Wonder Lake shoreline demonstration project	MPOA			$50,000		$2,500	A
Wonder Lake	6-6	Natural Habitat Restoration	Landowner / Government Outreach to develop and implement a Stream Corridor Enhancement project along Galt Creek; 4000 LF; parcel planned for future development	NCWPC / MPOA / VILLAGE OF WONDER LAKE / TLC	9.8	$50,000	$488,350	$1,000	$24,418	D
Wonder Lake	6-7	Natural Habitat Restoration	Landowner / Government Outreach to develop and implement a Stream Corridor Enhancement project along Barber Creek; first 4000 LF upstream of Wonder Lake	NCWPC / VILLAGE OF WONDER LAKE / VILLAGE OF BULL VALLEY	18.3	$50,000	$914,750	$1,000	$45,738	D
Wonder Lake	6-8	Water Quality	Agency Outreach to investigate possible pollution source to Merchant Creek from auto repair facility at Wonder Lake Road and Beaver Road	VILLAGE OF WONDER LAKE / MCHENRY COUNTY HEALTH DEPARTMENT / IEPA			$2,500	$500		F
Wonder Lake	6-9	Permanent Habitat Protection	Landowner Outreach to protect high quality Harrison-Benwell Two MCNAI Site; stream restoration 1700 LF	NCWPC / TLC / MCDEF	15.3	$50,000	$763,400	$500	$38,170	D

Table 7.11 Recommended Projects in the Wonder Lake Subwatershed

SUB WATERSHED	RECOMMENDATION #	TARGET GOAL	DESCRIPTION	RESPONSIBLE PARTY	ACRES	UNIT COST	INITIAL IMPLEMENTATION COST	INITIAL OUTREACH COST	ANNUAL MAINTENANCE COST	PRIORITY
Wonder Lake	6-10	Water Quality	Landowner / Government Outreach to retrofit dry bottom turf grass detention basin; commercial development SW corner of McCullom Lake Road and E. Wonder Lake Road	NCWPC			$15,000	$750	$1,125	E
Wonder Lake	6-11	Water Quality	Landowner / Government Outreach to retrofit dry bottom turf grass detention basin; commercial development east side of Wonder Lake Drive between Brook Drive and Sunset Drive	NCWPC			$15,000	$750	$1,125	E
Wonder Lake	6-12	Water Quality	Landowner / Government Outreach to retrofit dry bottom turf grass detention basin; residential subdivision east side of Wonder Lake Drive at Beach Court	NCWPC / HOA			$15,000	$750	$1,125	E
Wonder Lake	6-13	Water Quality	Landowner / Government Outreach to retrofit existing dry bottom detention basin at Hickory Road and Wonder Lake Drive with native vegetation and minor regrading to increase pollutant removal	NCWPC / HOA			$15,000	$750	$1,125	E
				SW TOTALS	**79.0**		**$9,626,931**	**$10,500**	**$178,722**	

PRIORITY

- **A Projects that have cooperating partners, can move to implementation quickly. Implementation Timeframe 1 to 3 years**
- **B Projects subject to imminent development pressure, Implementation Timeframe 1 to 2 years**
- **C Projects needed to protect sensitive areas. Timeframe 1 to 2 years**
- **D Restoration projects, Timeframe 1 to 5 years**
- **E Retrofit Projects, Timeframe 1 to 5 years**
- **F Existing Pollution Potential, Timeframe 1 to 2 years**
- **G Policy / Opportunity Review Project, Timeframe 1 to 3 years**

Chapter 8
Vander Karr Creek Subwatershed Assessment

8.1 Subwatershed Characteristics

The following section provides an overview of the physical characteristics of the subwatershed.

8.1.1 Subwatershed Location

The Vander Karr Creek subwatershed is located in the center of Nippersink Watershed, as shown in Figure 8.1. This subwatershed has an area of 12,231 acres, or 19.11 square miles (9.4% of watershed). The subwatershed is located within southern Hebron Township and northern Greenwood Township. This subwatershed includes not areas that drain directly to Vander Karr Creek, but also includes about 2,300 acres south of the main channel of Nippersink Creek. The northeastern corner of this 2,300 acre area is at the inflow to Wonder Lake, and the northwest corner is at the confluence of Nippersink Creek with the tributaries Vander Karr Creek and Neumann Creek

Figure 8.1 Vander Karr Creek Subwatershed Location Map

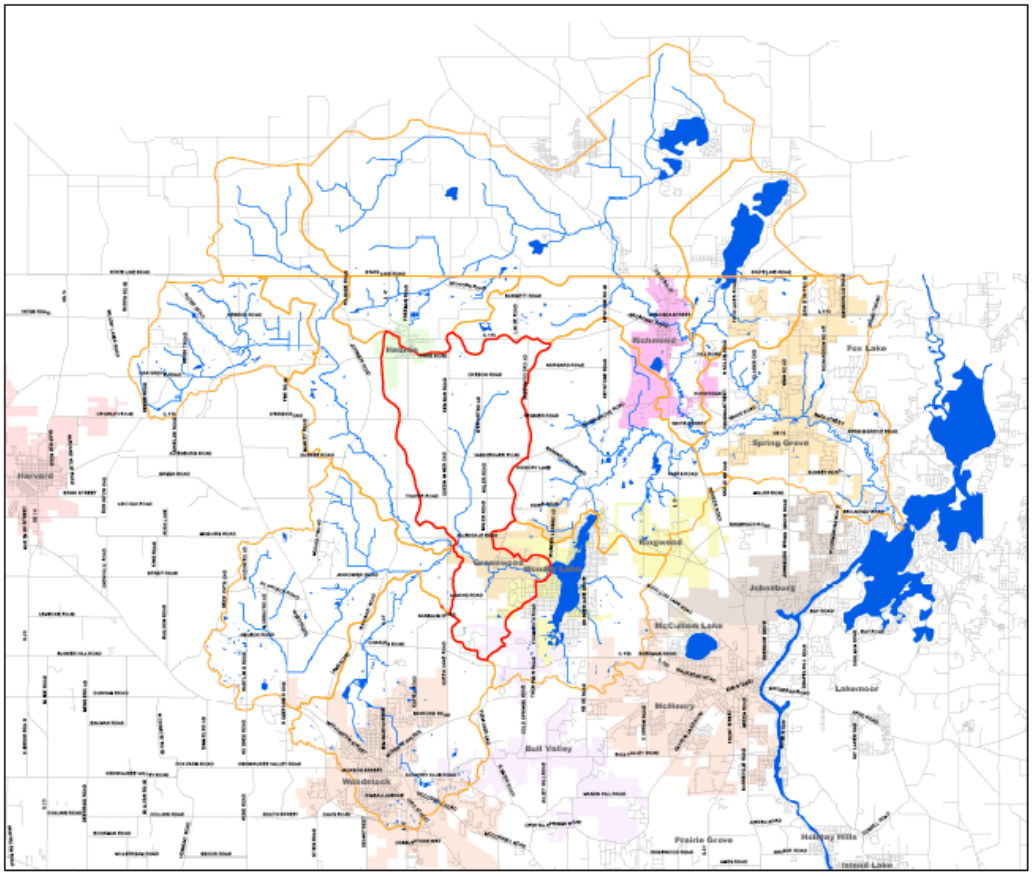
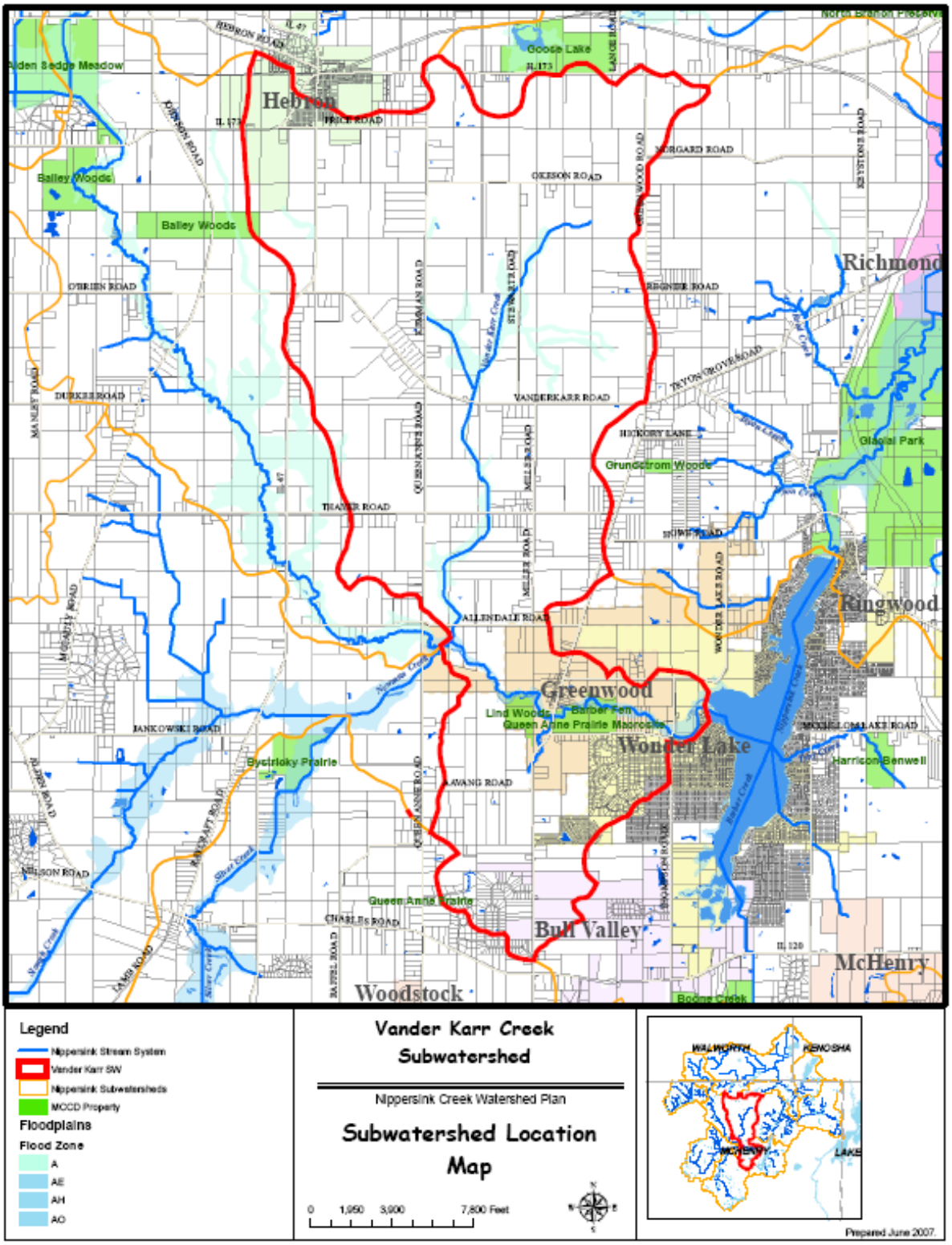


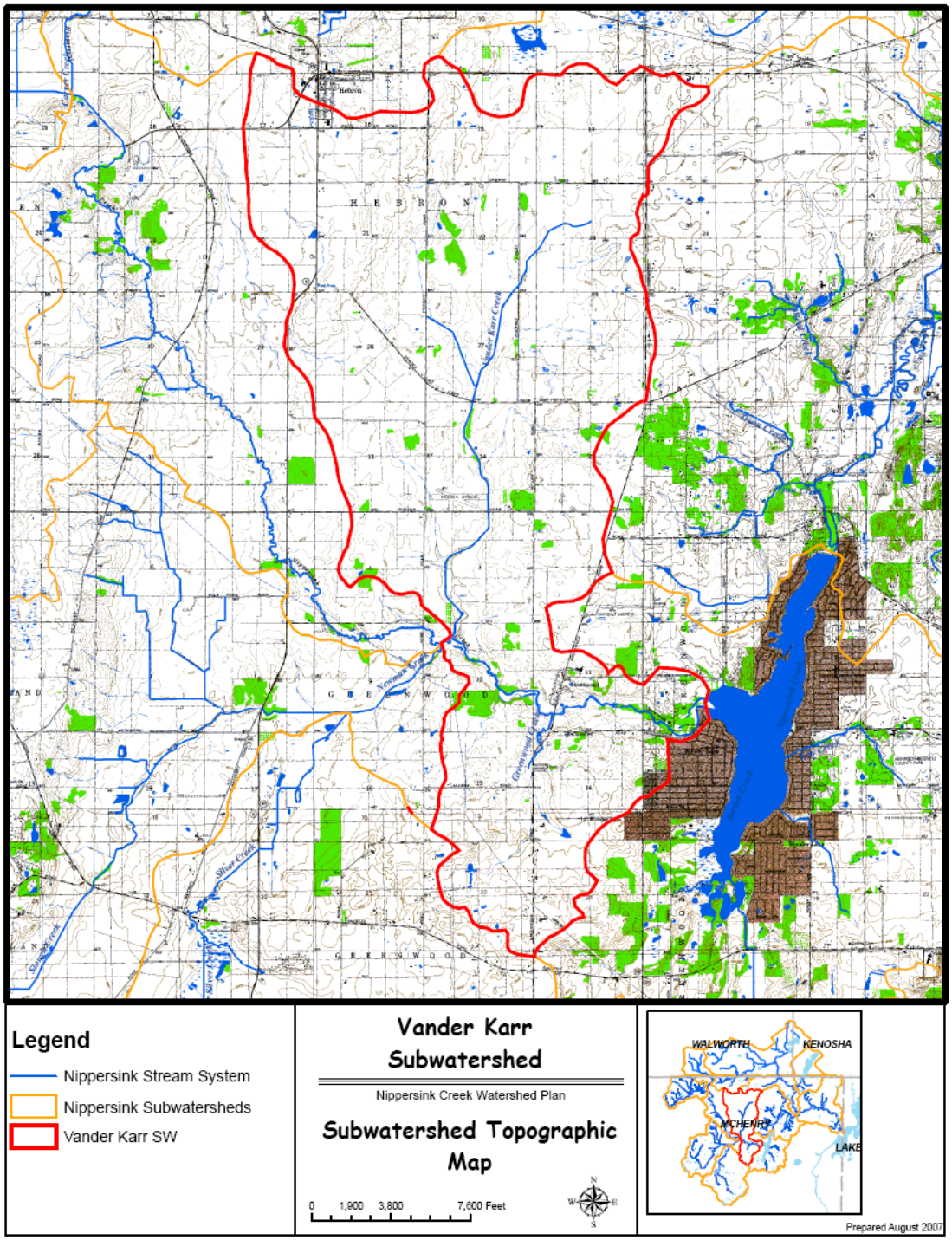
Figure 8.2 Vander Karr Creek Subwatershed Map



8.1.2 Topography & Geology

The topography of the Vander Karr Creek subwatershed is moderately sloping, generally between 2% and 4%. The highest point in the watershed is elevation of 954 feet, found on the southeast side of the Village of Hebron (northeast of Price Road and Illinois Route 47 intersection). The lowest elevation in this subwatershed is 802 feet, where Nippersink Creek flows into Wonder Lake.

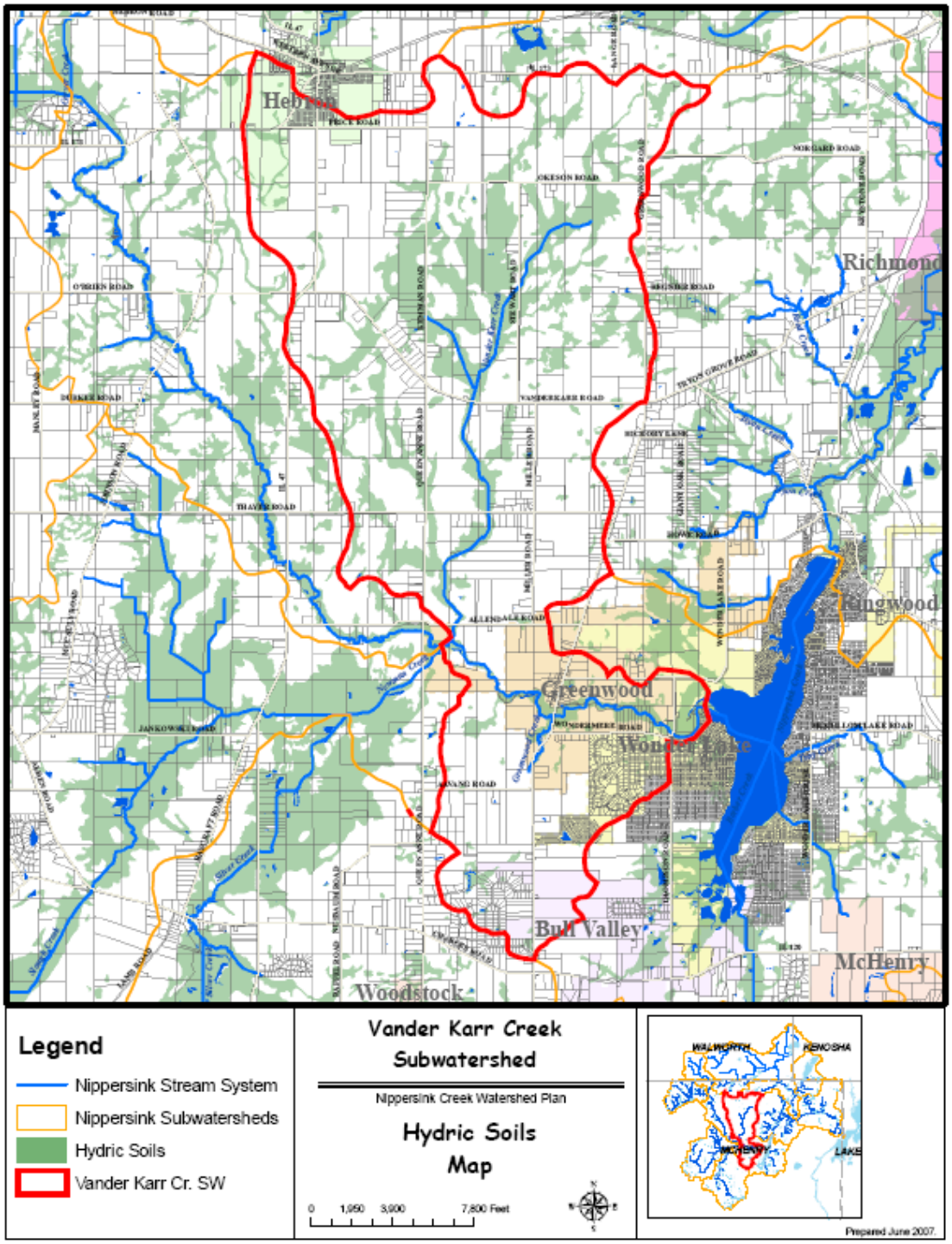
Figure 8.3 USGS Topographic Map of the Vander Karr Creek Subwatershed



8.1.3 Soil Characteristics

The glacial advances across McHenry County resulted in a wide variety of soil associations. Each major grouping of soil associations has potential impact on current and future land uses within the subwatershed. For example, hydric (wetland) soils constitute 2,598 acres, or 21.2% of the 12,231 acre subwatershed, and indicate those areas that contain functional wetlands, or former / degraded wetland areas that could be restored or enhanced.

Figure 8.4 Hydric Soils of the Vander Karr Creek Subwatershed



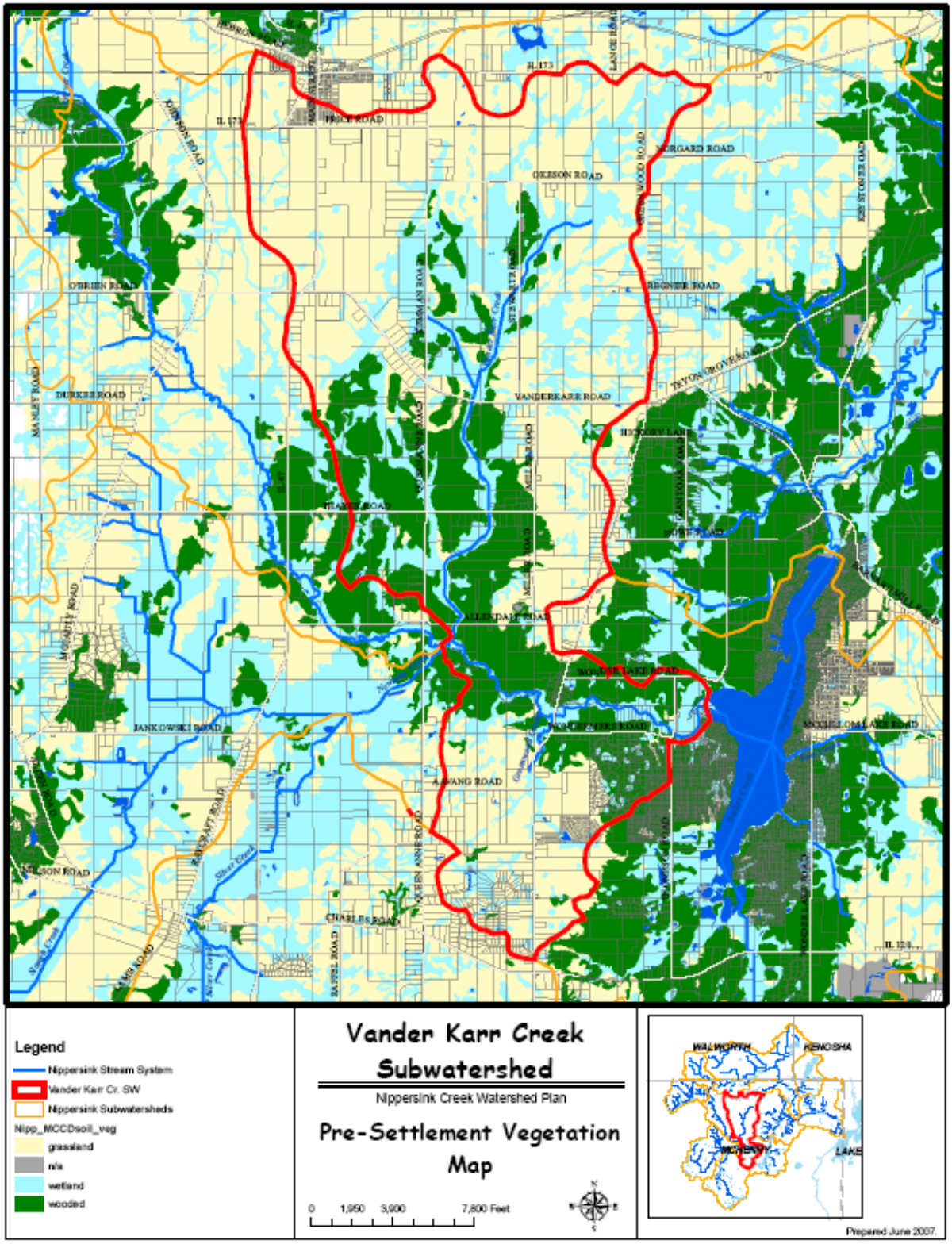
8.1.4 Pre-settlement Vegetation

To guide future land management or restoration efforts, it is important to recognize the native plant communities that naturally evolved subsequent to the last glacial advances. Prior to European settlement in the 1830's, the Vander Karr Creek Subwatershed was predominantly woodland, as described in Table 8.1, and depicted in Figure 8.5. These woodlands, largely comprised of oak / hickory woodland and savannah, were bisected with wetlands and grassland along the drainageways.

Table 8.1 Pre-Settlement Land Cover Conditions of the Vander Karr Creek Subwatershed

Land Cover Type	Area (acres)	Percent of Subwatershed
Grassland	1,848	23%
Wooded	3,535	45%
Wetland	1,586	20%
n/a	914	12%

Figure 8.5 Pre-settlement Vegetation of the Vander Karr Creek Subwatershed



8.1.5 Subwatershed Drainage Features

Streams

There are two principal streams in the Vander Karr Creek subwatershed, Vander Karr Creek and a portion of main channel of Nippersink Creek.

The section of Nippersink Creek in this subwatershed begins at the confluence of Nippersink Creek with Neuman Creek (at the end of the Silver and Slough Creek subwatersheds) and extends eastward to where Nippersink Creek enters Wonder Lake. This 3.6 mile reach of the Nippersink has a very high quality, well vegetated and relatively undisturbed stream corridor. The floodplain is well defined and varies from as narrow as 250 feet to as much as 800 feet, with 15 to 30 foot high slopes at the edge the floodplain.

Vander Karr Creek is a 5.5 mile long agricultural stream that extends from the confluence with Nippersink Creek near Allendale and Queen Anne Road northward to the farm fields on the south side of Okeson Road, west of Greenwood Road. For a small tributary stream, the channel is relatively flat, with slopes around 8 to 9 feet per mile. All but the first 900 feet of the stream is channelized (97%), which is of little surprise given the intense agricultural land uses in the subwatershed.

Manmade Drainage Systems

Analysis of land uses and aerial photography indicates that the majority of the subwatershed is drained using a system of agricultural open channels and road-side swales. Areas containing storm sewers are located at the far north end of the subwatershed (Hebron area – 80 acres) and in the extreme southeast corner of the subwatershed (south of Wondermere Road – about 360 acres). Areas drained using storm sewers and stormwater detention basins represent less than 4% of the subwatershed.

Agricultural Tile Systems

Due to the predominantly agricultural nature of the subwatershed, it is likely that there many functioning underground drain tile systems remaining in the subwatershed, particularly in the western half of the subwatershed. Historically, these were the areas that had poor drainage characteristics, but that farmers could successfully convert to agricultural usage by the installation of agricultural drain tile systems.

Identifying agricultural drain tile networks is important in watershed planning because current local flooding and drainage problems can often be linked to damage or age-related failure of drain tile systems. From a watershed preservation / restoration perspective, it is important to identify functional drain tile systems to determine opportunities for their removal or reconfiguration for the purposes of restoring valuable wetland habitat, and water quality benefits. It is probable that many of the depressional and low lying areas in the subwatershed that are now drained by tile systems were once wetland and wet prairie ecosystems that supported very diverse habitats.

8.1.6 Population

The use and analysis of population data in watershed planning is critical because there is a direct correlation between the number of people residing in a watershed, and the degree of impacts to the quality and quantity of the watershed's natural resources. The Illinois State Water Survey performed an analysis of the US Census data from 1990 and 2000 for the subwatersheds in the Fox River. In the Nippersink Creek Watershed, this analysis combined the Vander Karr Creek and Slough Creek subwatersheds into one unit. There the population data are really the sum total for both of these subwatersheds in this report. The combined population for the Vander Karr and Slough Creek subwatersheds in 1990 was 2,876. In the year 2000 US Census, the population in these two subwatersheds increased to 3,306 (15% increase).

8.1.7 Land Cover

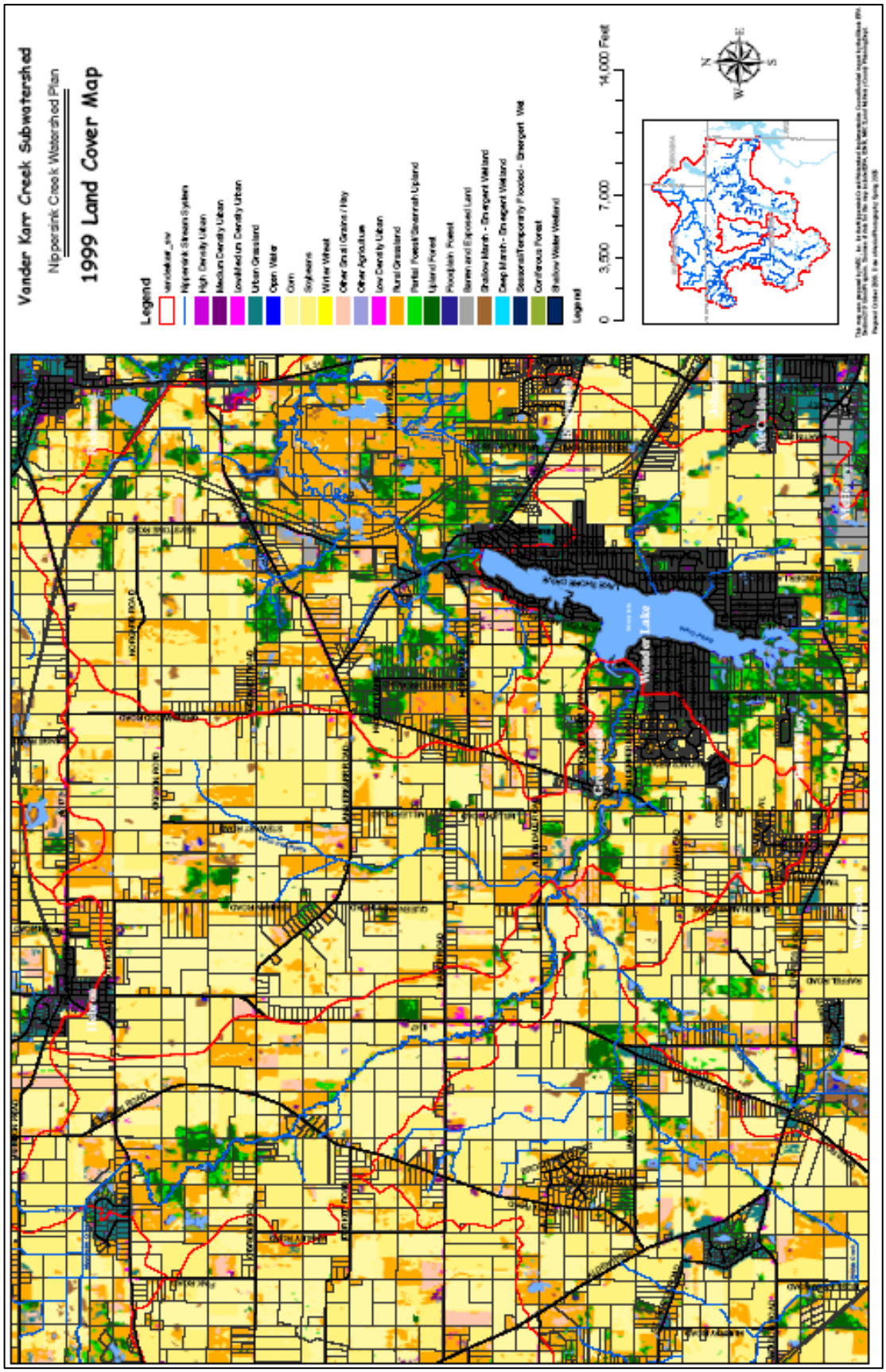
Often, the terms Land Cover and Land Use are used interchangeably. However, there are differences. Land Cover refers to the vegetation, structures, or other features that cover the land. On the other hand, Land Use (as discussed in Section 8.1.8) refers to how land is used by humans.

Land cover data for the Nippersink Creek Watershed is available from the Illinois Department of Natural Resources using LANDSAT data collected between 1998 and 1999. The dominant land cover, according to this data, was rural grasslands and agricultural row crops (91%). Urban landscapes accounted for roughly 2.7% of the Vander Karr Creek subwatershed area, while wooded areas and wetlands account for an additional 6.3% of the subwatershed.

Table 8.2 1999 Land Cover for the Vander Karr Creek Subwatershed

Land Cover Description	Total Acres	Percent of Subwatershed
Barren & Exposed Land	10.4	0.1%
Corn, Soybeans, Other Small Grains & Hay	8,542.4	69.8%
Winter Wheat	0.5	0.0%
Rural Grassland	2,562.3	20.9%
Low Density Urban	113.1	0.9%
Medium Density Urban	66.7	0.5%
High Density Urban	6.5	0.1%
Urban Grassland	148.5	1.2%
Shallow Marsh – Emergent Wetland	70	0.6%
Shallow Water Wetland	0	0.0%
Partial Forest /Savannah Upland	249.8	2.0%
Upland Forest	418.5	3.4%
Floodplain Forest	31.9	0.3%
Deep Marsh / Emergent Wetland	1.11	0.0%
Open Water	9.5	0.1%
TOTAL	**12,231.21**	**100.0%**

Figure 8.6 **1999-2000 Land Cover Map for the Vander Karr Creek Subwatershed**



8.1.8 Land Use / Existing Watershed Development

According to the 2005 McHenry County Land Use / Zoning map, 87% of the subwatershed is zoned for agricultural use, while about 13% is either already developed or zoned for development in the future. Only 0.5% is classified as open space.

Table 8.3 McHenry County 2005 Land Use in the Vander Karr Creek Subwatershed

Land Use	Total Acres	Percent of Subwatershed
Vacant	0.01	0.0%
Vacant; Zoned Residential	201.6	1.6%
Vacant; Zoned Commercial	0.22	0.0%
Vacant; Zoned Office	0	0.0%
Vacant; Zoned Industrial	0	0.0%
Agricultural	10,655.3	87.1%
Single Family Residential	872.5	7.1%
Multi-Family Residential	1.15	0.0%
Commercial	7.5	0.1%
Office	0	0.0%
Industrial	6.5	0.1%
Mining	0	0.0%
Open Space	63.1	0.5%
Institutional	59.8	0.5%
Right of Way	363.3	3.0%
TOTAL	**12,231**	**100.0%**

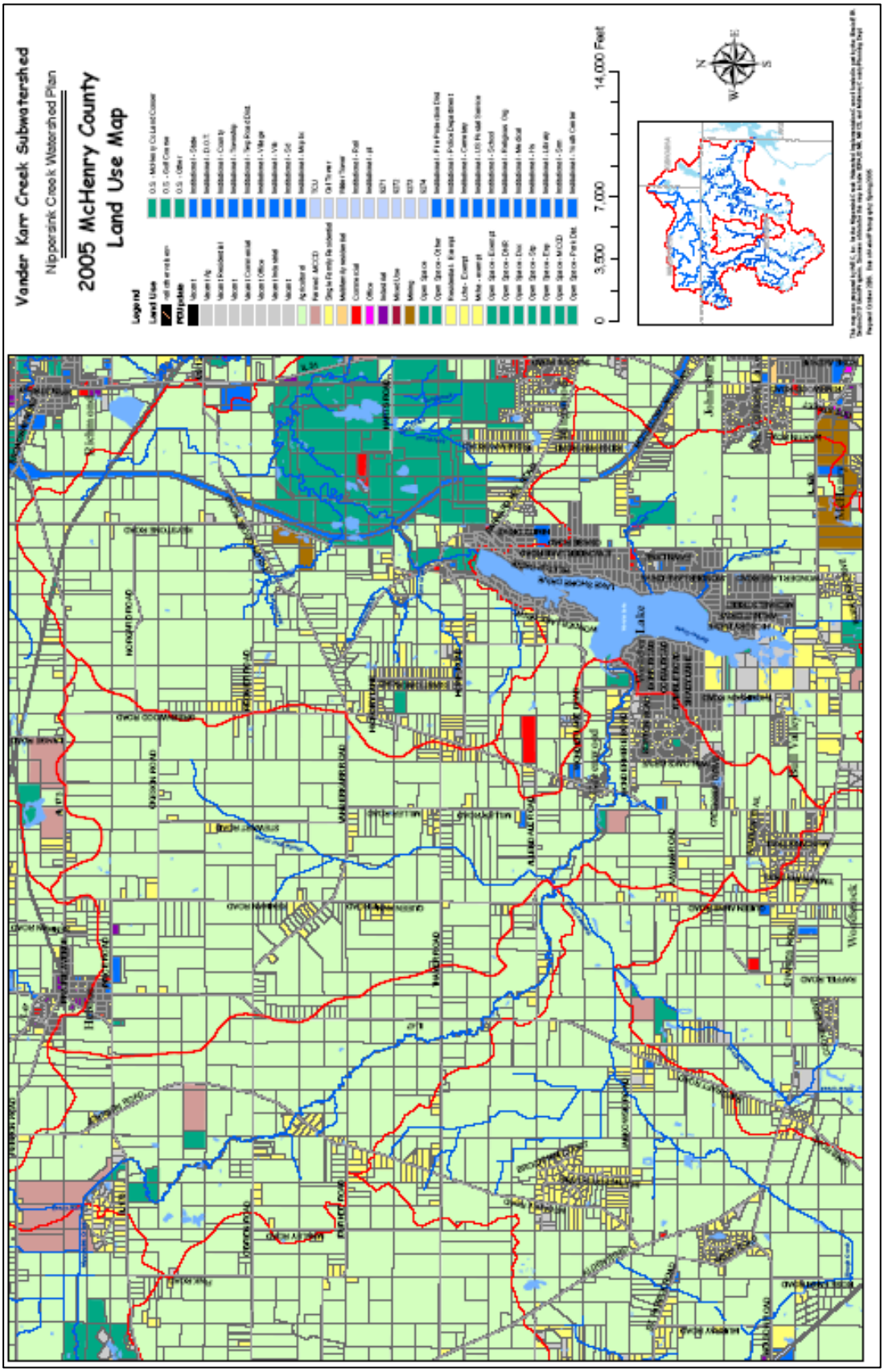
Development in the subwatershed has historically occurred through unincorporated residential development, although this subwatershed is currently experiencing development growth through municipal annexations by the Village of Greenwood.

Table 8.4 Municipal Areas in the Vander Karr Creek Subwatershed

Municipality	Total Acres	Percent of Subwatershed
Village of Greenwood	899	7.4%
Village of Wonder Lake	474	3.9%
Village of Hebron	428	3.5%
Village of Bull Valley	234	1.9%
Unincorporated McHenry County	10,195	83%

There are 43.7 miles of roads in the subwatershed, which equates to more than 148 acres of impervious cover (roadway pavement only – excludes parking lots, sidewalks, and driveways).

Figure 8.7 2005 McHenry County Land Use Map for the Vander Karr Creek Subwatershed



Point Source Discharges

There are no verified point source discharges in the Vander Karr Creek subwatershed.

8.1.9 Natural Resources

McHenry County Conservation District Properties

There are five McHenry County Conservation District properties in the subwatershed, totaling about 187.9 acres, or 1.5% of the Vander Karr subwatershed area.

Table 8.5 MCCD Properties in the Vander Karr Creek Subwatershed

Name	Area in SW (acres)	Total MCCD Property Area
Lind Woods	57.6	
Goose Lake	12.9	269.8
Barber Fen	18.1	
Bailey Woods	14.6	
Queen Anne Prairie Macrosite	84.7	
Total	**187.9**	

Other Publicly Protected Land

Table 8.6 Other Publicly Protected Land in the Vander Karr Creek Subwatershed

Name	Area (acres)	# of Parcels
Greenwood Township	8.0	1
Hebron/Alden/Greenwood Fire Prot. Dist.	4.0	3
Village of Hebron	6.0	5
Village of Wonder Lake	13.3	2
Total	**31.4**	

McHenry County Natural Areas Inventory

There are four McHenry County Natural Area Inventory (MCNAI) Sites within the subwatershed, representing about 2.4% of the entire subwatershed.

Table 8.7 McHenry County Natural Areas Inventory Sites in the Vander Karr Creek Subwatershed

MCNAI Site ID	Name	Area in Subwatershed (acres)	Total MCNAI Site Area	Ownership
GRE01	Aavang-Lind Woods	87.9	92.3	Public / Private
GRE05	Greenwood Fen	145.9	145.9	Public / Private
GRE13	Wonder Lake Sedge Meadow	30.5	79.0	Private
HEB08	Vander Karr Prairie	31.6	31.6	Private
	TOTAL	**296.0**		

Wetlands

McHenry County completed an Advanced Identification (ADID) Wetland Study in 2003. This study identified a total of 102 wetlands, totaling 639.4 acres, or 5% of the Vander Karr subwatershed. Of these wetlands, 312.1 acres (49%) were determined to be of High Quality.

Table 8.8 Mapped Wetlands in the Vander Karr Creek Subwatershed

ADID Code	Wetland Type	Number of Wetlands	Total Area (acres)
HFV	High Functional Value	8	88.1
HQW	High Quality Wetland	3	312.1
FW	Farmed Wetland	44	106.1
L	Lake	2	6.5
W	Other Wetlands (lower quality)	45	126.6
	TOTAL	**102**	**639.4**

Threatened & Endangered Species

Threatened and Endangered (T&E) species data were extracted from T&E data records documented in the McHenry County Natural Areas Inventory Database. The data were collected by the McHenry County Conservation District during field studies undertaken at the subwatershed Natural Area Inventory Sites. The data indicate that there are at least three threatened or endangered animal species living in the subwatershed.

Table 8.9 Threatened and Endangered Species in the Vander Karr Creek Subwatershed

Common Name	Scientific Name	Type	Status	NAI Site
Pale Vetchling	Lathyrus ochroleucus	Plant	State Threatened	GRE01
Nodding Trillium	Trillium cernuum	Plant	State Endangered	GRE01 GRE05
Blanding's Turtle	Emydoidea blandingii	Reptile	State Threatened	GRE13

Source: McHenry County Natural Areas Inventory Database, 2005

Fishery

According to a 2005 McHenry County Natural Areas Inventory, the MCCD has sampled Vander Karr Creek and found ten fish species present, including two pollution-intolerant species (Blacknose Dace & Fantail Darter).

Mussels

According to the 2005 McHenry County Natural Areas Inventory, the MCCD has sampled Vander Karr Creek and found no mussels inhabiting the stream.

Existing Greenways

There are no formal greenways in the Vander Karr Subwatershed,

8.2 Analysis of Subwatershed Data and Problem Identification

8.2.1 Water Quality Data & Identified Problems

The Illinois Environmental Protection Agency (IEPA) is tasked with assessing the quality of the surface water resources of Illinois. The IEPA has determined Nippersink Creek's designated uses are:

- Aquatic Life
- Fish Consumption
- Primary Contact
- Secondary Contact
- Aesthetic Quality

The IEPA periodically produces a 303(d) list, which identifies waterways that are not achieving certain designated uses. In the 2006 IEPA 303(d) list, Nippersink Creek is identified as being in Full Support of its Aquatic Life Designated Use, which is notable for a stream in northeastern Illinois.

However, Nippersink Creek was also determined to be Non-supporting of its Primary Contact Designated Use, due to excessive levels of fecal coliform. This pollutant, associated with human and animal waste, was listed as coming from an unknown source. The IEPA also identified fish consumption, secondary contact and aesthetic quality as designated uses for Nippersink Creek, although the ratings for these uses were classified as "not assessed".

The quality of the Vander Karr Creek itself is unknown, as the IEPA does not sample this small tributary and it appears that no local agencies monitor the quality of Vander Karr Creek either.

The Fox River Watershed Monitoring Network (FRWMN), administered by the not-for-profit group, *Friends of the Fox River*, maintains four volunteer stream monitoring sites on Nippersink Creek, however there are no established FRWMN monitoring stations on the Vander Karr Creek.

8.2.2 Flooding Problems

At the time of this writing, no data were provided by the County or municipalities regarding existing flooding problems. Analysis of available floodplain information suggests that there are less than 10 homes in the 100 Year Floodplain, however, it is important to note that Vander Karr Creek has not had its floodplain accurately calculated (shown as a Zone A Unstudied Floodplain on the current FEMA map)

8.2.3 Projected Development & Growth

Development in the Vander Karr subwatershed is expected to be moderate, depending largely on the rate of municipal annexations promoted through the Village of Greenwood in the south and the Village of Hebron in the north. There is currently over 200 acres of agricultural land zoned for residential development, according to the McHenry County Land Use Map.

8.2.4 Natural Area Protection / Preservation Issues

McHenry County Natural Area Inventory Sites

In the Vander Karr Creek subwatershed, about 27% of the McHenry County Natural Area Inventory (MCNAI) sites are protected through public ownership (80 of 296 acres on MCCD property).

Aavang-Lind Woods (MCNAI GRE01) is a 90.3 acre natural area located along Nippersink Creek just west of downtown Greenwood. The site features a neutral seep and spring, dry mesic silt loam woodland, and mesic silt loam woodland. The MCNAI database indicates that this site is currently impaired by streambank erosion, upstream impoundment, brush encroachment, agricultural runoff, and grazing. This site is only partially protected by the MCCD and partially as an Illinois Nature Preserve on private property.

Greenwood Fen (MCNAI GRE05) is a 146 acre natural area located along Nippersink Creek east of Greenwood Road (and parallel with Wondermere Road). The site features a well-buffered, meandering, gravel bottom stream, graminoid fens, a permanent pond, sedge meadows, a streamside marsh, and a mesic silt loam prairie. The MCNAI database indicates that this site is currently impaired by aquatic invasives, brush encroachment, Reed Canary Grass, grazing, and development. This site is only partially protected by the MCCD and by the privately-held Barber Fen, an Illinois Nature Preserve site.

About half of the Wonder Lake Sedge Meadow (MCNAI GRE13) is located in the Vander Karr Subwatershed (30 of 79 acres). This MCNAI site features a graminoid fen and is threatened by invasive species (Reed Canary Grass) and alterations to the water table. The site is entirely on private property with no known protection in place to preserve the natural features.

Vander Karr Prairie (MCNAI HEB08) is located in the northern region of the subwatershed between Kenman Road and Stewart Road. This 31.6 acre site contains a wet silt loam prairie and at least two sedge meadow communities. The site is impacted by alterations to the water table, brush encroachment, and invasive species (Reed Canary Grass).

8.3 Subwatershed-Specific Recommendations to Protect Water Resources

The following section discusses the Best Management Practices (BMP's) identified for this subwatershed that should be implemented to address existing or potential water quality impairments. The location of each recommended BMP project is presented in Figure 8.8.

Pollutant Loading Modeling, as discussed in Chapter 3, identified current and future pollutant loadings, based upon land use, soils, slopes, etc., and quantified these loadings. The results of this Pollutant Loading modeling were then used to identify the types of BMP's that should be implemented to create a loading reduction of those pollutants. Table 8.10 presents a summary of the recommended BMP projects, as well as the expected pollutant loading reductions expected if the BMP's are implemented, and function as intended.

Table 8.11 presents detailed cost and logistical information on each of the recommended BMP projects. Below is a summary list of recommendations for the subwatershed to help stakeholders and decision makers meet the Goals and Objectives set forth for Nippersink Creek. Background information regarding how each type of recommendation addresses watershed concerns and/or impairments (existing or future) can be found in Chapter 4.

Type:	Education / Outreach; Regulatory; Site Restoration; Monitoring; Permanent Habitat Protection, Water Quality
Target Goals:	Which watershed plan goals the recommendation is intended to address.
Initial Implementation Cost:	The initial cost, in 2007 dollars to initiate the recommended action, if applicable.
Initial Outreach Cost:	The initial cost, in 2007 dollars to initiate the recommended action, if applicable.
Annual Cost:	The long term expected annual cost (in 2007 dollars) to successfully implementation of the recommendation
Responsible Party:	Identifies the LEAD agency, entity, or landowner who will ultimately have to execute the recommendation. SUPPORTING parties, such as government agencies, grant sources, etc. may also be identified here.
Priority:	A ranking of the BMP recommendations, based upon the nature / urgency of the existing / potential impairment; the availability of willing landowners)/ partners; short-term vs. long-term development pressure; and whether the project is a new effort, or a retrofit of an existing practice.

The project cost estimates contained in this report should be considered preliminary, and are only presented to identify the potential magnitude of cost, from a watershed scale perspective. No site-specific investigation, analysis, or design of any recommended project, from which accurate cost information could be obtained, was completed as part of the preparation of the 2008 Nippersink Creek Watershed Plan.

If a watershed stakeholder decides to apply for grant funding assistance to implement any of the recommended projects presented in this report, they should first undertake any additional studies / research needed to determine an updated / accurate project cost. They should not solely rely on the cost estimates presented in the NCWP report as the basis for their grant request.

Note: The following acronyms for responsible parties identified in Table 8.12 are presented below:

NCWPC	Nippersink Creek Watershed Planning Committee
NRCS	Natural Resource Conservation Service
SWCD	McHenry County Soil and Water Conservation District
MCCD	McHenry County Water Conservation District
TLC	The Land Conservancy of McHenry County
IDOT	Illinois Department of Transportation
IEPA	Illinois Environmental Protection Agency
MCDOT	McHenry County Department of Transportation
MCDEF	McHenry County Defenders

Figure 8.8 Vander Karr Creek Subwatershed Site Recommendations Map

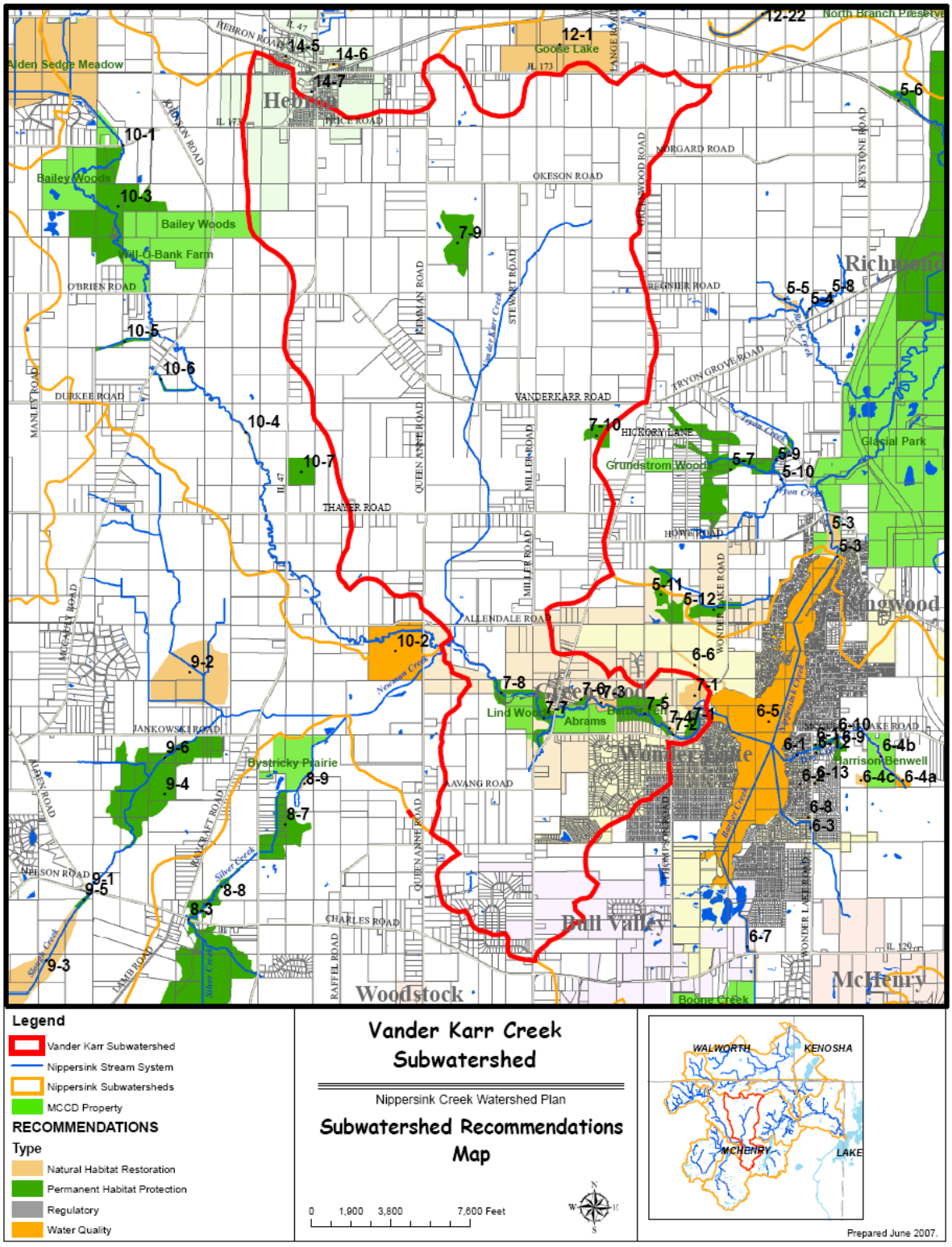


Table 8.11 BMP Selection & Associated Pollutant Load Reduction for the Vander Karr Creek Subwatershed

BMP	Type of BMP	Project Locations**	BMP		Removal Efficiency***			(lbs/year) ****			Percentage Reduction		
			Size	Unit	TN	TP	TSS	TN	TP	TSS	TN	TP	TSS
Natural Habitat Protection	Site-specific	7-1, 7-3	136	acres	30%	35%	60%	760	71	80	1.7	1.9	3.3
Stream Corridor Restoration	Site-specific	7-3	35	acres	53%	51%	88%	346	27	31	0.8	0.7	1.3
Permanent Habitat Protection	Site-specific	7-1, 7-5 to 7-10	97	acres	53%	51%	88%	958	74	86	2.1	2	3.6
Stormwater BMPs	Site-specific	7-2	18	acres	36%	95%	95%	121	25	28	0.3	0.7	1.2
Point Source Control/Monitoring	Site-specific	7-4	1	each	0%	0%	0%	0	0	0	0	0	0
Nutrient Management	Watershed-specific	Subwatershed wide	1,222	acres	70%	28%	-	15,941	510	-	35	14	-
Regulatory*	Watershed-Specific	Subwatershed	1	Water-shed	5%	5%	5%	2,278	182	120	5	5	5
Total								20,404	889	345	44.8	24.4	14.4

*Regulatory programs are assumed to have nominal pollutant reduction rates of 5%.

** Project locations and details are described in the corresponding chapter.

*** TN = total Nitrogen; TP = total Phosphate; TSS = total suspended solids or Sediment.

**** The unit of “TSS” is “Tons/year”.

Table 8.12 Recommended Projects in the Vander Karr Creek Subwatershed

SUB WATERSHED	RECOMMENDATION #	TARGET GOAL	DESCRIPTION	RESPONSIBLE PARTY	ACRES	UNIT COST	INITIAL IMPLEMENTATION COST	INITIAL OUTREACH COST	ANNUAL MAINTENANCE COST	PRIORITY
Vander Karr Creek	7-1	Permanent Habitat Protection	Landowner Outreach to restore ADID High Quality Wetlands; streambank stabilization along east bank of Nippersink Creek; establish Conservation Easements with private landowners	NCWPC / TLC / MCDEF	14.3	$5,000	$71,535	$1,000	$1,431	D
Vander Karr Creek	7-1	Natural Habitat Restoration	Landowner / Government Outreach to restore wetlands in Wonder Lake Sedge Meadow and establish Conservation Easement for MCNAI site protection from future development	NCWPC / VILLAGE OF WONDER LAKE / TLC	32.2	$3,000	$96,450	$1,000	$804	D
Vander Karr Creek	7-2	Water Quality	Government Outreach to install Stormwater BMP's as part of Thompson Road Bridge replacement project	NCWPC / VILLAGE OF WONDER LAKE / MCHENRY DOT			$50,000	$1,000	$2,500	E
Vander Karr Creek	7-3	Natural Habitat Restoration	**MCCD Barber Fen** eroded banks, rock riffle structures, tile removal, 45 acre field restoration of highly erodible	MCCD	18.4	$5,000	$92,035			A
Vander Karr Creek	7-4	Water Quality	Agency Outreach to investigate possible pollution source to Nippersink Creek from debris / junk on private parcel west of Thompson Road north of bridge.	VILLAGE OF WONDER LAKE / MCHENRY COUNTY HEALTH DEPARTMENT / IEPA			$2,500	$500		F
Vander Karr Creek	7-5	Permanent Habitat Protection	Landowner Outreach to create Conservation Easement to protect High Quality ADID Wetland	NCWPC / TLC / MCDEF	64.8	$1,500	$97,257	$1,000	$6,484	C
Vander Karr Creek	7-6	Permanent Habitat Protection	Landowner Outreach to create Conservation Easement to protect High Quality ADID Wetland	NCWPC / TLC / MCDEF	5.1	$1,500	$7,575	$500	$505	C
Vander Karr Creek	7-7	Permanent Habitat Protection	Landowner Outreach to create Conservation Easement to protect High Quality ADID Wetland; stabilize severe erosion on Nippersink Cr 500 ft west of Greenwood Road	NCWPC / TLC / MCDEF	35.2	$3,000	$105,684	$1,000	$3,523	C

Table 8.12 Recommended Projects in the Vander Karr Creek Subwatershed

SUB WATERSHED	RECOMMENDATION #	TARGET GOAL	DESCRIPTION	RESPONSIBLE PARTY	ACRES	UNIT COST	INITIAL IMPLEMENTATION COST	INITIAL OUTREACH COST	ANNUAL MAINTENANCE COST	PRIORITY
Vander Karr Creek	7-7	Permanent Habitat Protection	Landowner Outreach to create Conservation Easement to protect High Quality ADID Wetland; stabilize severe erosion on Nippersink Cr 500 ft west of Greenwood Road	NCWPC / TLC / MCDEF	35.2	$3,000	$105,684	$1,000	$3,523	C
Vander Karr Creek	7-8	Permanent Habitat Protection	Landowner Outreach to create Conservation Easement to protect High Quality ADID Wetland	NCWPC / TLC / MCDEF	18.0	$1,500	$27,041	$1,000	$1,803	C
Vander Karr Creek	7-9	Permanent Habitat Protection	Landowner Outreach to create Conservation Easement(s) to protect Vander Karr Prairie and remaining oak woodlland west of prairie	NCWPC / TLC / MCDEF	72.8	$1,500	$109,212	$1,000	$7,281	C
Vander Karr Creek	7-10	Permanent Habitat Protection	Landowner Outreach to create Conservation Easement(s) to protect oak woodland. Restore quality of oak woodland.	NCWPC / TLC / MCDEF	24.4	$1,500	$36,558	$1,000	$2,437	C
				SW TOTALS	**285.2**		**$695,847**	**$9,000**	**$26,767**	

PRIORITY

- **A Projects that have cooperating partners, can move to implementation quickly. Implementation Timeframe 1 to 3 years**
- **B Projects subject to imminent development pressure, Implementation Timeframe 1 to 2 years**
- **C Projects needed to protect sensitive areas. Timeframe 1 to 2 years**
- **D Restoration projects, Timeframe 1 to 5 years**
- **E Retrofit Projects, Timeframe 1 to 5 years**
- **F Existing Pollution Potential, Timeframe 1 to 2 years**
- **G Policy / Opportunity Review Project, Timeframe 1 to 3 years**

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Chapter 9
Silver Creek Subwatershed Assessment

This section presents a summary of the characteristics of the Silver Creek Subwatershed, as well as specific issues and challenges in this subwatershed that must be addressed in the Nippersink Creek Watershed Management Plan.

9.1 Subwatershed Characteristics

The following section provides an overview of the physical characteristics of the subwatershed.

9.1.1 Subwatershed Location

The Silver Creek Subwatershed has a drainage area of 12,010 acres (18.8 square miles), and is located in the southwestern portion of the Nippersink Creek Watershed, as shown in Figure 9.1. The subwatershed is located principally in southwestern Greenwood Township and northwestern Dorr Township. The headwaters of the subwatershed are located in the urbanized southeastern portion of the City of Woodstock. From there, Silver Creek flows northwest through Duffield Pond, the McHenry County Fair Grounds, and across northern Woodstock. After flowing through a large complex of wetlands and cropland north of Woodstock, Silver Creek becomes tributary to Slough Creek between Queen Anne Road and Raycraft Road, about 3/4 mile south of Allendale Road.

Figure 9.1

Silver Creek Subwatershed Location Map

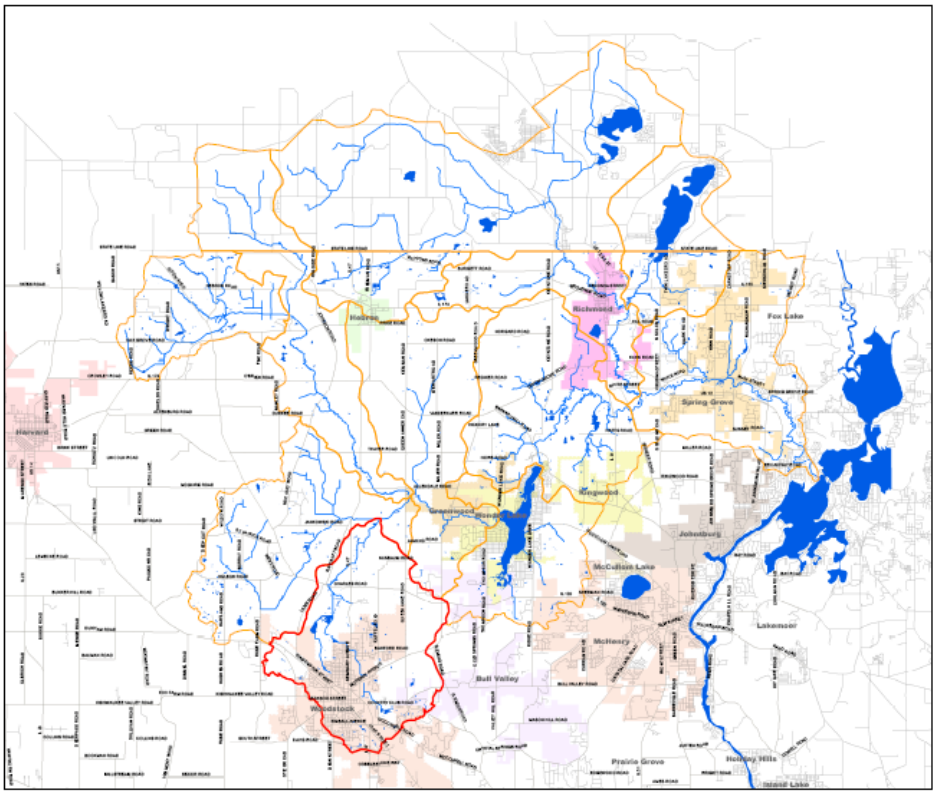
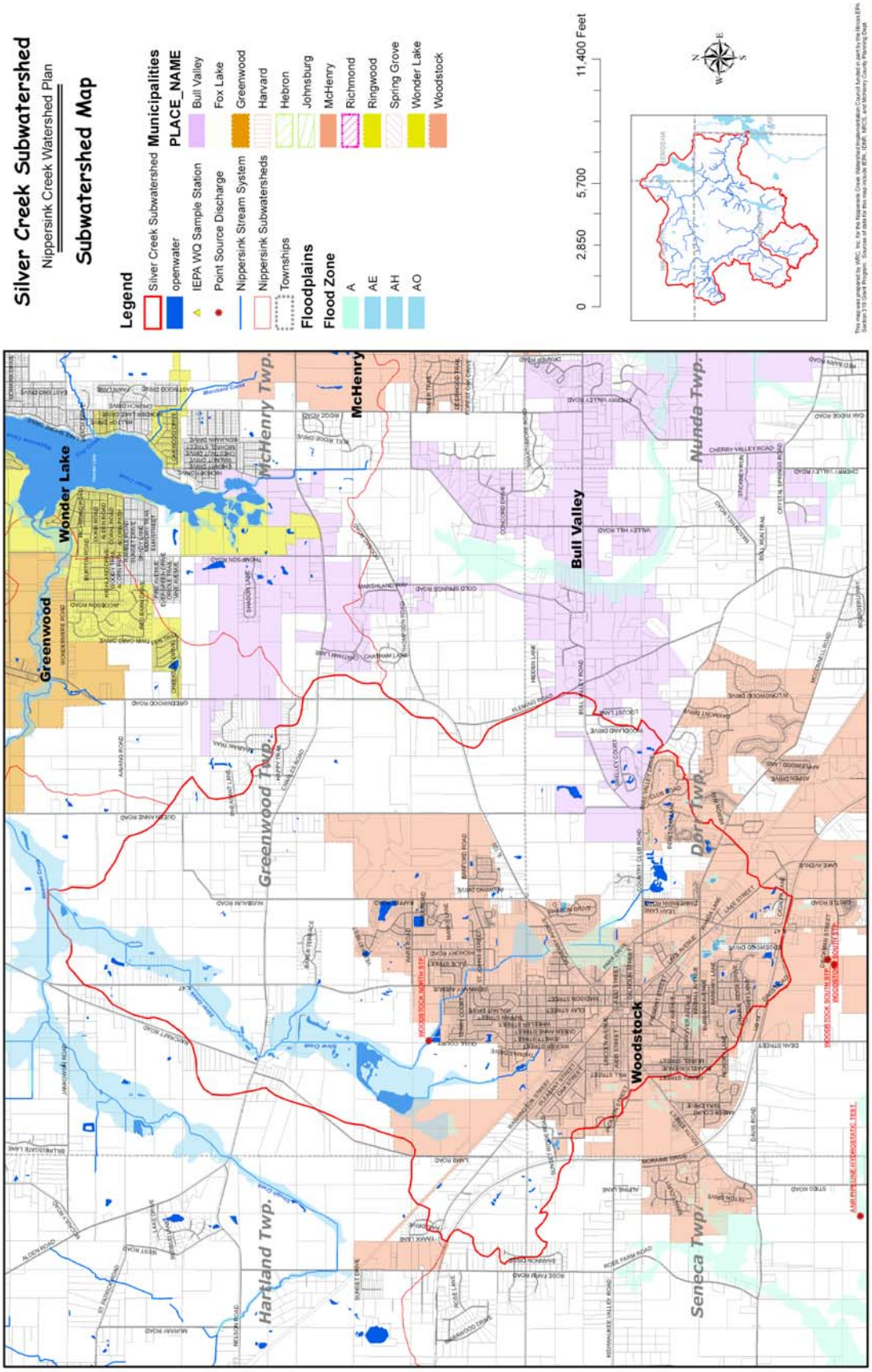


Figure 9.2 Silver Creek Subwatershed Map



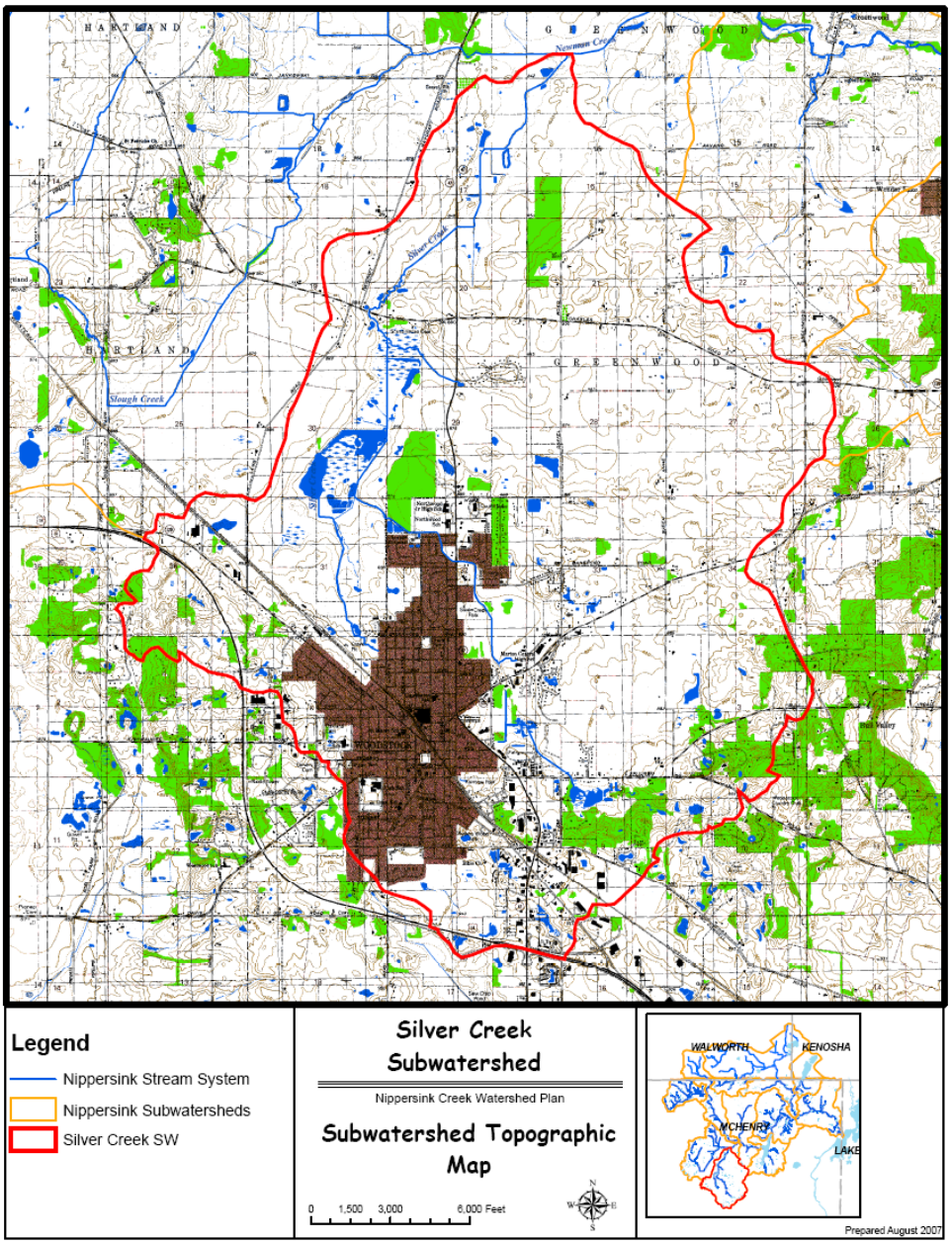
9.1.2 Topography & Geology

The topography of the subwatershed features a highly glaciated landscape, with the southern half of the subwatershed boundary sharing drainage divides with Boone Creek to the southeast, and the North Branch Kishwaukee River to the southwest.

Within the subwatershed, the high terrain and steeper slopes (3% - 5%) found along the southwest, southern and southeast drainage divide boundaries slope away to the north. The northern portion of the subwatershed features somewhat flatter slopes, where the subwatershed shares watershed boundaries with Slough Creek to the northwest and Nippersink Creek to the northeast. The maximum elevation in the subwatershed is around 990′ feet above MSL near the southern end and the minimum elevation is 836′ at the subwatershed outlet just west of Queen Anne Road.

Figure 9.3

USGS Topographic Map of the Silver Creek Subwatershed

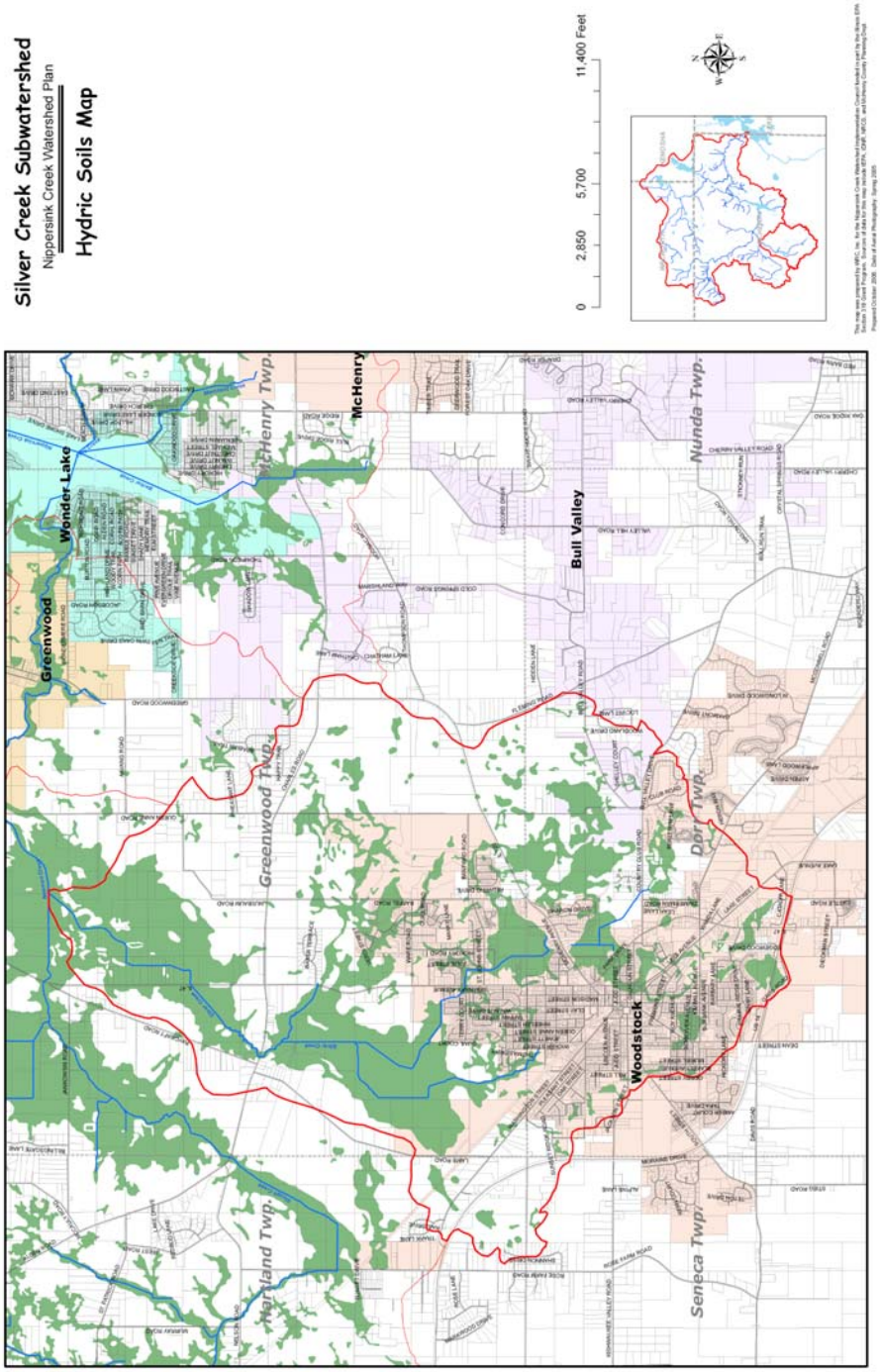


9.1.3 Soil Characteristics

The soils in the subwatershed, as depicted in Figure 9.4, consist of mostly silty and silty loam soil units on 2% - 4% slopes. The glacial advances across McHenry County resulted in a wide variety of soil associations. Each major grouping of soil associations has potential impact on current and future land uses within the subwatershed. For example, hydric (wetland) soils constitute 3,387 acres, or 28% of the 12,010 acre subwatershed, and indicate those areas that contain functional wetlands, or former / degraded wetland areas that could be restored or enhanced.

Figure 9.4

Hydric Soils Map of the Silver Creek Subwatershed



9.1.4 Pre-settlement Vegetation

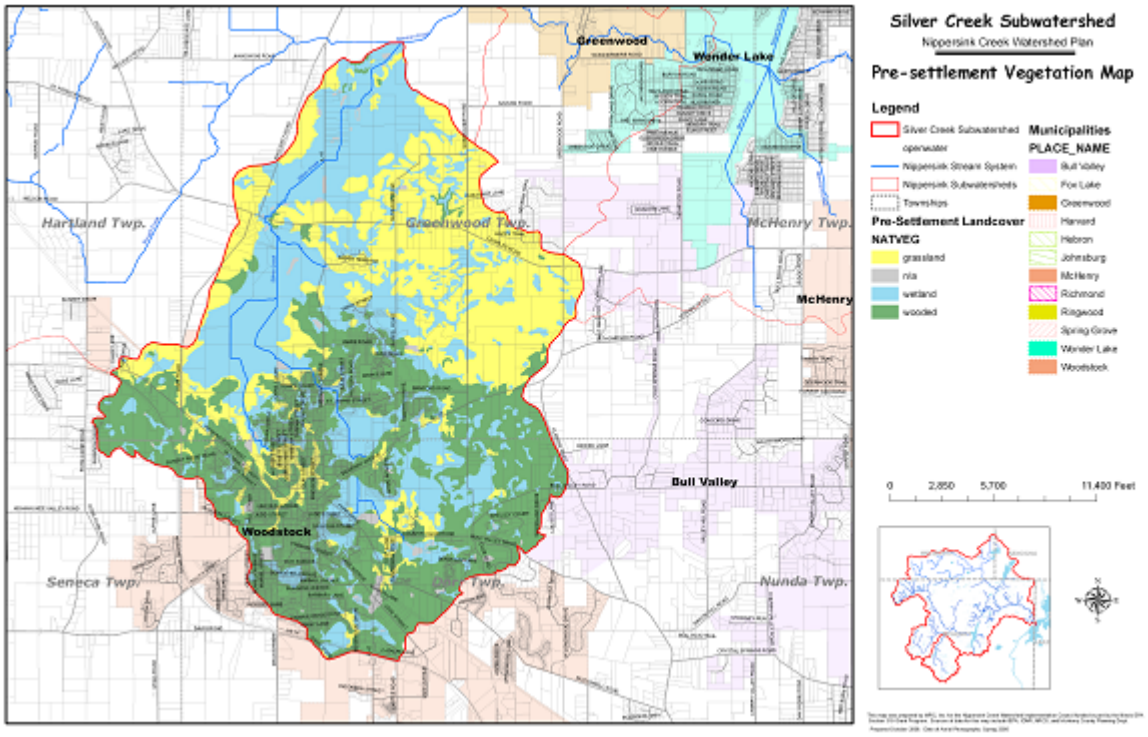
Prior to European settlement in the 1830's, the Silver Creek Subwatershed was fairly evenly divided between grasslands, woodlands, and wetlands. As described in Table 9.1, and depicted in Figure 9.5, woodlands dominated the southern half; wetlands the northwestern portion, and prairie the northeastern portion.

Table 9.1 Pre-Settlement Land Cover Conditions of the Silver Creek Subwatershed

Land Cover Type	Area (acres)	Percent of Subwatershed
Grasslands	3,430 acres	29%
Wooded	4,460 acres	37%
Wetlands	3,978 acres	33%
n/a	141 acres	1%

Source: MCCD Soils Analysis using GIS data

Figure 9.5 Pre-settlement Vegetation of the Silver Creek Subwatershed



9.1.5 Subwatershed Drainage Features

Streams

Silver Creek is the principal stream in the Silver Creek Subwatershed. The main branch of Silver Creek originates near Wicker Street and Donovan Street on the northeast side of Woodstock. Silver Creek flows north through a tree nursery and into Silver Creek Marsh. From there, it flows north under Charles Road, and through low-lying areas that parallel the east side of Raycraft Road Silver Creek. It then flows into Slough Creek about one mile east of the intersection of Illinois Route 47 and Raycraft Road.

There are two tributary streams in the subwatershed. The largest tributary is the East Branch Silver Creek (EBSC), which has its origins near Country Club Road and Zimmerman Road. The EBSC tributary is perhaps the most heavily urbanized and impacted stream in the entire Nippersink Creek Watershed. Channelized for nearly all of its length, the East Branch Silver Creek stream corridor is dominated by residential and other urban land uses, and is generally bordered by a narrow, yet thick dense growth of invasive and low quality trees and shrubs, such as Box Elder, Buckthorn, and Honeysuckle.

The second Silver Creek tributary is a short ephemeral stream that originates from a small, private recreational pond at Illinois Route 47 and Cooney Drive, and flows for less than a mile northwest to its confluence with Silver Creek at the north end of the Silver Creek Marsh McHenry County Natural Areas Inventory (MCNAI) site.

Channelization Analysis of aerial photography indicates that Silver Creek has historically been subjected to extensive channelization. Of the 10.44 miles of stream channels in the subwatershed, about 87% have been ditched and channelized to provide improved agricultural drainage relief. The only significant reach of Silver Creek that is not channelized is located immediately upstream and downstream of Charles Road.

Stream Channel Condition There is no documented information regarding the stream condition of Silver Creek or its tributaries. Most of the stream reaches are unmanaged and confined within a corridor of herbaceous grasses or low quality deciduous trees. The stream corridor is often extremely narrow (< 100 feet) in the urbanized upstream portion and through parcels that are used exclusively for row crop agriculture. The corridor widens to 200 to 400 feet wide near Charles Road. Through Silver Creek Marsh, the natural corridor widens to the limits of the wetland ranging from 500 to more than 2,000 feet.

Impoundments There may be as many as three on-line dams on Silver Creek; all of which are within the Silver Creek Marsh. Two appear to be beaver dams, and one may be the remnants of an older, manmade structure built to raise the water level in the marsh.

There are 148 impoundments (ponds, lakes, or wet bottom stormwater facilities) within the subwatershed, ranging in size from less than a 1/10th acre to more than 11 acres. About half of the impoundments appear to have been manmade ponds or small lakes constructed for recreation. Many of them may have been isolated wetland pockets that were excavated to create a permanent open water feature.

Manmade Drainage Systems

Although the City of Woodstock and Village of Bull Valley did not provide storm sewer infrastructure data or maps, there is no doubt an extensive network of storm sewers in the Woodstock portion of the subwatershed. The Village of Bull Valley, with its largely rural residential land uses, does not appear to have a significant network of storm sewers. Given the higher density developments within the City of Woodstock, there are an estimated 3,100 acres of developed land that is drained via storm sewers. A limited field investigation revealed that this stormwater drainage system consists of catch basins, inlets, small diameter pipe, and about a dozen stormwater detention basins. There do not appear to be any type of water quality treatment devices in place, which is not surprising given much of the area developed before the onset of stormwater detention or water quality regulations.

Agricultural Tile Systems

There are likely extensive underground drain tile systems in the northern and western portions of the subwatershed, as these areas are largely agricultural in use. These systems, installed to remove excess soil moisture to increase the productivity of the regions rich soils, were likely installed over the last century by private property owners. Therefore, little documented information is available about their size and exact location, although their probable distribution and occurrence can be roughly determined by inspection of a combination of aerial photographs, hydric soils and topography. Based on preliminary observations as part of this subwatershed assessment, it appears that there are several small to medium size agricultural drain tile networks that provide subsurface drainage. These are likely present on the many farmed parcels that are adjacent to the tributary streams, particularly in the northern portion of the subwatershed.

Identifying agricultural drain tile networks is important in watershed planning because current local flooding and drainage problems can often be linked to damage or age-related failure of drain tile systems. From a watershed preservation / restoration perspective, it is important to identify functional drain tile systems to determine opportunities for their removal or reconfiguration for the purposes of restoring valuable wetland habitat, and water quality benefits. Many of the depressional and low lying areas in the subwatershed that are serviced by agricultural drain tiles today were likely once wetland habitats that supported a very diverse ecosystem.

Floodplains

The 100-year Floodplain for Silver Creek and East Branch Silver Creek was calculated and mapped during the 1980s. The regulatory floodway has also been determined for both streams, although, as with the floodplain, the detailed mapping stops short of the entire stream lengths. In the case of the East Branch Silver Creek (EBSC), the mapping of regulatory floodplain and floodway was terminated just north of McHenry Avenue (Illinois Route 120), even though the stream system continues upstream for another mile through a heavily developed landscape.

9.1.6 Population

Population data in watershed planning is critical because of there is a direct correlation between the number of people residing in a watershed and the degree of impacts to the quality and quantity of the watershed's natural resources. Using US Census data compiled by the Fox River Study Group for the Nippersink Creek subwatershed, past population data are available for the Silver Creek Subwatershed. This data indicated that in 1990 about 13,925 people lived in the subwatershed, which equated to 748 persons per square mile. According to the 2000 US Census, the population increased to 17,527 people, or about 941 persons per square mile. This represents an increase of about 26% in 10 years.

9.1.7 Land Cover

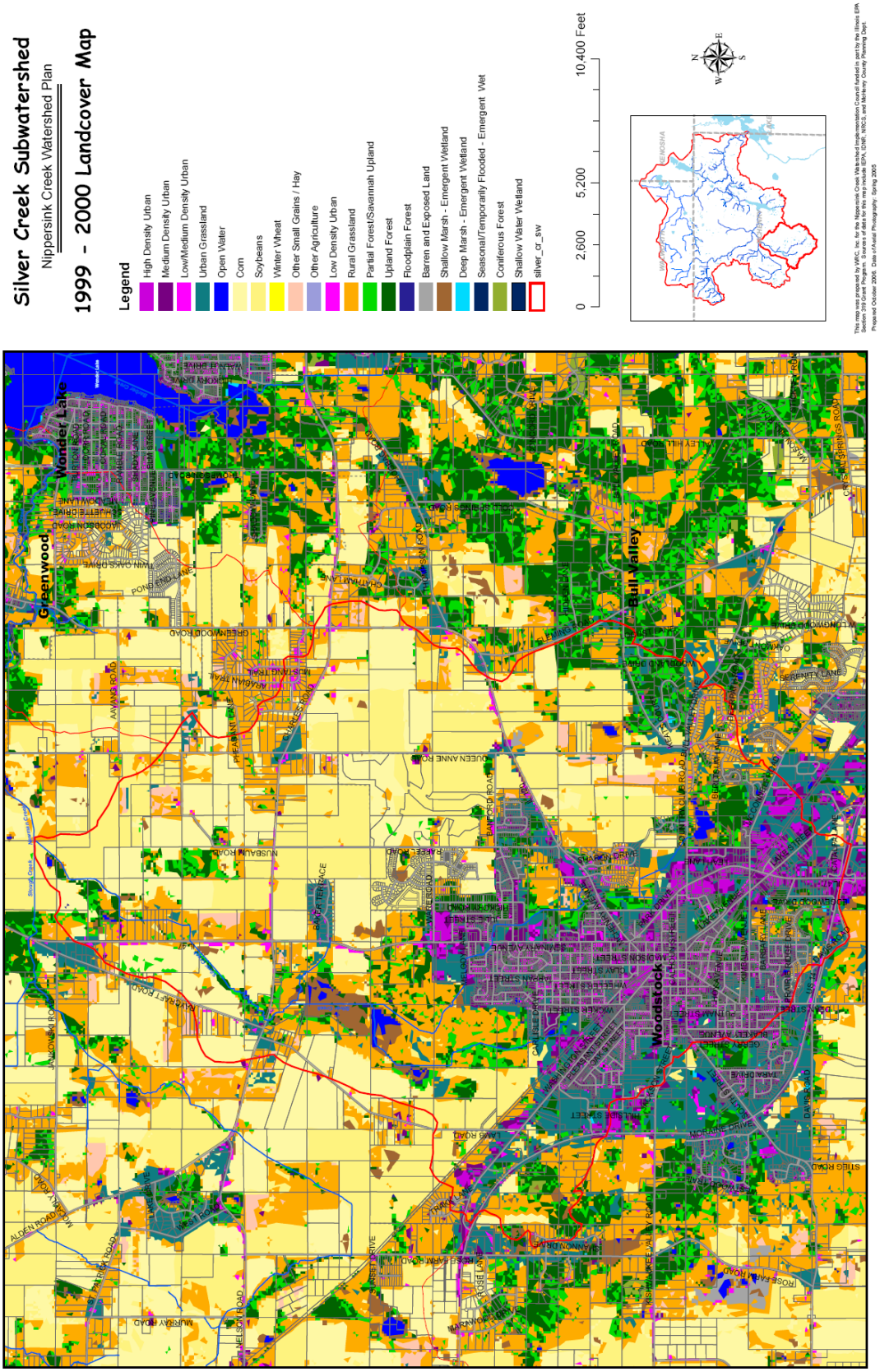
Often, the terms Land Cover and Land Use are used interchangeably. However, there are differences. Land Cover refers to the vegetation, structures, or other features that cover the land. On the other hand, Land Use (as discussed in Section 9.1.8) refers to how land is used by humans.

Land cover data for the Silver Creek Subwatershed are available from the Illinois Department of Natural Resources using LANDSAT data collected between 1998 – 1999. The dominant land cover, according to the 1999-2000 data, was row crop agriculture, which accounted for roughly 39% of the subwatershed area. Rural grasslands accounted for another 19%, while wooded areas and wetlands account for an additional 14% of the subwatershed. These three land cover categories account for 72% of the subwatershed, with the remaining 28% comprised of urban land cover.

Table 9.2 1999 Land Cover for the Silver Creek Subwatershed

Land Cover Description	Total Acres	Percent of Subwatershed
Barren & Exposed Land	8.4	0.1%
Corn, Soybeans, Other Small Grains & Hay	4,644.8	38.7%
Winter Wheat	0	0.0%
Rural Grassland	2,286.9	19.0%
Low Density Urban	457.7	3.8%
Medium Density Urban	1012.0	8.4%
High Density Urban	337.6	2.8%
Urban Grassland	1,466.8	12.2%
Shallow Marsh – Emergent Wetland	266.1	2.2%
Partial Forest / Savannah Upland	543.6	4.5%
Upland Forest	889.5	7.4%
Floodplain Forest	18.2	0.2%
Coniferous Forest	7.4	0.1%
Deep Marsh / Emergent Wetland	5.9	0.0%
Open Water	59.9	0.5%
TOTAL	**12,004.8**	**100.0%**

Figure 9.6 1999-2000 Land Cover Map for the Silver Creek Subwatershed



9.1.8 Land Use / Existing Watershed Development

According to the 2005 McHenry County Land Use / Zoning map, 53% of the subwatershed is zoned for agricultural use, while about 42% is either already developed or zoned for development in the future. Only 5% is classified as open space.

Table 9.3 McHenry County 2005 Land Use in Silver Creek Subwatershed

Land Use	Total Acres	Percent of Subwatershed
Vacant	21	0.2%
Vacant; Zoned Residential	697.3	5.8%
Vacant; Zoned Commercial	91.1	0.8%
Vacant; Zoned Office	0.25	0.0%
Vacant; Zoned Industrial	83.2	0.7%
Agricultural	6,398.0	53.3%
Single Family Residential	2,181.5	18.2%
Multi-Family Residential	134.5	1.1%
Commercial	280.9	2.3%
Office	12.9	0.1%
Industrial	225.9	1.9%
Mixed Use	3.0	0.0%
Mining	0	0.0%
Open Space	567.5	4.7%
Institutional	455.7	3.8%
Right of Way	857.5	7.1%
TOTAL	**12,010.3**	**100.0%**

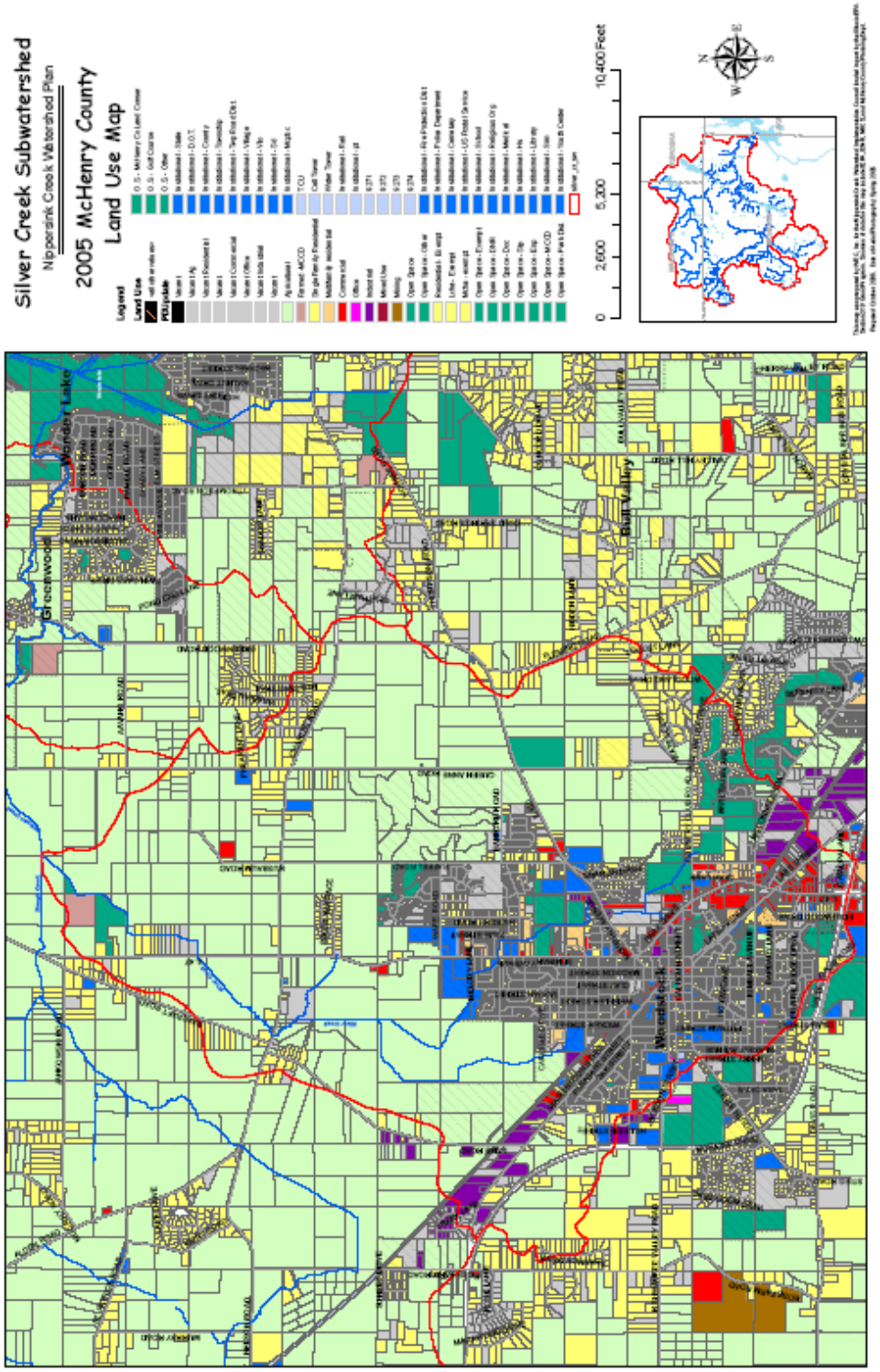
Source: 2005 McHenry County Land Use Zoning Data for Silver Creek Subwatershed

Developed land accounted for about 28% of the subwatershed, consisting mostly of medium density urban lands and adjacent urban grasslands (lawns). Roughly 40% of the subwatershed was classified as being located within municipal boundaries in 2005.

Table 9.4 **Municipal Areas in the Silver Creek Subwatershed**

Municipality	Area (acres)	Percent
Village of Bull Valley	309	2.6%
Village of Woodstock	4,457	37.1%
Unincorporated	7,244	60.3%

Figure 9.7 **McHenry County 2005 Land Use in Silver Creek Subwatershed**



Permit Point Source Discharges There is one permitted point source discharge in the subwatershed. According to the Illinois IEPA NPDES database, the Woodstock North Waste Water Treatment Plan holds a NPDES permit (# IL0031861) to discharge up to 3,000,000 gallons per day of effluent into the East Branch of Silver Creek near Illinois Route 47 and Melody Lane.

Road Network An analysis of GIS roadway data indicates that there are 105.7 miles of roads in the subwatershed. This represents approximately 359 acres of pavement.

9.1.9 Natural Resources

McHenry County Conservation District Property

The McHenry County Conservation District (MCCD) owns five natural area properties within the Silver Creek Subwatershed. These properties account for about 2% of the subwatershed area.

Table 9.5 MCCD Properties in the Silver Creek Subwatershed

Name	Area (acres)
Duffield Pond / McConnell Woods	77.8
Bystricky Prairie	100.9
Ryder's Woods Park	23.6
Silver Creek Park	64.2
Queen Anne Prairie Macrosite	0.7
Total	**267.2**

It should be noted that of the 723.3 acres of identified Natural Area Inventory Sites, only the Bystricky Prairie and Queen Anne Road Prairie sites are protected through ownership by the MCCD. These protected properties represent only about 15% of NAI sites in the subwatershed. Bystricky Prairie is also protected through its designation as an Illinois Nature Preserve.

McHenry County Natural Areas Inventory

There are five McHenry County Natural Area Inventory (MCNAI) Sites within the subwatershed, representing nearly about 6.0% of the subwatershed area.

Table 9.6 McHenry County Natural Areas Inventory Sites in the Silver Creek Subwatershed

MCNAI Site ID #	Name	Area (acres)
DOR02	Bull Valley Golf Course Wetlands	69.4
DOR06	Woodstock Marsh	29.2
GRE03	Bystricky Prairie	18.2
GRE06	Queen Anne Prairie	0.7
GRE07	Silver Creek Marsh	605.8
	Total	**723.3**

These MCNAI sites contain several significant natural features, including a graminoid fen, basin marshes, sedge meadows, wet silt loam prairies, mesic silt loam prairies, wet mesic silt loam woodland, and a streamside marsh.

Wetlands

McHenry County completed an Advanced Identification (ADID) Wetland Study in 1998. This study identified a total of 1,251.8 acres of wetlands, or 10.4 % of the subwatershed. Of these wetlands 1,129 acres (90%) were determined to be of High Quality or High Functional Value, rating an ADID classification.

Table 9.7 Mapped Wetlands in the Silver Creek Subwatershed

ADID Code	Wetland Type	# of Wetlands	Total Area
FW	Farmed Wetlands	35	76.7
HFVW	High Functional Value Wetlands	13	463.8
HQL	High Quality Lakes	0	0
HQW	High Quality Wetlands	4	666.6
L	Lakes	0	0
W	Other Wetlands (lower quality)	77	121.4
	TOTAL	**129**	**1,251.8**

The most significant wetland in the subwatershed is the 603 acre high quality wetland found within the Silver Creek Marsh (MCNAI GRE07). Currently considered a high-quality wetland complex, this wetland is threatened by invasive species intrusion (Reed Canary Grass, Cattails), artificially manipulated water levels, siltation, and encroachment by development.

Threatened & Endangered Species

The McHenry County Natural Area Inventory (MCNAI) database has identified several threatened or endangered (T&E) species of plants and animals that inhabit the remaining subwatershed natural areas. They are listed below:

Table 9.8 Threatened and Endangered Species in the Silver Creek Subwatershed

Common Name	Scientific Name	Type	Status	MCNAI Site
White Lady's Slipper	Cypripedium candidum	Plant	St Threatened	GRE03
Small Yellow Lady's Slipper	Cypripedium parviflorum makasin	Plant	St Endangered	GRE03
Common Moorhen	Gallinula chloropus	Bird	St Threatened	DOR02
Yellow-Headed Blackbird	Xanthocephalus xanthocephalus	Bird	St Endangered	DOR02

Existing Greenways

There are no formal greenways established in the subwatershed, although the City of Woodstock has identified a greenway element in its 2002 Comprehensive Plan. This greenway element, referred to as "Resource Conservation" in the City's plan, calls for the protection of existing wetlands and stream corridors within the City's planning jurisdiction, including Silver Creek and East Branch Silver Creek.

9.2 Analysis of Subwatershed Data and Problem Identification

9.2.1 Water Quality Data & Identified Problems

The Illinois Environmental Protection Agency (IEPA) is the lead agency in Illinois that monitors and regulates water quality in our rivers, lakes, and streams.

The IEPA has determined that the designated uses for Nippersink Creek are to support:

- Aquatic Life
- Fish Consumption
- Primary Contact (swimming, etc.)
- Secondary Contact (canoeing, etc.)
- Aesthetic Quality.

The IEPA periodically produces a 303(d) list, which identifies waterways that are not achieving certain designated uses. In the 2006 IEPA 303(d) list, Nippersink Creek is identified as being in Full Support of its Aquatic Life Designated Use, which is notable for a stream in northeastern Illinois.

Unfortunately, Silver Creek and its tributaries were not assessed in this IEPA report, probably due to the fact that Silver Creek is a small tributary to the Nippersink, and the IEPA has very limited funds for their state-wide water quality monitoring program.

The Illinois Environmental Protection Agency does not maintain any water quality sampling stations on Silver Creek. Likewise, the Fox River Watershed Monitoring Network, administered by the not-for-profit Friends of the Fox River, also has not established any volunteer stream monitoring sites on Silver Creek as of 2006. However, it is presumed that the City of Woodstock collects water quality data along the East Branch Silver Creek as part of their use of the creek as a receiving water for their treated waste water effluent.

9.2.2 Flooding Problems

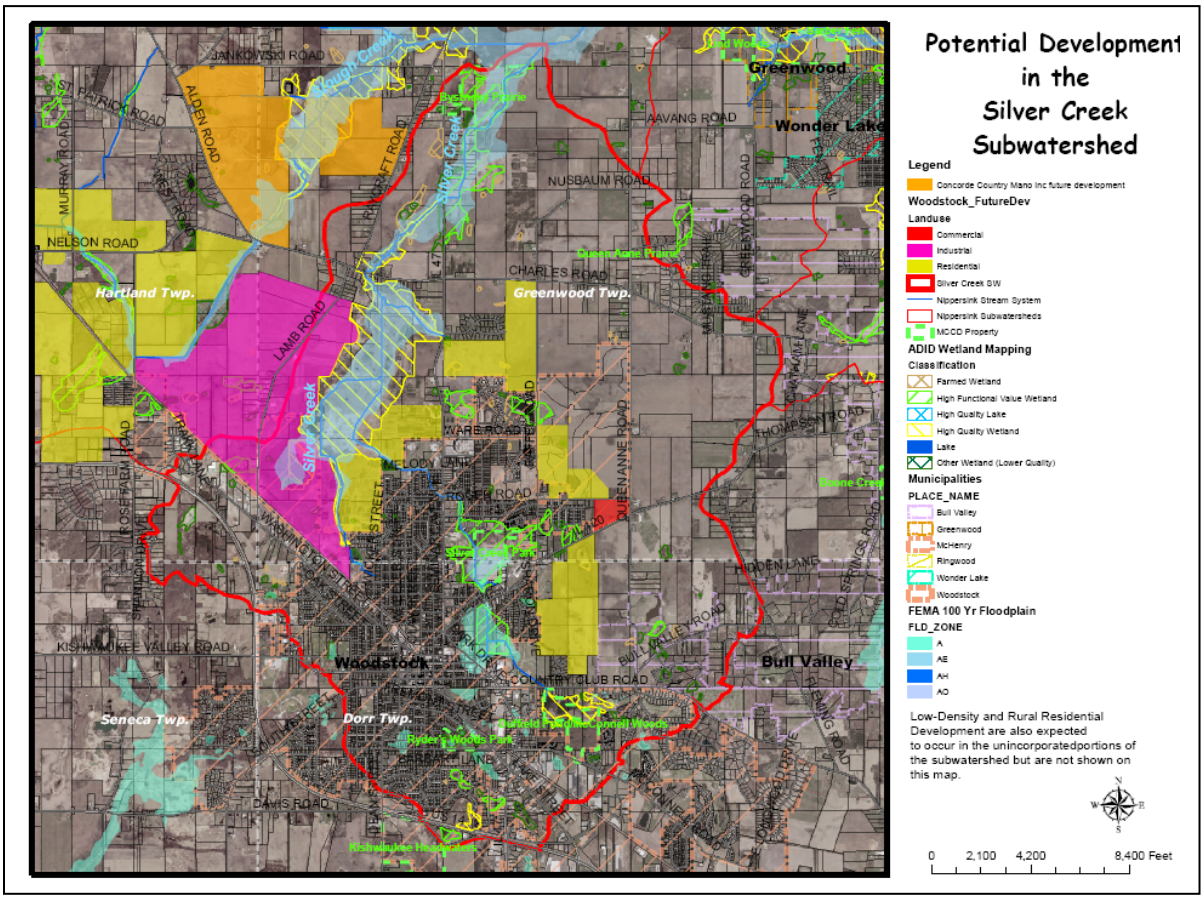
There are no known flooding problems in the subwatershed. The existing FEMA 100-year Floodplain Map suggests that there may be 8 to 10 structures (residential dwellings or non-residential buildings) in the 100-year floodplain, however, the horizontal boundaries shown on the floodplain maps may be inaccurate as the 100-year flood profiles have not been overlaid onto the County two-foot topographic mapping that is now available.

9.2.3 Projected Development & Growth

The Silver Creek Subwatershed probably faces more challenges in coping with future land use changes than any other subwatershed in the Nippersink Watershed. Development in this subwatershed will likely occur in the form of moderate to high density residential land uses, as well as commercial/office and industrial land uses. Most of the projected development will occur as part of annexation and expansion northward by the City of Woodstock. Analysis of their current Comprehensive Land Use Plan (5/7/2002) indicates that an additional 1,400+ acres of new development is expected. The City has also indicated that there are several developments being planned for future annexation that are outside of the current proposed planning area, as developers seek to develop their land using City sewer and water.

Therefore, if current plans hold true, the City of Woodstock will have jurisdiction over at least 50% of the land within the subwatershed. While the current stormwater ordinances will likely prevent significant encroachment into subwatershed sensitive natural areas, the current land development practices and stormwater management methods will probably create a significant increase in total stormwater runoff volume and a decrease in water quality in the streams.

Figure 9.8 Potential Development in the Silver Creek Subwatershed



9.2.4 Natural Area Protection / Preservation Issues

McHenry County Natural Area Inventory Sites

The Silver Creek Marsh McHenry County Natural Area Inventory (MCNAI GRE07) site is one of the largest wetland complexes in the entire watershed that is entirely in private ownership. This status, along with its close proximity to the City of Woodstock, ranks the Silver Creek Marsh MCNAI site highest on the list of watershed protection items for the Silver Creek Subwatershed. The MCCD has indicated that this wetland complex is threatened by invasive species intrusion (Reed Canary Grass, Cattails), and is being degraded due to the artificial water level alterations that have occurred. MCCD also indicated that the wetland will be threatened by the negative effects of new development, which is planned to encircle nearly the entire natural area.

Wetlands

In the subwatershed, only 1,250 acres of wetland remain, compared to an estimated 3,387 acres that existed before settlement. That means that roughly 63% of the wetlands have already been lost and can no longer provide their valuable functions. Therefore, it is critical that the remaining wetland resources in the subwatershed be protected and managed so that stakeholders can gain from benefits these wetlands provide.

There are four High Habitat Quality wetland complexes in the subwatershed, ranging in size from six acres to more than 600 acres. The two of the three smallest wetlands, ADID N961 and N909, are partially protected as significant portions of the wetlands are owned by the MCCD. Wetland N962 is a sedge meadow / fen that is located on the Bull Valley Golf Course Property. It is considered high quality but is suffering from encroachment activities and runoff from the golf course.

9.3 Subwatershed-Specific Recommendations to Protect Water Resources

The following section discusses the Best Management Practices (BMP's) identified for this subwatershed that should be implemented to address existing or potential water quality impairments. The location of each recommended BMP project is presented in Figure 9.9

Pollutant Loading Modeling, as discussed in Chapter 3, identified current and future pollutant loadings, based upon land use, soils, slopes, etc., and quantified these loadings. The results of this Pollutant Loading modeling were then used to identify the types of BMP's that should be implemented to create a loading reduction of those pollutants. Table 9.9 presents a summary of the recommended BMP projects, as well as the expected pollutant loading reductions expected if the BMP's are implemented, and function as intended.

Table 9.10 presents detailed cost and logistical information on each of the recommended BMP projects. Below is a summary list of recommendations for the subwatershed to help stakeholders and decision makers meet the Goals and Objectives set forth for Nippersink Creek. Background information regarding how each type of recommendation addresses watershed concerns and/or impairments (existing or future) can be found in Chapter 4.

Type:	Education / Outreach; Regulatory; Site Restoration; Monitoring; Permanent Habitat Protection, Water Quality
Target Goals:	Which watershed plan goals the recommendation is intended to address.
Initial Implementation Cost:	The initial cost, in 2007 dollars to initiate the recommended action, if applicable.
Initial Outreach Cost:	The initial cost, in 2007 dollars to initiate the recommended action, if applicable.
Annual Cost:	The long term expected annual cost (in 2007 dollars) to successfully implementation of the recommendation
Responsible Party:	Identifies the LEAD agency, entity, or landowner who will ultimately have to execute the recommendation. SUPPORTING parties, such as government agencies, grant sources, etc. may also be identified here.
Priority:	A ranking of the BMP recommendations, based upon the nature / urgency of the existing / potential impairment; the availability of willing landowners)/ partners; short-term vs. long-term development pressure; and whether the project is a new effort, or a retrofit of an existing practice.

The project cost estimates contained in this report should be considered preliminary, and are only presented to identify the potential magnitude of cost, from a watershed scale perspective. No site-specific investigation, analysis, or design of any recommended project, from which accurate cost information could be obtained, was completed as part of the preparation of the 2008 Nippersink Creek Watershed Plan.

If a watershed stakeholder decides to apply for grant funding assistance to implement any of the recommended projects presented in this report, they should first undertake any additional studies / research needed to determine an updated / accurate project cost. They should not solely rely on the cost estimates presented in the NCWP report as the basis for their grant request.

Note: The following acronyms for responsible parties identified in Table 9.12 are presented below:

NCWPC	Nippersink Creek Watershed Planning Committee
NRCS	Natural Resource Conservation Service
SWCD	McHenry County Soil and Water Conservation District
MCCD	McHenry County Water Conservation District
TLC	The Land Conservancy of McHenry County
IDOT	Illinois Department of Transportation
IEPA	Illinois Environmental Protection Agency
MCDOT	McHenry County Department of Transportation
MCDEF	McHenry County Defenders

Figure 9.9 Silver Creek Subwatershed Site Recommendations Map

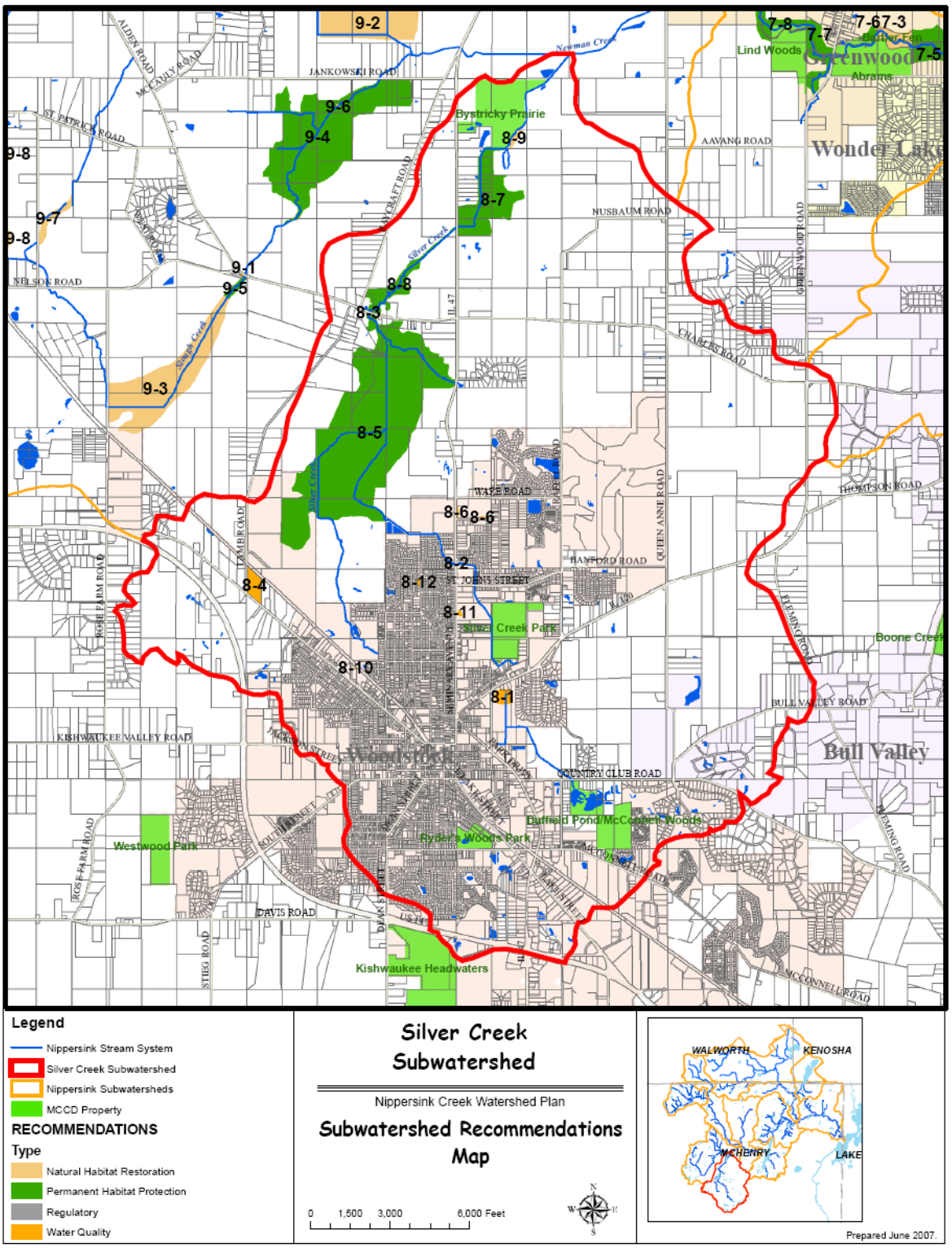


Table 9.9 BMP Selection & Associated Pollutant Load Reduction for the Silver Creek Subwatershed

BMP*	BMP Type**	Project Locations***	BMP		Removal Efficiency****				Pollutant Load Reduction (lbs/year)*****				Percentage Reduction			
			Size	Unit	TN	TP	TSS	FC	TN	TP	TSS	FC	TN	TP	TSS	FC
Permanent Habitat Protection	SS	8-5, 8-7, 8-8	13	acres	53%	51%	88%	78%	120	6	8	322	0.3	0.3	0.5	0.4
Stream Buffers	SS	8-7, 8-9	94	acres	36%	95%	95%	75%	588	86	64	2,236	1.4	3.7	3.7	2.9
Stormwater BMPs	SS	8-1, 8-2, 8-3, 8-10	1	each	36%	95%	95%	75%	134	7	6	244	0.3	0.3	0.3	0.3
Point Source Control/Monitoring	SS	8-4	1	each	0%	0%	0%	0%	0	0	0	0	0	0	0	0
Detention Basin Retrofit	SS	8-6, 8-11, 8-12	94	acres	32%	55%	68%	71%	523	50	46	2,117	1.3	2.2	2.7	2.8
Nutrient Management	WS	Subwater-shed wide	1,201	acres	70%	28%	-	-	14,610	325	-	-	35	14	-	-
Regulatory	WS	Subwater-shed	1	Water-shed	5%	5%	5%	5%	2,086	116	86	3,807	5	5	5	5
Street Sweeping (Bi-weekly)	WS	City wide	106	curb miles	-	-	-	2%	-	-	-	228	-	-	-	0.3
Sand Filters	SS	8-1, 8-3, 8-6, 8-10, 8-11, 8-12	59	each	-	-	83%	37%	-	-	348	6,864	-	-	20.2	9
Pet Waste Management	WS	Subwater-shed wide	1	Water-shed	-	-	-	90%	-	-	-	3,285	-	-	-	4.3
Illicit Discharge Detection and Elimination	SS	Sewer & Stormwater Drainage system	1	Water-shed	3%	3%	3%	3%	1,252	70	52	2,284	3	3	3	3
Education and Outreach	WS	Residential areas	1	each	3%	3%	3%	3%	1,043	58	43	1,904	2.5	2.5	2.5	2.5
Total									20,356	719	653	23,290	48.8	31	37.9	30.6

*Regulatory programs are assumed to have nominal pollutant reduction rates of 5%; "Education and Outreach" programs are assumed to have 2.5%; Illicit discharge detection and elimination" programs

** SS = Site-specific; WS = Watershed-specific.

*** Project locations and details are described in the corresponding chapter.

**** TN = total Nitrogen; TP = total Phosphate; TSS = total suspended solids or Sediment; FC = Fecal coliform.

***** Units of "TSS" and "FC" are "Tons/year" and "FCU/year", respectively.

Table 9.12 Recommended Projects in the Silver Creek Subwatershed

SUB WATERSHED	RECOMMENDATION #	TARGET GOAL	DESCRIPTION	RESPONSIBLE PARTY	ACRES	UNIT COST	INITIAL IMPLEMENTATION COST	INITIAL OUTREACH COST	ANNUAL MAINTENANCE COST	PRIORITY
Silver Creek	8-1	Water Quality	Government Outreach to IInvestigate feasibility of reconfiguring stream to allow for construction of BMP basin or structural BMP device to treat runoff from industrial area with auto & materials storage along stream channel	NCWPC / CITY OF WOODSTOCK			$125,000	$1,000	$6,250	E
Silver Creek	8-2	Water Quality	Government Outreach to Install Stormwater BMP's (structural BMP device) where IL 47 crosses Silver Creek	NCWPC / CITY OF WOODSTOCK / IDOT			$75,000	$1,000	$2,500	E
Silver Creek	8-3	Water Quality	Government Outreach to install BMP's to treat roadway runoff at Charles Road prior to discharge into Silver Creek	NCWPC / MCHENRY DOT			$50,000	$1,000	$2,500	E
Silver Creek	8-4	Water Quality	Agency Outreach to monitor water quality of runoff from auto junkyard at Lamb Road and Washington Street; flows under railroad NE to Silver Creek Marsh MCNAI Site; determine feasibility of structural BMP for urban pollutant removal	CITY OF WOODSTOCK / MCHENRY COUNTY HEALTH DEPARTMENT / IEPA			$2,500	$500		F
Silver Creek	8-5	Permanent Habitat Protection	Government Outreach to protect high quality ADID Wetland N766 from future land development; Investigate feasibility of reconfiguring channel to increase pollutant removal efficiency	NCWPC / MCHENRY COUNTY	549.7	$2,500	$1,374,368	$2,000	$13,744	D
Silver Creek	8-6	Water Quality	Government Outreach to retrofit dry bottom detention basin at McHenry County Government Center - West Basin	NCWPC / MCHENRY COUNTY			$17,500	$750	$2,000	E
Silver Creek	8-6	Water Quality	Government Outreach to retrofit dry bottom detention basin at McHenry County Government Center - Southeast Basin	NCWPC / MCHENRY COUNTY			$17,500	$750	$2,000	E
Silver Creek	8-7	Permanent Habitat Protection	Landowner Outreach to create Conservation Easement to protect High Functional Value ADID Wetland;	NCWPC / TLC / MCDEF	90.8	$1,500	$136,259	$1,000	$9,084	C

Table 9.12 Recommended Projects in the Silver Creek Subwatershed

SUB WATERSHED	RECOMMENDATION #	TARGET GOAL	DESCRIPTION	RESPONSIBLE PARTY	ACRES	UNIT COST	INITIAL IMPLEMENTATION COST	INITIAL OUTREACH COST	ANNUAL MAINTENANCE COST	PRIORITY
Silver Creek	8-8	Permanent Habitat Protection	Landowner Outreach to protect high quality ADID Wetland N766 north of Charles Rd. Develop & help landowners implement management plan	NCWPC / TLC / MCDEF	34.8	$2,000	$69,652	$1,000	$3,483	C
Silver Creek	8-9	Natural Habitat Restoration	Landowner Outreach to expand natural Stream Buffer to minimum 100 ft with on agricultural parcel east of Bystricky Prairie	NRCS / SWCD	2.9	$3,000	$8,649	$500	$288	D
Silver Creek	8-10	Water Quality	Landowner / Government Outreach to determine feasibility of installing BMP basin or structural BMP device to treat runoff from industrial storage site at end of Elm Lane just upstream of railroad culvert	NCWPC / MCHENRY COUNTY			$25,000	$500	$1,000	E
Silver Creek	8-11	Water Quality	Landowner / Government Outreach to retrofit existing dry bottom detention basin with native vegetation and minor regrading to increase pollutant removal	NCWPC / MCHENRY COUNTY			$15,000	$750	$1,000	E
Silver Creek	8-12	Water Quality	Landowner / Government Outreach to retrofit existing dry bottom detention basin at Tappan Street and Ash Avenue with native vegetation and minor regrading to increase pollutant removal	NCWPC / CITY OF WOODSTOCK / MEADOWS OF WOODSTOCK HOA			$15,000	$750	$1,500	E
				SW TOTALS	**678.3**		**1,931,427.0**	**11,500.0**	**45,348.5**	

PRIORITY

- **A Projects that have cooperating partners, can move to implementation quickly. Implementation Timeframe 1 to 3 years**
- **B Projects subject to imminent development pressure, Implementation Timeframe 1 to 2 years**
- **C Projects needed to protect sensitive areas. Timeframe 1 to 2 years**
- **D Restoration projects, Timeframe 1 to 5 years**
- **E Retrofit Projects, Timeframe 1 to 5 years**
- **F Existing Pollution Potential, Timeframe 1 to 2 years**
- **G Policy / Opportunity Review Project, Timeframe 1 to 3 years**

Chapter 10
Slough Creek Subwatershed Assessment

This section presents a summary of the characteristics of the Slough Creek Subwatershed, as well as specific issues and challenges in this subwatershed that must be addressed in the Nippersink Creek Watershed Management Plan.

10.1 Subwatershed Characteristics

The following section provides an overview of the physical characteristics of the subwatershed.

10.1.1 Subwatershed Location

The Slough Creek Subwatershed has an area of 11,876 acres (18.6 square miles) and is located in the southwestern portion of the Nippersink Creek Watershed, as shown in Figure 10.1. The Slough Creek Subwatershed straddles Hartland and Greenwood Townships, with the northern boundary extending just over the township line into Alden and Hebron townships.

Figure 10.1 Slough Creek Subwatershed Location Map

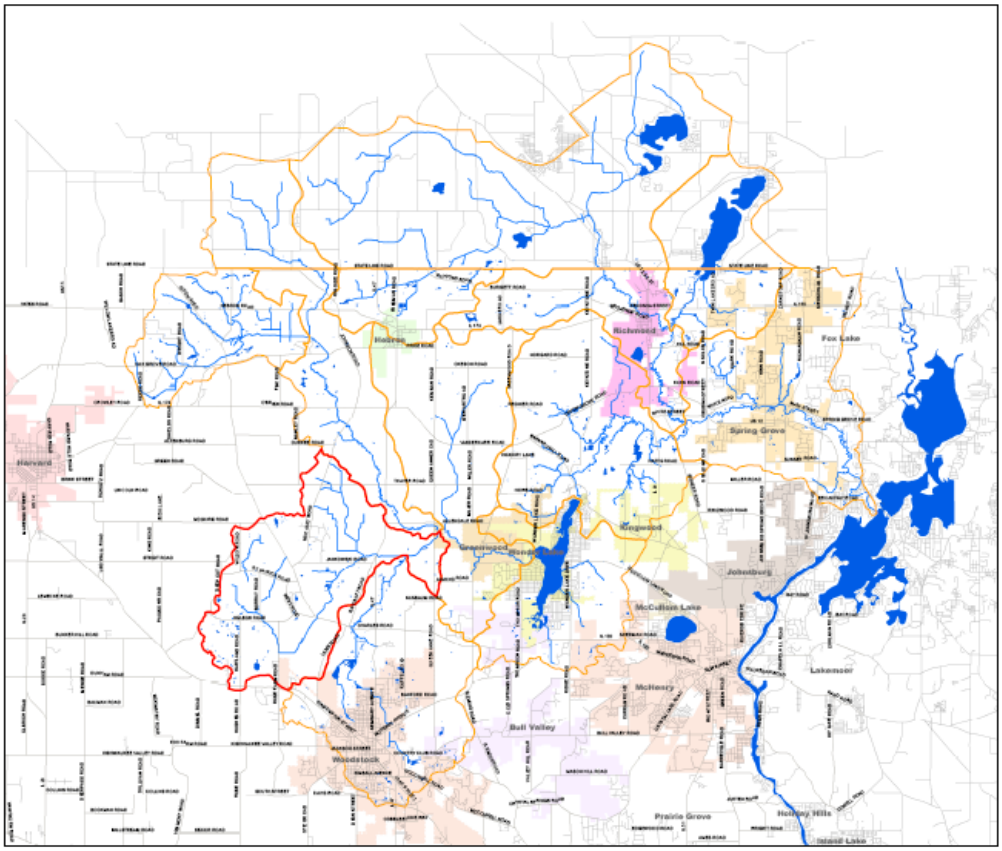
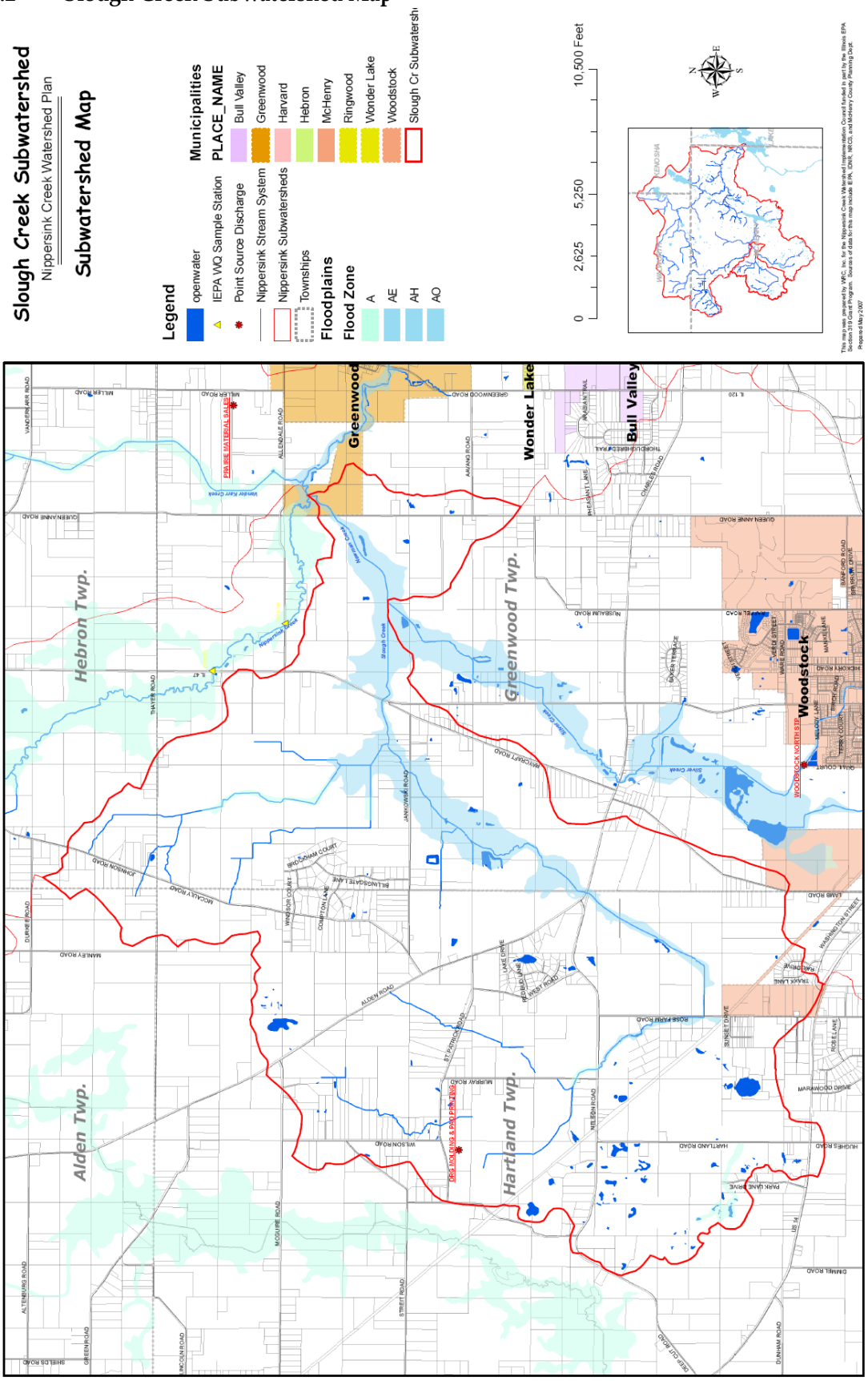


Figure 10.2 Slough Creek Subwatershed Map



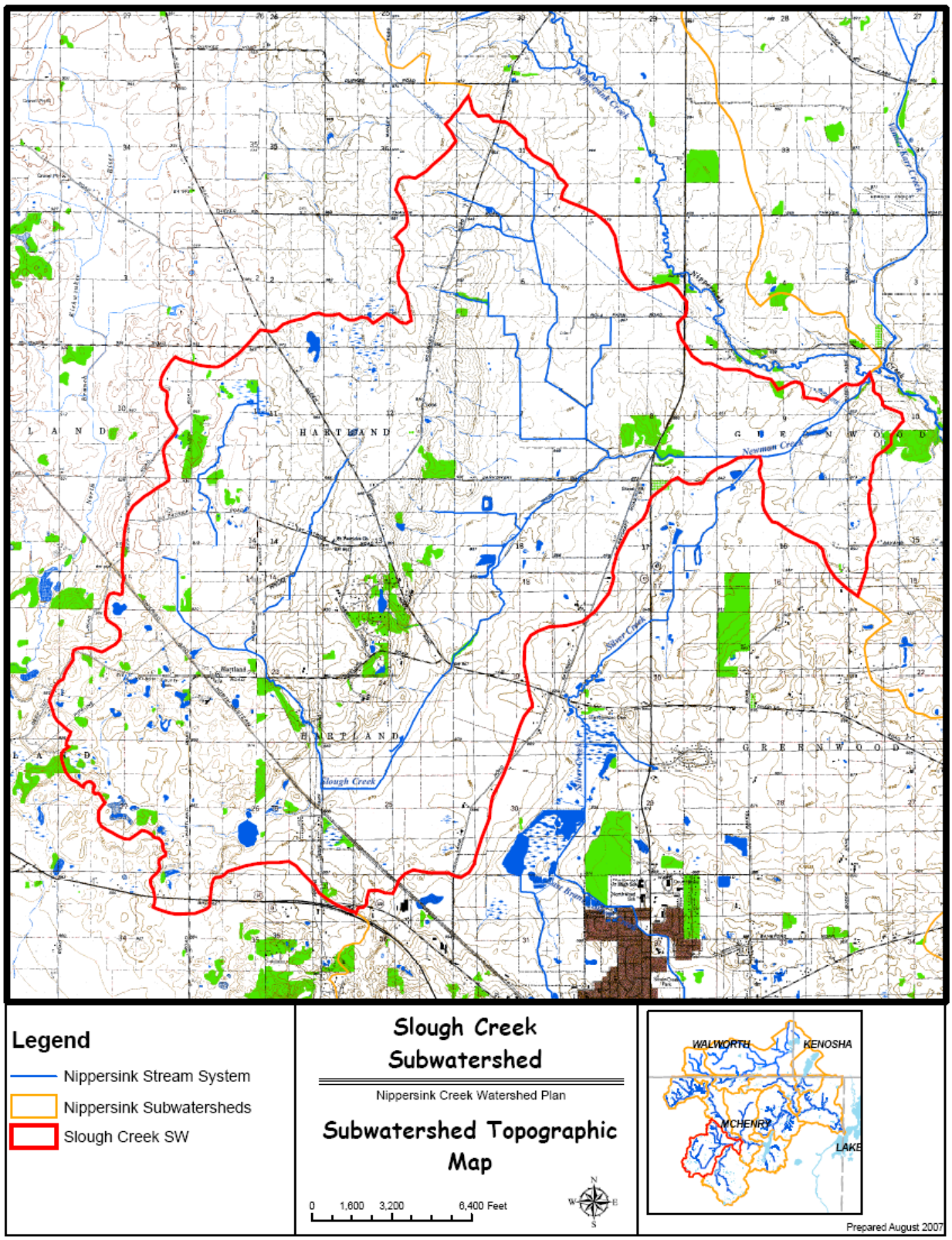
10.1.2 Topography & Geology

The topography of the subwatershed varies greatly. The higher elevations and internal drainage divides have given the drainage features of the subwatershed a "U" shape. There is a large internal drainage divide or ridge line that extends from the northern subwatershed boundary south about 2/3 the length of the subwatershed towards the southern boundary.

This ridgeline is located generally along West Road and McNaully Road. The western half of the subwatershed is higher and has a relatively gentle slope to the south, due to the ridge line that bisects the subwatershed in the middle. This ridge line has a steep slope on the eastern side; dropping in elevation between 80 and 140 feet at slopes ranging from 3 to 5%.

The eastern half of the subwatershed is relatively flat and slopes from the southwest to the northeast towards the confluence of Slough Creek with Silver Creek. The maximum elevation in the subwatershed is 1,006 feet above MSL near the Illinois - Wisconsin state line and the minimum elevation is 836 at the subwatershed outlet just east of Queen Anne Road.

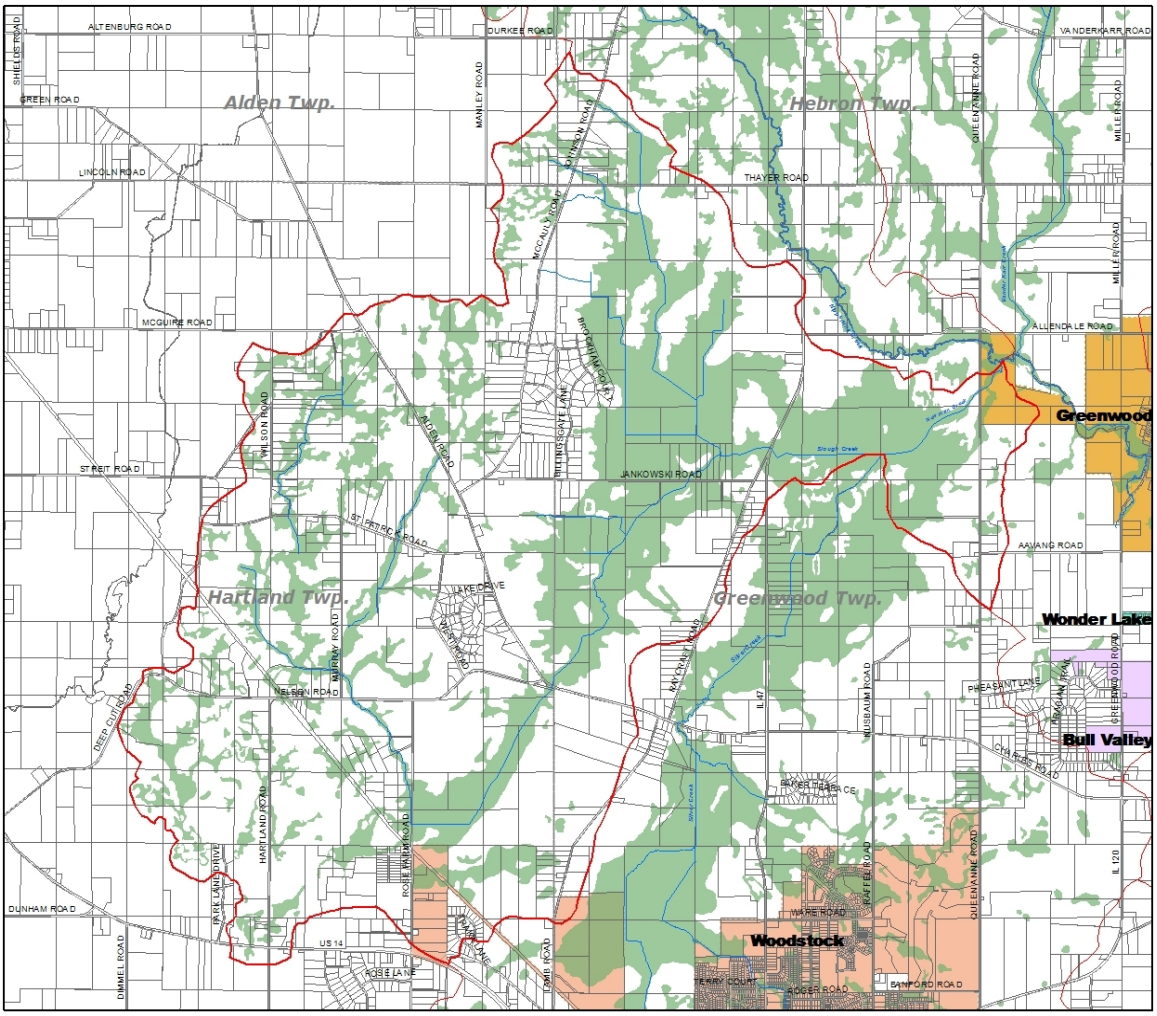
Figure 10.3 USGS Topographic Map for the Slough Creek Subwatershed



10.1.3 Soil Characteristics

The soils in the subwatershed consist of mostly silty and silty loams soil units on 0% - 2% slopes. The glacial advances across McHenry County resulted in a wide variety of soil associations. Each major grouping of soil associations has potential impact on current and future land uses within the subwatershed. For example, hydric (wetland) soils constitute 4,672 acres, or 39% of the 11,876 acre subwatershed, and indicate those areas that contain functional wetlands, or former / degraded wetland areas that could be restored or enhanced.

Figure 10.4 Hydric Soils Map of the Slough Creek Subwatershed



10.1.4 Pre-settlement Vegetation of the Slough Creek Subwatershed

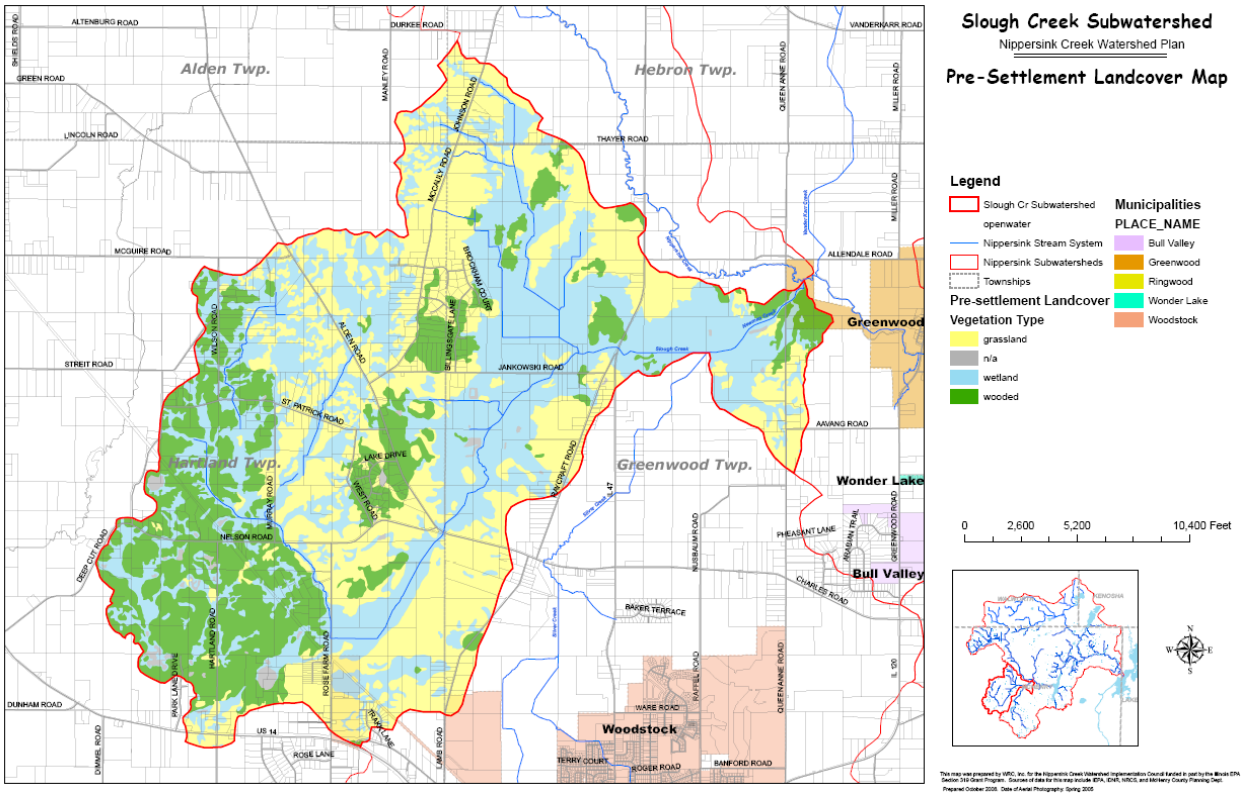
To guide future land management or restoration efforts, it is important to recognize the native plant communities that naturally evolved subsequent to the last glacial advances. Prior to European settlement in the 1830's, the subwatershed was covered by extensive wetland and prairie complexes in the eastern two-thirds and predominantly woodlands in the western one-third, as described in Table 10.1, and depicted in Figure 10.5.

Table 10.1 Pre-Settlement Land Cover Conditions of the Slough Creek Subwatershed

Cover Type	Area	Percent of Subwatershed
Grasslands	4,425 acres	37%
Wooded	2,665 acres	22%
Wetlands	4,698 acres	40%
n/a	88 acres	< 1%

Source: MCCD Soils Analysis using GIS data

Figure 10.5 Pre-settlement Vegetation of the Slough Creek Subwatershed



10.1.5 Subwatershed Drainage Features

Streams

The principal stream in the subwatershed is, of course, Slough Creek. Slough Creek has its origins in northeast Hartland Township, near Wilson Road and Alden Road. The stream travels south from here to Rose Farm Road, where it turns and runs to the northeast towards Jankowski Road, and then to its confluence with Silver Creek about one mile east of Raycraft Road in Greenwood Township. Where Slough Creek and Silver Creek join, the stream has been named Neuman Creek, which continues downstream for about one mile, where the stream merges with Nippersink Creek, east of Queen Anne Road.

There are three tributary streams in the subwatershed, all of which appear to have been excavated during the onset of conversion of the historic wetlands and prairies into fertile agricultural lands. The uppermost reaches of Slough Creek appear to have been channelized, and in some places, buried and converted into a drain tile, as the open channels near St. Patrick Road do not have surface connections to the main stem of Slough Creek north of Nielson Road.

Channelization Analysis of aerial photography indicates that Slough Creek has been subjected to extensive channelization. Of the 20.2 miles of stream channels in the subwatershed, about 92% have been ditched and channelized to better serve the intense agricultural activities that dominate the area. There are only four segments of Slough Creek that have not been channelized, and none of them are more than 2,100 feet in length.

Stream Channel Condition There is no documented information regarding the stream condition of Slough Creek or its tributaries. The streams appear to be unmanaged and are usually confined within a narrow corridor of herbaceous grasses or low quality deciduous trees. Along channelized reaches, the stream corridor ranges in width from about 60 to 100 feet. There are short reaches, however, where the un-maintained stream corridor (i.e. not used for agricultural production) is as wide as 1,200 feet or more. An example of this occurrence can be found at the Slough Creek Wetlands / Standlee Fen MCNAI site between Jankowski Road and Charles Road.

Impoundments There are two on-line impoundments on Slough Creek. One is located just upstream of Rose Farm Road, and appears to be manmade. The second appears to be created by a beaver dam within the Slough Creek Wetland/ Standlee Fen MCNAI site.

There are 114 impoundments within the subwatershed, ranging in size from less than a ¼ acre to more than 14 acres. The majority of them appear to have been manmade ponds or small lakes constructed for landowner's recreation. Many of them may have been isolated wetland pockets that were excavated to create a permanent open water feature.

Manmade Drainage Systems

There are no significant storm sewer systems within the subwatershed. Nearly all of the development in the subwatershed is rural residential or large lot (1 acre +) residential and likely to be drained via overland swales, roadside ditches and culverts installed along road right-of-ways. There is only one stormwater detention basin identified, and that is a dry-bottom style detention basin serving the unincorporated industrial / commercial development in the far southern edge of the subwatershed, at Washington Street east of Rose Farm Road.

Agricultural Tile Systems

Due to the predominantly agricultural nature of the subwatershed, it is likely that there are extensive underground drain tile systems to increase productivity of the area's rich soil. These systems were likely installed more than fifty years ago by private property owners, and therefore there is little documented information about there size and exact location, although their distribution can be general determined by inspection of a combination of aerial photographs, hydric soils and topography. Based on preliminary observations as part of this subwatershed assessment, it appears that there are several small to medium size agricultural drain tile networks that provide subsurface drainage to many farmed parcels that are adjacent to the tributary streams in the subwatershed.

Identifying agricultural drain tile networks is important in watershed planning because current local flooding and drainage problems can often be linked to damage or age-related failure of drain tile systems. From a watershed preservation / restoration perspective, it is important to identify functional drain tile systems to determine opportunities for their removal or reconfiguration for the purposes of restoring valuable wetland habitat, and water quality benefits. There is little doubt that many of the depressional and low lying areas in the subwatershed that are serviced by drain tiles today for agriculture were once wetland habitats that supported a very diverse ecosystem.

Floodplains

The true floodplain system within the subwatershed has not been mapped to date. Existing FEMA floodplain maps depict the floodplain of Slough Creek as "Zone A", meaning that a floodplain analysis has not been done to accurately determine the elevation or spatial limits of the 100-year floodplain.

10.1.6 Population

Population data in watershed planning is critical because of there is a direct correlation between the number of people residing in a watershed and the degree of impacts to the quality and quantity of the watershed's natural resources.

Using US Census data compiled by the Fox River Study Group for the Nippersink Creek subwatersheds, past population data are available for the combined area of the Vander Karr and Slough Creek subwatersheds. This data indicated that in 1990, about 2,875 people lived in the subwatershed, which equated to 76 persons per square mile. According to the 2000 US Census, the population increased to 3,300 people, or about 88 persons per square mile. While this represents an increase of about 11%, the overall growth in the subwatershed to date is considered slow, as the population only increase by about 425 people over the 37.4 square mile study area (Slough & Vander Karr subwatersheds combined).

10.1.7 Land Cover

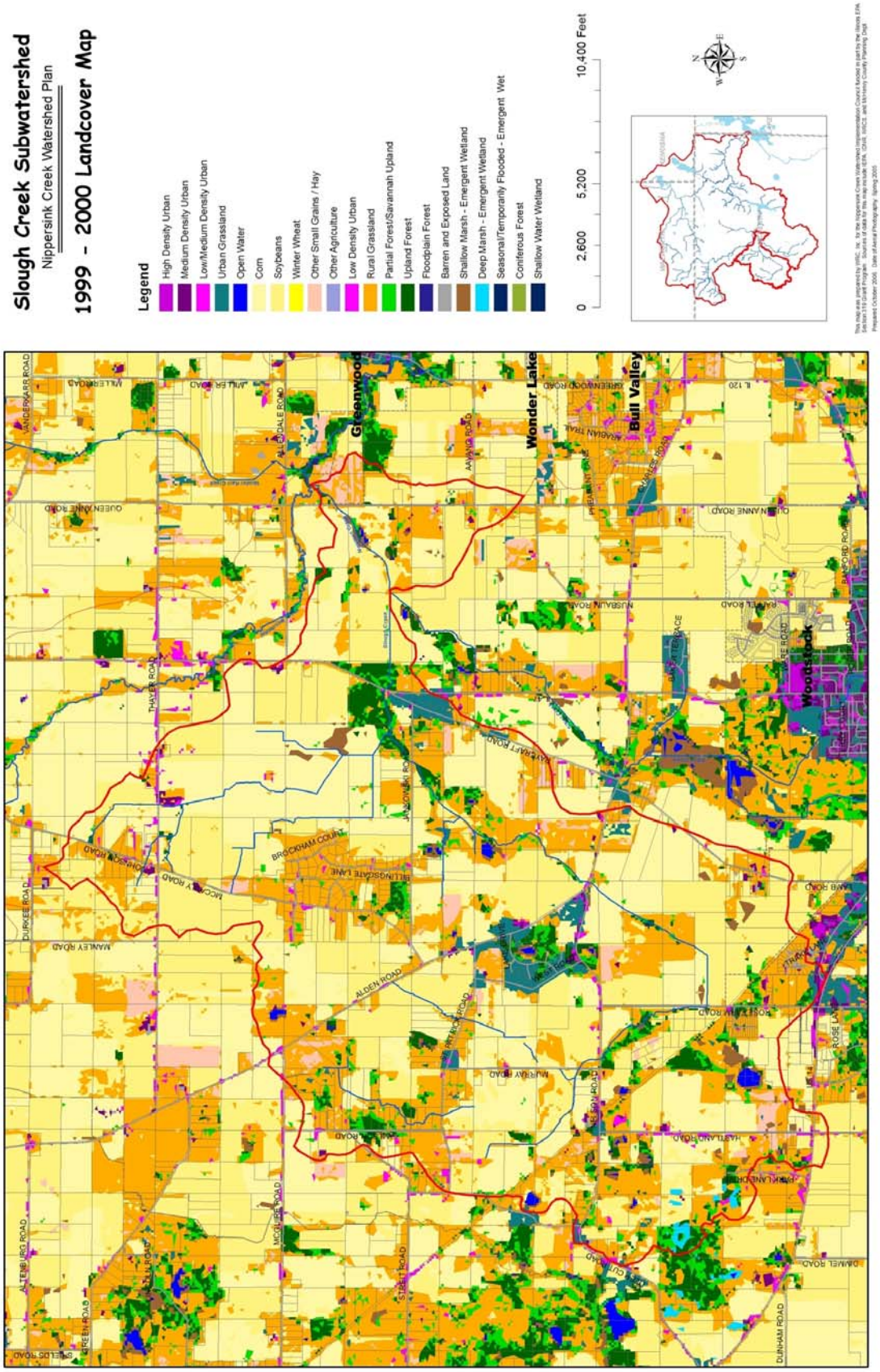
Often, the terms Land Cover and Land Use are used interchangeably. However, there are differences. Land Cover refers to the vegetation, structures, or other features that cover the land. On the other hand, Land Use (as discussed in Section 10.1.8) refers to how land is used by humans.

Land cover data for the subwatershed is available from the Illinois Department of Natural Resources using LANDSAT data collected between 1998 – 1999. The dominant land use according to the 1999-2000 data was row crop agriculture, which accounted for roughly 61% of the subwatershed area. Rural grasslands, including pasture lands and nurseries accounted for another 26% of the subwatershed. These two land cover categories account for 87% of the subwatershed.

Table 10.2 1999 Land Cover for the Slough Creek Subwatershed

Land Cover Description	Total Acres	Percent of Subwatershed
Barren & Exposed Land	8.18	0.1%
Corn, Soybeans, Other Small Grains & Hay (row crop agriculture)	7,263.8	61.2%
Winter Wheat	0.34	0.0%
Rural Grassland	3129	26.4%
Low Density Urban	116.3	1.0%
Medium Density Urban	67.45	0.6%
High Density Urban	4.2	0.0%
Urban Grassland	267.11	2.3%
Shallow Marsh – Emergent Wetland	154.54	1.3%
Partial Forest / Savannah Upland	315.5	2.7%
Upland Forest	468.26	3.9%
Floodplain Forest	9.1	0.1%
Deep Marsh / Emergent Wetland	25.9	0.2%
Open Water	41.1	0.3%
TOTAL	**11,870.8**	**100%**

Figure 10.6 1999-2000 Land Cover Map for the Slough Creek Subwatershed



10.1.8 Land Use / Existing Watershed Development

According to the 2005 McHenry County Land Use / Zoning map, 85% of the subwatershed is zoned agriculture, while about 15% is either already developed or zoned for development in the near future.

Table 10.3 McHenry County 2005 Land Use in Slough Creek Subwatershed

Land Use	Total Acres	Percent of subwatershed
Vacant	0	0.0%
Vacant; Zoned Residential	133.5	1.1%
Vacant; Zoned Commercial	0.5	0.0%
Vacant; Zoned Office	0	0.0%
Vacant; Zoned Industrial	56.9	0.5%
Agricultural	10,056.8	84.7%
Single Family Residential	1,156.5	9.7%
Multi-Family Residential	0.9	0.0%
Commercial	2.75	0.0%
Office	0	0.0%
Industrial	42.9	0.4%
Mixed Use	0	0.0%
Mining	0	0.0%
Open Space	53.77	0.5%
Institutional	91	0.8%
Right of Way	280.5	2.4%
TOTAL	**11,876**	**100.0%**

Source: 2005 McHenry County Land Use Zoning Data for Slough Creek Subwatershed

Developed land accounted for about 7.7% of the subwatershed, consisting almost entirely of unincorporated, large lot rural residential development. To date, municipal expansion into the subwatershed has been almost non-existent, as nearly 99% of the subwatershed was classified as unincorporated in 2005.

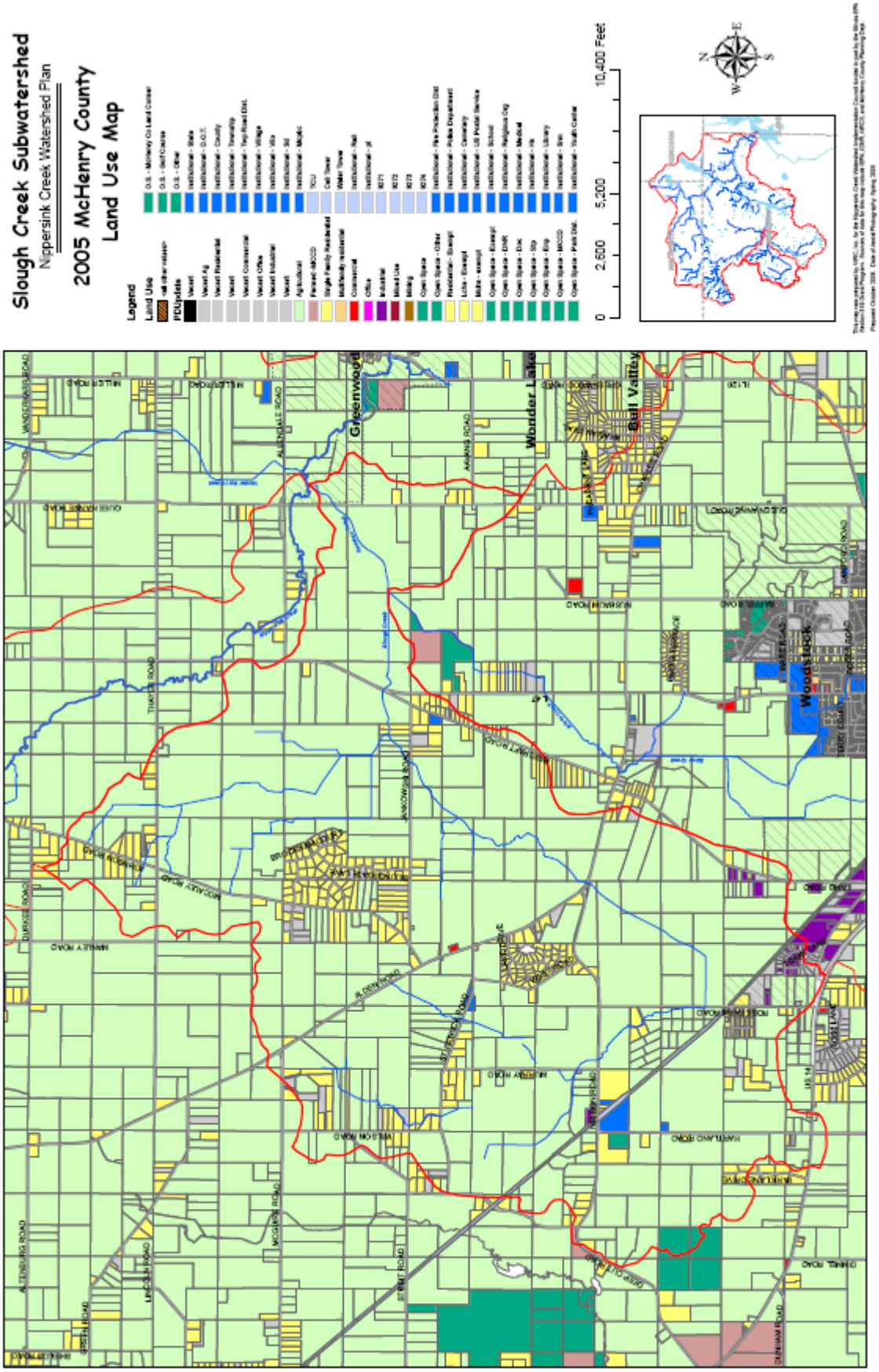
Table 10.4 Municipal Areas in the Slough Creek Subwatershed

Municipality	Area (acres)	Percent of Subwatershed
Village of Greenwood	67	0.6%
Village of Woodstock	134	1.1%
Unincorporated	11,675	98.3%

Permit Point Source Discharges There are no verified permitted point source discharges in the subwatershed. According to the Illinois IEPA NPDES database, Prairie Material Sales, Yard 23, maintains a NPDES permit for stormwater discharge near Miller Road and Allendale Road (permit # IL0071731), however, a review of 2005 aerial photography does not indicate the presence of land disturbance activities indicative of a point source discharge.

Road Network An analysis of GIS roadway data indicates that there are 33.2 miles of roads in the subwatershed. This is approximately 112 acres of pavement.

Figure 10.7 McHenry County 2005 Land Use in Slough Creek Subwatershed



10.1.9 Natural Resources

McHenry County Conservation District Property

The McHenry County Conservation District (MCCD) does not own any parcels within the Slough Creek Subwatershed, although two adjacent MCCD properties extend slightly into the subwatershed. These properties account for less than 0.1% of the subwatershed area.

Table 10.5 MCCD Properties in Slough Creek Subwatershed

Name	Area (acres)
Brookdale	3.28
Bystricky Prairie	1.94
Total	**5.22**

McHenry County Natural Areas Inventory

There are six McHenry County Natural Area Inventory (MCNAI) Sites within the subwatershed, representing about 5% of the subwatershed area.

Table 10.6 McHenry County Natural Areas Inventory Sites in Slough Creek Subwatershed

MCNAI Site ID #	Name	Area (acres)
GRE09	Slough Creek Wetlands / Standlee Fen	379
HAR08	Lakota Wetlands	115.9
GRE08	Slough Creek Meadow	48.4
HAR02	Alden Road Wetland	19.8
HAR01	Rose Farm Prairie	5.8
GRE01	Aavang-Lind Woods	4.4
	Total	**573.3**

These MCNAI sites contain several significant natural features, including a graminoid fen, sedge meadows, a streamside marsh, wet silt loam prairies, mesic silt loam prairie, dry mesic silt loam woodland, and mesic silt loam woodland.

Wetlands

McHenry County completed an Advanced Identification (ADID) Wetland Study in 1998. This study identified a total of 1,058 acres of wetlands, or 9% of the subwatershed. Of these wetlands, 785.1 acres (74%) were determined to be of High Quality or High Functional Value, rating an ADID classification.

Table 10.7 Mapped Wetlands in the Slough Creek Subwatershed

ADID Code	Wetland Type	# of Wetlands	Total Acres
FW	Farmed Wetlands	43	99.0
HFVW	High Functional Value Wetlands	18	336.7
HQL	High Quality Lakes	0	0
HQW	High Quality Wetlands	7	448.4
L	Lakes	0	0
W	Other Wetlands (lower quality)	79	174.0
	TOTAL	**147**	**1,058.1**

The most significant wetland in the subwatershed is the 308 acre high quality wetland found within the Slough Creek Wetland / Standlee Fen MCNAI site. Currently considered a high-quality wetland complex, this wetland is threatened by invasive species intrusion (Reed Canary Grass), and drainage modifications (ditching / channelization). This wetland complex also lies within parcels that are planned for future development, which may encroach into the wetland boundary or alter the wetland's hydrology and water quality.

Threatened & Endangered Species

The McHenry County Natural Area Inventory database has identified several threatened or endangered species of plants and animals that inhabit the remaining natural areas of the subwatershed. They are listed below:

Table 10.8 Threatened and Endangered Species in the Slough Creek Subwatershed

Common Name	Scientific Name	Type	Status	MCNAI Site
Eastern Prairie Fringed Orchid	Platanthera leucophaea	Plant	St Endangered & Fed Threatened	GRE09
Black Tern	Chlidonias niger	Bird	St Endangered	HAR08
Yellow-Headed Blackbird	Xanthocepalus xanthocephalus	Bird	St Endangered	HAR08
Blanding's Turtle	Emydoidea blandingii	Reptile	St Threatened	HAR08

Existing Greenways

There are no formal greenways established in the subwatershed. The stream corridor in most places has been severely encroached upon by adjacent agriculture, with exceptions at locations of larger wetland complexes that probably proved too wet to accommodate farming or grazing. None of the 20+ miles of stream channel are protected, as there are no MCCD properties or private conservation easements along slough Creek or any of its tributaries.

10.2 Analysis of Subwatershed Data and Problem Identification

10.2.1 Water Quality Data & Identified Problems

The Illinois Environmental Protection Agency (IEPA) is the lead agency in Illinois that monitors and regulates water quality in our rivers, lakes, and streams.

The IEPA has determined that the designated uses for Nippersink Creek are to support:

- Aquatic Life
- Fish Consumption
- Primary Contact
- Secondary Contact
- Aesthetic Quality

The IEPA periodically produces a 303(d) list, which identifies waterways that are not achieving certain designated uses. In the 2006 IEPA 303(d) list, Nippersink Creek is identified as being in Full Support of its Aquatic Life Designated Use, which is notable for a stream in northeastern Illinois.

Unfortunately, Slough Creek and its tributaries were not assessed in this IEPA report, probably due to the fact that Slough Creek is a small tributary to the Nippersink, and the IEPA has very limited funds for their state-wide water quality monitoring program.

The Illinois Environmental Protection Agency does not maintain any water quality sampling stations on Slough Creek. Likewise, the Fox River Watershed Monitoring Network, administered by the not-for-profit Friends of the Fox River, also has not established any volunteer stream monitoring sites on Slough Creek, as of 2006.

10.2.2 Flooding Problems

There are no known flooding problems in the subwatershed. The existing FEMA 100-year Floodplain Map suggests that there are no dwellings in the 100-year floodplain. The floodplain and floodway for Slough Creek have been studied and mapped from the confluence upstream to Nelson Road; about 80% of the length of Slough Creek.

10.2.3 Projected Development & Growth

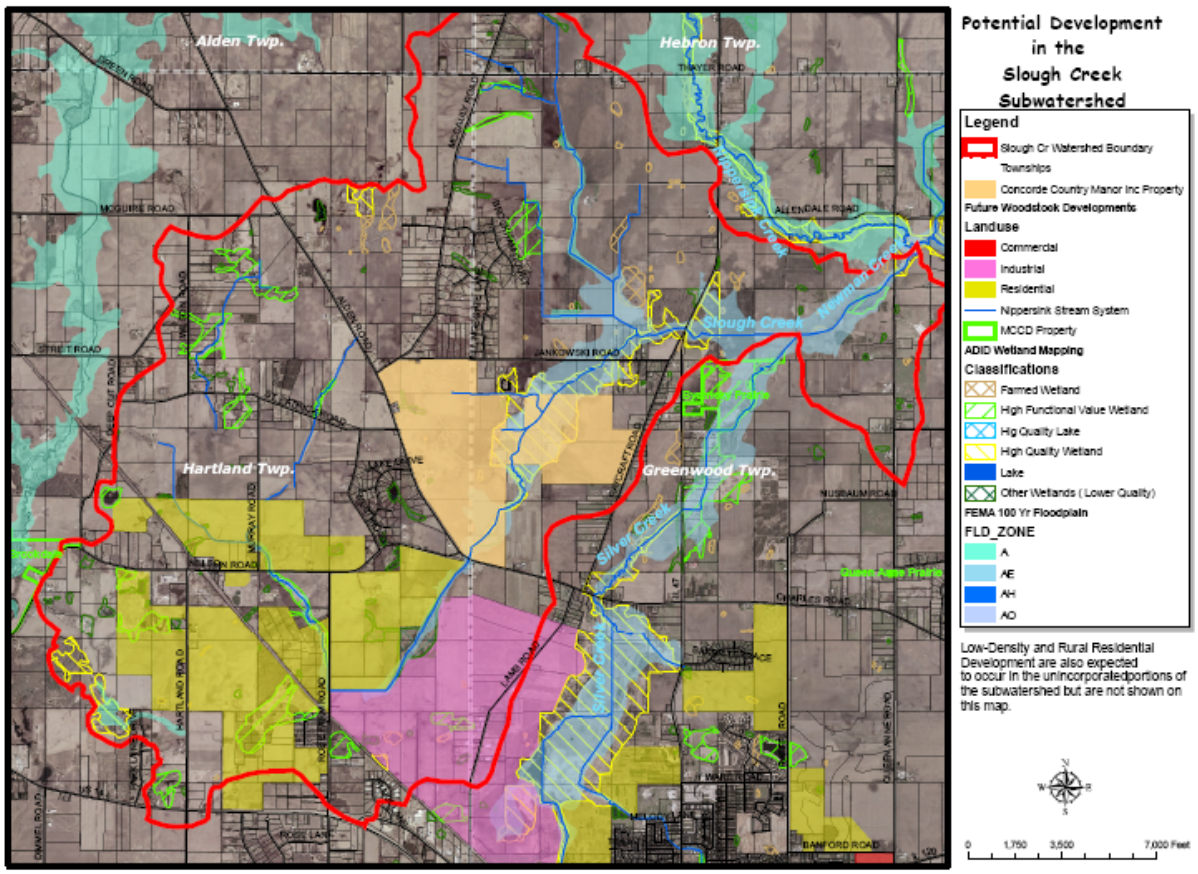
Future development and land use change in the subwatershed is likely to be dominated by the conversion of agricultural land to large lot (1+ acre), rural residential type of development. This development will likely continue in the subwatershed at a moderate pace.

Future suburban development in the subwatershed is expected to be extensive, particularly in the southern half of the subwatershed. The most intensive land use changes are expected to occur as part of annexation and expansion northward by the City of Woodstock. Analysis of their current Comprehensive Land Use Plan (5/7/2002) indicates that an additional 2,360+ acres of new development is expected in the subwatershed alone. 1,560 acres of this proposed development plan is expected to be residential; 60 acres is planned for Commercial / Industrial / Office Mixed Use; and 740 acres is planned to become industrial.

There may also be additional residential development outside of Woodstock's current plan boundary, as there are nearly 800 acres of land north and east of Charles and Alden Roads that are owned by a development company. This area is of special significance because the parcels owned by the developer contain more than 150 acres of ADID High Quality Habitat wetland; part of the Slough Creek Wetlands / Standlee Fen NAI site.

Therefore, if current plans hold true, the City of Woodstock will have jurisdiction over at 2,900+ acres of the subwatershed (24% of total). While the current stormwater ordinances will likely prevent significant encroachment into sensitive natural areas, the current land development practices and stormwater management methods will probably create a significant increase in total stormwater runoff and a decrease in water quality in the streams.

Figure 10.8 Future Development in the Slough Creek Subwatershed



10.2.4 Natural Area Protection / Preservation Issues

McHenry County Natural Area Inventory Sites

The Slough Creek Wetlands / Standlee Fen site (MCNAI GRE09), has been identified by the MCCD as being impacted by stream bank erosion, channelization, siltation, water table alteration, brush encroachment, Reed Canary Grass, and development (future development). The Lakota Wetlands (MCNAI HAR08), located on the watershed divide between the Nippersink Watershed and the Kishwaukee Watershed, has also been identified by the MCCD as being impacted by artificial pond construction, water table alteration, and invasive species such as various non-native brush, Cattails, and Reed Canary Grass. Neither of these high quality natural areas are protected, other than the protections afforded to them through the McHenry County Stormwater Ordinance or Conservation Design Ordinance, if future development occurs.

Wetlands

In the subwatershed, only 1,058 acres of wetland remain, compared to an estimated 4,673 acres that existed before settlement. That means that 77% of the wetlands have already been lost and can no longer provide the valuable functions described above. Therefore, it is critical that the remaining wetland resources in the subwatershed be protected and managed so that stakeholders can gain from the benefits these wetlands provide.

There are seven High Habitat Quality wetland complexes in the Slough Creek Subwatershed, ranging in size from three acres to more than 300 acres. Many of these wetlands need either protection and/or restoration to maintain the high quality characteristics that make the wetlands so valuable to the watershed.

Uplands

Most of the upland forest areas and oak savannah remnants in the subwatershed are located on private property and have no form of permanent protection and no active management program to control invasive species.

10.3 Subwatershed-Specific Recommendations to Protect Water Resources

The following section discusses the Best Management Practices (BMP's) identified for this subwatershed that should be implemented to address existing or potential water quality impairments. The location of each recommended BMP project is presented in Figure 10.9.

Pollutant Loading Modeling, as discussed in Chapter 3, identified current and future pollutant loadings, based upon land use, soils, slopes, etc., and quantified these loadings. The results of this Pollutant Loading modeling were then used to identify the types of BMP's that should be implemented to create a loading reduction of those pollutants. Table 10.9 presents a summary of the recommended BMP projects, as well as the expected pollutant loading reductions expected if the BMP's are implemented, and function as intended.

Table 10.10 presents detailed cost and logistical information on each of the recommended BMP projects. Below is a summary list of recommendations for the subwatershed to help stakeholders and decision makers meet the Goals and Objectives set forth for Nippersink Creek. Background information regarding how each type of recommendation addresses watershed concerns and/or impairments (existing or future) can be found in Chapter 4.

Type:	Education / Outreach; Regulatory; Site Restoration; Monitoring; Permanent Habitat Protection, Water Quality
Target Goals:	Which watershed plan goals the recommendation is intended to address.
Initial Implementation Cost:	The initial cost, in 2007 dollars to initiate the recommended action, if applicable.
Initial Outreach Cost:	The initial cost, in 2007 dollars to initiate the recommended action, if applicable.
Annual Cost:	The long term expected annual cost (in 2007 dollars) to successfully implementation of the recommendation
Responsible Party:	Identifies the LEAD agency, entity, or landowner who will ultimately have to execute the recommendation. SUPPORTING parties, such as government agencies, grant sources, etc. may also be identified here.
Priority:	A ranking of the BMP recommendations, based upon the nature / urgency of the existing / potential impairment; the availability of willing landowners)/ partners; short-term vs. long-term development pressure; and whether the project is a new effort, or a retrofit of an existing practice.

The project cost estimates contained in this report should be considered preliminary, and are only presented to identify the potential magnitude of cost, from a watershed scale perspective. No site-specific investigation, analysis, or design of any recommended project, from which accurate cost information could be obtained, was completed as part of the preparation of the 2008 Nippersink Creek Watershed Plan.

If a watershed stakeholder decides to apply for grant funding assistance to implement any of the recommended projects presented in this report, they should first undertake any additional studies / research needed to determine an updated / accurate project cost. They should not solely rely on the cost estimates presented in the NCWP report as the basis for their grant request.

Note: The following acronyms for responsible parties identified in Table 10.12 are presented below:

NCWPC	Nippersink Creek Watershed Planning Committee
NRCS	Natural Resource Conservation Service
SWCD	McHenry County Soil and Water Conservation District
MCCD	McHenry County Water Conservation District
TLC	The Land Conservancy of McHenry County
IDOT	Illinois Department of Transportation
IEPA	Illinois Environmental Protection Agency
MCDOT	McHenry County Department of Transportation
MCDEF	McHenry County Defenders

Figure 10.9 Slough Creek Subwatershed Site Recommendations Map

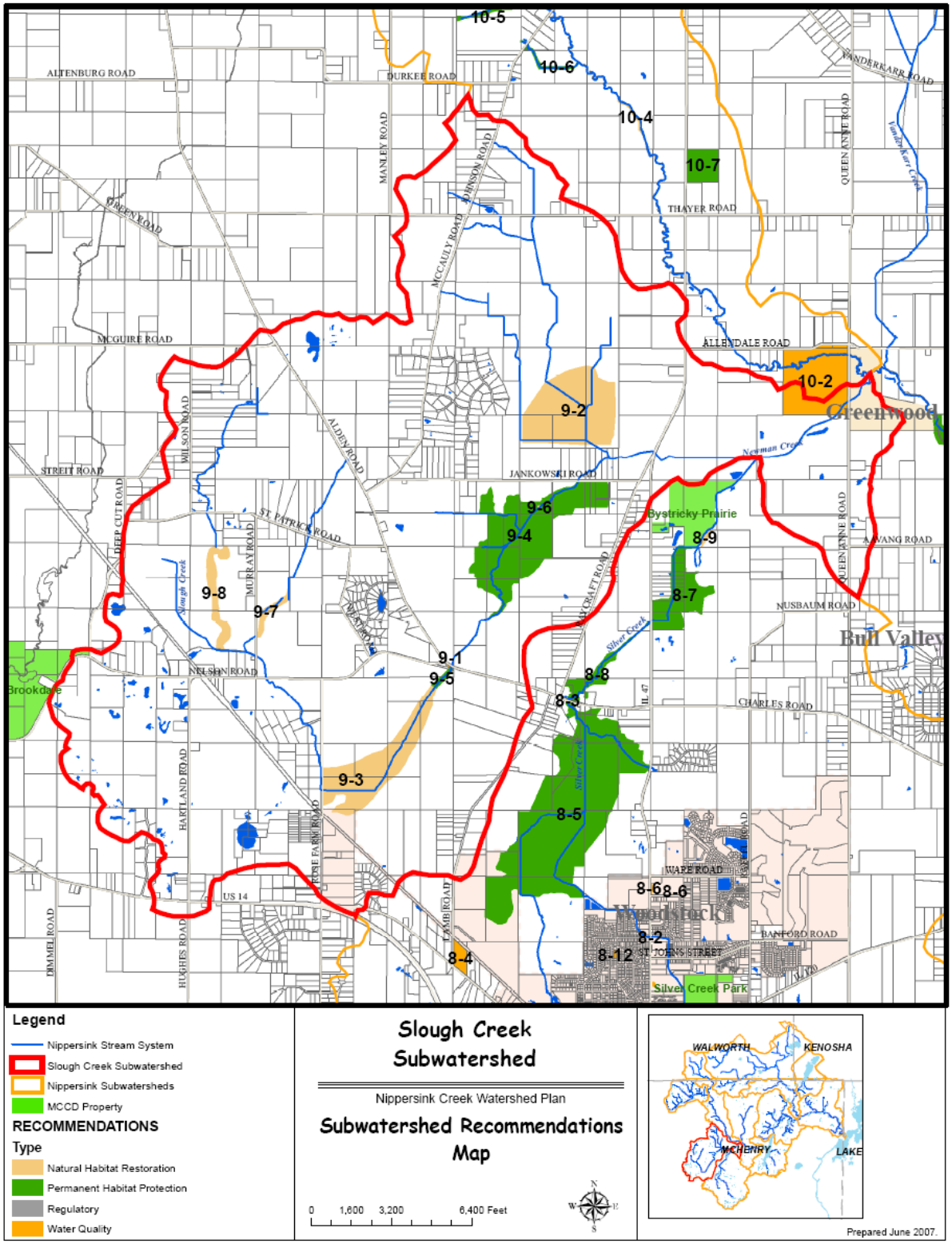


Table 10.9 BMP Selection & Associated Pollutant Load Reduction for the Slough Creek Subwatershed

BMP	Type of BMP	Project Locations**	BMP		Removal Efficiency***			(lbs/year) ****			Percentage Reduction		
			Size	Unit	TN	TP	TSS	TN	TP	TSS	TN	TP	TSS
Natural Habitat Protection	Site-specific	9-2, 9-3, 9-6, 9-7	13	acres	30%	35%	60%	77	6	7	0.2	0.2	0.3
Conservation Development Practices	Site-specific	9-3, 9-4, 9-8	38	acres	52%	58%	64%	389	31	22	0.8	0.9	1
Dam Removal / Modification	Site-specific	9-6	1	lump sum	0%	0%	0%	0	0	0	0	0	0
Regulatory*	Watershed-Specific	Subwatershed	1	Water-shed	5%	5%	5%	2,338	169	109	5	5	5
Nutrient Management	Watershed-specific	Subwatershed wide	1,187.00	acres	70%	28%	-	16,367	472	-	35	14	-
Wetland Restoration	Site-specific	9-2, 9-3	163	acres	53%	51%	88%	1,702	118	132	3.6	3.5	6
Stream Corridor Restoration	Site-specific	9-1, 9-5, 9-7, 9-8	286	acres	53%	51%	88%	2,986	207	232	6.4	6.1	10.6
Total								23,860	1,003	502	51	29.8	23

*Regulatory programs are assumed to have nominal pollutant reduction rates of 5%.

** Project locations and details are described in the corresponding chapter.

*** TN = total Nitrogen; TP = total Phosphate; TSS = total suspended solids or Sediment.

**** The unit of “TSS” is “Tons/year”.

***** The cost indicates the review/investigation fee only.

Table 10.10 Recommended Projects in the Slough Creek Subwatershed

SUB WATERSHED	RECOMMENDATION #	TARGET GOAL	DESCRIPTION	RESPONSIBLE PARTY	ACRES	UNIT COST	INITIAL IMPLEMENTATION COST	INITIAL OUTREACH COST	ANNUAL MAINTENANCE COST	PRIORITY
Slough Creek	9-1	Water Quality	Government Outreach to install BMP's to treat roadway runoff prior to discharge into Slough Creek at Charles Road	NCWPC / MCHENRY DOT			$25,000	$500	$1,250	E
Slough Creek	9-2	Natural Habitat Restoration	Landowner / Government Outreach to determine feasibility Potential for 200+ acre wetland restoration on unnamed tributary to Slough Creek north of Jankowski Road / west of Raycraft Road	NCWPC / NRCS	215.4	$2,500	$538,560	$1,500	$21,542	D
Slough Creek	9-3	Natural Habitat Restoration	Landowner / Government Outreach to determine feasibility of 150+ acre wetland restoration on Slough Creek between Charles Road and Rose Farm Road; Conservation Design on parcels planned for development	NCWPC / CITY OF WOODSTOCK / NRCS	162.8	$2,500	$406,893	$1,500	$16,276	D
Slough Creek	9-4	Permanent Habitat Protection	Landowner Outreach to establish Conservation Easement on MCNAI GRE09 and actively manage the natural areas; parcels are likely to be developed	NCWPC / TLC / CITY OF WOODSTOCK / MCHENRY COUNTY	280.7	$1,500	$421,041	$1,500	$28,069	C
Slough Creek	9-5	Permanent Habitat Protection	Landowner Outreach / Government Outreach to establish Conservation Easement along Slough Creek south of Charles Road and create expanding natural stream corridor buffer; Conservation Design on parcels likely to be developed	NCWPC / TLC / CITY OF WOODSTOCK / MCHENRY COUNTY	5.1	$1,500	$7,575	$500	$505	C
Slough Creek	9-6	Natural Habitat Restoration	Landowner Outreach to investigate possible on-line dam on Slough Creek and retrofit for fish passage if necessary	NCWPC / NRCS / TLC			$20,000	$500	$1,000	E

Table 10.10 Recommended Projects in the Slough Creek Subwatershed

SUB WATERSHED	RECOMMENDATION #	TARGET GOAL	DESCRIPTION	RESPONSIBLE PARTY	ACRES	UNIT COST	INITIAL IMPLEMENTATION COST	INITIAL OUTREACH COST	ANNUAL MAINTENANCE COST	PRIORITY
Slough Creek	9-7	Natural Habitat Restoration	Landowner / Government Outreach to determine feasibility of wetland / stream restoration on unnamed tributary to Slough Creek east side of Murray Road; Conservation Design on parcels likely to be developed	NCWPC / TLC / CITY OF WOODSTOCK / MCHENRY COUNTY	12.6	$500	$6,294	$500	$315	B
Slough Creek	9-8	Natural Habitat Restoration	Landowner / Government Outreach to include restoration of stream corridor as part of any future land development scenarios on unnamed Slough Creek tributary just west of Murray Road	NCWPC / TLC / CITY OF WOODSTOCK / MCHENRY COUNTY	38.1	$500	$19,053	$1,000	$953	B
				SW TOTALS	**714.6**		**$1,444,415**	**$7,500**	**$69,910**	

PRIORITY

- **A Projects that have cooperating partners, can move to implementation quickly. Implementation Timeframe 1 to 3 years**
- **B Projects subject to imminent development pressure, Implementation Timeframe 1 to 2 years**
- **C Projects needed to protect sensitive areas. Timeframe 1 to 2 years**
- **D Restoration projects, Timeframe 1 to 5 years**
- **E Retrofit Projects, Timeframe 1 to 5 years**
- **F Existing Pollution Potential, Timeframe 1 to 2 years**
- **G Policy / Opportunity Review Project, Timeframe 1 to 3 years**

Chapter 11
Bailey Woods Subwatershed Assessment

This section presents a summary of the characteristics of the Bailey Woods Subwatershed, as well as specific issues and challenges in this subwatershed that must be addressed in the Nippersink Creek Watershed Management Plan.

11.1 Subwatershed Characteristics

The following section provides an overview of the physical characteristics of the subwatershed.

11.1.1 Subwatershed Location

The Bailey Woods subwatershed is located in the northwestern portion of the Nippersink Creek Watershed, and has a drainage area of 7,283 acres (11.4 square miles). As shown on Figure 11.1, the subwatershed is located primarily within Hebron Township, but extends west into the Alden Township and southeast into Greenwood Township.

Figure 11.1 Bailey Woods Creek Subwatershed Location Map

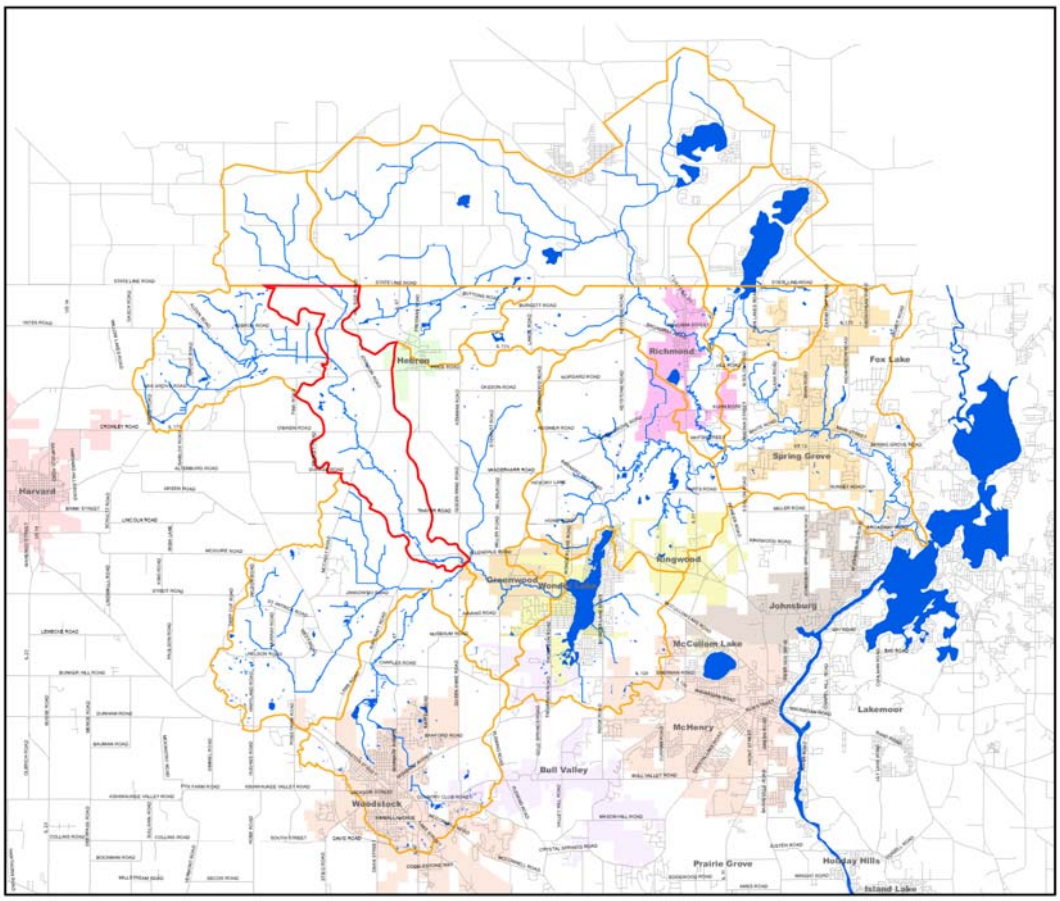
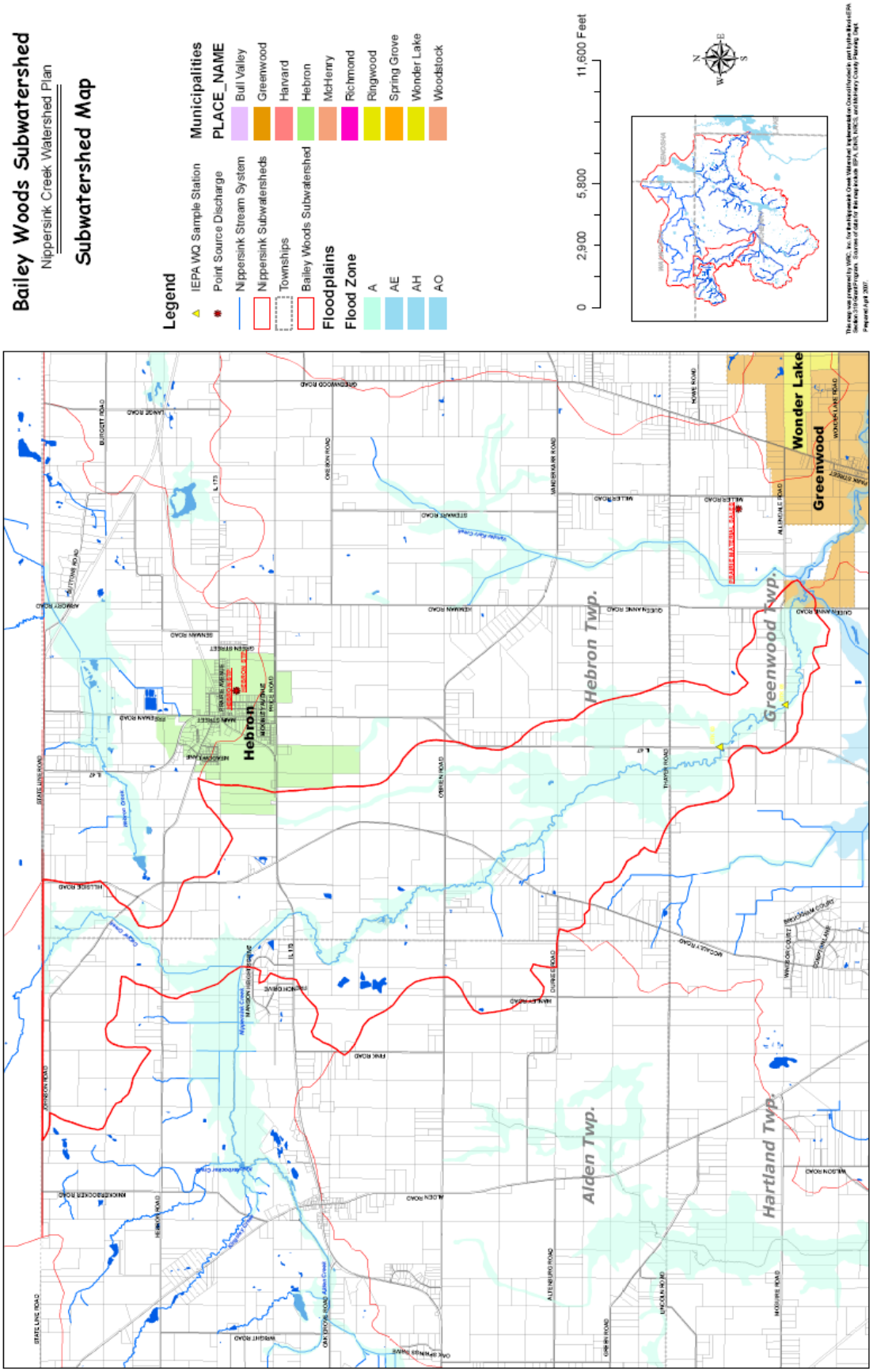


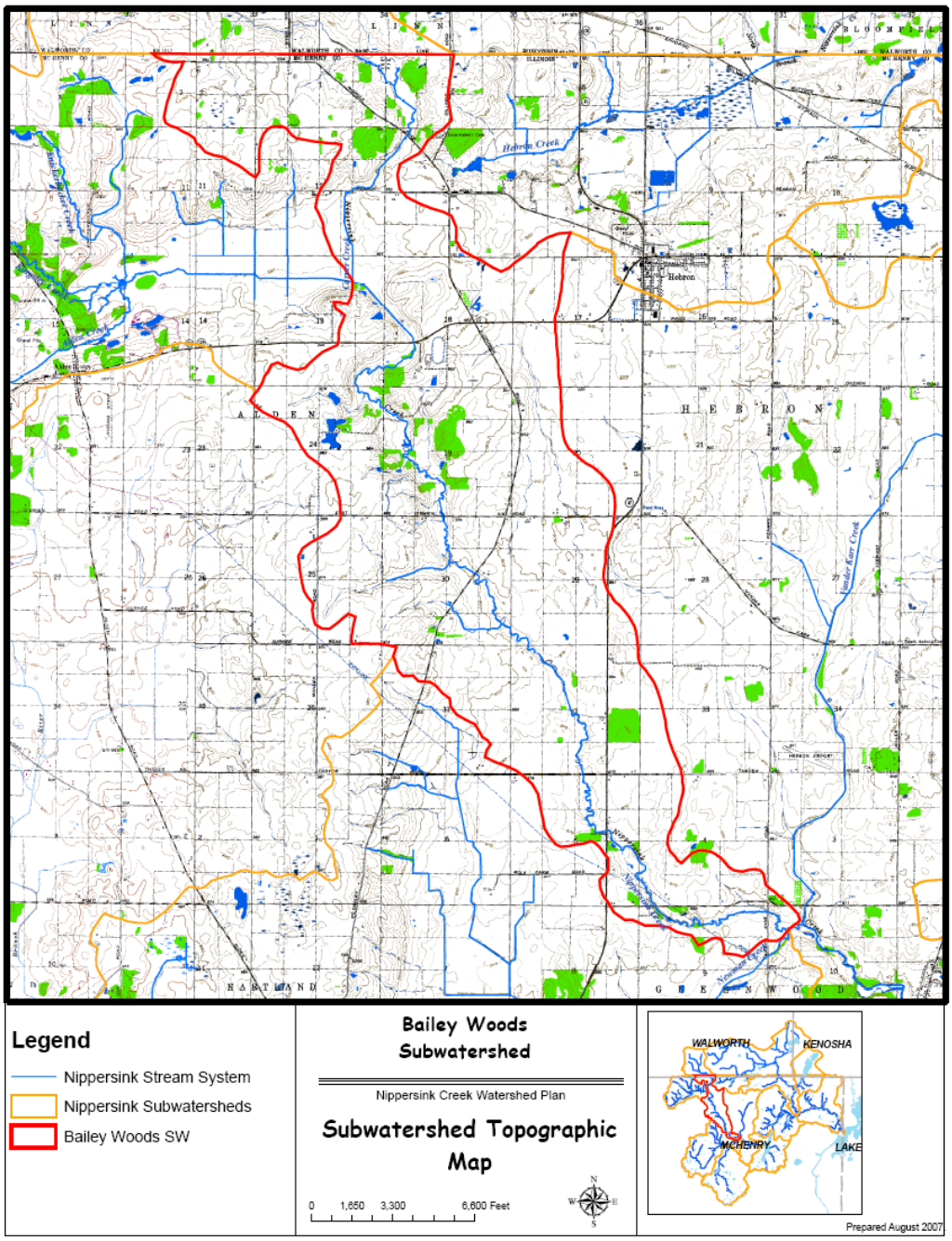
Figure 11.2 Bailey Woods Subwatershed Map



11.1.2 Topography & Geology

The topography of the subwatershed varies greatly. The lower and eastern half of the subwatershed is gently sloping, generally between 0% and 2%. However, Nippersink Creek passes through a relatively deep valley between Johnson Road (on the south) and Illinois Route 173 (on the north), where the topography varies by more than 60 feet from valley ridge to valley floor and slopes range from 5% to more than 10%. The maximum elevation in the subwatershed is 1,022 feet near the Illinois - Wisconsin state line and the minimum elevation is 836 at the subwatershed outlet just east of Queen Anne Road.

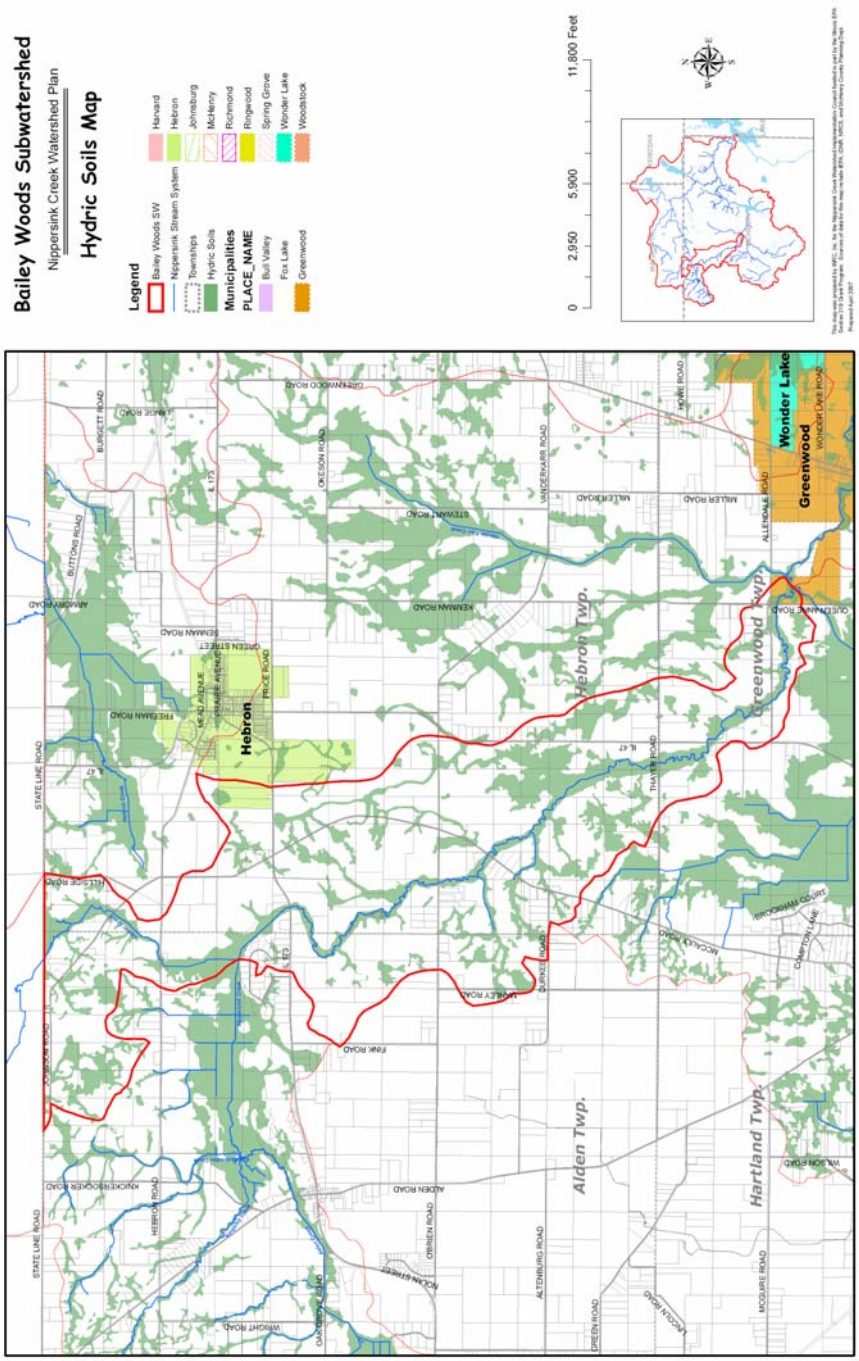
Figure 11.3 USGS Topographic Map of the Bailey Woods Subwatershed



11.1.3 Soil Characteristics

The glacial advances across McHenry County resulted in a wide variety of soil associations. The soils in the subwatershed consist of mostly silty loams soil units on 0% - 2% slopes. Each major grouping of soil associations has potential impact on current and future land uses within the subwatershed. For example, hydric (wetland) soils constitute 2,028 acres, or 28% of the 7,283 acre subwatershed, and indicate those areas that contain functional wetlands, or former / degraded wetland areas that could be restored or enhanced.

Figure 11.4 Hydric Soils Map the Bailey Woods Subwatershed



11.1.4 Pre-settlement Vegetation

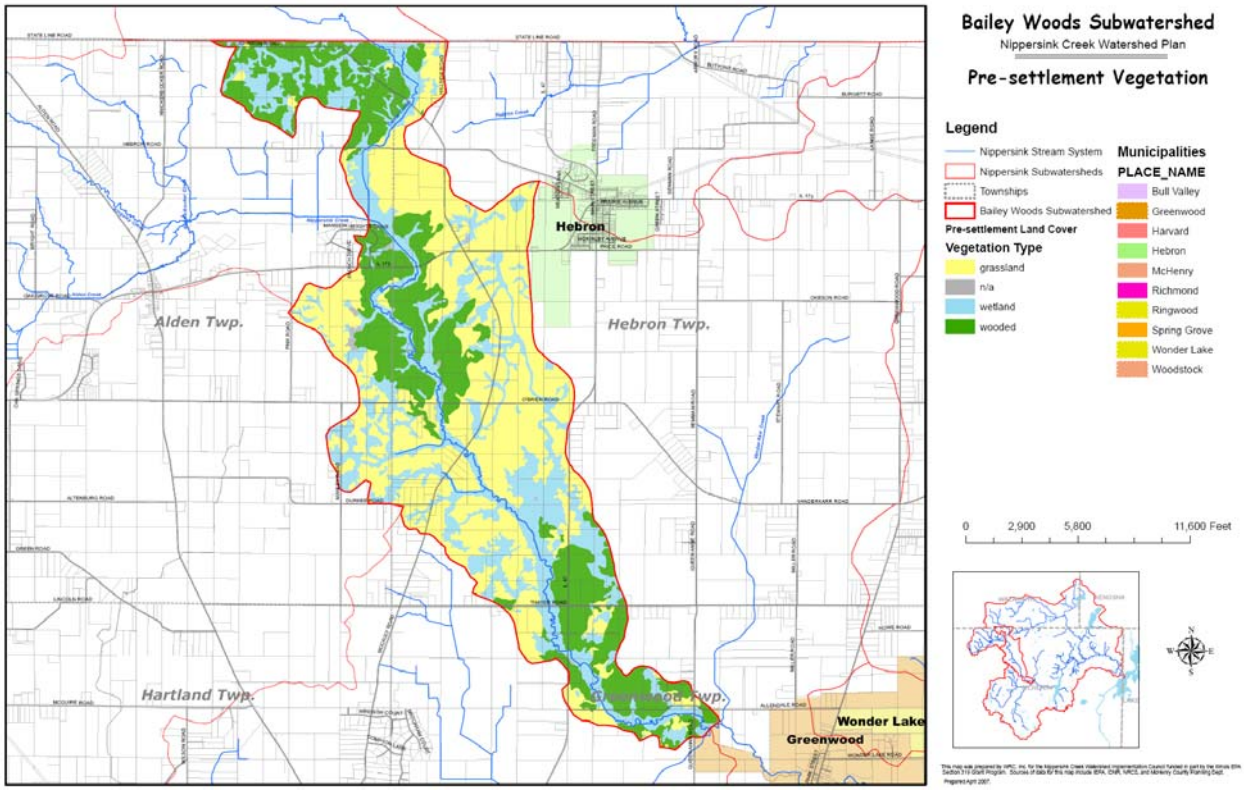
To guide future land management or restoration efforts, it is important to recognize the native plant communities that naturally evolved subsequent to the last glacial advances. Prior to European settlement in the 1830's, the subwatershed was covered by extensive woodland and wetland complexes in the upper, middle, and lower portions of the subwatershed, and prairie throughout the mid-section, as described in Table 11.1, and depicted in Figure 11.5.

Table 11.1 Pre-Settlement Land Cover Conditions

Cover Type	Area	Percent of Subwatershed
Grasslands	3,107 acres	43%
Wooded	1,965 acres	27%
Wetlands	2,190 acres	30%
n/a	21 acres	< 0.3%

Source: MCCD Soils Analysis using GIS data

Figure 11.5 Pre-settlement Vegetation of the Bailey Woods Subwatershed



11.1.5 Subwatershed Drainage Features

Streams

The principal stream in the Bailey Woods Subwatershed is Nippersink Creek. Nippersink Creek extends from the downstream outlet of the subwatershed upstream (north) to the Nippersink confluence with Carver Creek, just north of Illinois Route 173. Carver Creek drains the northeast portion of the subwatershed, and receives the discharge from the Zenda Headwaters branch of the Nippersink originating in Wisconsin.

Because the landscape in the Bailey Woods subwatershed has been heavily modified for agriculture, there are currently only two small ephemeral streams which empty into Nippersink Creek. They are located on the west side of the Nippersink channel, between Durkee Road and O'Brien Road.

Channelization Analysis of aerial photography indicates that Nippersink Creek, as it flows through this subwatershed, has not been subjected to extensive channelization. Only about 7% of the main stem of Nippersink Creek appears to have been channelized (0.74 miles). The channelization is located at the extreme upstream end of the subwatershed, just below the confluence between Nippersink and Carver Creeks. If channelization on Nippersink occurred further downstream of this area in the past, the stream appears to have recovered significantly, as the aerial photos indicate good sinuosity / meandering of the stream channel al the way down to the subwatershed outlet, east of Queen Anne Road.

Stream Channel Condition While there is little documented information regarding the stream condition of Nippersink Creek in the Bailey Woods subwatershed, the McHenry County Natural Area Inventory (MCNAI) database indicates that the Bailey Woods / Nichols Valley MCNAI site is suffering from "bank erosion" as one of its management problems.

Manmade Drainage Systems

There are no known storm sewer systems within the subwatershed. Developed areas are drained via overland swales, roadside ditches and culverts installed along road right-of-ways. There are also no known detention basins within the subwatershed.

Agricultural Tile Systems

Due to the predominantly agricultural nature of the subwatershed, it is likely that there are extensive underground drain tile systems to increase productivity of the area's rich soil. These systems were likely installed more than 50 years ago by private property owners and therefore there is little documented information about there size and exact location, although their distribution can be general determined by inspection of a combination of aerial photographs, hydric soils and topography.

Based on preliminary observations as part of this subwatershed assessment, it appears that there are several small to medium size agricultural drain tile networks. These tile systems provide subsurface drainage to many farmed parcels that are adjacent to the tributary streams in the subwatershed, as well as the low lying area east of Alden Sedge Meadow.

Identifying agricultural drain tile networks is important in watershed planning because current local flooding and drainage problems can often be linked to damage or age-related failure of drain tile systems. From a watershed preservation / restoration perspective, it is important to identify functional drain tile systems to determine opportunities for their removal or reconfiguration for the purposes of restoring valuable wetland habitat, and water quality benefits. There is little doubt that many of the depressional and low lying areas in the subwatershed that are serviced by drain tiles today for agriculture were once wetland habitats that supported a very diverse ecosystem.

Floodplains

The true floodplain system within the subwatershed has not been mapped to date. Existing FEMA floodplain maps depict the floodplain of Nippersink Creek through the subwatershed as "Zone A", meaning that a floodplain analysis has not been done to accurately determine the elevation or spatial limits of the 100-year floodplain.

11.1.6 Population

Population data in watershed planning is critical because of there is a direct correlation between the number of people residing in a watershed and the degree of impacts to the quality and quantity of the watershed's natural resources. In 1990, the US Census data indicated that about 645 people lived in the subwatershed, which equated to 57 persons per square mile. According to the 2000 US Census, the population increased to 740 people, or about 65 persons per square mile. While this represents an increase 15%, the overall growth in the subwatershed to date is considered slow, as the population only increased by about 95 people.

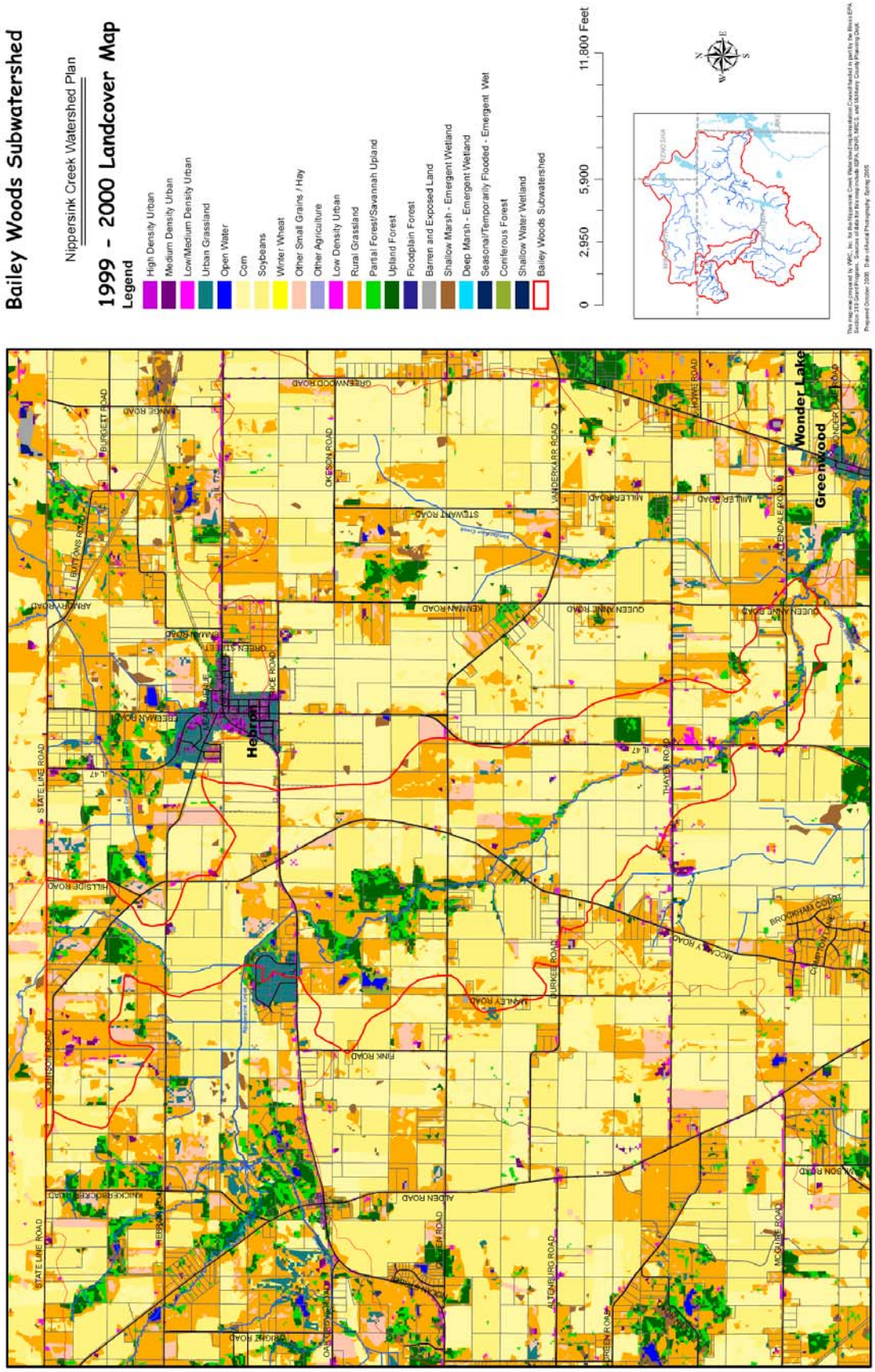
11.1.7 Land Cover

Often, the terms Land Cover and Land Use are used interchangeably. However, there are differences. Land Cover refers to the vegetation, structures, or other features that cover the land. On the other hand, Land Use (as discussed in Section 11.1.8) refers to how land is used by humans. Land cover data for the Bailey Woods Subwatershed is available from the Illinois Department of Natural Resources using LANDSAT data collected in 1999. The dominant land cover, according to this data, was agriculture, which accounted for roughly 90% of the subwatershed area (croplands + rural grasslands).

Table 11.2 1999 Land Cover for the Bailey Woods Subwatershed

Land Cover Description	Total Acres	Percent of Subwatershed
Barren & Exposed Land	2.7	0.0%
Corn, Soybeans, Other Small Grains & Hay (row crop)	4,692.3	64.4%
Winter Wheat	0.9	0.0%
Rural Grassland	1829	25.1%
Low Density Urban	75.9	1.0%
Medium Density Urban	24	0.3%
High Density Urban	0	0.0%
Urban Grassland	69.7	1.0%
Shallow Marsh – Emergent Wetland	28.7	0.4%
Partial Forest /Savannah Upland	216.4	3.0%
Upland Forest	308.4	4.2%
Floodplain Forest	1.43	0.0%
Coniferous Forest	15.4	0.2%
Deep Marsh / Emergent Wetland	0	0.0%
Open Water	15.8	0.2%
TOTAL	**7,280.63**	**100.0%**

Figure 11.6 1999-2000 Land Cover Map for the Bailey Woods Subwatershed



11.1.8 Land Use / Existing Watershed Development

According to the 2005 McHenry County Land Use / Zoning map, 91% of the subwatershed is zoned agriculture, while about 9% is either already developed or zoned for development in the near future.

Table 11.3 McHenry County 2005 Land Use in the Bailey Woods Subwatershed

Land Cover Description	Total Acres	Percent of Subwatershed
Vacant	1.2	0.0%
Vacant; Zoned Residential	50.4	0.7%
Vacant; Zoned Commercial	0	0.0%
Vacant; Zoned Office	0	0.0%
Vacant; Zoned Industrial	0	0.0%
Agricultural	6,659.5	91.4%
Single Family Residential	278.1	3.8%
Multi-Family Residential	0	0.0%
Commercial	0.9	0.0%
Office	0	0.0%
Industrial	0	0.0%
Mixed Use	0	0.0%
Mining	0	0.0%
Open Space	104	1.4%
Institutional	4.1	0.1%
Right of Way	185.3	2.5%
TOTAL	**7,283.5**	**100.0%**

Developed land accounted for about 10.7%, consisting almost entirely of unincorporated, large lot rural residential development. To date, municipal expansion into the subwatershed has been almost non-existent, as nearly 99% of the subwatershed was classified as unincorporated in 2005.

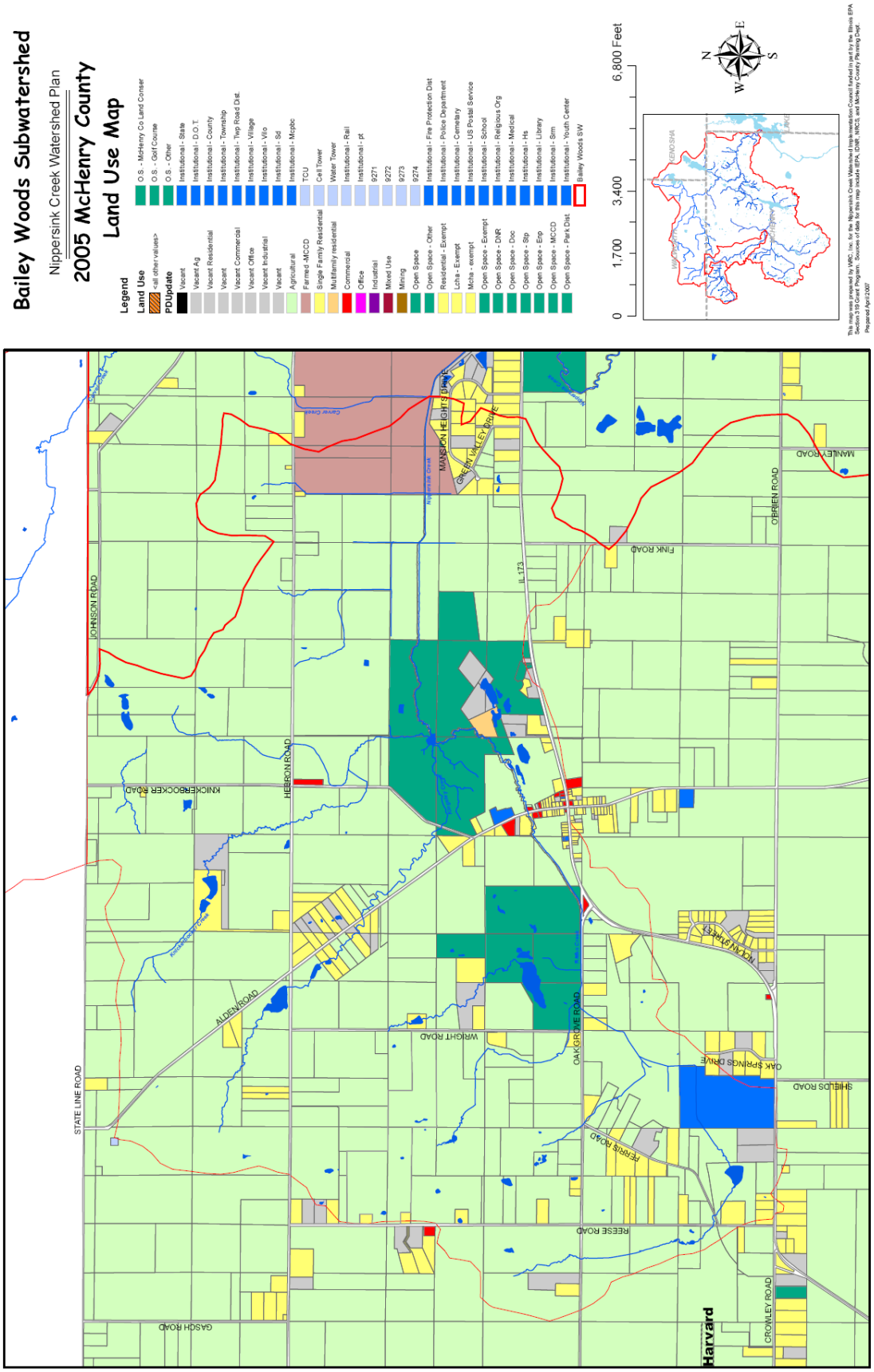
Table 11.4 Municipal Areas in the Bailey Woods Subwatershed

Municipality	Area (acres)	Percent of Subwatershed
Village of Greenwood	32	0.4%
Village of Hebron	72	1.0%
Unincorporated	7,179	98.6%

There are no permitted point source discharges in the subwatershed.

An analysis of GIS roadway data indicates that there are 17.98 miles of roads in the subwatershed. This is approximately 61 acres of pavement.

Table 11.7 McHenry County 2005 Land Use in Bailey Woods Subwatershed



11.1.9 Natural Resources

McHenry County Conservation District Property

The McHenry County Conservation District (MCCD) currently owns 739 acres of land within the subwatershed. There are four McHenry County Conservation District Sites within the subwatershed, representing over 10% of the subwatershed.

Table 11.5 MCCD Properties in the Bailey Woods Subwatershed

Name	Area (acres)
Alden Sedge Meadow (east)	219
Bailey Woods - North	180
Bailey Woods – East	163
Willobank Farm	177
Total	**739**

McHenry County Natural Areas Inventory

There are two McHenry County Natural Area Inventory (MCNAI) Sites within the subwatershed, representing nearly about 9% of the subwatershed area.

Table 11.6 McHenry County Natural Areas Inventory Sites in the Bailey Woods Subwatershed

MCNAI Site ID #	Name	Area (acres)
HEB01	Bailey Woods / Nichols Valley	641
HEB06	Route 47 Heronry	41
	Total	**682**

The Bailey Woods/Nichols Valley MCNAI site contains a Mesic Silt Loam Woodland, a Mid Order Low Gradient Stream (Nippersink Creek), and a Sedge Meadow.

Wetlands

McHenry County completed an Advanced Identification (ADID) Wetland Study in 1998. This study identified a total of 579 acres of wetlands, or 11% of the subwatershed. Of these wetlands, 434.4 acres (75%) were determined to be of High Quality or High Functional Value, rating an ADID classification.

Table 11.7 Wetlands in the Bailey Woods Subwatershed

ADID Code	Wetland Type	# of Wetlands	Total Acres
FW	Farmed Wetlands	29	78.7
HFVW	High Functional Value Wetlands	1	31.8
HQL	High Quality Lakes	0	0
HQW	High Quality Wetlands	5	402.6
L	Lakes	0	0
W	Other Wetlands (lower quality)	30	65.6
	Total	**65**	**578.7**

Of most significance is the nearly 6.8 mile long stretch of Nippersink Creek designated as High Quality Wetland between Queen Anne Road and Illinois Route 173. The highest quality portion of this wetland complex is found within the Bailey Woods / Nichols Valley MCNAI site just south Illinois Route 173.

Threatened & Endangered Species

The McHenry County Natural Area Inventory database did not reveal the presence of any threatened or endangered species of plants and animals in the subwatershed.

Existing Greenways

While there are no formal greenways established in the subwatershed, the land owners have done a fairly good job of preserving the active portion of the Nippersink Creek stream corridor. Only about one mile of Nippersink Creek is permanently protected on MCCD property. This represents only 10% of Nippersink Creek in the subwatershed, meaning that 90% is located on private property. There are no records of any of these properties containing conservation easements to protect the Nippersink stream corridor from encroachment by agricultural or other land disturbance activities.

11.2 Analysis of Subwatershed Data and Problem Identification

11.2.1 Water Quality Data & Identified Problems

The Illinois Environmental Protection Agency (IEPA) is the lead agency in Illinois that monitors and regulates water quality in our rivers, lakes, and streams.

The IEPA has determined that the designated uses for Nippersink Creek are to support:

- Aquatic Life
- Fish Consumption
- Primary Contact
- Secondary Contact
- Aesthetic Quality.

The IEPA periodically produces a 303(d) list, which identifies waterways that are not achieving certain designated uses. In the 2006 IEPA 303(d) list, below Wonder Lake, Nippersink Creek is identified as being in Full Support of its Aquatic Life and Fish Consumption Designated Uses, which is notable for a stream in northeastern Illinois. Upstream of Wonder Lake (including this subwatershed), Nippersink Creek is identified as being in Full Support of its Fish Consumption Designated Use, however, the Aquatic Life Designated Use was not assessed.

Nippersink Creek, upstream of Wonder Lake, as well as the segment of the Creek that flows through Wonder Lake, was not listed as impaired. However, the reach of Nippersink Creek downstream of Wonder Lake, extending all the way downstream to its confluence with the Fox River, is listed as "impaired" due to fecal coliform entering the stream water from an as yet unidentified source.

The Illinois Environmental Protection Agency maintains two water quality sampling stations in the BWSW. They are listed in the table below:

Table 11.8 IEPA Water Quality Sampling Stations in the Bailey Woods Subwatershed

Station	Stream	Location
DTK 06	Nippersink Cr.	Nippersink Creek at Allendale Road
DTK 03	Nippersink Cr.	Nippersink Creek at IL Route 47

The Fox River Watershed Monitoring Network, administered by the not-for-profit Friends of the Fox River, maintains three volunteer stream monitoring sites on Nippersink Creek. Unfortunately, none of the monitoring sites is located in the Bailey Woods Subwatershed.

11.2.2 Flooding Problems

There are no known flooding problems in the subwatershed. The existing FEMA 100 Year Floodplain Map suggests that as many as 11 dwellings are in the floodplain, however the floodplain in this subwatershed is classified as an Unstudied Zone A Floodplain. Analysis of the actual flood discharges and floodplain hydraulics would likely show that none of the adjacent dwellings are actually in the Nippersink Creek Floodplain or the floodplain of its two small tributaries.

11.2.3 Projected Development & Growth

Future development and land use change in the subwatershed is likely to be dominated by the conversion of agricultural land to large lot, rural residential type of development. This development will likely continue in the subwatershed at a slow to moderate pace. There is significant uncertainty about how much new development will encroach into the northeast area of the subwatershed as part of Hebron's recent annexations along Illinois Route 173. Further annexation and development west of the current Hebron corporate boundary will spread new development onto agricultural land that drains toward Nippersink Creek.

11.2.4 Natural Area Protection / Preservation Issues

McHenry County Natural Area Inventory Sites

The Bailey Woods / Nichols Valley (MCNAI HEB01) site, has been identified by the MCCD as being impacted by stream bank erosion, siltation, water table alteration, brush encroachment, Garlic Mustard, Reed Canary Grass, and illegal waste dumping.

Wetlands

In the subwatershed, only 579 acres of wetland remain, compared to an estimated 2,028 acres that existed before settlement. That means that 71% of the wetlands have already been lost and can no longer provide the valuable functions described above. Therefore, it is critical that the remaining wetland resources in the subwatershed be protected and managed so that stakeholders can gain the benefits these wetlands provide.

There are four High Habitat Quality wetland complexes that lie along the main stem of Nippersink Creek in the BWSW. Many of these wetlands need either protection and / or restoration to maintain the high quality characteristics that make the wetlands so valuable to the watershed.

Specifically, ADID Wetlands N233, N385, N419, and N610 are all high quality wetlands along the Nippersink Creek stream corridor which have no form of permanent protection in place. About 25% of high quality ADID wetland N257 is protected within the Bailey Woods MCCD property.

11.3 Subwatershed-Specific Recommendations to Protect Water Resources

The following section discusses the Best Management Practices (BMP's) identified for this subwatershed that should be implemented to address existing or potential water quality impairments. The location of each recommended BMP project is presented in Figure 11.8.

Pollutant Loading Modeling, as discussed in Chapter 3, identified current and future pollutant loadings, based upon land use, soils, slopes, etc., and quantified these loadings. The results of this Pollutant Loading modeling were then used to identify the types of BMP's that should be implemented to create a loading reduction of those pollutants. Table 11.9 presents a summary of the recommended BMP projects, as well as the expected pollutant loading reductions expected if the BMP's are implemented, and function as intended.

Table 11.10 presents detailed cost and logistical information on each of the recommended BMP projects. Below is a summary list of recommendations for the subwatershed to help stakeholders and decision makers meet the Goals and Objectives set forth for Nippersink Creek. Background information regarding how each type of recommendation addresses watershed concerns and/or impairments (existing or future) can be found in Chapter 4.

Type:	Education / Outreach; Regulatory; Site Restoration; Monitoring; Permanent Habitat Protection, Water Quality
Target Goals:	Which watershed plan goals the recommendation is intended to address.
Initial Implementation Cost:	The initial cost, in 2007 dollars to initiate the recommended action, if applicable.
Initial Outreach Cost:	The initial cost, in 2007 dollars to initiate the recommended action, if applicable.
Annual Cost:	The long term expected annual cost (in 2007 dollars) to successfully implementation of the recommendation
Responsible Party:	Identifies the LEAD agency, entity, or landowner who will ultimately have to execute the recommendation. SUPPORTING parties, such as government agencies, grant sources, etc. may also be identified here.
Priority:	A ranking of the BMP recommendations, based upon the nature / urgency of the existing / potential impairment; the availability of willing landowners)/ partners; short-term vs. long-term development pressure; and whether the project is a new effort, or a retrofit of an existing practice.

The project cost estimates contained in this report should be considered preliminary, and are only presented to identify the potential magnitude of cost, from a watershed scale perspective. No site-specific investigation, analysis, or design of any recommended project, from which accurate cost information could be obtained, was completed as part of the preparation of the 2008 Nippersink Creek Watershed Plan.

If a watershed stakeholder decides to apply for grant funding assistance to implement any of the recommended projects presented in this report, they should first undertake any additional studies / research needed to determine an updated / accurate project cost. They should not solely rely on the cost estimates presented in the NCWP report as the basis for their grant request.

Note: The following acronyms for responsible parties identified in Table 11.10 are presented below:

NCWPC	Nippersink Creek Watershed Planning Committee
NRCS	Natural Resource Conservation Service
SWCD	McHenry County Soil and Water Conservation District
MCCD	McHenry County Water Conservation District
TLC	The Land Conservancy of McHenry County
IDOT	Illinois Department of Transportation
IEPA	Illinois Environmental Protection Agency
MCDOT	McHenry County Department of Transportation
MCDEF	McHenry County Defenders

Table 11.8 Bailey Woods Subwatershed Site Recommendation Map

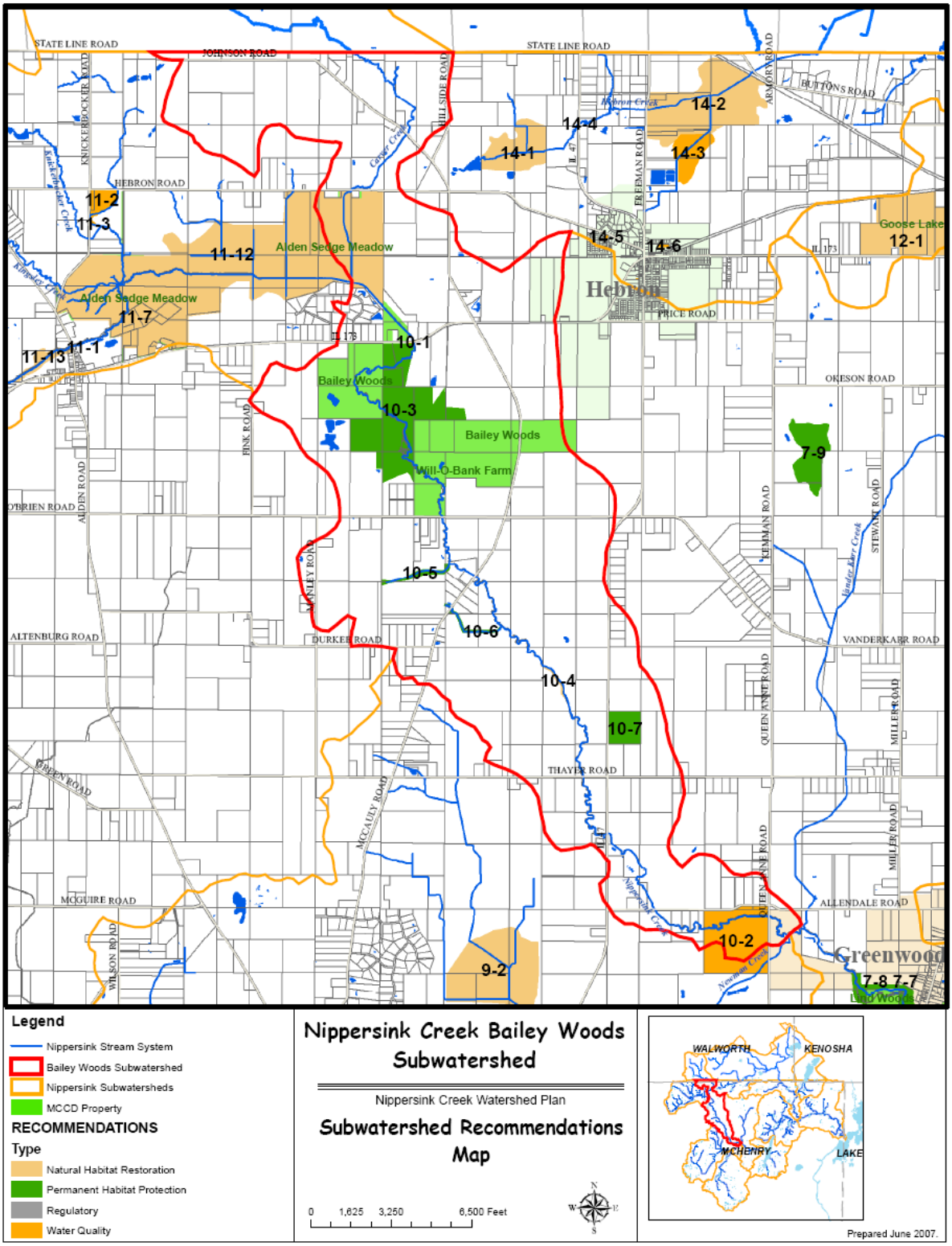


Table 11.9 BMP Selection & Associated Pollutant Load Reduction for the Bailey Woods Subwatershed

BMP	Type of BMP	Project Locations**	BMP		Removal Efficiency***			(lbs/year)****			Percentage Reduction		
			Size	Unit	TN	TP	TSS	TN	TP	TSS	TN	TP	TSS
Natural Habitat Protection	Site-specific	10-4	400	acres	30%	35%	60%	2,602	246	264	8.2	9.6	16.5
Conservation Development Practices	Site-specific	10-2, 10-3, 10-5, 10-6, 10-7	13	acres	52%	58%	64%	147	13	9	0.5	0.5	0.6
Regulatory*	Watershed-Specific	Subwatershed	1	Water-shed	5%	5%	5%	1,579	128	80	5	5	5
Nutrient Management	Watershed-specific	Subwatershed wide	728	acres	70%	28%	-	11,049	359	-	35	14	-
Stream Buffers	Site-specific	10-1, 10-4, 10-5, 10-6	48	acres	36%	95%	95%	375	80	50	1.2	3.1	3.1
Total								15,750	827	403	49.9	32.3	25.2

*Regulatory programs are assumed to have nominal pollutant reduction rates of 5%.

** Project locations and details are described in the corresponding chapter.

*** TN = total Nitrogen; TP = total Phosphate; TSS = total suspended solids or Sediment.

**** The unit of “TSS” is “Tons/year”.

Table 11.10 Recommended Projects in the Bailey Woods Subwatershed

SUB WATERSHED	RECOMMENDATION #	TARGET GOAL	DESCRIPTION	RESPONSIBLE PARTY	ACRES	UNIT COST	INITIAL IMPLEMENTATION COST	INITIAL OUTREACH COST	ANNUAL MAINTENANCE COST	PRIORITY
Bailey Woods	10-1	Water Quality	Government Outreach to install BMP's to treat roadway runoff prior to discharge into North Branch Nippersink Creek	NCWPC / MCHENRY DOT			$50,000	$1,000	$2,500	E
Bailey Woods	10-2	Water Quality	Landowner / Government Outreach to mandate Conservation Design for land development on parcel east of Queen Anne Road and south of Allendale Road	NCWPC / VILLAGE OF GREENWOOD / TLC	158.4	$500	$79,186	$1,000	$3,959	B
Bailey Woods	10-3	Permanent Habitat Protection	Landowner Outreach to secure Conservation Easements to protect privately owned sections of Bailey Woods / Nichols Valley MCNAI Site	NCWPC / TLC / MCDEF	236.9	$1,500	$355,313	$1,500	$23,688	C
Bailey Woods	10-4	Natural Habitat Restoration	Landowner Outreach to establish minimum 100 foot Stream Buffer on either side of creek	NCWPC / TLC / MCDEF	3.7	$3,000	$11,232	$500	$374	D
Bailey Woods	10-5	Permanent Habitat Protection	Landowner Outreach to establish Conservation Easement / Stream Buffer along tributary stream corridor	NCWPC / TLC / MCDEF	12.9	$3,000	$38,847	$500	$1,295	D
Bailey Woods	10-6	Permanent Habitat Protection	Landowner Outreach to establish Conservation Easement / Stream Buffer along tributary stream corridor	NCWPC / TLC / MCDEF	9.2	$3,000	$27,591	$500	$920	D
Bailey Woods	10-7	Permanent Habitat Protection	Landowner Outreach to establish Conservation Easement for Rt 47 Heronry MCNAI Site	NCWPC / TLC / MCDEF	39.3	$1,500	$59,009	$1,000	$3,934	C
				SW TOTALS	**460.5**		**$621,177**	**$6,000**	**$36,670**	

PRIORITY

- **A Projects that have cooperating partners, can move to implementation quickly. Implementation Timeframe 1 to 3 years**
- **B Projects subject to imminent development pressure, Implementation Timeframe 1 to 2 years**
- **C Projects needed to protect sensitive areas. Timeframe 1 to 2 years**
- **D Restoration projects, Timeframe 1 to 5 years**
- **E Retrofit Projects, Timeframe 1 to 5 years**
- **F Existing Pollution Potential, Timeframe 1 to 2 years**
- **G Policy / Opportunity Review Project, Timeframe 1 to 3 years**

Chapter 12
Nippersink Creek Headwaters Assessment

This section presents a summary of the characteristics of the Nippersink Creek Headwaters Subwatershed, as well as specific issues and challenges in this subwatershed that must be addressed in the Nippersink Creek Watershed Management Plan.

12.1 Subwatershed Characteristics

The following section provides an overview of the physical characteristics of the subwatershed.

12.1.1 Subwatershed Location

The Nippersink Creek Headwaters, located in the northwestern portion of the Nippersink Creek Watershed, drains an area of 6,600 acres (10.3 square miles) in size. As shown in Figure 12.1, the subwatershed is located entirely within Alden Township and is roughly bordered by O'Brien Road on the south, the Illinois-Wisconsin border to the north, and the Alden Township boundaries on both the east and west.

Figure 12.1 Nippersink Headwaters Subwatershed Location Map

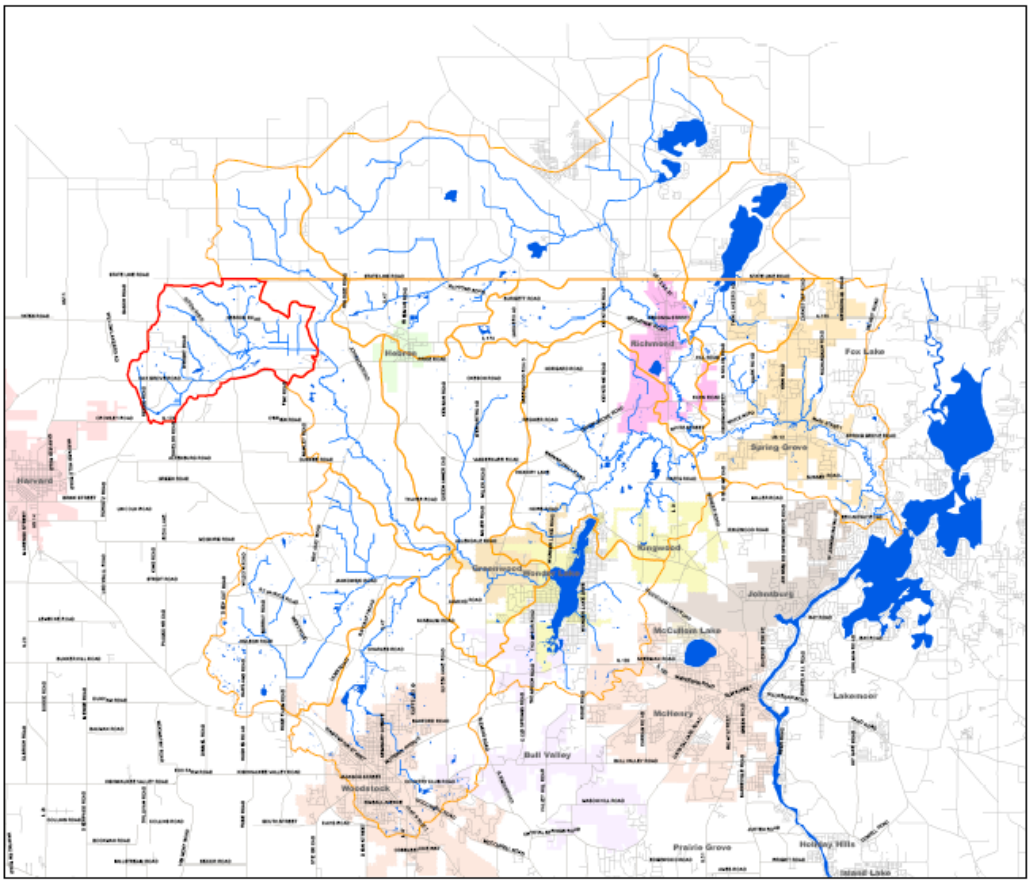
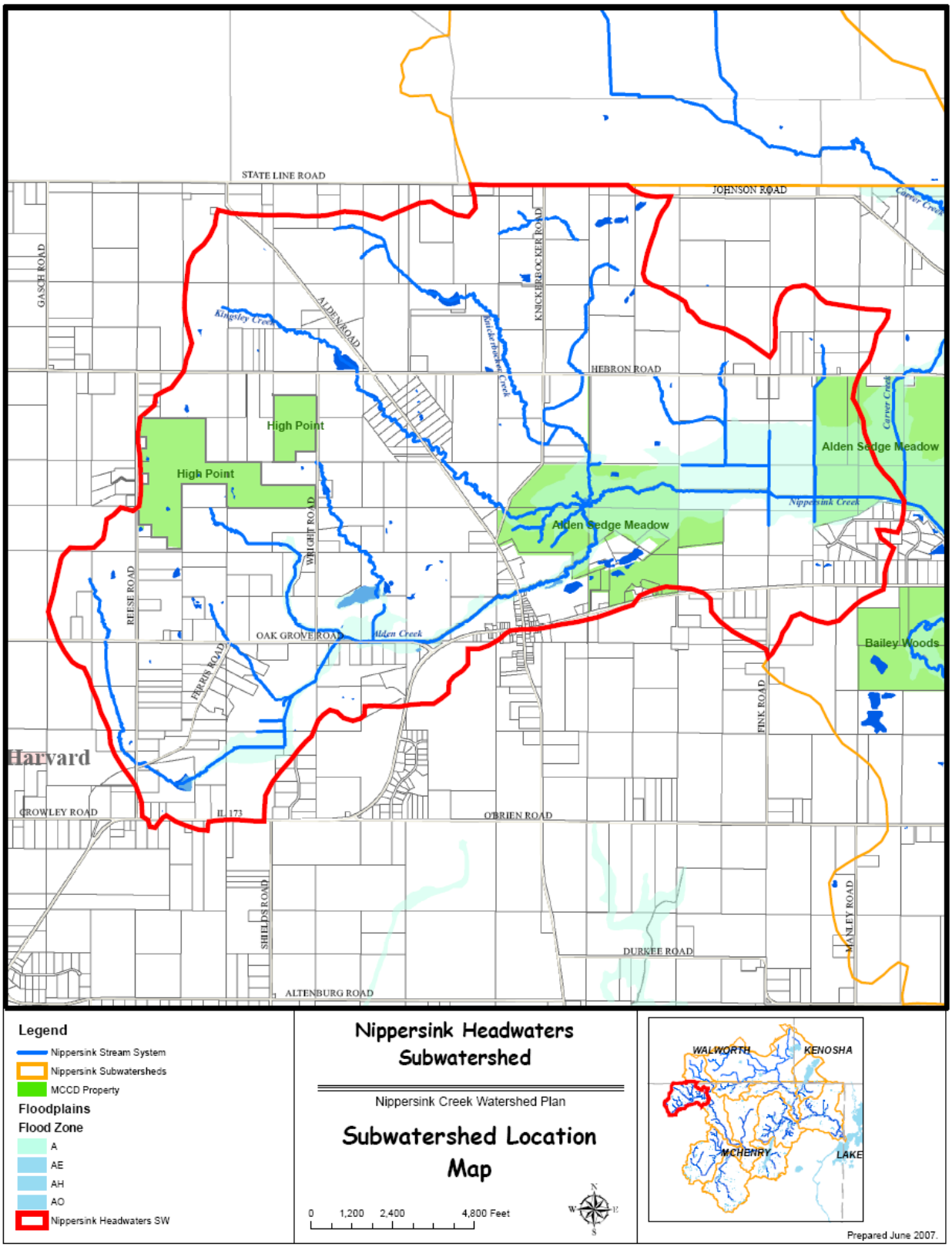


Figure 12.2 **Nippersink Creek Headwaters Subwatershed Map**



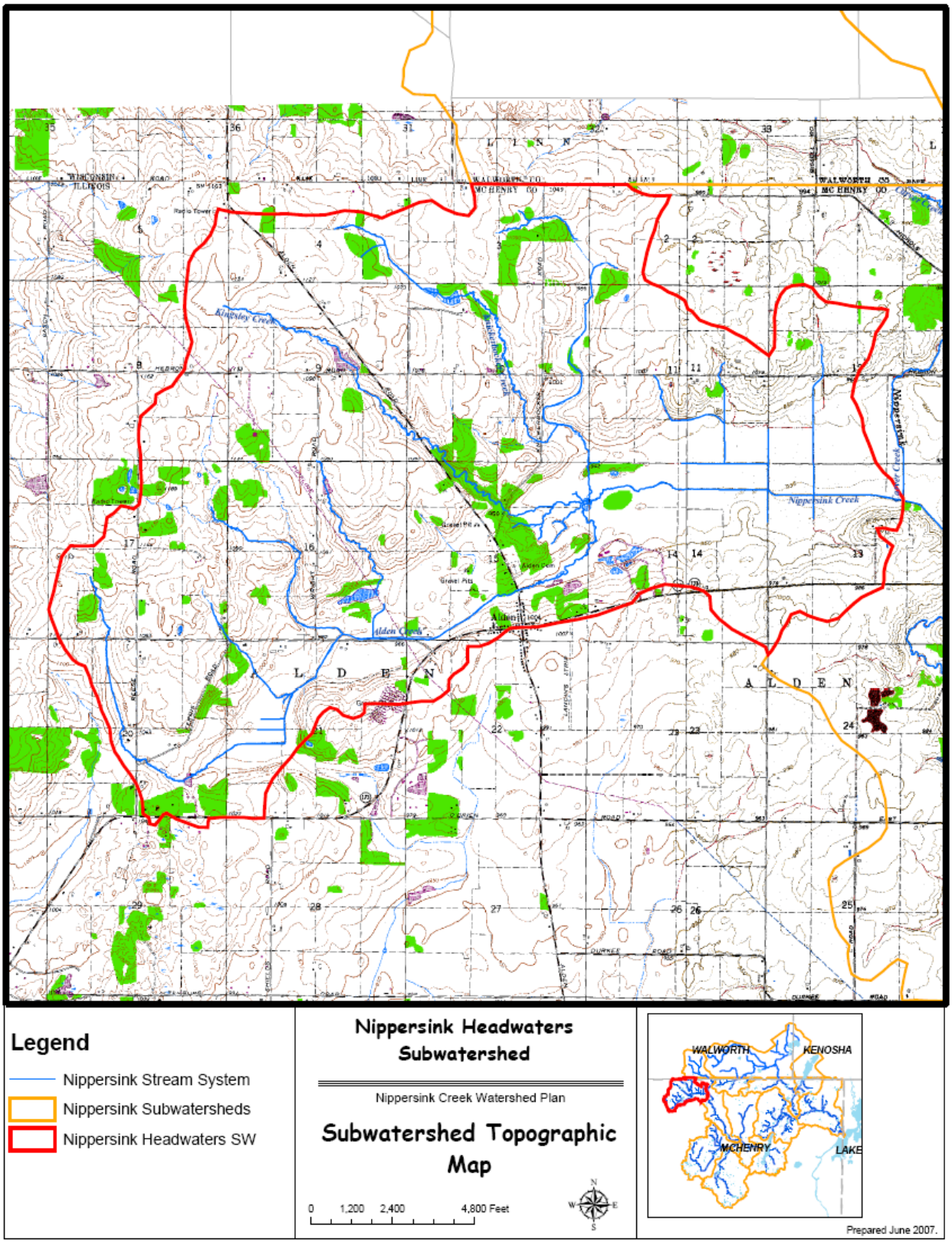
12.1.2 Topography & Geology

The West Chicago Moraine forms the watershed divide between the Fox and Rock Rivers, and also the headwaters boundary of Nippersink Creek. As a result, the highest glaciated point in Illinois (2nd highest overall) featuring an elevation of 1,189 feet, is found in this subwatershed. Native Americans named Nippersink Creek "little waters" for its many springs. Within this "High Point" area, the glacial advances also created the one of the largest concentration of ephemeral wetlands in the Midwest, which provide critical habitat for amphibians. The glacial activity also created uncommon wetlands including calcareous seeps, graminoid fens, and sedge meadows, all of which are found at the Alden Sedge Meadow, a 764 acre unit of the McHenry County Conservation District.

From the "High Point", the landscape descends 261 feet to an elevation of 928 feet at the subwatershed outlet, approximately four miles east. A number of small tributary streams combine to form the main channel of Nippersink Creek, and have relatively steep grades for northeastern Illinois, falling as much as 200 feet in less than 2 miles, or an average slope of nearly 2%. Moving downstream, there is a long, low-lying valley along Alden Creek and Nippersink Creek, which has a slope of less than 0.15%.

Alden Sedge Meadow

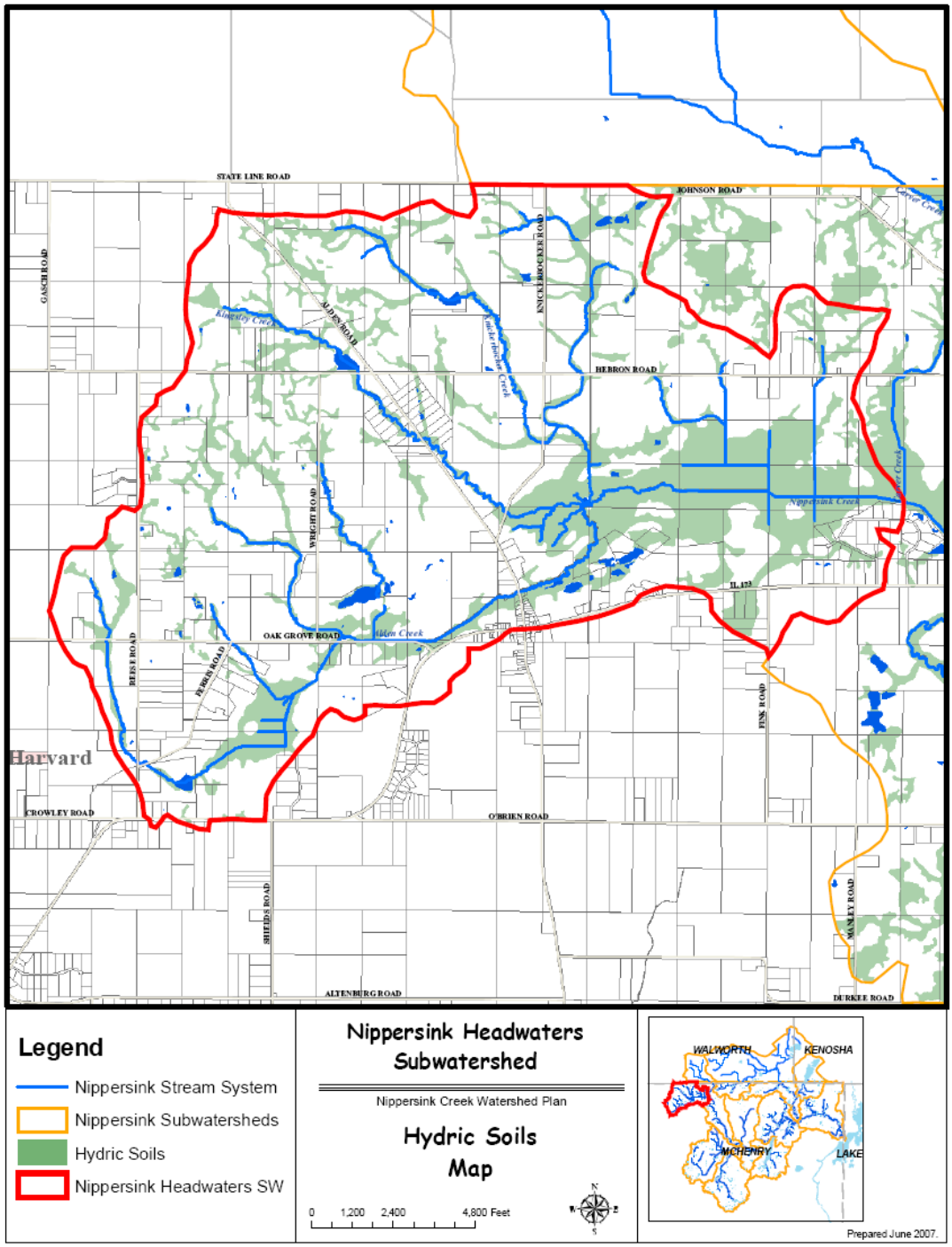
Figure 12.3 **Nippersink Creek Headwaters Topographic Map**



12.1.3 Soil Characteristics

The glacial advances across McHenry County resulted in a wide variety of soil associations. Each major grouping of soil associations has potential impacts on current and future land uses within the subwatershed. For example, hydric (wetland) soils constitute 1,680 acres, or 25.5% of the subwatershed, and indicate those areas that contain functional wetlands, or former / degraded wetland areas that could be restored or enhanced.

Figure 12.4 Hydric Soils Map for the Nippersink Creek Headwaters Subwatershed



12.1.4 Pre-Settlement Vegetation

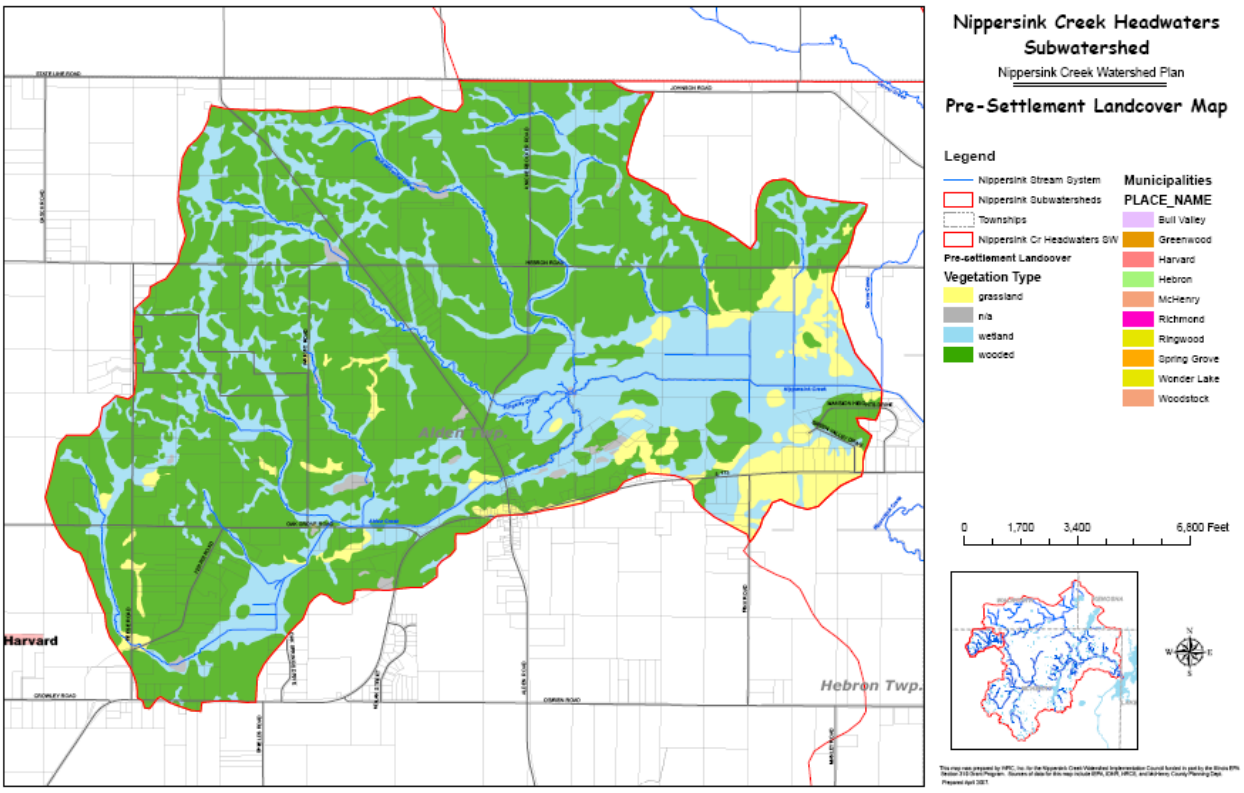
To guide future land management or restoration efforts, it is important to recognize the native plant communities that naturally evolved subsequent to the last glacial advances. Prior to European settlement in the 1830's, the Nippersink Headwaters Subwatershed was largely dominated by woodland, due to its location on the glacial moraine. As described in Table 12.1, and depicted in Figure 12.5, these woodlands, largely comprised of oak / hickory woodland and savannah, were bisected with wetlands and grassland along the drainageways.

Table 12.1 Pre-Settlement Land Cover Conditions

Cover Type	Area	Percent of Subwatershed
Grasslands	398 acres	6%
Wooded	4,291 acres	65%
Wetlands	1,857 acres	28%
n/a	51 acres	1%

Source: MCCD Soils Analysis using GIS data

Figure 12.5 Pre-settlement Vegetation for the Nippersink Creek Headwaters Subwatershed



12.1.5 Subwatershed Drainage Features

Streams

The Nippersink Headwaters Subwatershed features six small tributary streams that come together to form Nippersink Creek. Nippersink Creek has its origins between Reese and Wright Road, north of Oak Grove Road. There are four named streams that drain into Nippersink Creek at or upstream of the Alden Sedge Meadow. They are Knickerbocker Creek, Kingsley Creek, and Alden Creek. There is also one tributary to Nippersink Creek which is officially unnamed, but unofficially referred to as Johnson Creek, and it drains the area between Reese and Wright Road.

Channelization Analysis of aerial photography indicates that the subwatershed contains approximately 22.25 miles of stream channel. Of this distance, about 45% of all the stream channels in the subwatershed have been subjected to historic channelization by agricultural activities.

Manmade Drainage Systems

There are no known storm sewer systems within the subwatershed. Developed areas are drained via overland swales, roadside ditches and culverts installed along road right-of-ways. There are also no known detention basins within the subwatershed.

Agricultural Tile Systems

Due to the predominantly agricultural nature of the subwatershed, it is likely that there are extensive underground drain tile systems that were installed to increase productivity of the area's rich soil. These systems were likely installed more than fifty years ago by private property owners and therefore there is little documented information about there size and exact location, although their distribution can be general determined by inspection of a combination of aerial photographs, hydric soils and topography. Based on preliminary observations as part of this subwatershed assessment, it appears that there are several small to medium size agricultural drain tile networks that provide subsurface drainage to many farmed parcels that are adjacent to the tributary streams in the subwatershed, as well as the low lying area east of Alden Sedge Meadow.

Identifying agricultural drain tile networks is important in watershed planning because current local flooding and drainage problems can often be linked to damage or age-related failure of drain tile systems. From a watershed preservation / restoration perspective, it is important to identify functional drain tile systems to determine opportunities for their removal or reconfiguration for the purposes of restoring valuable wetland habitat, and water quality benefits. There is little doubt that many of the depressional and low lying areas in the subwatershed that are serviced by drain tiles today for agriculture were once wetland habitats that supported a very diverse ecosystem.

12.1.6 Population

Population data in watershed planning is critical because of there is a direct correlation between the number of people residing in a watershed and the degree of impacts to the quality and quantity of the watershed's natural resources. In 1990, the US Census data indicated that about 450 people lived in the subwatershed, which equated to 44 persons per square mile. According to the 2000 US Census, the population only increased to 472 people, or about 46 persons per square mile. This represents an increase of only 5%, indicating that the growth in the subwatershed has been very slow to date.

12.1.7 Land Cover

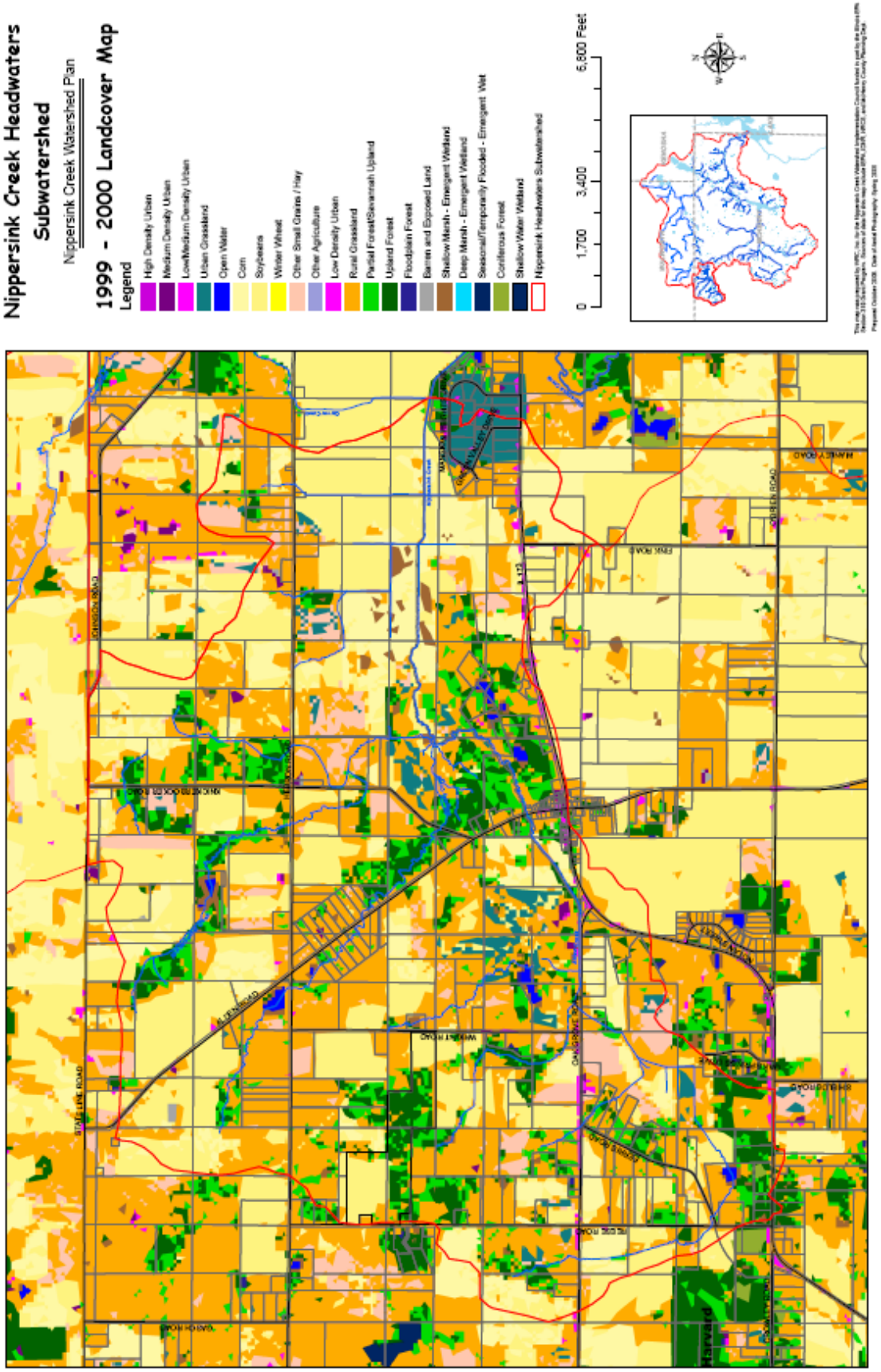
Often, the terms Land Cover and Land Use are used interchangeably. However, there are differences. Land Cover refers to the vegetation, structures, or other features that cover the land. On the other hand, Land Use (as discussed in Section 12.1.8) refers to how land is used by humans.

Land Cover data for the Nippersink Headwaters Subwatershed is available from the Illinois Department of Natural Resources using LANDSAT data collected in 1999. The dominant land cover, according to this data, was row crop agriculture, which accounted for roughly 42% of the subwatershed area. Rural grasslands accounted for another 38%, while wooded areas and wetlands account for an additional 16% of the subwatershed. These three land cover categories account for 96% of the subwatershed, with the remaining 4% comprised of urban land cover.

Table 12.2 1999 Land Cover for the Nippersink Headwaters Subwatershed

Land Cover Description	Total Acres	Percent of Subwatershed
Barren & Exposed Land	4.5	0.1%
Corn, Soybeans, Other Small Grains & Hay	2,735.0	41.5%
Rural Grassland	2,504.3	38.0%
Low Density Urban	45.5	0.7%
Medium Density Urban	18.6	0.3%
Urban Grassland	184.8	2.8%
Shallow Marsh – Emergent Wetland	70.7	1.1%
Partial Forest / Savannah Upland	453.8	6.9%
Upland Forest	543.2	8.2%
Floodplain Forest	3.6	0.1%
Coniferous Forest	2.3	0.0%
Open Water	24.7	0.4%
TOTAL	**6,591**	**100.0%**

Figure 12.6 1999-2000 Land Cover Map for the Nippersink Headwaters Subwatershed



12.1.8 Land Use / Existing Watershed Development

According to the 2005 McHenry County Land Use / Zoning map, 79% of the subwatershed is zoned for agricultural use, while about 12% is either already developed or zoned for development in the future. Almost 9% is classified as open space.

Table 12.3 McHenry County 2005 Land Use in the Nippersink Headwaters Subwatershed

Land Use	Total Acres	Percent of Subwatershed
Vacant	18.5	0.3%
Vacant; Zoned Residential	145.1	2.2%
Vacant; Zoned Commercial	1.7	0.0%
Vacant; Zoned Office	0	0.0%
Vacant; Zoned Industrial	0	0.0%
Agricultural	5,204.5	78.9%
Single Family Residential	386.9	5.9%
Multi-Family Residential	0	0.0%
Commercial	10.2	0.2%
Office	0	0.0%
Industrial	0	0.0%
Mixed Use	0	0.0%
Mining	0	0.0%
Open Space	570.0	8.6%
Institutional	86.7	1.3%
Right of Way	173	2.6%
TOTAL	**6,596.6**	**100.0%**

Source: 2005 McHenry County Land Use Zoning Data

There is a small unincorporated town in the center of the subwatershed called Alden, which, in land planning terms, is considered a rural crossroads hamlet. In actuality, it consists of roughly 45 homes, a gas station, a church, and a re-sale shop.

The principal development in the subwatershed has been rural or estate residential. Development to date is governed by McHenry County. In 1995, Alden Township formed a Plan Commission, which has created a land use plan that calls for the preservation of agricultural areas, and the protection and enhancement of existing natural areas within the Township. Through objections filed by Alden Township, a proposed five lot subdivision that would have been bisected by Knickerbocker Creek, was voted down by the McHenry County Board, and withstood a lawsuit by the developer. Plan Commission actions have also resulted in the creation of two conservation easements within the Township

Roads are maintained by the Alden Township Highway Department, McHenry County, and the State of Illinois.

Until recently, Alden Township was the only Township in McHenry County that did not have an incorporated municipality within its borders. The City of Harvard has recently annexed land within Alden Township (within the Lawrence Creek subwatershed of the Kishwaukee River), and approved two high density residential subdivisions on steeply sloped woodland and cropland. Based upon these recent annexations, the City of Harvard is within one parcel of entering the Nippersink Watershed.

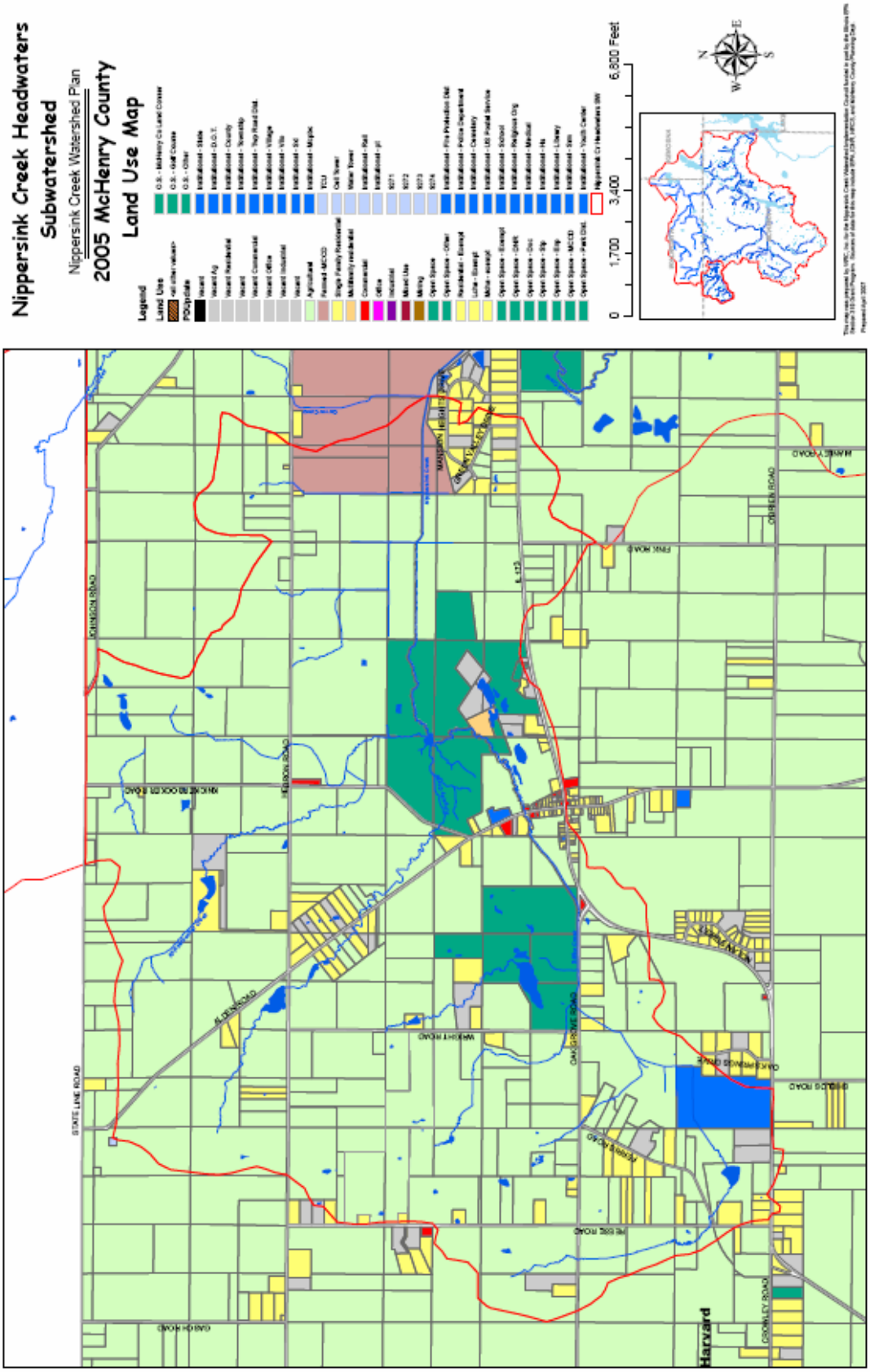
Table 12.4 Municipal Areas in the Lower Nippersink Creek Subwatershed

Municipality	Area (acres)	Percent of Subwatershed
Unincorporated McHenry County	6,600.0	100.0%

There are no documented point source discharges within the subwatershed. However, one potential water quality issue may exist at a sawmill located along Knickerbocker Creek. This sawmill, which makes pallets, stockpiles large volumes of wood chips and mulch in areas directly adjacent to the Creek. Concern about the quality of the water leaving the site, and flowing down to the Alden Sedge Meadow, has been expressed over the years. Ironically, a major fire at the site in February 2007 destroyed the sawmill. If the sawmill is rebuilt, opportunities may exist to have water quality Best Management Practices (BMP's) incorporated into the site redevelopment.

Another potential water quality issue involves plans by the McHenry County Division of Transportation (MCDOT) to extensively re-build Alden Road over its entire length. This project would include the removal of the existing pavement and installation of a new roadway sub-grade, pavement, and drainage improvements. As part of this project, the installation of left-turn lanes and other improvements may result in the increase in amount of paved surfaces, and in turn, a higher volume of stormwater runoff, and associated pollutants. Particular concern exists about the proposed replacement of the Alden Road Bridge at Nippersink Creek proposed to be undertaken in 2009. MCDOT preliminary engineering plans call for an expansion of roadway surface, and improvements to the existing drainage system leading to the creek. However, no provisions for providing stormwater detention capacity or water quality "Best Management Practices" were included in the preliminary plans.

Figure 12.7 2005 McHenry County Land Use Map for the Nippersink Headwaters Subwatershed



12.1.9 Natural Resources

McHenry County Conservation District Property

The McHenry County Conservation District (MCCD) currently owns 1,059 acres of land within the subwatershed, representing nearly 16 percent of the subwatershed.

Table 12.5 MCCD Properties in the Nippersink Headwaters Subwatershed

Name	Area (acres)
Alden Sedge Meadow (west)	410
Alden Sedge Meadow (east)	354
High Point	188
High Point – North	55
High Point - Southwest	52
Total	**1,059**

MCCD has expressed a desire to increase land holdings in areas adjacent to the Alden Sedge Meadow, with the hopes of creation a "Macrosite" similar to their Glacial Park unit, downstream of Wonder Lake. The recent High Point site acquisition also represented a unique situation for MCCD in that adjacent private landowners agreed to place conservation easements on adjacent environmentally sensitive portions of their property, increasing the amount of open space protected.

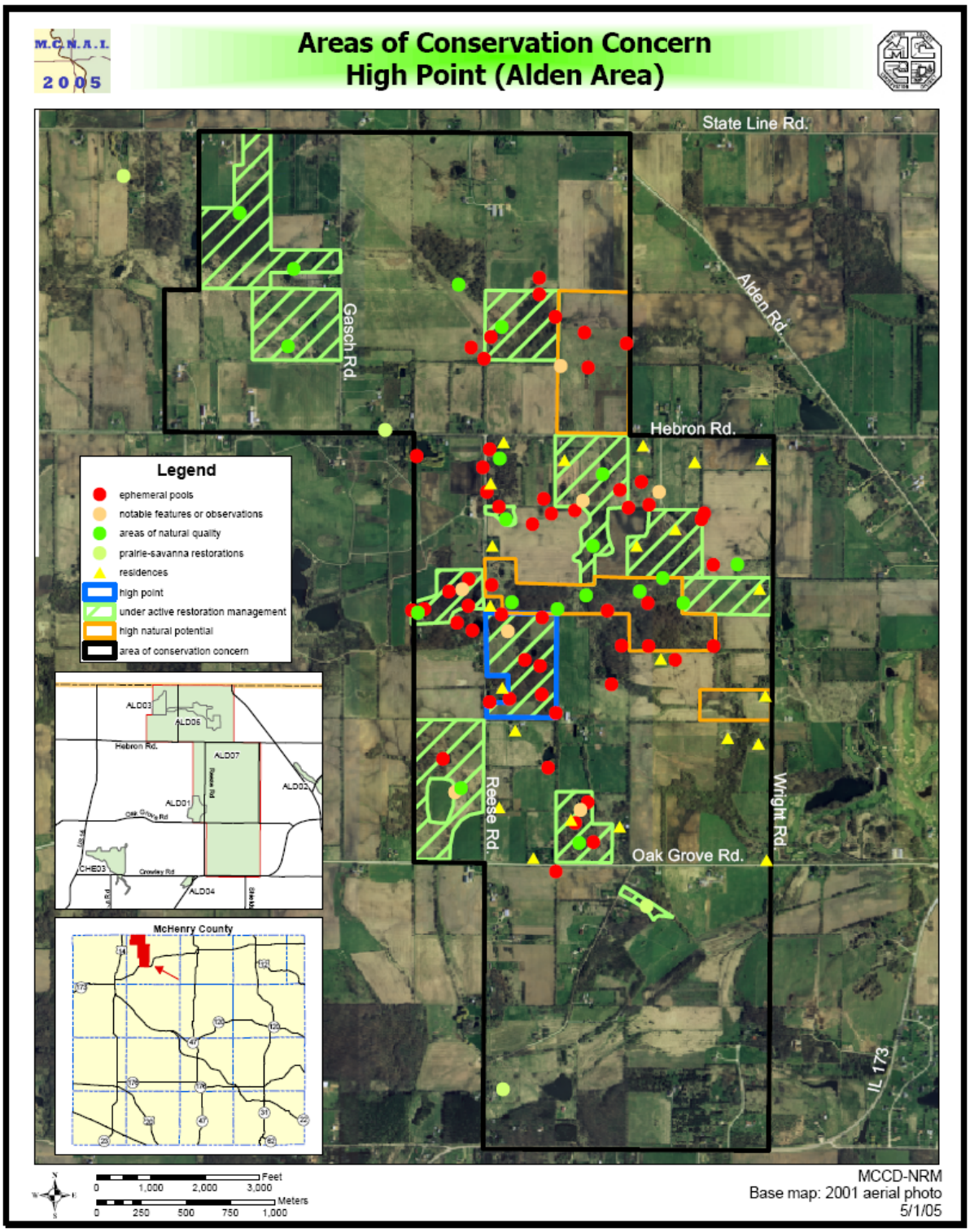
McHenry County Natural Areas Inventory

There are four McHenry County Natural Area Inventory (MCNAI) Sites within the subwatershed, totaling 2,211 acres, representing nearly one-third of the entire subwatershed. Proportionally, this is by far the largest concentration of MCNAI sites of any Nippersink Creek subwatershed, and is due to the presence of the High Point Area of Conservation Concern (ACC), one of only two locations in McHenry County that include a geographic region as an MCNAI site, rather than specific parcels. The High Point Area of Conservation Concern is shown on Figure 12.8.

Table 12.6 McHenry County Natural Areas Inventory Sites in the Nippersink Headwaters Subwatershed

Name	Area (acres)
High Point Area of Conservation Concern	1,673
Alden Sedge Meadow	441
Alden Fen	65
Bailey Woods / Nichols Valley	32
Total	**2,211**

Figure 12.8 McHenry County Natural Areas Inventory Map – Alden High Point ACC



McHenry County Wetlands

McHenry County completed an Advanced Identification (ADID) Wetland Study in 1998. This study identified a total of 795.4 acres of wetlands, or 12 % of the subwatershed. Of these wetlands, 521.2 acres (65%) were determined to be of High Quality or High Functional Value, rating an ADID classification.

Table 12.7 Mapped Wetlands in the Nippersink Headwaters Subwatershed

ADID Code	Wetland Type	# of Wetlands	Total Area
FW	Farmed Wetlands	5	90.9
HFVW	High Functional Value Wetlands	7	205.3
HQL	High Quality Lakes	0	0
HQW	High Quality Wetlands	1	315.9
L	Lakes	0	0
W	Other Wetlands (lower quality)	52	183.3
	TOTAL	**65**	**795.4**

Threatened & Endangered Species

Threatened and Endangered (T&E) species data were extracted from T&E data records documented in the McHenry County Natural Areas Inventory (MCNAI) Database. The data were collected by the McHenry County Conservation District during field studies undertaken at subwatershed Natural Area Inventory Sites. The data indicates that there are at least seven threatened or endangered species present in the subwatershed.

Table 12.8 Threatened and Endangered Species in the Nippersink Headwaters Subwatershed

Common Name	Scientific Name	Type	Status	MCNAI Site
American Bittern	Botaurus lentiginosus	Bird	St Endangered	ALD02
Sandhill Crane	Grus Canadensis	Bird	St Threatened	ALD02
Slippershell Mussel	Alasmidonta viridis	Mussel	St Threatened	ALD02
Blanding's Turtle	Emydoidea blandingii	Reptile	St Threatened	ALD02
Grass Pink	Calopogon tuberosus	Plant	St Endangered	ALD02
Pitcher Plant	Sarracenia purpurea	Plant	St Endangered	ALD02
Common Bog Arrow Grass	Triglochin maritime	Plant	St Threatened	ALD02

Existing Greenways

While there are no formal greenways established in the subwatershed, a former railroad alignment (now abandoned) formerly crossed the subwatershed. This rail line passed through Richmond, Hebron, Alden, Harvard, and continued on towards Boone County. Efforts are underway to try and re-establish a bicycle trail between Hebron and Harvard which would allow connections to existing trails within those communities. This is one of the final missing trail links in creating the "Grand Illinois Trail".

There are several greenway "segments" of substantial length located along the streams upstream of Alden Sedge Meadow. A number of water resource enhancement projects have been funded and implemented through the Habitat Restoration Program (HRP) administered by the McHenry County Soil & Water Conservation District. These projects have included wetland, woodland, and stream corridor rehabilitation projects, a number of which have resulted in the creation of conservation easements on Nippersink Headwaters stream segments.

The Land Conservancy of McHenry County has also received a Conservation 2000 grant from the Illinois Department of Natural Resources to develop a land management plan for private lands within the MCNAI High Point Area of Special Conservation Concern.

12.2 Watershed Analysis and Problem Identification

12.2.1 Water Quality Data

The Illinois Environmental Protection Agency (IEPA) is tasked with assessing the quality of the surface water resources of Illinois. The IEPA has determined Nippersink Creek's designated uses are:

- Aquatic Life
- Fish Consumption
- Primary Contact
- Secondary Contact
- Aesthetic Quality

Below Wonder Lake, Nippersink Creek is identified as being in Full Support of its Aquatic Life and Fish Consumption Designated Uses, which is notable for a stream in northeastern Illinois. Upstream of Wonder Lake (including this subwatershed), Nippersink Creek is identified as being in Full Support of its Fish Consumption Designated Use, however, the Aquatic Life Designated Use was not assessed.

This information, obtained from the 2006 IEPA 303(d) list, also identifies waterways that are not achieving certain designated uses.

Nippersink Creek, upstream of Wonder Lake, as well as the segment of the Creek that flows through Wonder Lake, was not listed as impaired. However, the reach of Nippersink Creek downstream of Wonder Lake, extending all the way downstream to its confluence with the Fox River, is listed as "impaired" due to fecal coliform entering the stream water from an as yet unidentified source.

Although the IEPA has been monitoring the water quality throughout the Nippersink Creek Watershed for more than 20 years, there are no known IEPA water quality sampling stations located within the Nippersink Creek Headwaters. With little water quality information available for streams in this subwatershed, there is no documentation of quantifiable water quality problems.

12.2.2 Flooding Problems

There are no known flooding problems in the subwatershed.

12.2.3 Projected Development & Growth

The projected growth in the subwatershed is expected to remain relatively slow, with the predominant land use change being the conversion of larger agricultural parcels into smaller, subdivided rural residential estates (> 5 acres). Rapid development may occur in the subwatershed if the City of Harvard continues to annex parcels along the west boundary of the Nippersink Watershed. While the County has a Watershed Development Ordinance that effectively regulates and minimizes large stormwater flows that could cause flooding, there are several deficiencies with regards to water quality and protection/restoration of farmed wetlands.

12.2.4 Natural Area Protection / Preservation Issues

McHenry Natural Area Inventory Sites

Alden Sedge Meadow (MCNAI ALD02) is threatened by water table alteration, brush encroachment, and invasive species (Common Reed Grass, Purple Loosestrife, Reed Canary Grass).

Alden Fen (MCNAI ALD01) is threatened by bank erosion, water table alteration, brush encroachment, and agricultural runoff. This MCNAI site is also not protected, in that it is not owned by MCCD, and has no conservation easement.

ADID Wetland Sites

ADID Wetland N190 consists of a wetland stream corridor through golf course up to Wright Road. The ADID study lists this wetland as "very disturbed, managed for game hunting" and "surrounding golf course construction". However, when this golf course was constructed, the owners enrolled the course in an Audubon certification program that works to minimize environmental impacts.

12.3 Subwatershed-specific Recommendations to Protect Watershed Resources

The following section discusses the Best Management Practices (BMP's) identified for this subwatershed that should be implemented to address existing or potential water quality impairments. The location of each recommended BMP project is presented in Figure 12.9.

Pollutant Loading Modeling, as discussed in Chapter 3, identified current and future pollutant loadings, based upon land use, soils, slopes, etc., and quantified these loadings. The results of this Pollutant Loading modeling were then used to identify the types of BMP's that should be implemented to create a loading reduction of those pollutants. Table 12.11 presents a summary of the recommended BMP projects, as well as the expected pollutant loading reductions expected if the BMP's are implemented, and function as intended.

Table 12.12 presents detailed cost and logistical information on each of the recommended BMP projects. Below is a summary list of recommendations for the subwatershed to help stakeholders and decision makers meet the Goals and Objectives set forth for Nippersink Creek. Background information regarding how each type of recommendation addresses watershed concerns and/or impairments (existing or future) can be found in Chapter 4.

Type:	Education / Outreach; Regulatory; Site Restoration; Monitoring; Permanent Habitat Protection, Water Quality
Target Goals:	Which watershed plan goals the recommendation is intended to address.
Initial Implementation Cost:	The initial cost, in 2007 dollars to initiate the recommended action, if applicable.
Initial Outreach Cost:	The initial cost, in 2007 dollars to initiate the recommended action, if applicable.
Annual Cost:	The long term expected annual cost (in 2007 dollars) to successfully implementation of the recommendation
Responsible Party:	Identifies the LEAD agency, entity, or landowner who will ultimately have to execute the recommendation. SUPPORTING parties, such as government agencies, grant sources, etc. may also be identified here.
Priority:	A ranking of the BMP recommendations, based upon the nature / urgency of the existing / potential impairment; the availability of willing landowners)/ partners; short-term vs. long-term development pressure; and whether the project is a new effort, or a retrofit of an existing practice.

The project cost estimates contained in this report should be considered preliminary, and are only presented to identify the potential magnitude of cost, from a watershed scale perspective. No site-specific investigation, analysis, or design of any recommended project, from which accurate cost information could be obtained, was completed as part of the preparation of the 2008 Nippersink Creek Watershed Plan.

If a watershed stakeholder decides to apply for grant funding assistance to implement any of the recommended projects presented in this report, they should first undertake any additional studies / research needed to determine an updated / accurate project cost. They should not solely rely on the cost estimates presented in the NCWP report as the basis for their grant request.

Note: The following acronyms for responsible parties identified in Table 12.10 are presented below:

NCWPC	Nippersink Creek Watershed Planning Committee
NRCS	Natural Resource Conservation Service
SWCD	McHenry County Soil and Water Conservation District
MCCD	McHenry County Water Conservation District
TLC	The Land Conservancy of McHenry County
IDOT	Illinois Department of Transportation
IEPA	Illinois Environmental Protection Agency
MCDOT	McHenry County Department of Transportation
MCDEF	McHenry County Defenders

Figure 12.9 Nippersink Headwaters Subwatershed Site Recommendation Map

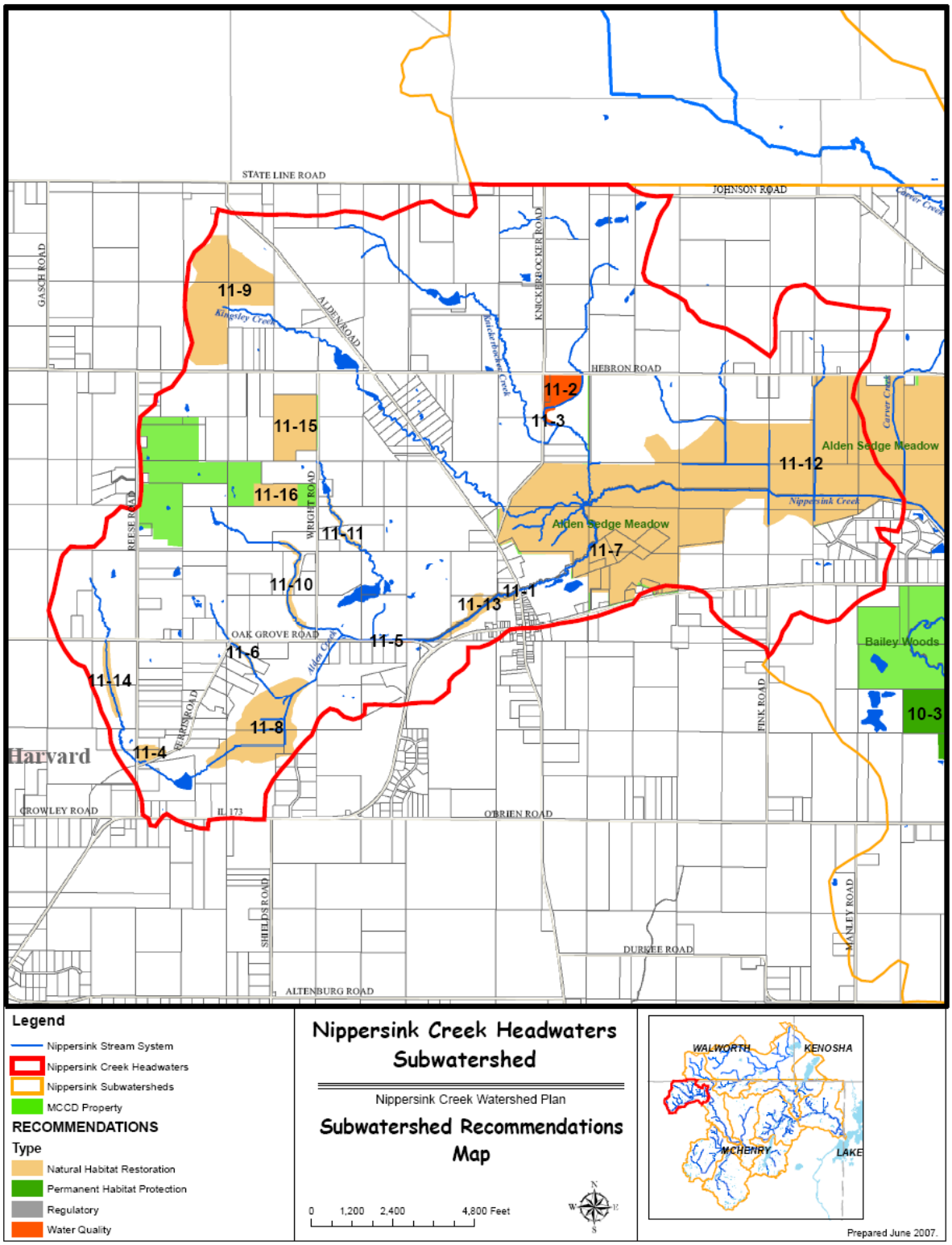


Table 12.9 BMP Selection & Associated Pollutant Load Reduction for the Nippersink Headwaters Subwatershed

BMP	Type of BMP	Project Locations**	BMP		Removal Efficiency***			(lbs/year) ****			Percentage Reduction		
			Size	Unit	TN	TP	TSS	TN	TP	TSS	TN	TP	TSS
Natural Habitat Protection	Site-specific	11-4, 11-6, 11-8 to 11-16	64	acres	30%	35%	60%	402	25	27	1.5	1.7	2.9
Stormwater BMPs	Site-specific	11-1, 11-2, 11-5, 11-7	1	lump sum	36%	95%	95%	149	21	13	0.5	1.4	1.4
Regulatory*	Watershed-Specific	Subwatershed	1	Water-shed	5%	5%	5%	1,381	75	46	5	5	5
Nutrient Management	Watershed-specific	Subwatershed wide	659	acres	70%	28%	-	9,662	209	-	35	14	-
Stream Buffers	Site-specific	11-2, 11-3, 11-4, 11-5	10	acres	36%	95%	95%	75	11	7	0.3	0.7	0.7
Stream Corridor Restoration	Site-specific	11-2, 11-6, 11-10, 11-11, 11-13, 11-14, 11-15	256	acres	53%	51%	88%	2,842	148	156	10.3	9.9	17.1
Wetland Restoration	Site-specific	11-8, 11-9, 11-12, 11-13, 11-15	87	acres	53%	51%	88%	966	50	53	3.5	3.4	5.8
Total								15,477	540	302	56	36.1	32.9

*Regulatory programs are assumed to have nominal pollutant reduction rates of 5%.

** Project locations and details are described in the corresponding chapter.

*** TN = total Nitrogen; TP = total Phosphate; TSS = total suspended solids or Sediment.

**** The unit of “TSS” is “Tons/year”.

Table 12.10 Recommended Projects in the Nippersink Headwaters Subwatershed

SUB WATERSHED	RECOMMENDATION #	TARGET GOAL	DESCRIPTION	RESPONSIBLE PARTY	ACRES	UNIT COST	INITIAL IMPLEMENTATION COST	INITIAL OUTREACH COST	ANNUAL MAINTENANCE COST	PRIORITY
Nippersink Headwaters	11-1	Water Quality	Government Outreach to install BMP's to treat roadway runoff at Alden Road prior to discharge into Alden Creek	NCWPC / MCHENRY DOT			$25,000	$1,000	$1,250	E
Nippersink Headwaters	11-2	Water Quality	Landowner Outreach landowner to develop a Stormwater BMP plan to minimize discharge of mulch pile leachate to Knickerbocker Creek or the shallow groundwater aquifer; establish Stream Buffer along stream corridor	NCWPC / ALDEN TOWNSHIP / NORThWEST WOOD PRODUCTS	19.6	$1,500	$29,361	$1,000	$1,468	E
Nippersink Headwaters	11-3	Water Quality	Landowner / Government Outreach to relocate Kickerbocker Creek at Knickerbocker Road to the west to reduce bank erosion and maximize buffer between road and stream channel	NCWPC / ALDEN TOWNSHIP	2.5	$7,500	$18,570	$500	$929	E
Nippersink Headwaters	11-4	Natural Habitat Restoration	Landowner Outreach landowner to enhance stream corridor at NE corner of Ferris Road and Reese Road and recreate drained wetland	NCWPC / TLC / MCDEF	7.4	$5,000	$36,960	$500	$739	D
Nippersink Headwaters	11-5	Water Quality	Government Outreach to install Stormwater BMP / Buffer Strip along Oak Grove Road at Alden Creek to treat roadway runoff prior to discharge to Alden Creek	NCWPC / MCHENRY DOT	2.6	$12,500	$32,913	$1,000	$1,646	E
Nippersink Headwaters	11-6	Natural Habitat Restoration	Landowner Outreach to private landowners to stabilize steep gradient stream and restore degraded stream corridor	NCWPC / TLC / MCDEF	3.2	$5,000	$16,145	$500	$323	D
Nippersink Headwaters	11-7	Water Quality	Landowner Outreach to Shagbark Condo Association to determine feasibility of alternative water softener treatement to minimze chloride loading to adjacent Alden Sedge Meadow	NCWPC / SHAGBARK HOA			$20,000	$500		F

Table 12.10 Recommended Projects in the Nippersink Headwaters Subwatershed

SUB WATERSHED	RECOMMENDATION #	TARGET GOAL	DESCRIPTION	RESPONSIBLE PARTY	ACRES	UNIT COST	INITIAL IMPLEMENTATION COST	INITIAL OUTREACH COST	ANNUAL MAINTENANCE COST	PRIORITY
Nippersink Headwaters	11-8	Natural Habitat Restoration	Landowner Outreach to determine potential for 90+ acre wetland restoration on Alden Creek 1/4 mile south of Oak Grove Road in Nippersink Bottoms area	NCWPC / TLC / MCDEF	92.3	$2,000	$184,504	$1,000	$9,225	D
Nippersink Headwaters	11-9	Natural Habitat Restoration	Landowner Outreach to determine feasibility of removing agricultural drain tiles and restoring prairie & wetland landscapes wherever possible	NCWPC / NRCS / SWCD	131.1	$2,000	$262,126	$1,500	$13,106	D
Nippersink Headwaters	11-10	Natural Habitat Restoration	Landowner Outreach to private landowners to stabilize steep gradient stream and restore degraded stream corridor along Johnson Creek upstream of Wright Road	NCWPC / TLC / MCDEF	12.6	$5,000	$63,230	$500	$1,265	D
Nippersink Headwaters	11-11	Natural Habitat Restoration	Landowner Outreach private landowners to stabilize steep gradient stream and restore degraded stream corridor along Alden Creek tributary east of Wright Road; discourage livestock access directly into the creek.	NCWPC / TLC / NRCS	6.6	$5,000	$32,755	$500	$655	D
Nippersink Headwaters	11-12	Natural Habitat Restoration	**MCCD Alden Sedge Meadow** Develop and implement restoration plan (MCNAI ALD); 800 acres tile removal; 3.2 miles stream dechannelization; 700 acres wetland restoration; marsh/sedge meadow/wet prairie and prairie restoration	MCCD	1,015.1	$1,000	$1,015,109			A
Nippersink Headwaters	11-13	Natural Habitat Restoration	Landowner Outreach to investigate potential for re-meandering Alden Creek upstream of Alden Road; potential for 20+ acres of wetland recreation along stream corridor	NCWPC / TLC / MCDEF	19.7	$5,000	$98,670	$1,000	$1,973	D

Table 12.10 Recommended Projects in the Nippersink Headwaters Subwatershed

SUB WATERSHED	RECOMMENDATION #	TARGET GOAL	DESCRIPTION	RESPONSIBLE PARTY	ACRES	UNIT COST	INITIAL IMPLEMENTATION COST	INITIAL OUTREACH COST	ANNUAL MAINTENANCE COST	PRIORITY
Nippersink Headwaters	11-14	Natural Habitat Restoration	Landowner Outreach private landowners to stabilize steep gradient stream and restore degraded stream corridor along Alden Creek south of Oak Grove Road west of Reese Road	NCWPC / TLC / MCDEF	12.8	$5,000	$64,125	$500	$1,283	D
Nippersink Headwaters	11-15	Natural Habitat Restoration	**MCCD High Point North** remove ag field tiles, stabilize stream channel, 55 acres of re-forestation, savanna and wet swale recreation	MCCD	53.8	$2,500	$134,485			A
Nippersink Headwaters	11-16	Natural Habitat Restoration	**MCCD High Point South** parcel; restore 15 acres of forest / savanna habitat	MCCD	19.5	$4,000	$77,864			A
				SW TOTALS	**1,398.7**		**$2,111,817**	**$10,000**	**$33,861**	

PRIORITY

- **A** Projects that have cooperating partners, can move to implementation quickly. Implementation Timeframe 1 to 3 years
- **B** Projects subject to imminent development pressure, Implementation Timeframe 1 to 2 years
- **C** Projects needed to protect sensitive areas. Timeframe 1 to 2 years
- **D** Restoration projects, Timeframe 1 to 5 years
- **E** Retrofit Projects, Timeframe 1 to 5 years
- **F** Existing Pollution Potential, Timeframe 1 to 2 years
- **G** Policy / Opportunity Review Project, Timeframe 1 to 3 years

Chapter 13
North Branch Nippersink Creek Subwatershed Assessment

This section presents a summary of the characteristics of the North Branch Nippersink Creek Subwatershed, as well as specific issues and challenges in this subwatershed that must be addressed in the Nippersink Creek Watershed Management Plan.

13.1 Subwatershed Characteristics

The following section provides an overview of the physical characteristics of the subwatershed.

13.1.1 Subwatershed Location

The North Branch Nippersink Creek subwatershed is the subwatershed located at the north end of the watershed. This subwatershed has an area of 6,757 acres, or 10.56 square miles (5.2% of watershed). The boundary of the subwatershed is shown in Figure 13.1. The subwatershed is located within northwest Richmond Township and extends into the far northeast corner of Hebron Township. The subwatershed is specifically "divided" at the Illinois-Wisconsin border; north of the state line there is an additional 24,500 acres draining to the North Branch Nippersink Creek. This subwatershed and the two other smaller subwatersheds north of the state line are covered in brief summaries in Chapter 16 of this plan.

Figure 13.1

North Branch Nippersink Creek Subwatershed Location Map

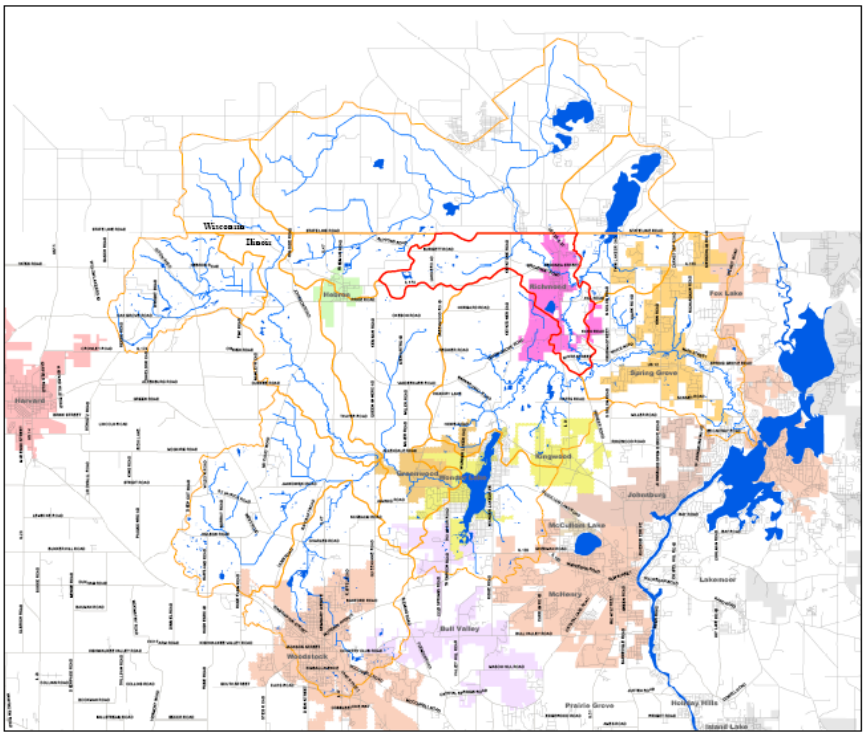
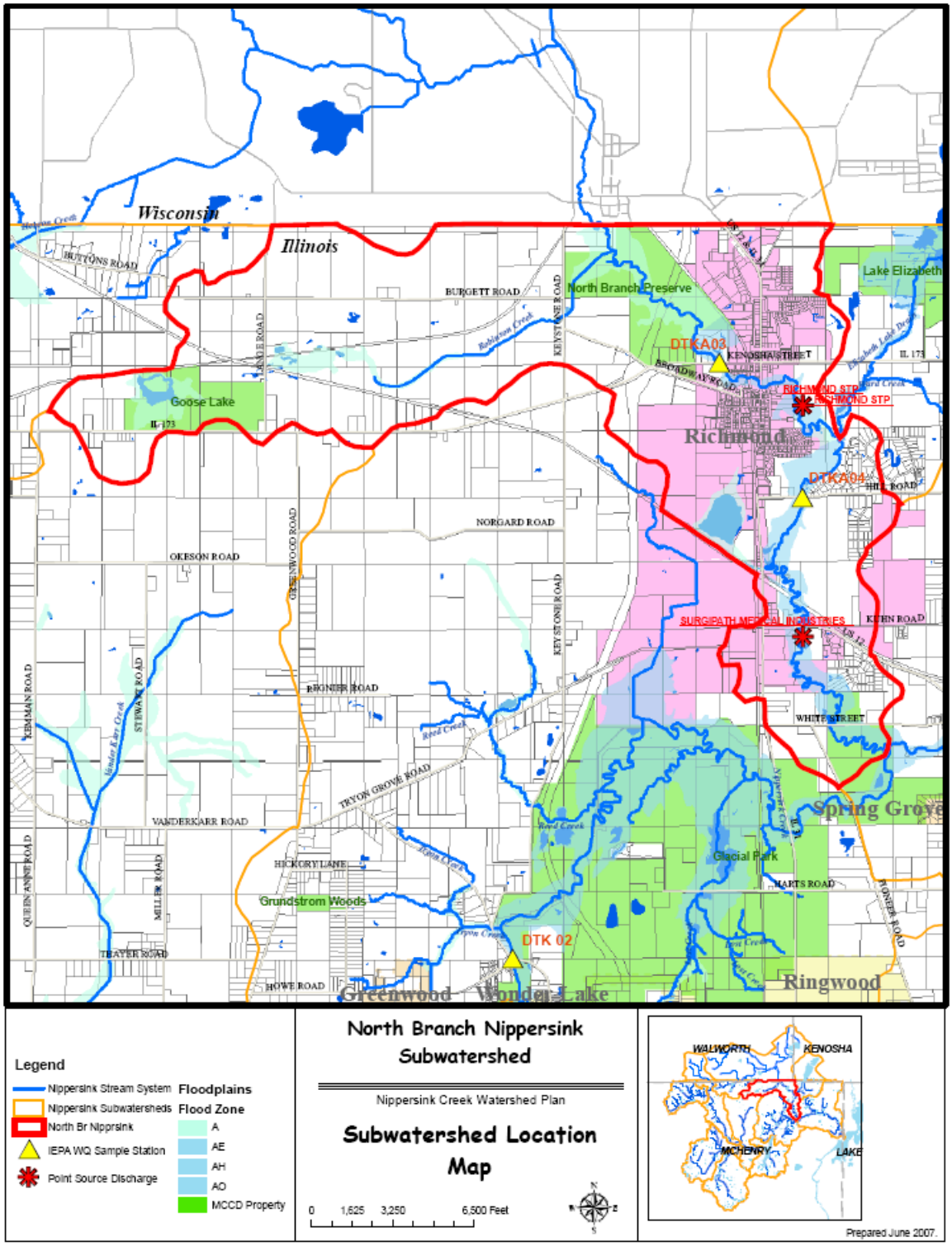


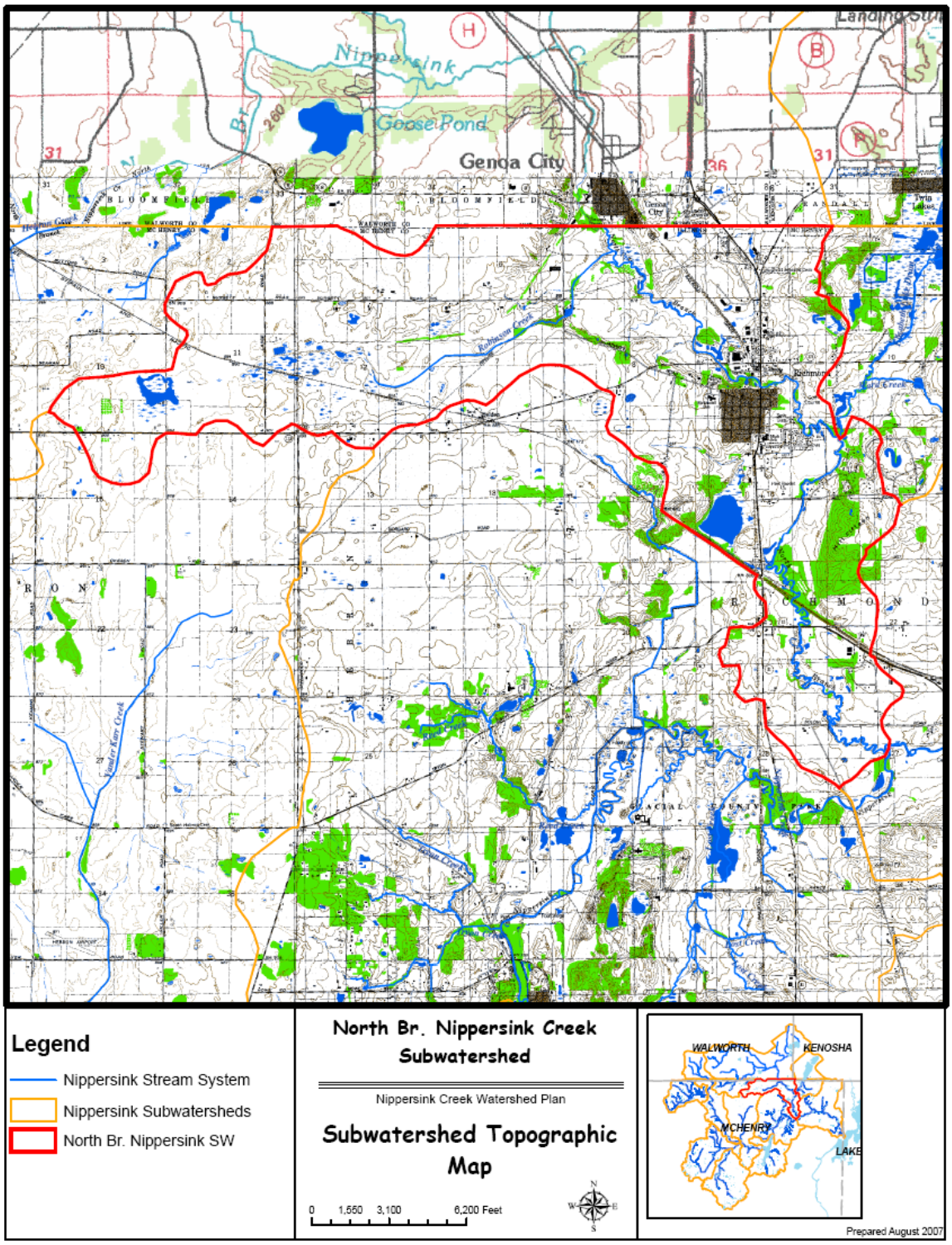
Figure 13.2 North Branch Nippersink Creek Subwatershed Map



13.1.2 Topography & Geology

The topography of the North Branch Nippersink Creek subwatershed is moderately sloping, generally between 2% and 4%, with a maximum elevation of 922 feet near Illinois Route 173 and Kenman Road, and a minimum elevation of 762 feet at the subwatershed outlet near White Street, just west of US Route 12.

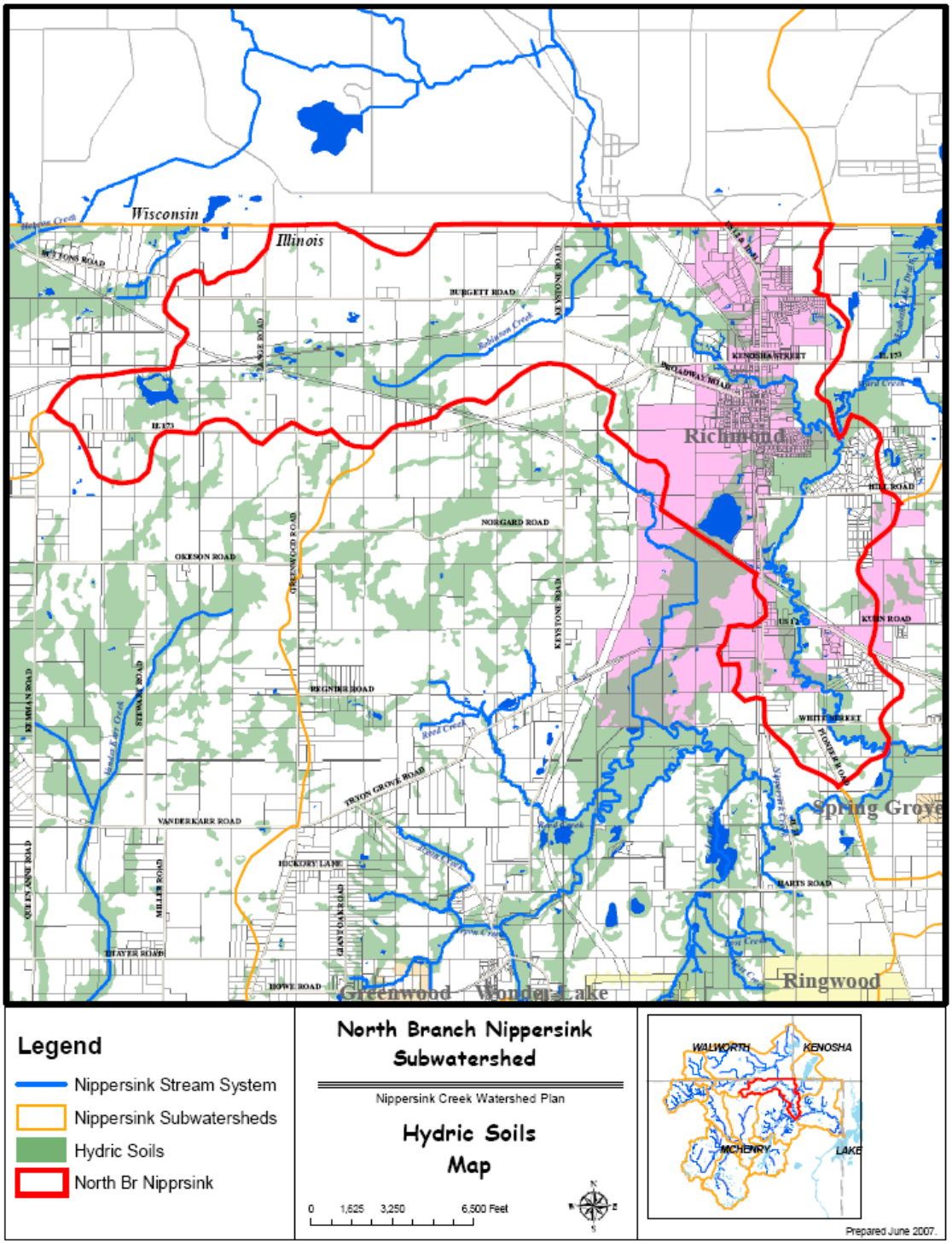
Figure 13.3 USGS Topographic Map for the North Branch Nippersink Creek Subwatershed



13.1.3 Soil Characteristics

The glacial advances across McHenry County resulted in a wide variety of soil associations. Each major grouping of soil associations has potential impact on current and future land uses within the subwatershed. For example, hydric (wetland) soils constitute 1,535 acres, or 22.7% of the 6,757 acre subwatershed, and indicate those areas that contain functional wetlands, or former / degraded wetland areas that could be restored or enhanced.

Figure 13.4 Hydric Soils of the North Branch Nippersink Subwatershed



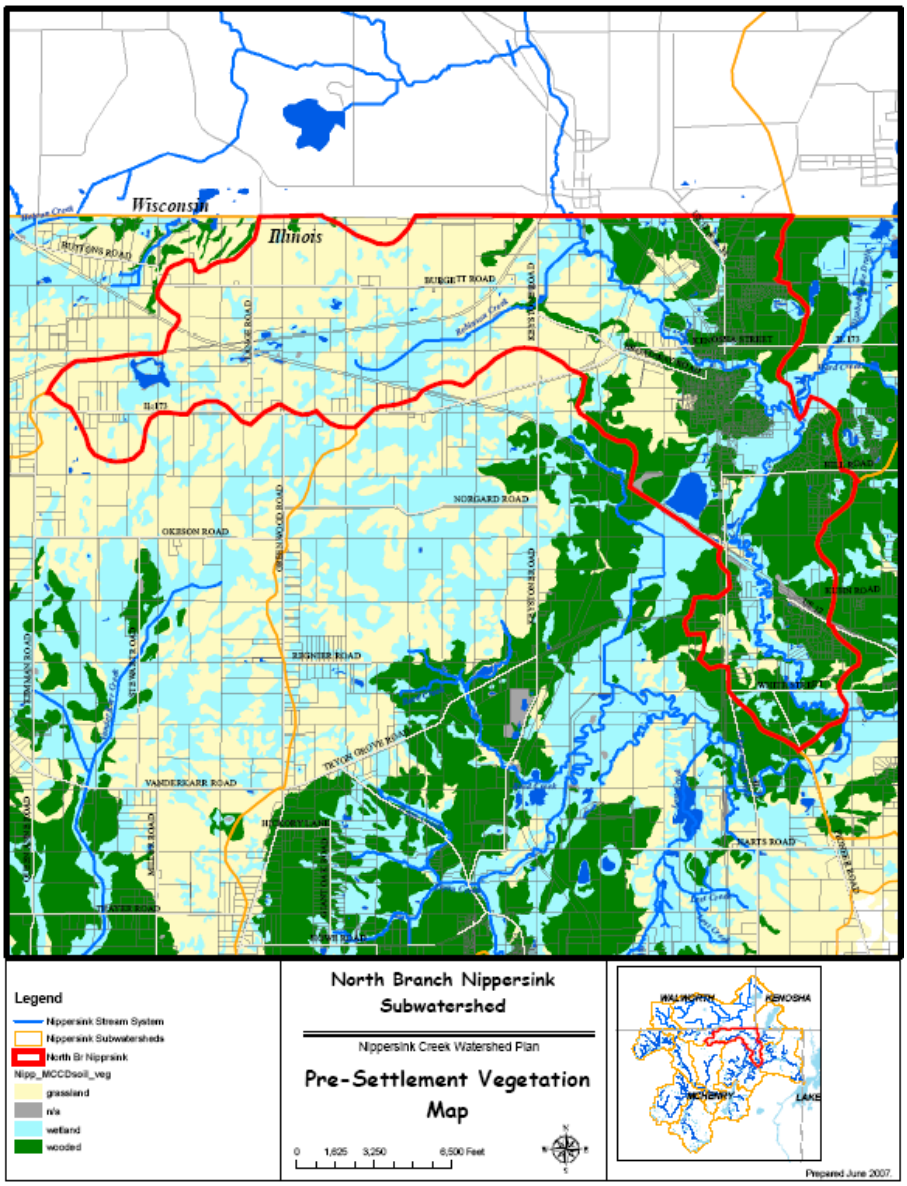
13.1.4 Pre-settlement Vegetation

To guide future land management or restoration efforts, it is important to recognize the native plant communities that naturally evolved subsequent to the last glacial advances. Prior to European settlement in the 1830's, the North Branch Nippersink Creek Subwatershed was comprised of a mixture of grassland, woodland, and wetland, as described in Table 13.1, and depicted in Figure 13.5.

Table 13.1 Pre-Settlement Land Cover Conditions

Land Cover Type	Area (acres)	Percent of Subwatershed
Grassland	2,811.4	42%
Wooded	2,123.7	31%
Wetland	1,737.1	26%
n/a	74.8	1%

Figure 13.5 Pre-settlement Vegetation Map in the North Branch Nippersink Creek Subwatershed



13.1.5 Subwatershed Drainage Features

Streams

The principal stream in the North Branch Nippersink Creek subwatershed is, of course, the North Branch of the Nippersink Creek. There are two tributaries to the North Branch in this subwatershed: Robinson Creek and Elizabeth Lake Drain. This section describes the physical conditions of the streams in this subwatershed, including the stream corridor though which they flow.

The North Branch Nippersink Creek, in this subwatershed, flows south for about 9.5 miles from the state line at Genoa City through the Village of Richmond, and enters Nippersink Creek south of White Street, about ½ mile west of South Solon Road.

Robinson Creek is a small tributary to the North Branch that drains the agricultural region northwest of Richmond (north of Illinois Route 173 as far west as Kenman Road). The upstream half of this tributary is entirely channelized and very low gradient (8 ft / mi), with little to no natural stream corridor remaining. The lower half of Robinson Creek (1/2 mile west of Keystone Road to confluence with North Branch) is much steeper, approaching 50 feet / mile (1% slope) in some reaches, and is buffered by heavy tree canopy. There is one on-line recreational / farm pond on Robinson Creek, on the east side of Keystone Road, which likely prohibits fish from utilizing the upper 2/3 of the tributary.

Manmade Drainage Systems

Analysis of land uses and aerial photography indicates that the majority of the man-made drainage features in the subwatershed consist of drained by a system of open channel swales and culverts. Limited field investigations indicate that only about 5% of the subwatershed is drained via storm sewers. Given its age, the existing man-made storm water system was not designed or constructed to treat the runoff from developed areas prior to discharge to the sensitive streams and wetlands in the subwatershed.

Agricultural Tile Systems

Due to the predominantly agricultural nature of the subwatershed, it is likely that there many functioning underground drain tile systems remaining in the subwatershed, particularly in the western half of the subwatershed. Historically, these were the areas that had poor drainage characteristics, but that farmers could successfully convert to agricultural usage by the installation of agricultural drain tile systems. Identifying agricultural drain tile networks is important in watershed planning because current local flooding and drainage problems can often be linked to damage or age-related failure of drain tile systems. From a watershed preservation / restoration perspective, it is important to identify functional drain tile systems to determine opportunities for their removal or reconfiguration for the purposes of restoring valuable wetland habitat, and water quality benefits. There is little doubt that many of the depressional and low lying areas in the subwatershed that are serviced by drain

tiles today for agriculture were once wetland habitats that supported a very diverse ecosystem.

13.1.6 Population

The use and analysis of population data in watershed planning is critical because of there is a direct correlation between the number of people residing in a watershed, and the degree of impacts to the quality and quantity of the watershed's natural resources. In 1990, the population in the subwatershed was estimated at 1,230, or 117 persons per square mile. According to the 2000 US Census, the population in the North Branch Nippersink subwatershed was about 1,520 people, or about 145 persons per square mile, a 23% increase.

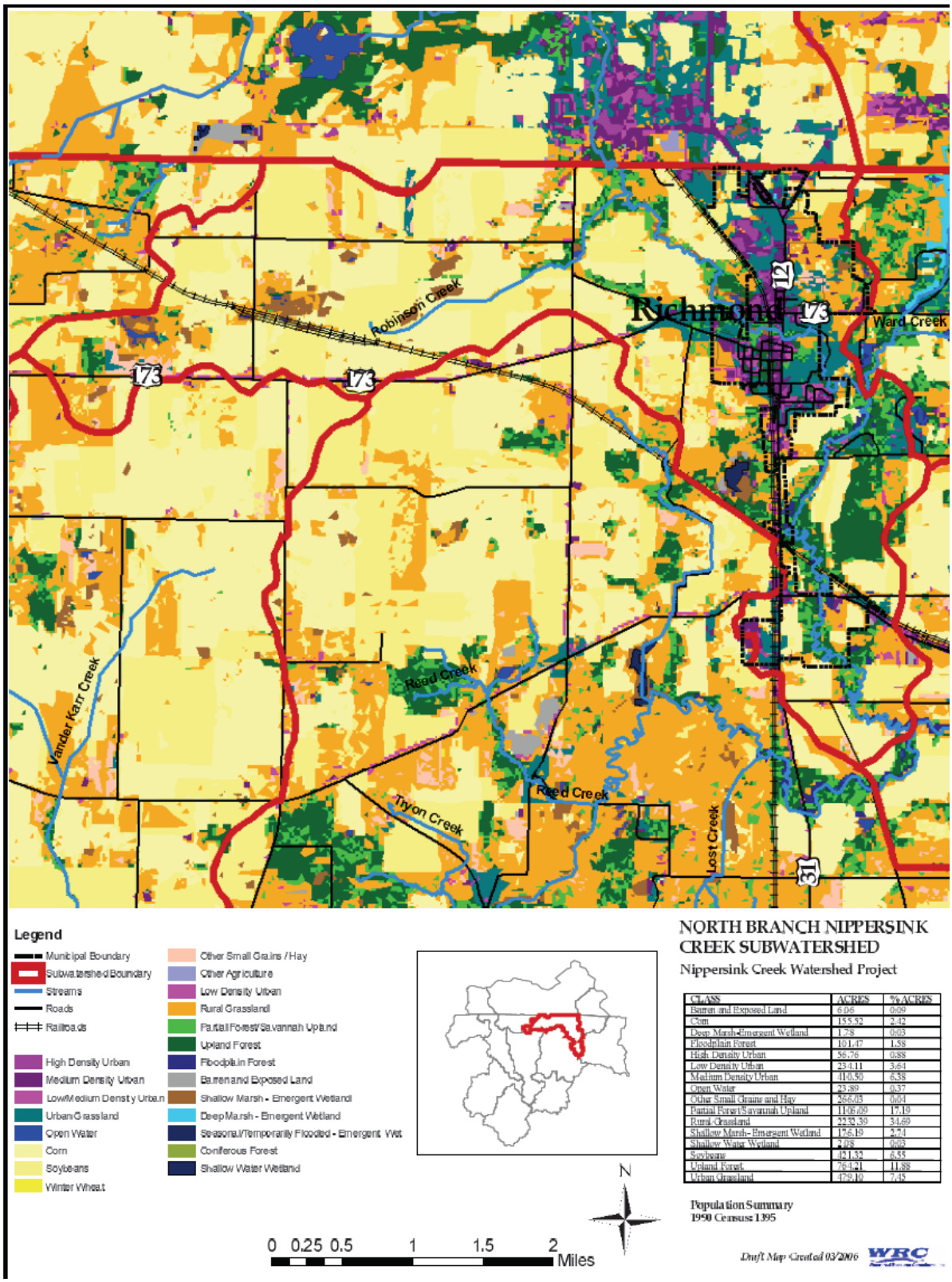
13.1.7 Land Cover

Often, the terms Land Cover and Land Use are used interchangeably. However, there are differences. Land Cover refers to the vegetation, structures, or other features that cover the land. On the other hand, Land Use (as discussed in Section 13.1.8) refers to how land is used by humans. Land cover data for the Nippersink Creek Watershed is available from the Illinois Department of Natural Resources using LANDSAT data collected between 1998 and 1999. The dominant land cover, according to this data, was rural grasslands and agricultural row crops (69%). Urban landscapes accounted for roughly 13% of the Lower Nippersink Creek subwatershed while wooded areas and wetlands account for an additional 18%.

Table 13.2 1999 Land Cover for the North Branch Nippersink Creek Subwatershed

Land Cover Description	Total Acres	Percent of Subwatershed
Barren & Exposed Land	16.2	0.2%
Corn, Soybeans, Other Small Grains & Hay	3,424.4	50.7%
Rural Grassland	1,262.0	18.7%
Low Density Urban	119.7	1.8%
Medium Density Urban	211.3	3.1%
High Density Urban	55.7	0.8%
Urban Grassland	484.2	7.2%
Shallow Marsh – Emergent Wetland	179.2	2.7%
Shallow Water Wetland	13.9	0.2%
Partial Forest /Savannah Upland	350.2	5.2%
Upland Forest	572.5	8.5%
Floodplain Forest	49.3	0.7%
Deep Marsh / Emergent Wetland	1.0	0.0%
Open Water	17.4	0.3%
TOTAL	**6,757**	**100.0%**

Figure 13.6 1999-2000 Land Cover Map for North Branch Nippersink Creek Subwatershed



CLASS	ACRES	% ACRES
Barren and Exposed Land	6.06	0.09
Corn	155.52	2.42
Deep Marsh-Emergent Wetland	1.78	0.03
Floodplain Forest	101.47	1.58
High Density Urban	56.76	0.88
Low Density Urban	234.11	3.64
Medium Density Urban	410.50	6.38
Open Water	23.89	0.37
Other Small Grains and Hay	266.03	0.04
Partial Forest/Savannah Upland	1106.09	17.19
Rural Grassland	2232.59	34.69
Shallow Marsh- Emergent Wetland	156.19	2.43
Shallow Water Wetland	2.08	0.03
Soybeans	421.32	6.55
Upland Forest	761.21	11.88
Urban Grassland	479.19	7.45

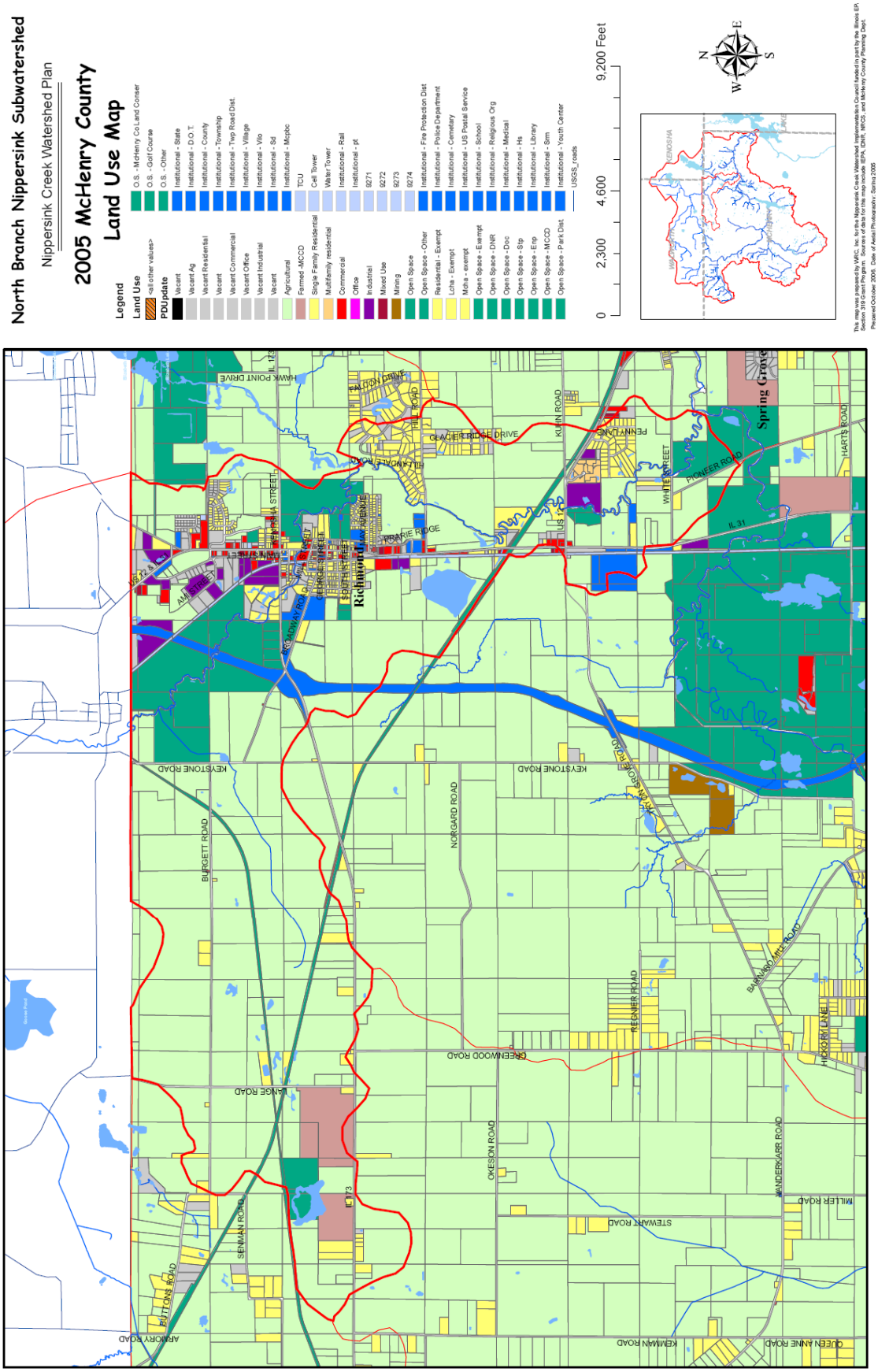
13.1.8 Land Use / Existing Watershed Development

According to the 2005 McHenry County Land Use / Zoning map, 66% of the subwatershed is zoned for agricultural use, while about 23% is either already developed or zoned for development in the future. Over 11% is classified as open space.

Table 13.3 McHenry County 2005 Land Use in North Branch Nippersink Creek Subwatershed

Land Use	Total Acres	Percent of Subwatershed
Vacant	6.9	0.1%
Vacant; Zoned Residential	147.1	2.2%
Vacant; Zoned Commercial	29.8	0.4%
Vacant; Zoned Office	0	0.0%
Vacant; Zoned Industrial	66	1.0%
Agricultural	4,454.9	65.9%
Single Family Residential	522.4	7.7%
Multi-Family Residential	21.3	0.3%
Commercial	69.1	1.0%
Office	0	0.0%
Industrial	123.8	1.8%
Mixed Use	7.6	0.1%
Mining	0	0.0%
Open Space	763.4	11.3%
Institutional	238.8	3.5%
Right of Way	305.9	4.5%
TOTAL	**6,757**	**100.0%**

Figure 13.7 2005 McHenry County Land Use Map for North Branch Nippersink Creek Subwatershed



Development in the subwatershed has historically occurred through unincorporated residential development, although this subwatershed is currently experiencing development growth through municipal annexations by the Village of Richmond.

Table 13.4 Municipal Areas in the North Branch Nippersink Creek Subwatershed

Municipality	Area (acres)	Percent of Subwatershed
Village of Richmond	1,562	23%
Unincorporated McHenry County	5,196	77%

There are 30.2 miles of roads in the subwatershed, which equates to more than 100 acres of impervious cover (roadway pavement only – excludes parking lots, sidewalks, and driveways).

Point Source Discharges

There are two point source discharges into the North Branch Nippersink Creek in this subwatershed. It is also important to note that there are two additional point source discharges that discharge into the North Branch Nippersink or one of its tributaries upstream of this subwatershed; Wastewater Treatments in Hebron, and Genoa City, Wisconsin.

Table 13.5 NPDES Point Source Discharges in the North Branch Nippersink Creek Subwatershed

Name	Average Discharge (mgd)	Receiving Stream	IEPA Permit Number
Richmond WWTP	0.375	North Branch Nippersink Creek	IL0026093
Surgipath Medical Industries	0.048	Wetland adjacent to NB Nippersink Creek	IL0070645

Water quality and discharge information for Richmond WWTP can be found on the EPA's website at:

http://oaspub.epa.gov/enviro/pcs_det_reports.detail_report?npdesid=IL0026093

13.1.9 Natural Resources

McHenry County Conservation District Properties

There are three McHenry County Conservation District properties in the subwatershed, totaling about 843.5 acres, or 12.5% of the North Branch Nippersink subwatershed area.

Table 13.6 MCCD Properties in the North Branch Nippersink Creek Subwatershed

Name	Area is SW (acres)	Total MCCD Property Area
Glacial Park	143.7	3264.2
Goose Lake	256.2	269.8
North Branch Preserve	443.6	443.6
Total	**843.5**	

Other Publicly Protected Land

There is a proposed roadway alignment running north-south through the center of the subwatershed that was assembled to allow a divided highway linkage to Route 12 at the Wisconsin state line. Much of this alignment, owned by the State of Illinois, passes through MCCD property.

Table 13.7 Other Publicly Protected Land in the North Branch Nippersink Creek Subwatershed

Name	Area (acres)	# of Parcels
State of Illinois	70.2	3
Village of Richmond	32.3	22
Total	**102.5**	

McHenry County Natural Areas Inventory

There are four McHenry County Natural Area Inventory (MCNAI) Sites within the subwatershed, representing about 16% of the entire subwatershed.

Table 13.8 McHenry County Natural Areas Inventory Sites in the North Branch Nippersink Creek Subwatershed

MCNAI Site ID	Name	Area is SW (acres)	Total MCNAI Site Area	Ownership
RIC06	Glacial Park	415.1	4670	Public / Private
RIC05	Genoa City Wetlands & Barrens	282.2	282.2	Public / Private
RIC02	Elizabeth Lake	1.3	578	Public / Private
HEB05	Lange Road Bog	74.9	74.9	private
HEB02	Goose Lake	104.1	105	Public / Private
RIC09	Prairie Trail North Wetland	131.8	132	Public / Private
RIC12	South Richmond Sedge Meadow	88.4	88.4	Public / Private
	TOTAL	**1,097.8**		

Wetlands

McHenry County completed an Advanced Identification (ADID) Wetland Study in 2003. This study identified a total of 58 wetlands, totaling 1,139 acres, or 17% of the North Branch Nippersink subwatershed. Of these wetlands, 908.6 acres (80%) were determined to be of High Quality.

Table 13.9 Mapped Wetlands in the North Branch Nippersink Creek Subwatershed

ADID Code	Wetland Type	Number of Wetlands	Total Area (acres)
HFV	High Functional Value	3	36.3
HQW	High Quality Wetland	7	908.6
FW	Farmed Wetland	23	105.1
W	Other Wetlands (lower quality)	25	88.8
	TOTAL	**58**	**1,138.8**

Threatened & Endangered Species

Threatened and Endangered (T&E) species data were extracted from T&E data records documented in the McHenry County Natural Areas Inventory Database. The data were collected by the McHenry County Conservation District during field studies undertaken at subwatershed Natural Area Inventory Sites. The data indicates that there are at least six threatened or endangered animal species living in the subwatershed.

Table 13.10 Threatened and Endangered Species in the North Branch Nippersink Creek Subwatershed

Common Name	Scientific Name	Type	Status	MCNAI Site
Sandhill Crane	Grus canadensis	Bird	IL Threatened	RIC05 HEB02 HEB05
Yellow-Headed Blackbird	Xanthocephalus xanthocephalus	Bird	IL Endangered	RIC05 HEB02 HEB05
Black Tern	Chlidonias niger	Bird	IL Endangered	HEB02
Common Moorhen	Gallinula chloropus	Bird	IL Threatened	HEB02 HEB05
Least Bittern	Ixobrychus exilis	Bird	IL Threatened	HEB02
Blanding's Turtle	Emydoidea blandingii	Reptile	IL Threatened	HEB02

Source: McHenry County Natural Areas Inventory Database, 2005

Fishery

According to a 1999 Anti-degradation Study for the Village of Richmond (completed by Smith Engineering), the McHenry County Conservation District conducted fishery surveys on the North Branch Nippersink between West Solon Road and the state line between 1994 and 1996. As many as 30 native fish species were found, with 6-8 species being classified as pollution intolerant. Index of Biotic Integrity ratings at several stations were above 51, indicating that much of the North Branch is classified as a Class A Stream (Unique Aquatic Resource).

Mussels

The above mentions study also documented that the North Branch Nippersink Creek in the Richmond area is home to at least 5 species of mussels, including Three-ridge, Elktoe, Plain Pocketbook, and Fat Mucket species (the fifth species was not identified in the report). A 1995 survey by the MCCD found as many as 12 species of mussels, including the state endangered Rainbow mussel (Villosa iris).

Existing Greenways

Although there are no formal greenways in the North Branch Nippersink Subwatershed, about 3.3 miles (13%) of the North Branch Nippersink Creek and its tributaries are protected from disturbance due to acquisition by the McHenry County Conservation District.

13.2 Analysis of Subwatershed Data and Problem Identification

13.2.1 Water Quality Data & Identified Problems

The Illinois Environmental Protection Agency (IEPA) is tasked with assessing the quality of the surface water resources of Illinois. The IEPA has determined Nippersink Creek's designated uses are:

- Aquatic Life
- Fish Consumption
- Primary Contact
- Secondary Contact
- Aesthetic Quality

The IEPA periodically produces a 303(d) list, which identifies waterways that are not achieving certain designated uses. In the 2006 IEPA 303(d) list, Nippersink Creek is identified as being in Full Support of its Aquatic Life Designated Use, which is notable for a stream in northeastern Illinois.

However, Nippersink Creek was also determined to be Non-supporting of its Primary Contact Designated Use, due to excessive levels of fecal coliform. This pollutant, associated with human and animal waste, was listed as coming from an unknown source. The IEPA also identified fish consumption, secondary contact and aesthetic quality as designated uses for Nippersink Creek, although the ratings for these uses were classified as "not assessed".

The quality of the North Branch Nippersink Creek itself has historically been very good. Numerous biological studies conducted on the North Branch indicate high quality in-stream habitat (pools and riffles; gravel & sand substrate) and excellent species diversity, including many fish and macroinvertebrate species that are very intolerant of pollution in the water column.

The Illinois Environmental Protection Agency maintains two water quality sampling stations in the North Branch Nippersink Creek subwatershed.

Table 13.11 IEPA Water Quality Sampling Stations in the North Branch Nippersink Creek Subwatershed

Station	Stream	Location
DTKA04	North Branch Nippersink Creek	N. Br. Nippersink at Hill Road
DTKA03	North Branch Nippersink Creek	N. Br. Nippersink at IL Route 173

The Fox River Watershed Monitoring Network (FRWMN), administered by the not-for-profit group, *Friends of the Fox River*, maintains four volunteer stream monitoring sites on Nippersink Creek, however there are no established FRWMN monitoring stations on the North Branch Nippersink Creek.

The 1999 Village of Richmond Anti-Degradation Study (Smith Engineering) reported in-stream phosphorus levels at the old WWTP to range between 0.15 and 0.29 mg/L with an average of 0.19 mg/L (7 week period in summer of 1999). The study also indicated that phosphorus data from IEPA's DTKA04 station was found to range between 0.04 and 0.39 mg/L (1982-1996 time period). Data from the Wisconsin DNR for 1998 indicated that phosphorus concentrations in the North Branch just upstream of the Genoa City WWTP ranged from 0.05 to 0.11 mg/L.

13.2.2 Flooding Problems

At the time of this writing, no data were provided by the County or municipalities regarding existing flooding problems. Analysis of available floodplain information suggests that there are less than 10 homes in the FEMA 100-year Floodplain.

13.2.3 Projected Development & Growth

Development in the North Branch Nippersink Creek Subwatershed is likely to occur as part of construction within existing municipal jurisdictions as well as future annexations by Richmond and Spring Grove.

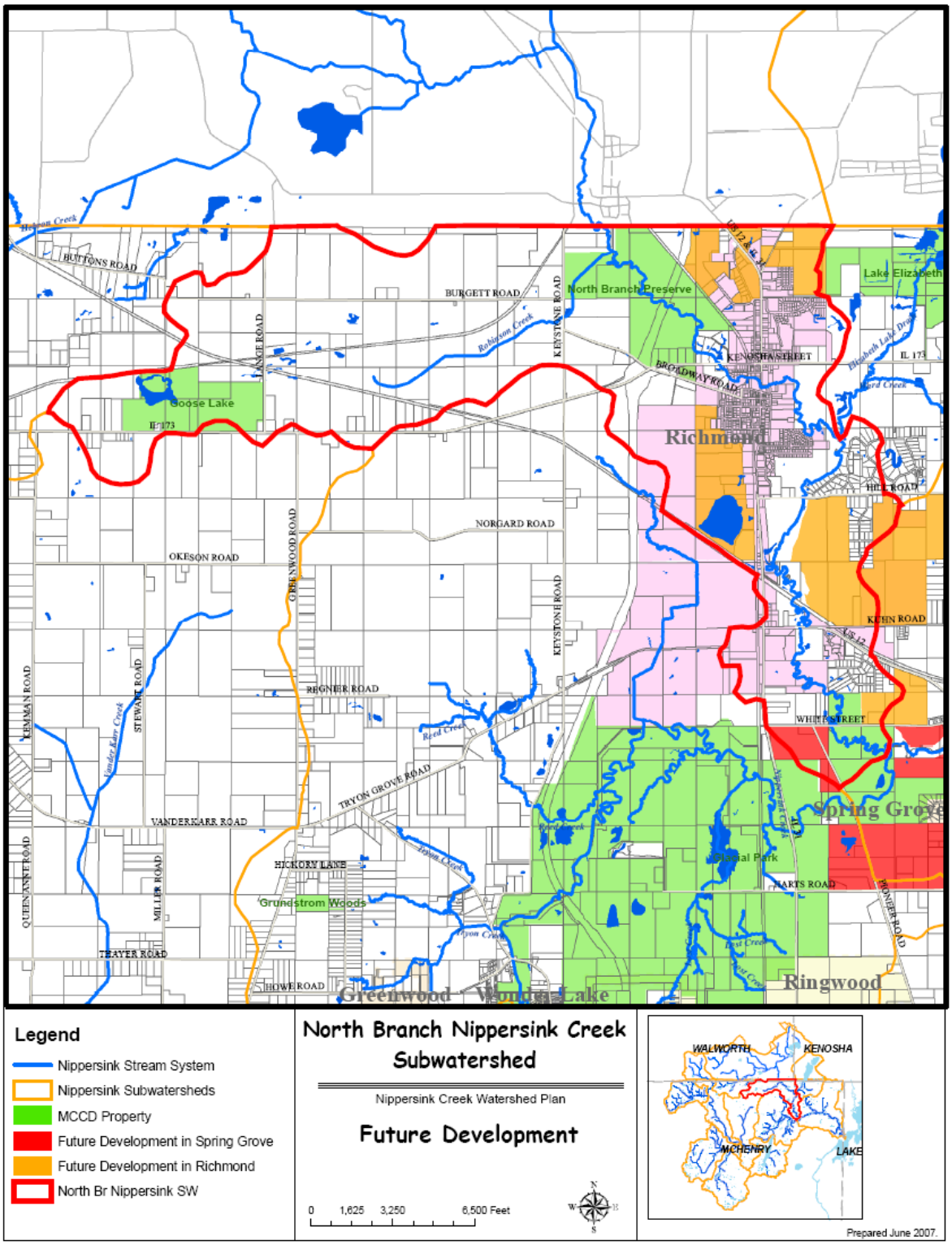
Development in the North Branch Nippersink subwatershed is expected to be significant. According to the 1999 Village of Richmond Anti-Degradation Study, the Village of Richmond anticipates adding more than 2,500 homes and 90 acres of commercial/office/light-industrial developments over the next several years. NIPC population projections for 2030 indicate that Richmond's population is expected to increase from 1,091 to 15,059 (1,280% increase). Approximately 50% of this projected population will reside in the North Branch Nippersink Subwatershed (7,500 residents; a 600% increase from the 2000 Census).

Table 13.12 Summary of Village of Richmond Projected Development.

Current Flow through Richmond WWTP	220,000 GPD
New High School Facility	25,000 GPD
Proposed May Development	171,500 GPD
Proposed Orsolini Development	25,000 GPD
Proposed Smith Development	17,500 GPD
ComDisco Office Park	10,000 GPD
Varga Property (225 homes)	85,400 GPD
Varga Property (40 acres business/commercial)	20,000 GPD
Hunt Club Estates (100 homes)	35,000 GPD
Remington Ridge (21 homes)	7,350 GPD
May Development – North (230 homes)	80,500 GPD
Eldredge Property (49.5 acre business/commercial)	24,750 GPD
ComDisco (500 homes)	175,000 GPD
ComDisco Development (1500 homes)	525,000 GPD
Total: 2575+ homes; 90 acres business/commercial	1,422,000 GPD

Source: Village of Richmond Anti-Degradation Study (1999, Smith Engineering)

Figure 13.8 Future Development in the North Branch Nippersink Creek Subwatershed



13.2.4 Natural Area Protection / Preservation Issues

McHenry County Natural Area Inventory Sites

In the North Branch Nippersink subwatershed, about 40% of the McHenry County Natural Area Inventory (MCNAI) sites are protected through public ownership (421 of 1097 acres on MCCD property).

Genoa City Wetlands & Barrens (MCNAI RIC05) is the second largest NAI site in the North Branch Nippersink Watershed. This 282 acre site contains sedge meadows, basin marshes, a graminoid fen, mid order low-gradient stream, and silt loam barrens. The MCNAI database indicates that the Genoa City Wetlands & Barrens site is currently impaired by water table alterations, brush encroachment, and invasive species (Reed Canary Grass, Cattails). It also lists development as a future problem that will impact the site.

The Goose Lake (MCNAI HEB02) is a 105 acre basin marsh located in the far northwest corner of the subwatershed. The MCNAI database indicates that the Goose Lake site is currently impaired by water table alterations, siltation from adjacent agricultural land uses, and invasive species (Reed Canary Grass & Purple Loosestrife). About 90% of this MCNAI site is protected by the MCCD.

The Lange Road Bog (MCNAI HEB05) is a 75 acre natural area located just east of the Goose Lake MCNAI site. This site contains a mesic silt loam prairie, basin marshes, sedge meadows, a calcareous floating mat, and a graminoid bog. The site is noted as having an "exceptional concentration of boreal wetland plants". The MCNAI database indicates that the Goose Lake site is currently impaired by water table alterations, siltation from adjacent agricultural land uses, and invasive species (Reed Canary Grass, Purple Loosestrife & Cattails). This natural area is not protected through any public agency or conservation easement.

The Prairie Trail North Wetland (MCNAI RIC09) is a 132 acre natural area located along the North Branch Nippersink, upstream of Main Street, in the Village of Richmond. A large portion of this natural area is unprotected on private property and contains a wet silt loam prairie and a sedge meadow. The MCNAI database indicates that this site is currently impaired by brush encroachment, invasive species (Reed Canary Grass) and filling by private landowners. About 30% of this MCNAI site is protected by the MCCD.

About 415 acres (8%) of the 4670 acre Glacial Park / Tamarack Farm MCNAI site extends into the southwest end of the subwatershed. This portion of the GP / TF MCNAI site is located entirely on private property (Tamarack Farms LLC) and includes a high quality shallow water / emergent wetland complex and several areas of mature woodlands and partial forest / savanna habitat. As most of this portion of the MCNAI site is within the Village of Richmond current municipal boundary, it is likely that much of this unprotected MCNAI will be converted to suburban development if a concerted effort is not made soon to protect the non-agricultural features of this site.

The South Richmond Sedge Meadow (MCNAI RIC12) is an 88 acre natural area along the North Branch Nippersink Creek stream corridor between US Route 12 and White Street. This site contains the creek as well as a sedge meadow and streamside marshes. About 14 acres on the north end of this NAI site are owned by the Village of Richmond (16%). An additional 10.5 acres on the south end area also protected – through the MCCD. This leaves the middle 70% of the site on private property, with a significant portion of that area planned for future development.

13.3 Subwatershed-Specific Recommendations to Protect Water Resources

The following section discusses the Best Management Practices (BMP's) identified for this subwatershed that should be implemented to address existing or potential water quality impairments. The location of each recommended BMP project is presented in Figure 13.9

Pollutant Loading Modeling, as discussed in Chapter 3, identified current and future pollutant loadings, based upon land use, soils, slopes, etc., and quantified these loadings. The results of this Pollutant Loading modeling were then used to identify the types of BMP's that should be implemented to create a loading reduction of those pollutants. Table 13.13 presents a summary of the recommended BMP projects, as well as the expected pollutant loading reductions expected if the BMP's are implemented, and function as intended.

Table 13.14 presents detailed cost and logistical information on each of the recommended BMP projects. Below is a summary list of recommendations for the subwatershed to help stakeholders and decision makers meet the Goals and Objectives set forth for Nippersink Creek. Background information regarding how each type of recommendation addresses watershed concerns and/or impairments (existing or future) can be found in Chapter 4.

Type:	Education / Outreach; Regulatory; Site Restoration; Monitoring; Permanent Habitat Protection, Water Quality
Target Goals:	Which watershed plan goals the recommendation is intended to address.
Initial Implementation Cost:	The initial cost, in 2007 dollars to initiate the recommended action, if applicable.
Initial Outreach Cost:	The initial cost, in 2007 dollars to initiate the recommended action, if applicable.
Annual Cost:	The long term expected annual cost (in 2007 dollars) to successfully implementation of the recommendation
Responsible Party:	Identifies the LEAD agency, entity, or landowner who will ultimately have to execute the recommendation. SUPPORTING parties, such as government agencies, grant sources, etc. may also be identified here.
Priority:	A ranking of the BMP recommendations, based upon the nature / urgency of the existing / potential impairment; the availability of willing landowners)/ partners; short-term vs. long-term development pressure; and whether the project is a new effort, or a retrofit of an existing practice.

The project cost estimates contained in this report should be considered preliminary, and are only presented to identify the potential magnitude of cost, from a watershed scale perspective. No site-specific investigation, analysis, or design of any recommended project, from which accurate cost information could be obtained, was completed as part of the preparation of the 2008 Nippersink Creek Watershed Plan.

If a watershed stakeholder decides to apply for grant funding assistance to implement any of the recommended projects presented in this report, they should first undertake any additional studies / research needed to determine an updated / accurate project cost. They should not solely rely on the cost estimates presented in the NCWP report as the basis for their grant request.

Note: The following acronyms for responsible parties identified in Table 13.14 are presented below:

NCWPC	Nippersink Creek Watershed Planning Committee
NRCS	Natural Resource Conservation Service
SWCD	McHenry County Soil and Water Conservation District
MCCD	McHenry County Water Conservation District
TLC	The Land Conservancy of McHenry County
IDOT	Illinois Department of Transportation
IEPA	Illinois Environmental Protection Agency
MCDOT	McHenry County Department of Transportation
MCDEF	McHenry County Defenders

Figure 13.9 North Branch Nippersink Creek Subwatershed Site Recommendations Map

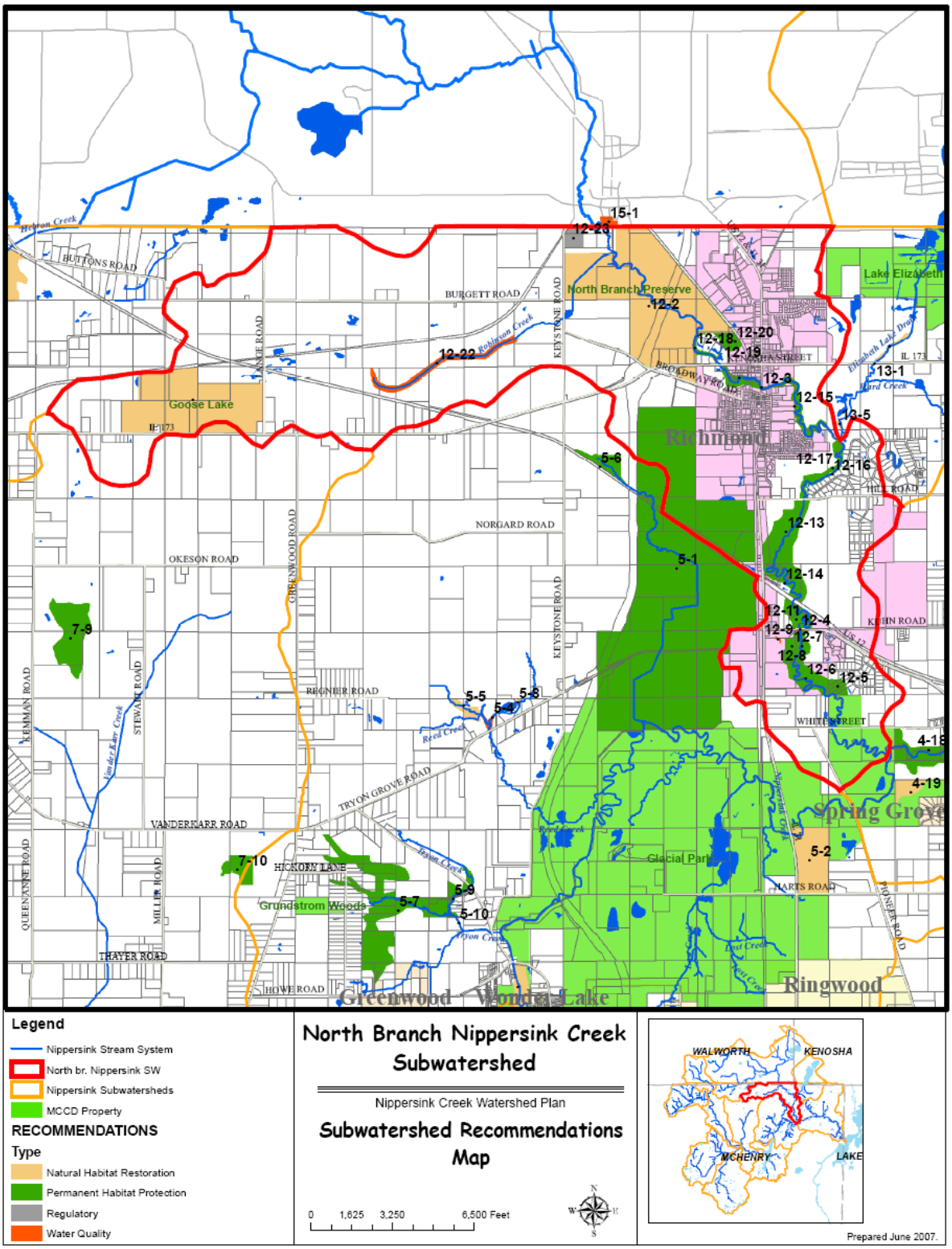


Table 13.13 BMP Selection & Associated Pollutant Load Reduction for the North Branch Nippersink Subwatershed

BMP	Type of BMP	Project Locations**	BMP		Removal Efficiency***			(lbs/year)****			Percentage Reduction		
			Size	Unit	TN	TP	TSS	TN	TP	TSS	TN	TP	TSS
Natural Habitat Protection	Site-specific	12-1, 12-2	203	acres	30%	35%	60%	1,083	90	103	4.5	5.3	9
Permanent Habitat Protection	Site-specific	12-5 to 12-8, 12-10 to 12-21	707	acres	53%	51%	88%	6,662	457	526	27.7	26.7	46.1
Point Source Control/Monitoring	Site-specific	12-9	1	lump sum	0%	0%	0%	0	0	0	0	0	0
Regulatory*	Watershed-Specific	Subwatershed	1	Water-shed	5%	5%	5%	1,201	86	57	5	5	5
Nutrient Management	Watershed-specific	Subwatershed wide	216	acres	70%	28%	-	2,688	77	-	11.2	4.5	-
Review Fish Hatchery Non native Species Policy	Site-specific	12-23	1	lump sum	0%	0%	0%	0	0	0	0	0	0
Stormwater BMPs	Site-specific	12-3, 12-4	6	acres	36%	95%	95%	38	7	5	0.2	0.4	0.4
Stream Buffers	Site-specific	12-15, 12-17, 12-22	20	acres	36%	95%	95%	128	24	16	0.5	1.4	1.4
Wetland Restoration	Site-specific	12-1	14	acres	53%	51%	88%	132	9	10	0.5	0.5	0.9
Total								11,932	750	718	49.7	43.8	62.8

*Regulatory programs are assumed to have nominal pollutant reduction rates of 5%.

** Project locations and details are described in the corresponding chapter.

*** TN = total Nitrogen; TP = total Phosphate; TSS = total suspended solids or Sediment.

**** The unit of “TSS” is “Tons/year”.

Table 13.14 Recommended Projects in the North Branch Nippersink Subwatershed

SUB WATERSHED	RECOMMENDATION #	TARGET GOAL	DESCRIPTION	RESPONSIBLE PARTY	ACRES	UNIT COST	INITIAL IMPLEMENTATION COST	INITIAL OUTREACH COST	ANNUAL MAINTENANCE COST	PRIORITY
North Branch	12-1	Natural Habitat Restoration	**MCCD Goose Lake** Purchase adjacent parcels to facilitate drain tile removal; add douser valve to lake tile system; prairie/wetland restoration on 460 acres	MCCD	268.9	$2,000	$537,820			A
North Branch	12-2	Natural Habitat Restoration	**MCCD Goose Lake** Purchase adjacent parcels to facilitate complete drain tile removal and subsequent fen restoration	MCCD	438.5	$2,000	$876,902			A
North Branch	12-3	Water Quality	Government Outreach to install Stormwater BMP's to treat roadway runoff prior to discharge into North Branch Nippersink Creek	NCWPC / MCDOT / IDOT			$50,000	$1,000	$2,500	E
North Branch	12-4	Water Quality	Government Outreach to install Stormwater BMP's to treat roadway runoff prior to discharge into North Branch Nippersink Creek	NCWPC / MCDOT / IDOT			$50,000	$1,000	$2,500	E
North Branch	12-5	Permanent Habitat Protection	Landowner Outreach to create Conservation Easement to protect High Quality ADID Wetland	NCWPC / TLC / MCDEF	9.9	$1,500	$14,910	$500	$994	C
North Branch	12-6	Permanent Habitat Protection	Landowner Outreach to create Conservation Easement to protect High Quality ADID Wetland	NCWPC / TLC / MCDEF	30.2	$1,500	$45,347	$1,000	$3,023	C
North Branch	12-7	Permanent Habitat Protection	Encourage Village of Richmond to actively manage High Quality ADID wetland on vlllage parcel	NCWPC / VILLAGE OF RICHMOND / TLC	15.6	$500	$7,819	$1,000	$1,564	D

Table 13.14 Recommended Projects in the North Branch Nippersink Subwatershed

SUB WATERSHED	RECOMMENDATION #	TARGET GOAL	DESCRIPTION	RESPONSIBLE PARTY	ACRES	UNIT COST	INITIAL IMPLEMENTATION COST	INITIAL OUTREACH COST	ANNUAL MAINTENANCE COST	PRIORITY
North Branch	12-8	Permanent Habitat Protection	Landowner Outreach to create Conservation Easement to protect High Quality ADID Wetland	NCWPC / TLC / MCDEF	8.6	$1,500	$12,954	$500	$864	C
North Branch	12-9	Water Quality	Investigate possible dump site and potential for runoff / groundwater contamination to North Branch Nippersink Creek	IEPA / MCHD				$1,000		F
North Branch	12-10	Permanent Habitat Protection	Landowner Outreach to create Conservation Easement to protect High Quality ADID Wetland	NCWPC / TLC / MCDEF	4.0	$1,500	$5,955	$500	$397	C
North Branch	12-11	Permanent Habitat Protection	Landowner Outreach to create Conservation Easement to protect High Quality ADID Wetland	NCWPC / TLC / MCDEF	6.9	$1,500	$10,385	$500	$692	C
North Branch	12-12	Permanent Habitat Protection	Landowner Outreach to create Conservation Easement to protect High Quality ADID Wetland	NCWPC / TLC / MCDEF	8.6	$1,500	$12,917	$500	$861	C
North Branch	12-13	Permanent Habitat Protection	Require Conservation Design practices for future development planned on this parcel, which contains substantial high quality ADID wetlands	NCWPC / VILLAGE OF RICHMOND / TLC	59.8	$500	$29,906	$1,000	$1,495	B
North Branch	12-14	Permanent Habitat Protection	Landowner Outreach to create Conservation Easement to protect High Quality ADID Wetland	NCWPC / TLC / MCDEF	34.7	$1,500	$52,055	$1,000	$3,470	C
North Branch	12-15	Permanent Habitat Protection	Landowner / Government Outreach to re-establish Stream Buffer, create Conservation Easement	NCWPC / VILLAGE OF RICHMOND / TLC	25.1	$1,500	$37,707	$1,000	$2,514	D
North Branch	12-16	Permanent Habitat Protection	Landowner Outreach to create Conservation Easement to protect High Quality ADID Wetland	NCWPC / TLC / MCDEF	5.2	$1,500	$7,752	$500	$517	C

Table 13.14 Recommended Projects in the North Branch Nippersink Subwatershed

SUB WATERSHED	RECOMMENDATION #	TARGET GOAL	DESCRIPTION	RESPONSIBLE PARTY	ACRES	UNIT COST	INITIAL IMPLEMENTATION COST	INITIAL OUTREACH COST	ANNUAL MAINTENANCE COST	PRIORITY
North Branch	12-17	Permanent Habitat Protection	Landowner / Government Outreach to re-establish Stream Buffer, create Conservation Easement, Conservation Design on future development	NCWPC / VILLAGE OF RICHMOND / TLC	14.4	$1,500	$21,609	$500	$1,441	D
North Branch	12-18	Permanent Habitat Protection	Landowner Outreach to create Conservation Easement to protect High Quality ADID Wetland	NCWPC / TLC / MCDEF	6.1	$1,500	$9,188	$500	$153	C
North Branch	12-19	Permanent Habitat Protection	Landowner Outreach to create Conservation Easement to protect High Quality ADID Wetland	NCWPC / TLC / MCDEF	6.2	$1,500	$9,252	$500	$617	C
North Branch	12-20	Permanent Habitat Protection	Landowner Outreach to create Conservation Easement to protect High Quality ADID Wetland	NCWPC / TLC / MCDEF	6.6	$1,500	$9,950	$500	$663	C
North Branch	12-21	Permanent Habitat Protection	Landowner Outreach to create Conservation Easement to protect High Quality ADID Wetland	NCWPC / TLC / MCDEF	14.7	$1,500	$22,077	$500	$1,472	C
North Branch	12-22	Water Quality	Landowner Outreach to expand Stream Buffer zone along stream corridor to mitigate impacts of row-crop agriculture	NCWPC / NRCS / SWCD	39.1	$1,500	$58,706	$1,000	$3,914	D
North Branch	12-23	Regulatory	Landowner Outreach to private fish hatchery's management plan to prevent non-native fish / plants from entering the stream system	NCWPC				$5,000		G
				SW TOTALS	**1,003.3**		**$1,883,207**	**$19,500**	**$29,650**	

PRIORITY

- **A** Projects that have cooperating partners, can move to implementation quickly. Implementation Timeframe 1 to 3 years
- **B** Projects subject to imminent development pressure, Implementation Timeframe 1 to 2 years
- **C** Projects needed to protect sensitive areas. Timeframe 1 to 2 years
- **D** Restoration projects, Timeframe 1 to 5 years
- **E** Retrofit Projects, Timeframe 1 to 5 years
- **F** Existing Pollution Potential, Timeframe 1 to 2 years
- **G** Policy / Opportunity Review Project, Timeframe 1 to 3 years

Chapter 14
Lower Elizabeth Lake Drain Subwatershed Assessment

This section presents a summary of the characteristics of the Lower Elizabeth Lake Drain Subwatershed, as well as specific issues and challenges in this subwatershed that must be addressed in the Nippersink Creek Watershed Management Plan.

14.1 Subwatershed Characteristics

The following section provides an overview of the physical characteristics of the subwatershed.

14.1.1 Subwatershed Location

The Lower Elizabeth Lake Drain subwatershed is located in Richmond Township, in the northeast corner of the Nippersink Creek Watershed. This subwatershed has an area of only 3,080 acres, or 4.8 square miles (2.4% of watershed). The boundary of the subwatershed is shown in Figure 14.1. The subwatershed is specifically "divided" at the Illinois-Wisconsin border; north of the state line there is an additional 4,492 acres draining to the Lower Elizabeth Lake Drain. The portion of the subwatershed north of the state line is covered in a brief summary in Chapter 16. The Lower Elizabeth Lake Drain subwatershed is bordered roughly by Main Street (Richmond) on the west, Hill Road on the south, Zarnstorf Road on the east, and the Illinois - Wisconsin state line on the north.

Figure 14.1

Location of Lower Elizabeth Lake Drain Subwatershed

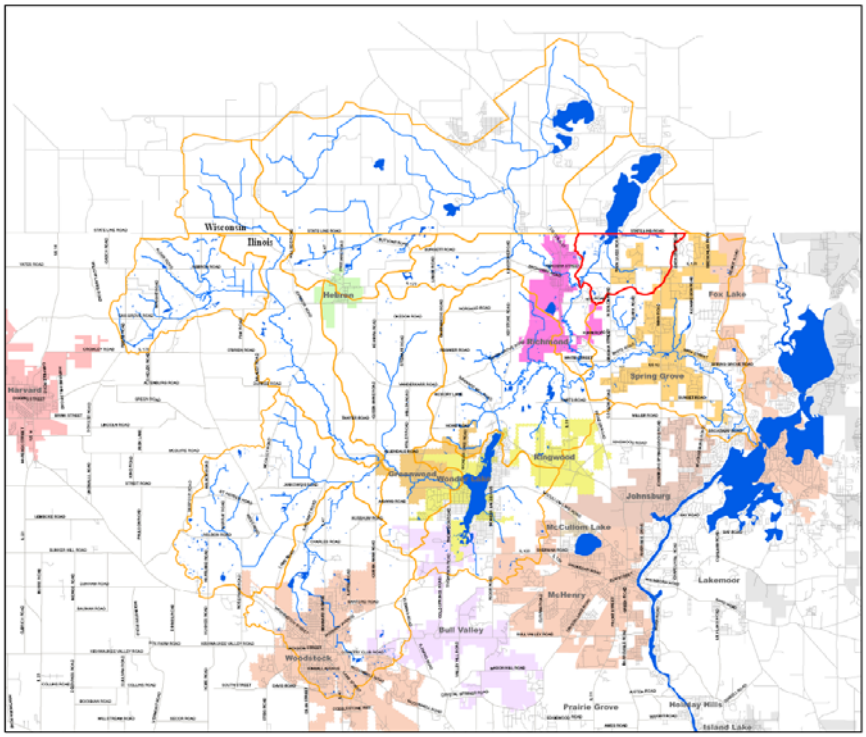
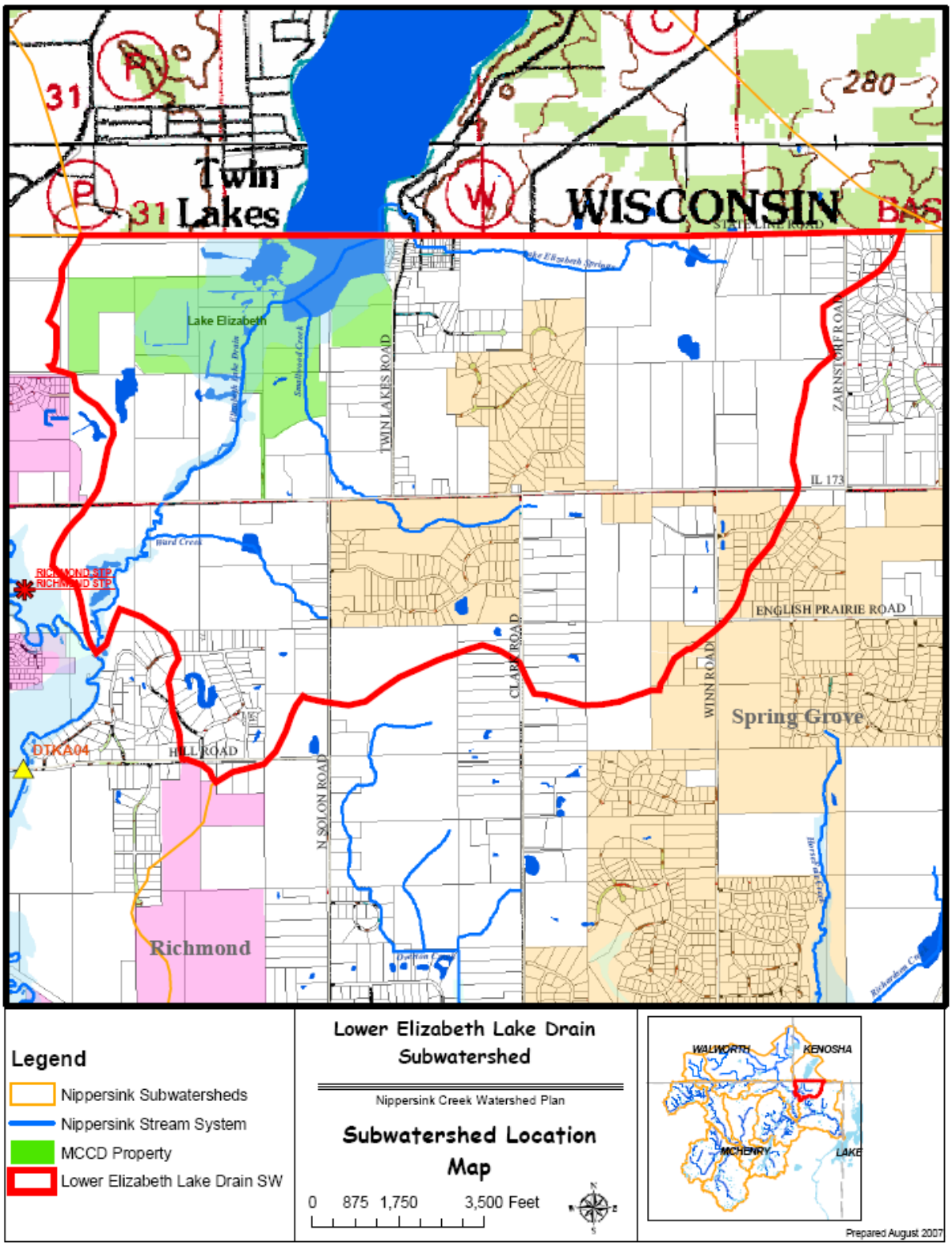


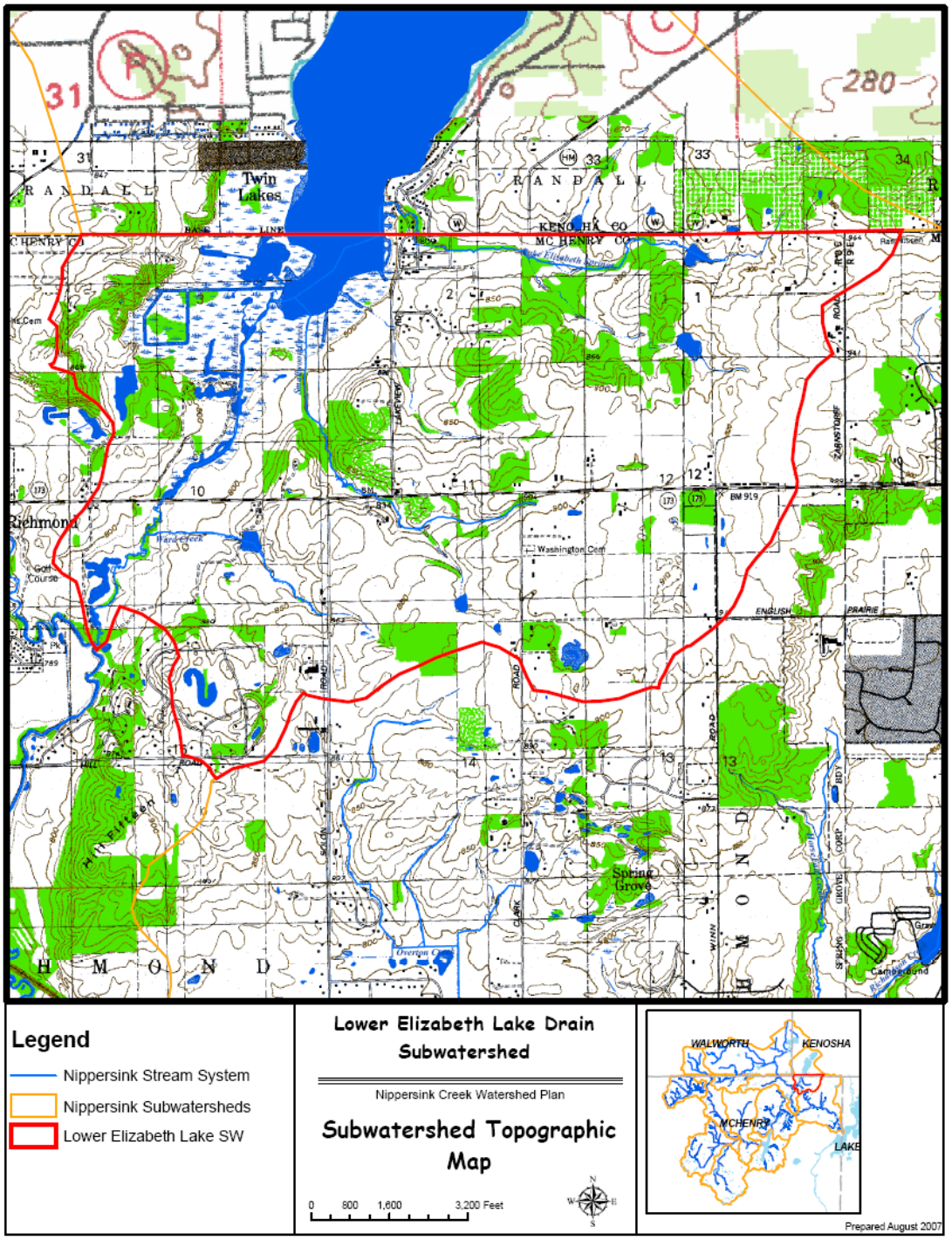
Figure 14.2 Lower Elizabeth Lake Drain Subwatershed Map



14.1.2 Topography & Geology

The topography of the Lower Elizabeth Lake Drain subwatershed is moderately sloping, generally between 2% and 4%, with a maximum elevation of 972 feet near State Line Road and Preservation Way on the far northwest side of Spring Grove. The minimum elevation of 784 feet is found at the subwatershed outlet, ½ mile north of Hill Road and 0.6 miles east of Main Street in Richmond.

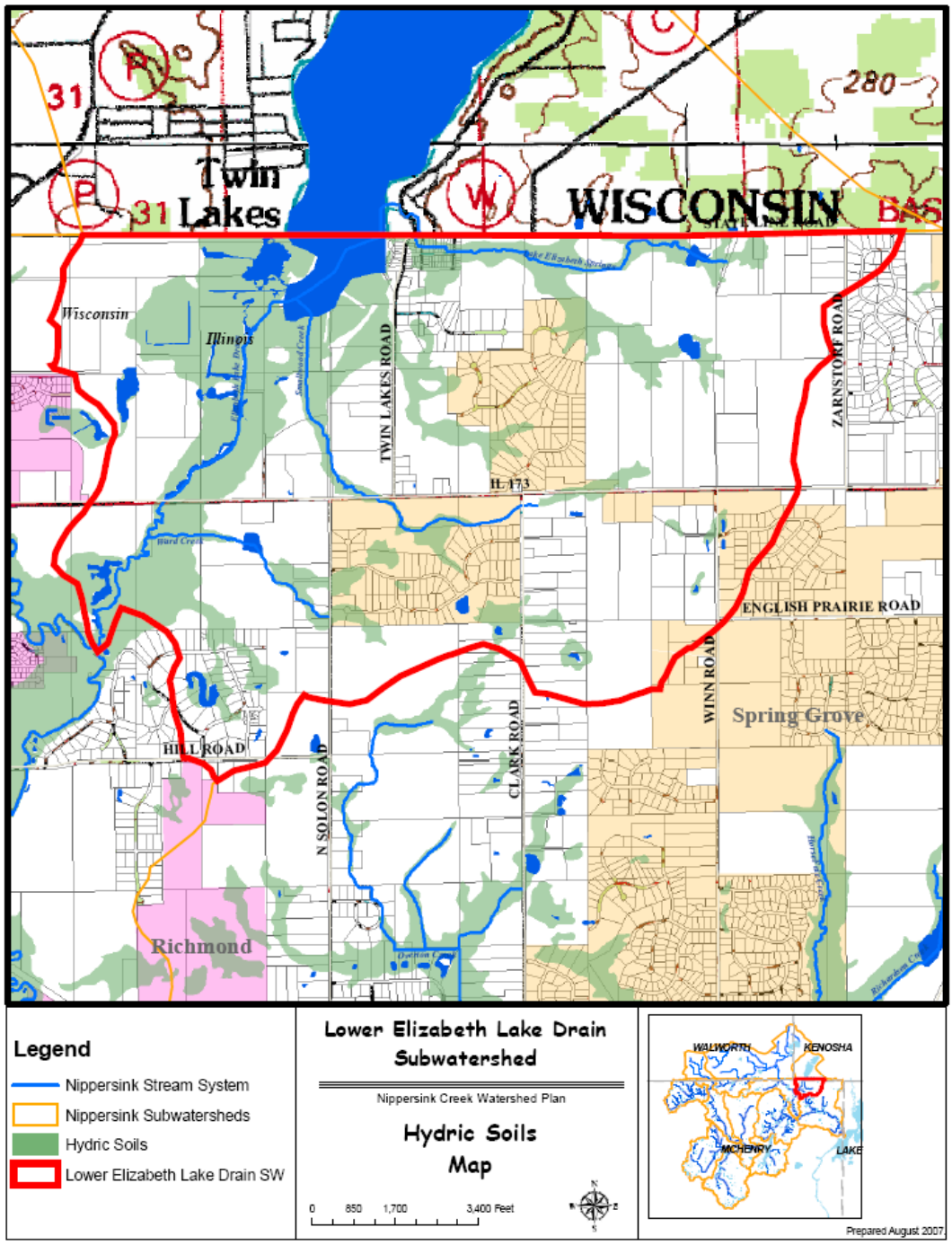
Figure 14.3 USGS Topographic Map for the Lower Elizabeth Lake Drain Subwatershed



14.1.3 Soil Characteristics

The glacial advances across McHenry County resulted in a wide variety of soil associations. The soils in the subwatershed consist of mainly silt loam and silt clay loam soil units on 2% - 6% slopes. Each major grouping of soil associations has potential impact on current and future land uses within the subwatershed. For example, hydric (wetland) soils constitute 769 acres, or 25% of the 3,079 acre subwatershed, and indicate those areas that contain functional wetlands, or former / degraded wetland areas that could be restored or enhanced.

Figure 14.4 Hydric Soils in the Lower Elizabeth Lake Drain Subwatershed



14.1.4 Pre-settlement Vegetation

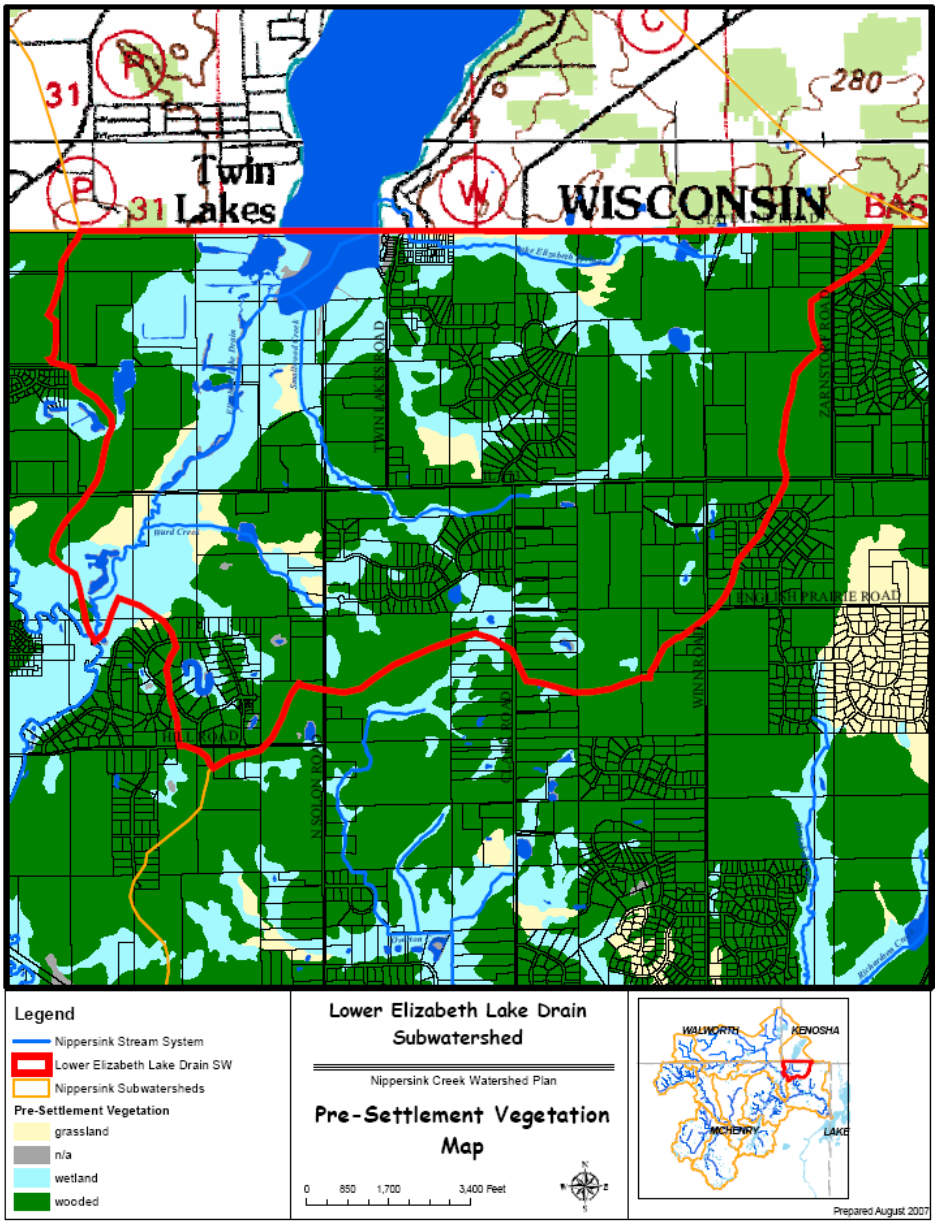
To guide future land management or restoration efforts, it is important to recognize the native plant communities that naturally evolved subsequent to the last glacial advances. Prior to European settlement in the 1830's, the Lower Elizabeth Lake Drain Subwatershed was comprised of a mixture of grassland, woodland, and wetland, as described in Table 14.1, and depicted in Figure 14.5.

Table 14.1 Pre-settlement Vegetation Summary

Land Cover Type	Area (acres)	Percent of Subwatershed
Grassland	95	3%
Wooded	2,085	68%
Wetland	803	26%
n/a	97	3%

Figure 14.5

Pre-Settlement Vegetation in the Lower Elizabeth Lake Drain Subwatershed



14.1.5 Subwatershed Drainage Features

Streams

The principal stream in the subwatershed is the Lower Elizabeth Lake Drain. This stream drains Twin Lakes, which extends northward into Wisconsin.

There are three tributaries to Elizabeth Lake Drain. The first is Ward Creek, which drains a small area (about 250 acres) generally southwest of Illinois Route 173 and North Solon Road.

The second tributary, Smallwood Creek, drains directly into the Lake Elizabeth at the south end. It drains more than 900 acres on the south east side of Lake Elizabeth.

The third tributary is Lake Elizabeth Springs. This tributary drains about 650 acres of the northeast region of the subwatershed and enters Lake Elizabeth on the east side just north of the Illinois - Wisconsin state line.

More than 75% of these streams appear to have been subjected to some degree of channelization during the past, although none appear to be actively maintained and are showing signs of re-establishing meander features indicative of natural stream systems.

Manmade Drainage Systems

Give the low-density nature of existing development in the subwatershed, nearly all of the developed land is serviced by majority of the man-made drainage features consisting of open channel swales and culverts. The areas serviced by stormwater detention basins appear to be mostly newer developments within the Village of Spring Grove. Given the age of the most land development in the subwatershed and drainage systems servicing it, the existing man-made storm water system was likely not designed to treat the runoff prior to discharge to the sensitive streams and wetlands in the subwatershed.

Agricultural Tile Systems

Due to the predominantly agricultural nature of the subwatershed, it is likely that there many functioning underground drain tile systems remaining in the subwatershed, particularly in the western half of the subwatershed. Historically, these were the areas that had poor drainage characteristics, but that farmers could successfully convert to agricultural usage by the installation of agricultural drain tile systems.

Identifying agricultural drain tile networks is important in watershed planning because current local flooding and drainage problems can often be linked to damage or age-related failure of drain tile systems. From a watershed preservation / restoration perspective, it is important to identify functional drain tile systems to determine opportunities for their

removal or reconfiguration for the purposes of restoring valuable wetland habitat, and water quality benefits. There is little doubt that many of the depressional and low lying areas in the subwatershed that are serviced by drain tiles today for agriculture were once wetland habitats that supported a very diverse ecosystem.

14.1.6 Population

The use and analysis of population data in watershed planning is critical because there is a direct correlation between the number of people residing in a watershed and the degree of impacts to the quality and quantity of the watershed's natural resources. According to the 2000 US Census, the population in the Lower Elizabeth Lake Drain subwatershed was about 841 people, or about 176 persons per square mile. In 1990, the population in the subwatershed was estimated at 625, or 131 persons per square mile (35% increase).

14.1.7 Land Cover

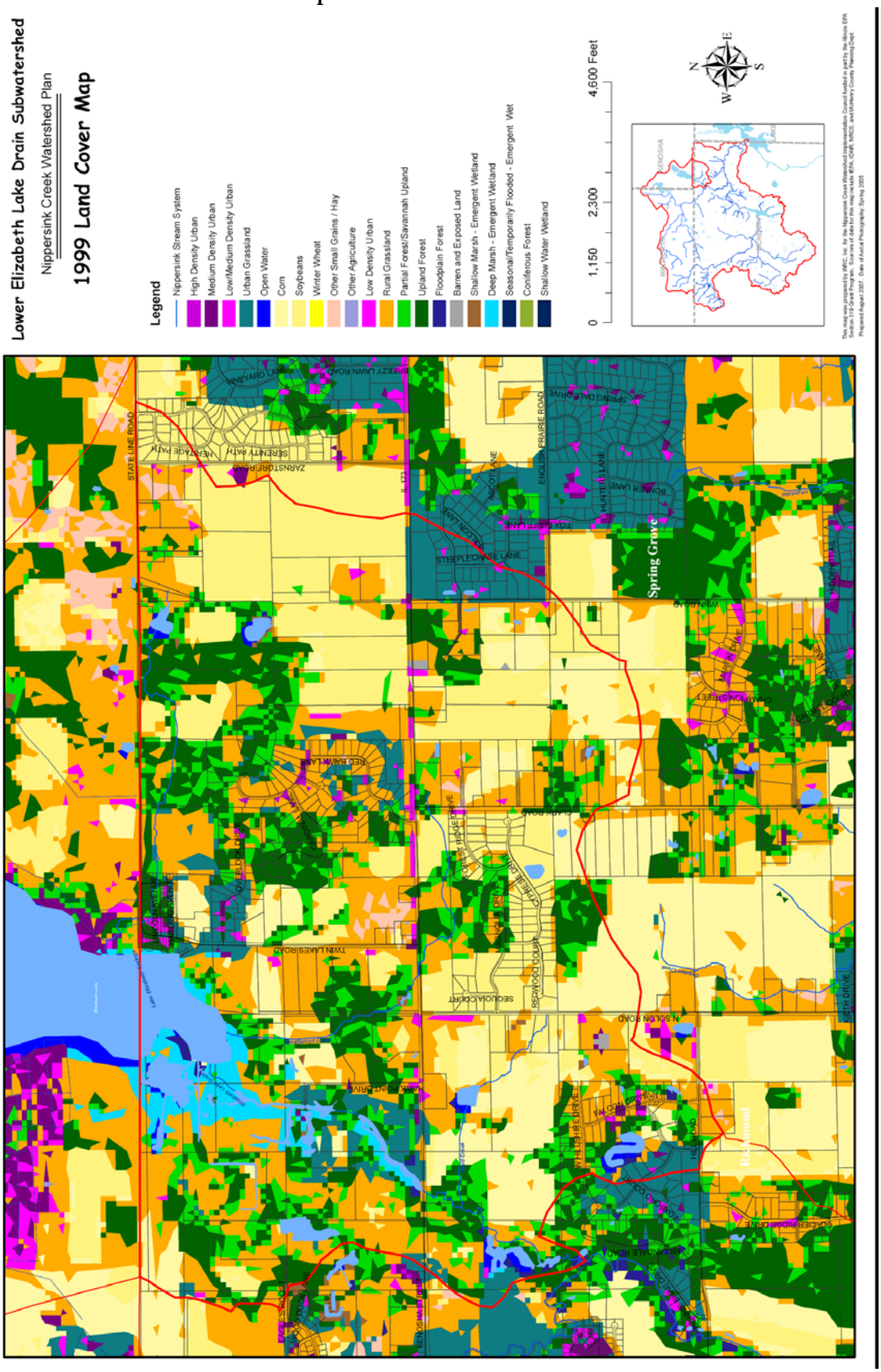
Often, the terms Land Cover and Land Use are used interchangeably. However, there are differences. Land Cover refers to the vegetation, structures, or other features that cover the land. On the other hand, Land Use (as discussed in Section 14.1.8) refers to how land is used by humans.

Land cover data for the Nippersink Creek Watershed is available from the Illinois Department of Natural Resources using LANDSAT data collected between 1998 and 1999. The dominant land cover, according to this data, was rural grasslands and agricultural row crops (70.6%). Urban landscapes accounted for roughly 7.7% of the Lower Elizabeth Lake Drain subwatershed area while wooded areas, wetlands and ponds/lakes account for an additional 21.7% of the subwatershed.

Table 14.2 1999 Land Cover for the Lower Elizabeth Lake Drain Subwatershed

Land Cover Description	Total Acres	Percent of Subwatershed
Barren & Exposed Land	3.4	0.1%
Corn, Soybeans, Other Small Grains & Hay	1,051.3	34.1%
Winter Wheat	0	0.0%
Rural Grassland	817.1	26.5%
Low Density Urban	31.5	1.0%
Medium Density Urban	9.1	0.3%
High Density Urban	4.3	0.1%
Urban Grassland	194.3	6.3%
Shallow Marsh – Emergent Wetland	8.0	0.3%
Partial Forest / Savannah Upland	320.3	10.4%
Upland Forest	466.3	15.1%
Floodplain Forest	18.6	0.6%
Coniferous Forest	0	0.0%
Deep Marsh / Emergent Wetland	114.8	3.7%
Open Water	40.7	1.3%
TOTAL	**3,079.7**	**100.0%**

Figure 14.6 1999-2000 Land Cover Map in the Lower Elizabeth Lake Drain Subwatershed



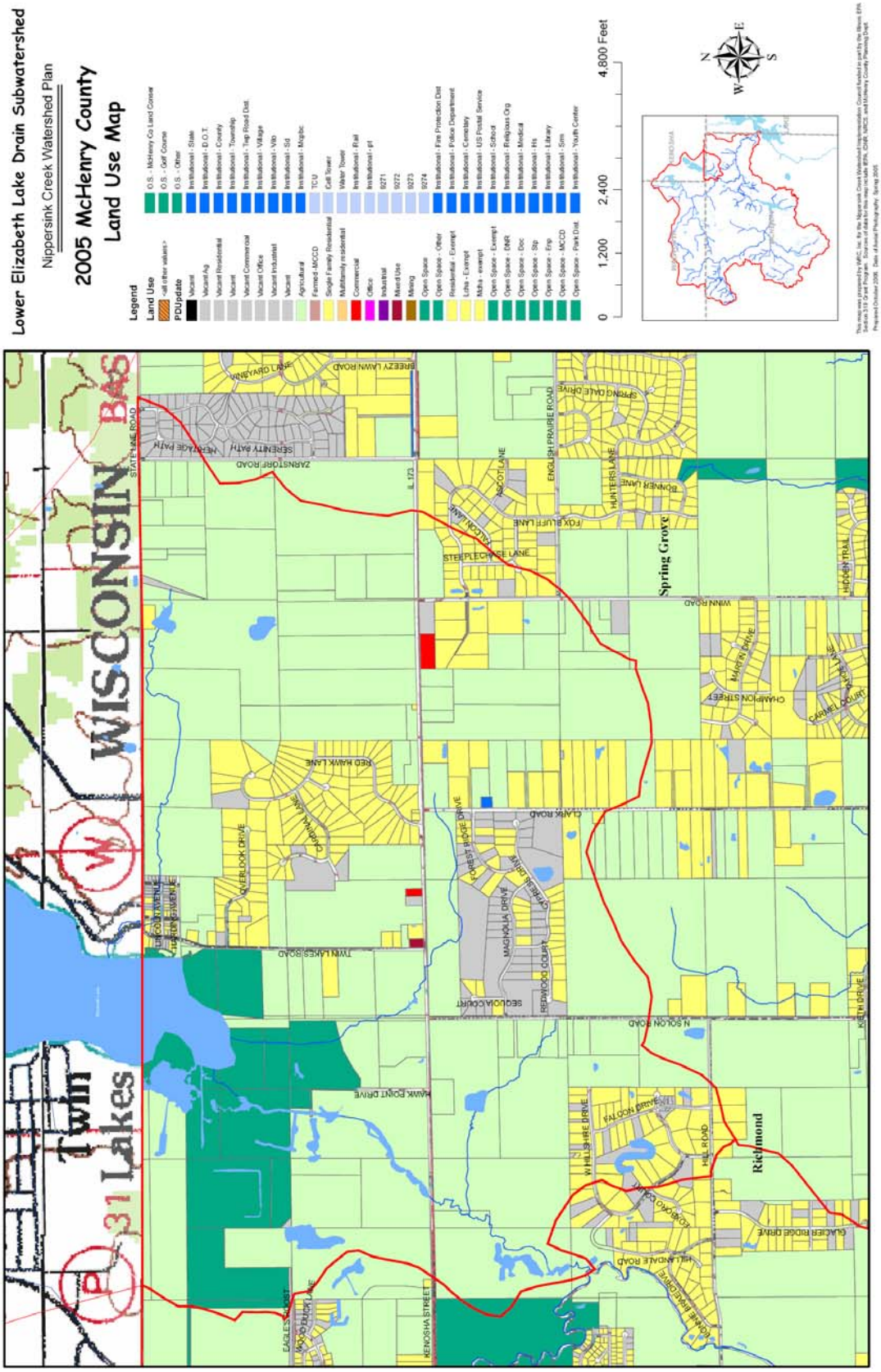
14.1.8 Land Use / Existing Watershed Development

According to the 2005 McHenry County Land Use / Zoning map, 62% of the subwatershed is zoned for agricultural use, while about 27% is either already developed or zoned for development in the future. 11% is classified as open space.

Table 14.3 McHenry County 2005 Land Use in the Lower Elizabeth Lake Drain Subwatershed

Land Use	Total Acres	Percent of Subwatershed
Vacant	0	0.0%
Vacant; Zoned Residential	199.6	6.5%
Vacant; Zoned Commercial	1.3	0.0%
Vacant; Zoned Office	0	0.0%
Vacant; Zoned Industrial	0	0.0%
Agricultural	1,915.7	62.2%
Single Family Residential	503.6	16.4%
Multi-Family Residential	0	0.0%
Commercial	5.3	0.2%
Office	0	0.0%
Industrial	0	0.0%
Mixed Use	1	0.0%
Mining	0	0.0%
Open Space	339.1	11.0%
Institutional	1	0.0%
Right of Way	113.1	3.7%
TOTAL	**3,079.7**	**100.0%**

Figure 14.7 2005 McHenry County Land Use Map in Lower Elizabeth Lake Drain Subwatershed



Development in the subwatershed has historically occurred through unincorporated residential development, although this subwatershed is currently experiencing development growth through municipal annexations by the Village of Richmond.

Table 14.4 Municipal Areas in the Lower Elizabeth Lake Drain Subwatershed

Municipality	Area (acres)	Percent of SW
Village of Spring Grove	513.7	16.7%
Unincorporated McHenry County	2,565.9	83.3%

There are 14.2 miles of roads in the subwatershed, which equates to at least 48 acres of impervious cover (roadway pavement only – excludes parking lots, sidewalks, and driveways).

Point Source Discharges

There are no documented point source discharges in the subwatershed

14.1.9 Natural Resources

McHenry County Conservation District Properties

There is one McHenry County Conservation District property in the subwatershed, which represents 11% of the Lower Elizabeth Lake Drain subwatershed area.

Table 14.5 MCCD Properties in the Lower Elizabeth Lake Drain Subwatershed

Name	Area in SW (acres)	Total MCCD Property Area
Lake Elizabeth	335.9	335.9

Other Publicly Protected Land

There are no other publicly protected open space parcels in the subwatershed.

McHenry County Natural Areas Inventory

There are three McHenry County Natural Area Inventory (MCNAI) Sites within the subwatershed, representing about 24% of the entire subwatershed.

Table 14.6 McHenry County Natural Areas Inventory Sites in the Lower Elizabeth Lake Drain Subwatershed

NAI Site ID	Name	Area in SW (acres)	Total NAI Site Area	Ownership
RIC02	Elizabeth Lake	577.0	578.0	60% Public (MCCD)
RIC03	Elizabeth Lake Springs One	119.2	119.2	Private
RIC04	Elizabeth Lake Springs Two	44.4	44.4	Private
	TOTAL	**740.6**		

Wetlands

McHenry County completed an Advanced Identification (ADID) Wetland Study in 2003. This study identified a total of 37 wetlands, totaling 706.2 acres, or 23% of the subwatershed. Of these wetlands, 566 acres (80%) were determined to be of High Quality.

Table 14.7 Mapped Wetlands in the Lower Elizabeth Lake Drain Subwatershed

ADID Code	Wetland Type	Number of Wetlands	Total Area (acres)
HFV	High Functional Value	4	102.1
HQL	High Quality lake	1	296.5
HQW	High Quality Wetland	4	270.3
FW	Farmed Wetland	12	11.6
W	Other Wetlands (lower quality)	16	25.7
	TOTAL	**37**	**706.2**

Threatened & Endangered Species

Threatened and Endangered (T&E) species data were extracted from T&E data records documented in the McHenry County Natural Areas Inventory Database. The data were collected by the McHenry County Conservation District during field studies undertaken at the subwatershed Natural Area Inventory Sites. The data indicates that there are at least twelve threatened or endangered animal species living in the subwatershed and at least eight T&E plant species present.

Table 14.8 Threatened and Endangered Species in the Lower Elizabeth Lake Drain Subwatershed

Common Name	Scientific Name	Type	Status	MCNAI Site
Sandhill Crane	Grus canadensis	Bird	St Threatened	RIC02
Black-Crowned Night Heron	Nycticorax nycticorax	Bird	St Endangered	RIC02
Black Tern	Chlidonias niger	Bird	St Endangered	RIC02
American Bittern	Botaurus lentiginosus	Bird	St Endangered	RIC02
Forster's Tern	Stema forsteri	Bird	St Endangered	RIC02
Least Bittern	Ixobrychus exilis	Bird	St Threatened	RIC02
Banded Killfish	Fundulus diaphanus	Fish	St Threatened	RIC02
Pugnose Shiner	Notropis anogenus	Fish	St Endangered	RIC02
Blackchin Shiner	Notropis heterodon	Fish	St Threatened	RIC02
Blacknose Shiner	Notropis heterolepis	Fish	St Threatened	RIC02
Iowa Darter	Etheostoma exile	Fish	St Threatened	RIC02
Blanding's Turtle	Emydoidea blandingii	Reptile	St Threatened	RIC02

Source: McHenry County Natural Areas Inventory Database, 2005

Fishery

While no fishery data were collected for this subwatershed, it is possible that fishery data for this subwatershed was collected and recorded by the McHenry County Conservation District. MCCD should be contacted if more information about the subwatershed fishery is desired.

Mussels

While no mussel data were collected for this subwatershed, it is possible that fishery data for this subwatershed was collected and recorded by the McHenry County Conservation District. MCCD should be contacted if more information about the presence of mussels in the subwatershed is desired.

Existing Greenways

There are no formal greenways in the Lower Elizabeth Lake Drain Subwatershed, however, a large percentage of Elizabeth Lake Drain is owned by either the MCCD or the Richmond Hunting Club, Inc. (private sportsman club).

14.2 Analysis of Subwatershed Data and Problem Identification

14.2.1 Water Quality Data & Identified Problems

The Illinois Environmental Protection Agency (IEPA) is tasked with assessing the quality of the surface water resources of Illinois. The IEPA has determined Nippersink Creek's designated uses are:

- Aquatic Life
- Fish Consumption
- Primary Contact
- Secondary Contact
- Aesthetic Quality

The IEPA periodically produces a 303(d) list, which identifies waterways that are not achieving certain designated uses. In the 2006 IEPA 303(d) list, Nippersink Creek is identified as being in Full Support of its Aquatic Life Designated Use, which is notable for a stream in northeastern Illinois.

However, Nippersink Creek was also determined to be Non-supporting of its Primary Contact Designated Use, due to excessive levels of fecal coliform. This pollutant, associated with human and animal waste, was listed as coming from an unknown source. The IEPA also identified fish consumption, secondary contact and aesthetic quality as designated uses for Nippersink Creek, although the ratings for these uses were classified as "not assessed".

The water quality of Elizabeth Lake Drain is largely unquantified. While there is no published water quality data, the water quality of Twin Lakes, and the North Branch Nippersink Creek, has historically been very good. Numerous biological studies conducted on the North Branch indicate high quality in-stream habitat (pools and riffles; gravel & sand substrate) and excellent species diversity, including many fish and macroinvertebrate species that are very intolerant of pollution in the water column.

The Illinois Environmental Protection Agency does not conduct any water quality sampling in the subwatershed.

The Fox River Watershed Monitoring Network (FRWMN), administered by the not-for-profit group, *Friends of the Fox River*, maintains four volunteer stream monitoring sites on Nippersink Creek, however there are no established FRWMN monitoring stations on Elizabeth Lake Drain.

14.2.2 Flooding Problems

At the time of this writing, no data were provided by the County or municipalities regarding existing flooding problems. Analysis of available floodplain information suggests that there are less than 5 homes in the 100 Year Floodplain.

14.2.3 Projected Development & Growth

Development in the Lower Elizabeth Lake Drain subwatershed is expected to be rapid. Much of the remaining undeveloped land is adjacent to either the Village of Spring Grove or the Village of Richmond, and the presence of poorly-draining hydric soils on those properties is minimal. Therefore, there is a reasonable probability that as much as 975 acres of new development could be built in the subwatershed.

14.2.4 Natural Area Protection / Preservation Issues

McHenry County Natural Area Inventory Sites

In this subwatershed, about 45% of the McHenry County Natural Area Inventory Sites (MCNAI) sites are protected through public ownership (336 of 740 acres on MCCD property).

Elizabeth Lake (MCNAI RIC02) is the largest MCNAI site in the Lower Elizabeth Lake Drain subwatershed. This 578 acre site contains sedge meadows, basin marshes, graminoid fens, a calcareous Floating Mat, and a glacial lake. The MCNAI database indicates that the site is currently impaired by water table alterations, brush encroachment, and invasive species (Cattails & Purple Loosestrife) and siltation. About 60% of this site is protected through ownership and management by the MCCD.

The Elizabeth Lake Springs One (MCNAI RIC03) is a 119 acre sedge meadow located in the far northeast corner of the subwatershed. The MCNAI database indicates that this site is impaired by water table alterations, siltation, invasive species (Reed Canary Grass & Purple Loosestrife), an upstream impoundment, and development. This NAI site is entirely unprotected from future development or other land disturbances.

The Elizabeth Lake Springs Two (MCNAI RIC04) site is a 44 acre sedge meadow northeast of Twin Lakes Road and IL Route 173. This sedge meadow extends up into a large-lot residential subdivision and the lower half is located on undeveloped parcels that have a high probability of being development in the near future. The MCNAI database lists this site as impaired by siltation, water table alteration and future development.

14.3 Subwatershed-Specific Recommendations to Protect Water Resources

The following section discusses the Best Management Practices (BMP's) identified for this subwatershed that should be implemented to address existing or potential water quality impairments. The location of each recommended BMP project is presented in Figure 14.9.

Pollutant Loading Modeling, as discussed in Chapter 3, identified current and future pollutant loadings, based upon land use, soils, slopes, etc., and quantified these loadings. The results of this Pollutant Loading modeling were then used to identify the types of BMP's that should be implemented to create a loading reduction of those pollutants. Table 14.9 presents a summary of the recommended BMP projects, as well as the expected pollutant loading reductions expected if the BMP's are implemented, and function as intended.

Table 14.10 presents detailed cost and logistical information on each of the recommended BMP projects. Below is a summary list of recommendations for the subwatershed to help stakeholders and decision makers meet the Goals and Objectives set forth for Nippersink Creek. Background information regarding how each type of recommendation addresses watershed concerns and/or impairments (existing or future) can be found in Chapter 4.

Type:	Education / Outreach; Regulatory; Site Restoration; Monitoring; Permanent Habitat Protection, Water Quality
Target Goals:	Which watershed plan goals the recommendation is intended to address.
Initial Implementation Cost:	The initial cost, in 2007 dollars to initiate the recommended action, if applicable.
Initial Outreach Cost:	The initial cost, in 2007 dollars to initiate the recommended action, if applicable.
Annual Cost:	The long term expected annual cost (in 2007 dollars) to successfully implementation of the recommendation
Responsible Party:	Identifies the LEAD agency, entity, or landowner who will ultimately have to execute the recommendation. SUPPORTING parties, such as government agencies, grant sources, etc. may also be identified here.
Priority:	A ranking of the BMP recommendations, based upon the nature / urgency of the existing / potential impairment; the availability of willing landowners)/ partners; short-term vs. long-term development pressure; and whether the project is a new effort, or a retrofit of an existing practice.

The project cost estimates contained in this report should be considered preliminary, and are only presented to identify the potential magnitude of cost, from a watershed scale perspective. No site-specific investigation, analysis, or design of any recommended project, from which accurate cost information could be obtained, was completed as part of the preparation of the 2008 Nippersink Creek Watershed Plan.

If a watershed stakeholder decides to apply for grant funding assistance to implement any of the recommended projects presented in this report, they should first undertake any additional studies / research needed to determine an updated / accurate project cost. They should not solely rely on the cost estimates presented in the NCWP report as the basis for their grant request.

Note: The following acronyms for responsible parties identified in Table 14.10 are presented below:

NCWPC	Nippersink Creek Watershed Planning Committee
NRCS	Natural Resource Conservation Service
SWCD	McHenry County Soil and Water Conservation District
MCCD	McHenry County Water Conservation District
TLC	The Land Conservancy of McHenry County
IDOT	Illinois Department of Transportation
IEPA	Illinois Environmental Protection Agency
MCDOT	McHenry County Department of Transportation
MCDEF	McHenry County Defenders

Figure 14.9 Lower Elizabeth Lake Drain Subwatershed Site Recommendations Map

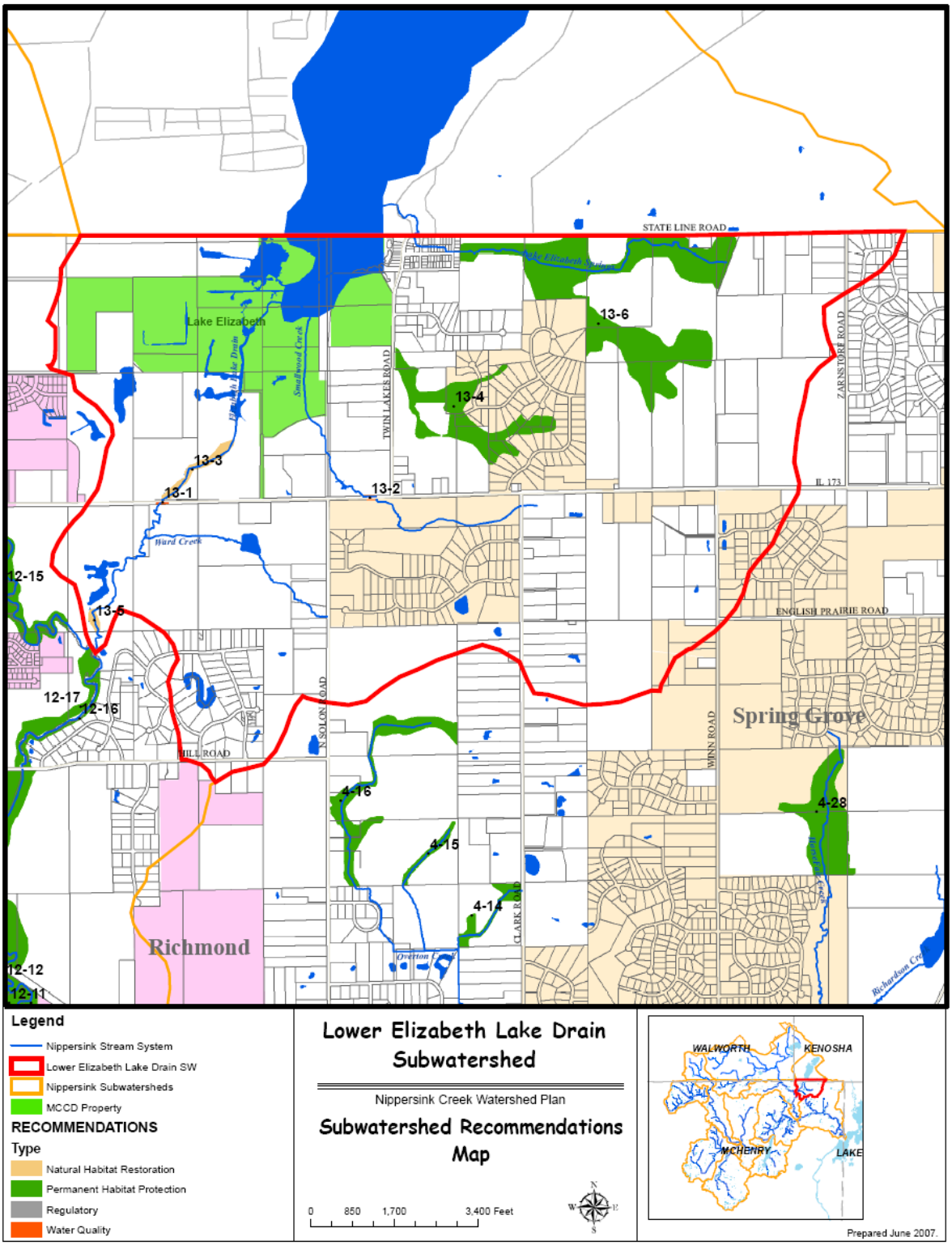


Table 14.9 BMP Selection & Associated Pollutant Load Reduction for the Lower Elizabeth Lake Drain Subwatershed

BMP	Type of BMP	Project Locations**	BMP		Removal Efficiency***			(lbs/year)****			Percentage Reduction		
			Size	Unit	TN	TP	TSS	TN	TP	TSS	TN	TP	TSS
Permanent Habitat Protection	Site-specific	13-4, 13-6	6.8	acres	53%	51%	88%	67	4	4	0.6	0.6	1
Dam Removal / Modification	Site-specific	13-3, 13-5	1	lump sum	0%	0%	0%	0	0	0	0	0	0
Regulatory*	Watershed-Specific	Subwatershed wide	1	Water-shed	5%	5%	5%	569	37	23	5	5	5
Nutrient Management	Watershed-specific	Subwatershed wide	540	acres	70%	28%	-	6,990	180	-	61.4	24.6	-
Stormwater BMPs	Site-specific	13-1, 13-2	93	acres	36%	95%	95%	619	105	66	5.4	14.4	14.4
Total								8,245	326	94	72.4	44.5	20.3

*Regulatory programs are assumed to have nominal pollutant reduction rates of 5%.

** Project locations and details are described in the corresponding chapter.

*** TN = total Nitrogen; TP = total Phosphate; TSS = total suspended solids or Sediment.

**** The unit of “TSS” is “Tons/year”.

Table 14.10 Recommended Projects in the Lower Elizabeth Lake Drain Subwatershed

SUB WATERSHED	RECOMMENDATION #	TARGET GOAL	DESCRIPTION	RESPONSIBLE PARTY	ACRES	UNIT COST	INITIAL IMPLEMENTATION COST	INITIAL OUTREACH COST	ANNUAL MAINTENANCE COST	PRIORITY
Lower Elizabeth	13-1	Water Quality	Government Outreach to install Stormwater BMP's to treat roadway runoff at IL 173 prior to discharge into Elizabeth Lake Drain	NCWPC / IDOT			$50,000	$500	$2,500	E
Lower Elizabeth	13-2	Water Quality	Government Outreach to install Stormwater BMP's to treat roadway runoff at IL 173 prior to discharge into Smallwood Creek	NCWPC / IDOT			$50,000	$500	$2,500	E
Lower Elizabeth	13-3	Natural Habitat Restoration	Landowner Outreach to identify on-line dam structures on Elizabeth Lake Drain and investigate feasibility of removal or modification for fish passage	NCWPC / RICHMOND HUNTING CLUB			$15,000	$500	$750	E
Lower Elizabeth	13-4	Permanent Habitat Protection	Landowner Outreach to private landowners to create Conservation Easement to protect Elizabeth Lake Springs Two MCNAI site; western parcels planned for future development	NCWPC / VILLAGE OF RICHMOND / TLC	44.6	$1,500	$66,863	$1,000	$4,458	C
Lower Elizabeth	13-5	Natural Habitat Restoration	Landowner Outreach to identify on-line dam structures on Elizabeth Lake Drain and investigate feasibility of removal or modification for fish passage	NCWPC / RICHMOND HUNTING CLUB			$15,000	$500	$750	E
Lower Elizabeth	13-6	Permanent Habitat Protection	Landowner / Government Outreach to ensure Conservation Design for proposed developments containing portions of Elizabeth Lake Springs MCNAI site	NCWPC / VILLAGE OF SPRING GROVE / TLC	127.4	$500	$63,708	$1,500	$3,185	B
				SW TOTALS	**172.0**		**$260,571**	**$4,500**	**$14,143**	

PRIORITY

- **A Projects that have cooperating partners, can move to implementation quickly. Implementation Timeframe 1 to 3 years**
- **B Projects subject to imminent development pressure, Implementation Timeframe 1 to 2 years**
- **C Projects needed to protect sensitive areas. Timeframe 1 to 2 years**
- **D Restoration projects, Timeframe 1 to 5 years**
- **E Retrofit Projects, Timeframe 1 to 5 years**
- **F Existing Pollution Potential, Timeframe 1 to 2 years**
- **G Policy / Opportunity Review Project, Timeframe 1 to 3 years**

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Chapter 15
Hebron Peatlands Subwatershed Assessment

This section presents a summary of the characteristics of the Hebron Peatlands Subwatershed, as well as specific issues and challenges in this subwatershed that must be addressed in the Nippersink Creek Watershed Management Plan.

15.1 Subwatershed Characteristics

The following section provides an overview of the physical characteristics of the subwatershed.

15.1.1 Subwatershed Location

The Hebron Peatlands subwatershed is located in the northwest portion of the watershed. This subwatershed, located within northwest Hebron Township, has an area of 3,751 acres, or 5.9 square miles (2.9% of watershed). The boundary of the subwatershed is shown in Figure 15.1. This subwatershed constitutes part of the headwaters of the North Branch Nippersink Creek, which originates in southern Walworth County, Wisconsin. Hebron Creek flows northeast from the Hebron Peatlands subwatershed and joins the North Branch Nippersink in Wisconsin, and then flows southeast back into Illinois near Richmond.

Figure 15.1

Location of Hebron Peatlands Subwatershed

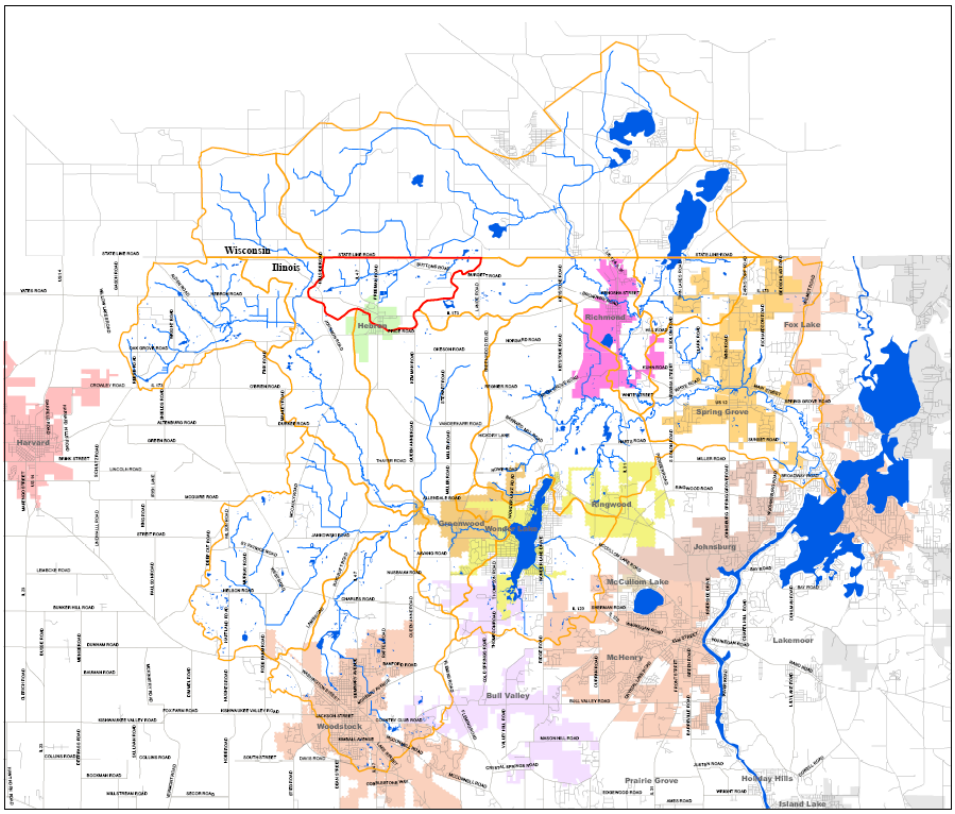
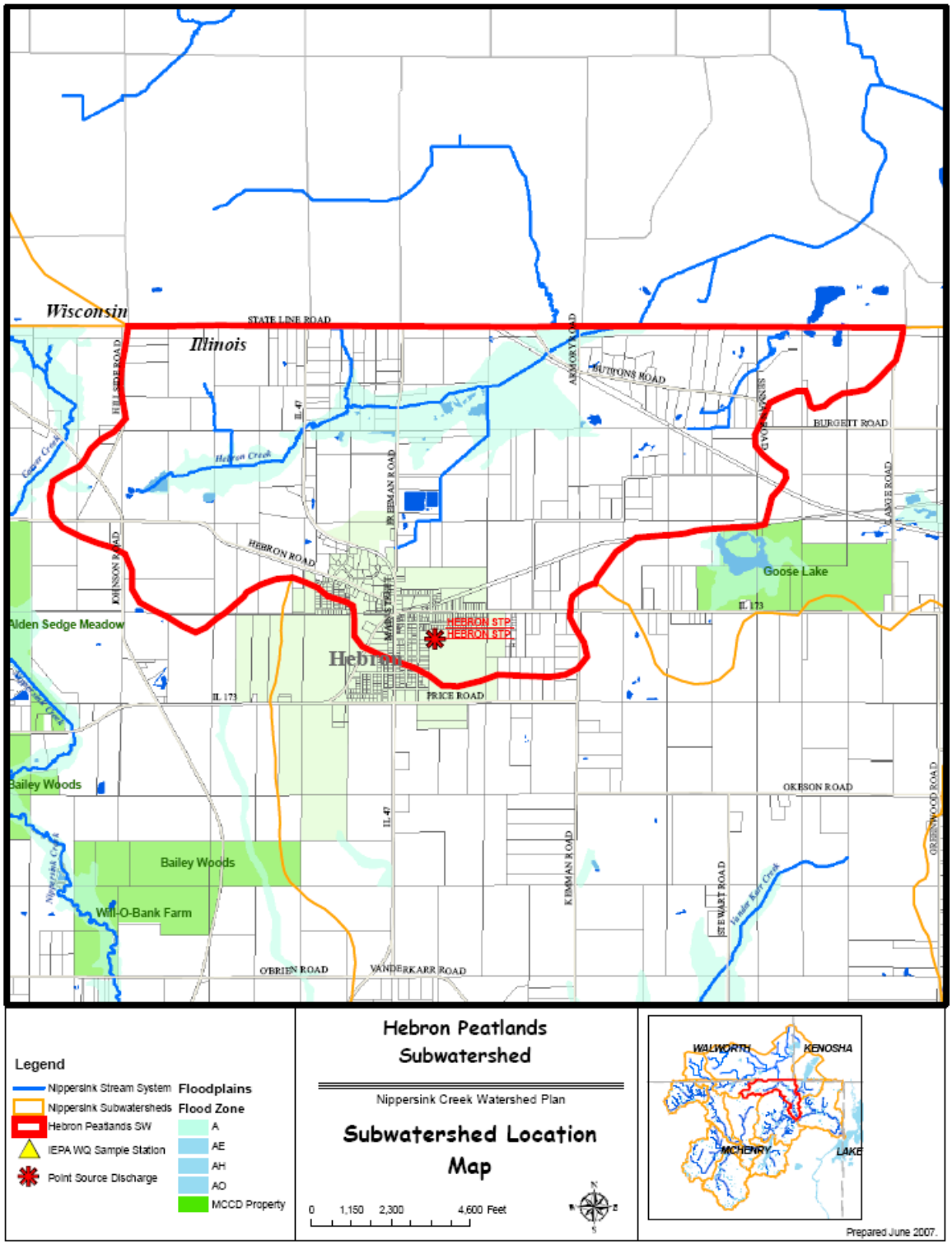


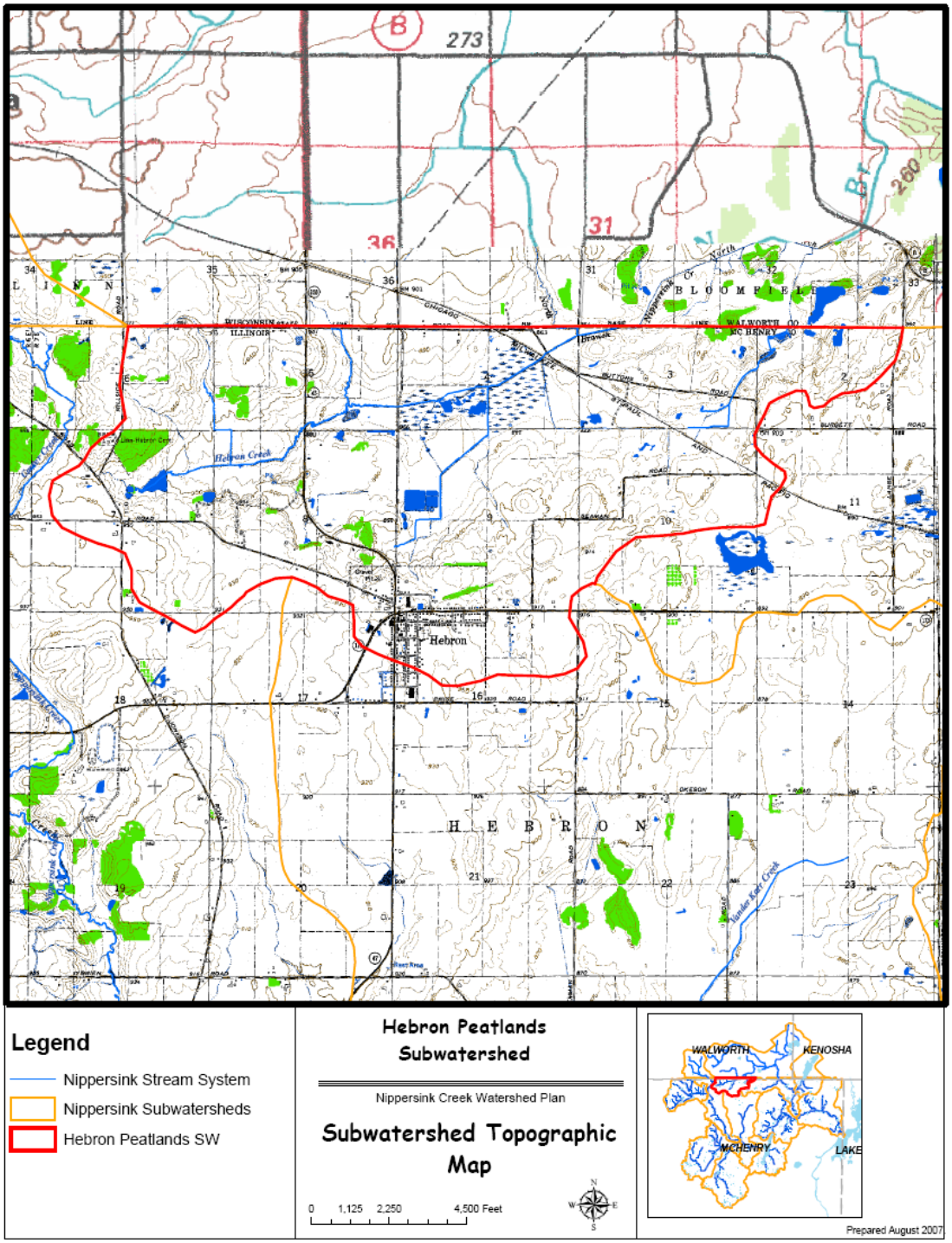
Figure 15.2 Hebron Peatlands Subwatershed Map



15.1.2 Topography & Geology

The topography of the Hebron Peatlands varies from very flat to very steep (<1% to > 15%). The highest point in the watershed is located in the cemetery on Hillside Road, about ¼ mile north of the intersection of Johnson Road and Hillside Road (elevation = 1,000'). At the subwatershed outlet, where Hebron Creek crosses the state line (1/2 mile east of Armory Road), the elevation is 854 feet above mean sea level.

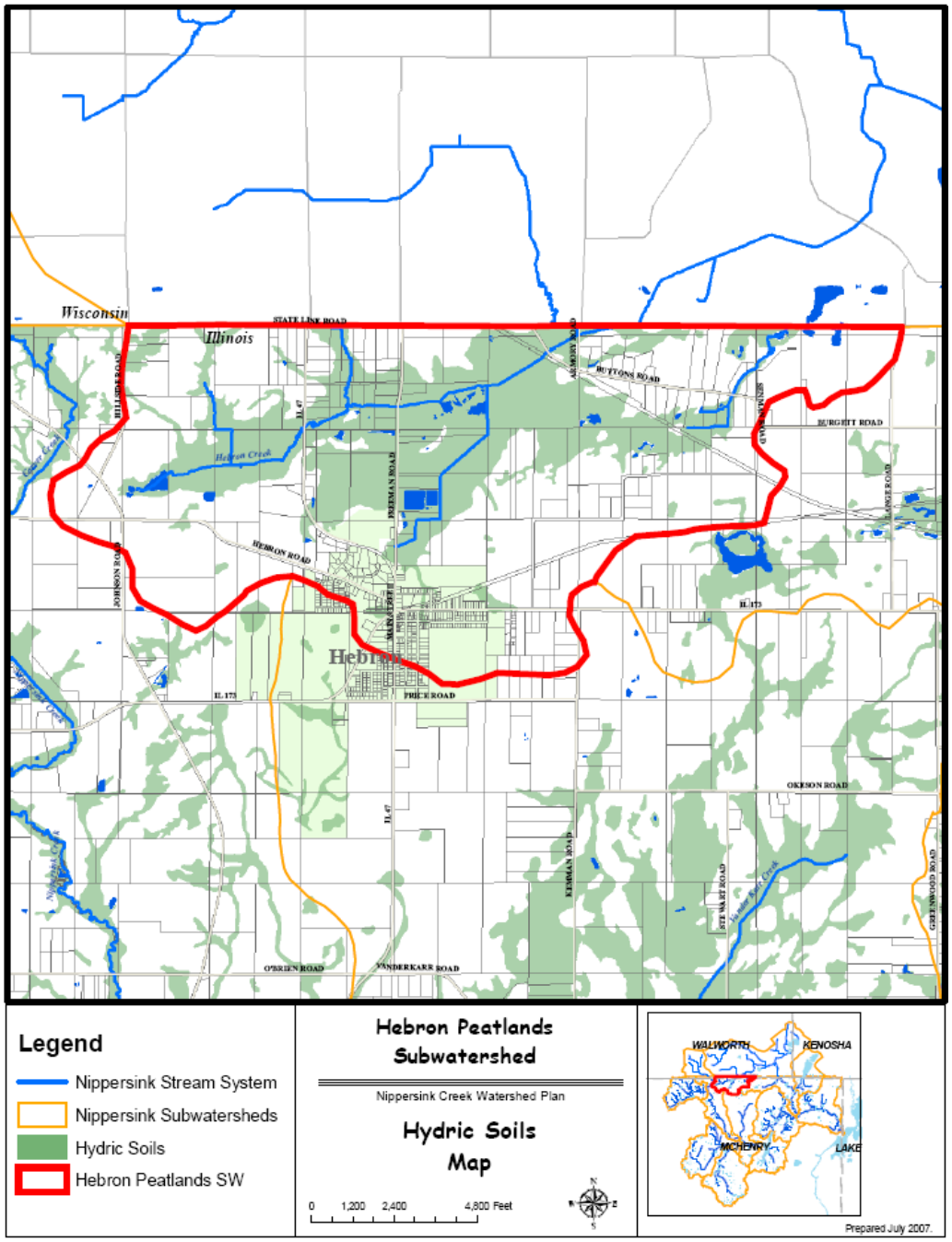
Figure 15.3 USGS Topographic Map for the Hebron Peatlands Subwatershed



15.1.3 Soil Characteristics

The glacial advances across McHenry County resulted in a wide variety of soil associations. The soils in the subwatershed consist of mainly Houghton and Lena muck and Ringwood and Kish loam soil units on 0% - 2% slopes. Each major grouping of soil associations has potential impact on current and future land uses within the subwatershed. For example, hydric (wetland) soils constitute 1,232 acres, or 33% of the 3,751 acre subwatershed, and indicate those areas that contain functional wetlands, or former / degraded wetland areas that could be restored or enhanced.

Figure 15.4 Hydric Soils in the Hebron Peatlands Subwatershed



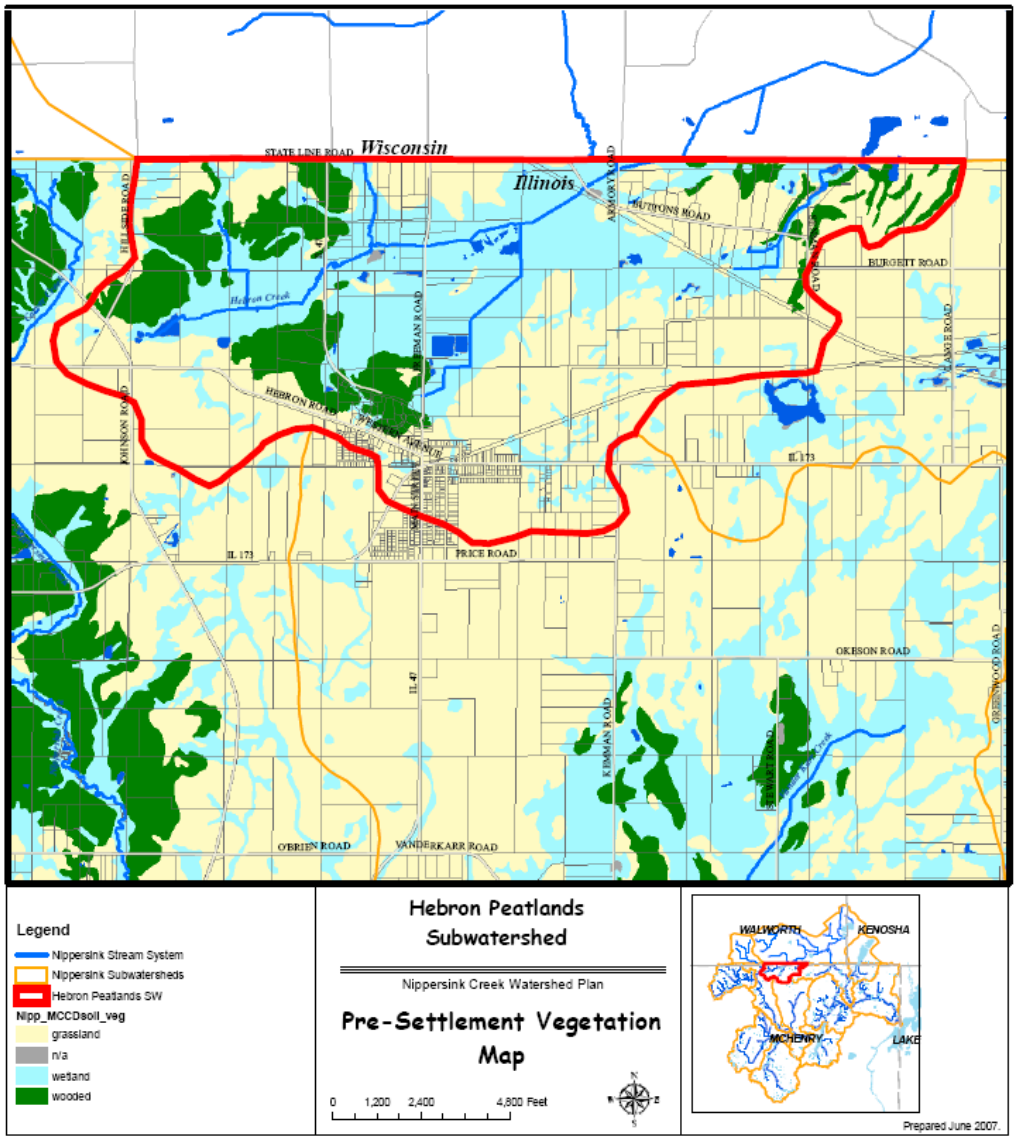
15.1.4 Pre-settlement Vegetation

To guide future land management or restoration efforts, it is important to recognize the native plant communities that naturally evolved subsequent to the last glacial advances. Prior to European settlement in the 1830's, the Hebron Peatlands Subwatershed was comprised of a mixture of grassland, woodland, and wetland, as described in Table 15.1, and depicted in Figure 15.5.

Table 15.1 Pre-settlement Vegetation Summary

Land Cover Type	Area (acres)	Percent of Subwatershed
Grassland	1,877.5	50%
Wooded	526.6	14%
Wetland	1,307.3	35%
n/a	34.1	1%

Figure 15.5 Pre-Settlement Vegetation in the Hebron Peatlands Subwatershed



15.1.5 Subwatershed Drainage Features

Streams

The principal stream in the Hebron Peatlands subwatershed is Hebron Creek. Hebron Creek is a 3.3 mile long perennial stream that has its origins in the agricultural pond just to the northeast of the Hebron Road / Johnson Road intersection. About 70% of this stream has been subjected to channelization. Of the seven miles of streams in the subwatershed, 81% are channelized.

Manmade Drainage Systems

Analysis of land uses and aerial photography indicates that the majority of the man-made drainage features in the subwatershed consist of open channel swales and culverts associated with the existing roadway system. Structural drainage features such as detention basins and storm sewers are more or less limited to a 225 acre area within the Village of Hebron. There are approximately five dry-bottom detention facilities in the subwatershed, all located in the newer sections of the Village of Hebron. Given its age, the existing storm water system was not designed or constructed to treat the runoff from developed areas prior to discharge to the sensitive streams and wetlands in the subwatershed.

Agricultural Tile Systems

Due to the predominantly agricultural nature of the subwatershed, it is likely that there many functioning underground drain tile systems remaining in the subwatershed, particularly in the western half of the subwatershed. Historically, these were the areas that had poor drainage characteristics, but that farmers could successfully convert to agricultural usage by the installation of agricultural drain tile systems.

Identifying agricultural drain tile networks is important in watershed planning because current local flooding and drainage problems can often be linked to damage or age-related failure of drain tile systems. From a watershed preservation / restoration perspective, it is important to identify functional drain tile systems to determine opportunities for their removal or reconfiguration for the purposes of restoring valuable wetland habitat, and water quality benefits. There is little doubt that many of the depressional and low lying areas in the subwatershed that are serviced by drain tiles today for agriculture were once wetland habitats that supported a very diverse ecosystem.

15.1.6 Population

The use and analysis of population data in watershed planning is critical because there is a direct correlation between the number of people residing in a watershed and the degree of impacts to the quality and quantity of the watershed's natural resources. According to the 2000 US Census, the population in the Hebron Peatlands subwatershed was about 990 people, or about 170 persons per square mile. In 1990, the population in the subwatershed was estimated at 800, or 137 persons per square mile (23% increase)

14.1.7 Land Cover

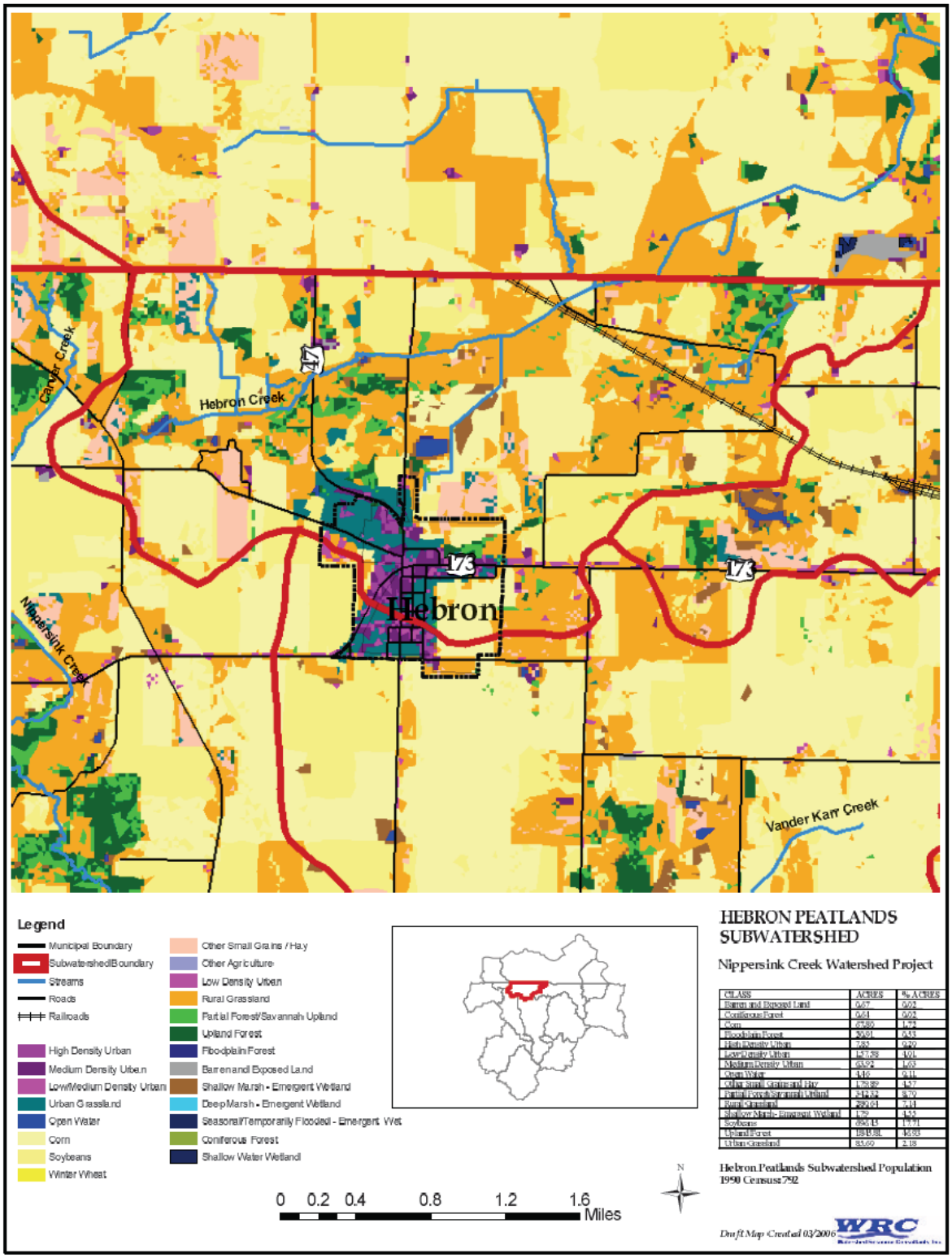
Often, the terms Land Cover and Land Use are used interchangeably. However, there are differences. Land Cover refers to the vegetation, structures, or other features that cover the land. On the other hand, Land Use (as discussed in Section 12.1.7) refers to how land is used by humans.

Land cover data for the Nippersink Creek Watershed is available from the Illinois Department of Natural Resources using LANDSAT data collected between 1998 and 1999. The dominant land cover, according to this data, was rural grasslands and agricultural row crops (82%). Urban landscapes accounted for roughly 8.4% of the Hebron Peatlands subwatershed area, while wooded areas and wetlands account for an additional 9.6% of the subwatershed.

Table 15.2 1999 Land Cover for the Hebron Peatlands Subwatershed

Land Cover Description	Total Acres	Percent of Subwatershed
Barren & Exposed Land	2.6	0.1%
Corn, Soybeans, Other Small Grains & Hay (row crop agriculture)	1,766.0	47.1%
Winter Wheat	0	0.0%
Rural Grassland	1,306.0	34.8%
Low Density Urban	44.8	1.2%
Medium Density Urban	61.9	1.7%
High Density Urban	23.2	0.6%
Urban Grassland	184.3	4.9%
Shallow Marsh – Emergent Wetland	59.4	1.6%
Partial Forest /Savannah Upland	153.9	4.1%
Upland Forest	128.9	3.4%
Floodplain Forest	2.1	0.1%
Coniferous Forest	1.7	0.0%
Deep Marsh / Emergent Wetland	0	0.0%
Open Water	15.9	0.4%
TOTAL	**3,750.7**	**100.0%**

Figure 15.6 1999-2000 Land Cover Map in the Hebron Peatlands Subwatershed



CLASS	ACRES	% ACRES
Barren and Exposed Land	0.67	0.02
Coniferous Forest	0.61	0.02
Corn	67.86	1.72
Floodplain Forest	30.81	0.53
High Density Urban	7.83	0.20
Low Density Urban	127.58	3.24
Medium Density Urban	63.92	1.63
Open Water	4.16	0.11
Other Small Grains and Hay	179.89	4.57
Partial Forest/Savannah Upland	342.32	8.70
Rural Grassland	279.61	7.11
Shallow Marsh - Emergent Wetland	1.79	0.05
Soybeans	890.15	19.71
Upland Forest	189.81	4.83
Urban Grassland	83.69	2.18

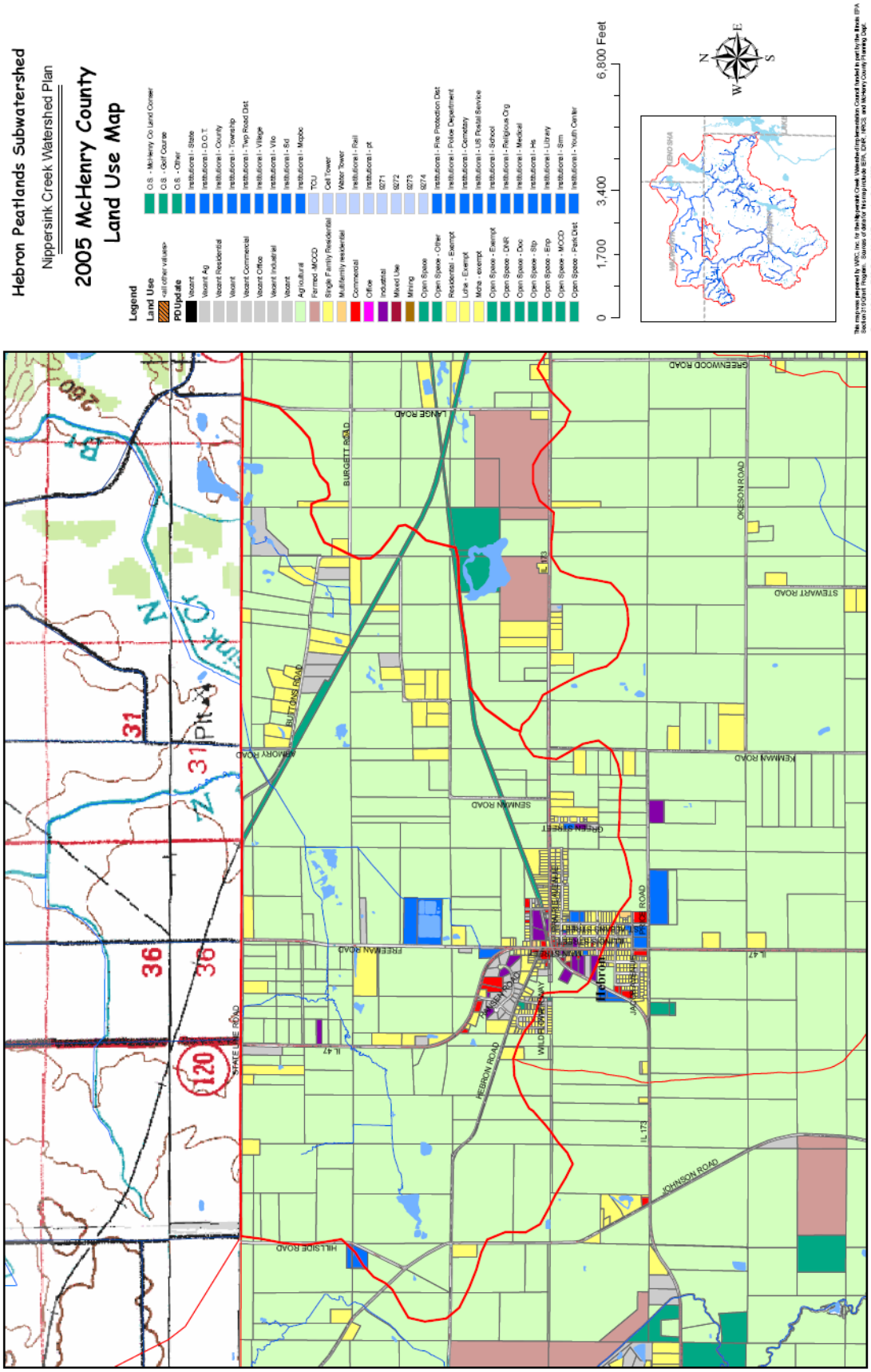
15.1.8 Land Use / Existing Watershed Development

According to the 2005 McHenry County Land Use / Zoning map, 82% of the subwatershed is zoned for agricultural use, while about 17% is either already developed or zoned for development in the future. Only 1.3% is classified as open space.

Table 15.3 McHenry County 2005 Land Use in the Hebron Peatlands Subwatershed

Land Use	Total Acres	Percent of Subwatershed
Vacant	1.0	0.0%
Vacant; Zoned Residential	64.0	1.7%
Vacant; Zoned Commercial	1.8	0.0%
Vacant; Zoned Office	0	0.0%
Vacant; Zoned Industrial	29.2	0.8%
Agricultural	3,093.7	82.5%
Single Family Residential	298.5	8.0%
Multi-Family Residential	1.5	0.0%
Commercial	13.7	0.4%
Office	0.4	0.0%
Industrial	22.5	0.6%
Mixed Use	0.8	0.0%
Mining	0	0.0%
Open Space	48.2	1.3%
Institutional	40.2	1.1%
Right of Way	135.5	3.6%
TOTAL	**3,751.0**	**100.0%**

Figure 15.7 2005 McHenry County Land Use Map in Hebron Peatlands Subwatershed



Development in the subwatershed has historically occurred through unincorporated residential development, although this subwatershed is currently experiencing development growth through municipal annexations by the Village of Hebron.

Table 15.4 Municipal Areas in the Hebron Peatlands Subwatershed

Municipality	Area (acres)	Percent of Subwatershed
Village of Hebron	364.1	9.7%
Unincorporated McHenry County	3,387.2	90.3%

There are 16.8 miles of roads in the subwatershed, which equates to more than 57 acres of impervious cover (roadway pavement only – excludes parking lots, sidewalks, and driveways).

Point Source Discharges

There is one point source discharge in the subwatershed. Tthe Village of Hebron maintains a municipal waste water treatment plant which discharges into a tributary of Hebron Creek.

Table 15.5 NPDES Point Source Discharges in the Hebron Peatlands Subwatershed

Name	Average Discharge (mgd)	Receiving Stream	IEPA Permit Number
Hebron WWTP	0.1	Tributary to Hebron Creek	IL0026433

Water quality and discharge information for Hebron WWTP can be found on the EPA's website at: **http://oaspub.epa.gov/enviro/pcs_det_reports.detail_report?npdesid=IL0026433**

15.1.9 Natural Resources

McHenry County Conservation District Properties

There are no McHenry County Conservation District properties in the subwatershed,

Other Publicly Protected Land

The Village of Hebron and Hebron Township own about 47 acres of land in the subwatershed. Most of this is used for municipal / township infrastructure purposes.

Table 15.6 Other Publicly Protected Land in the Hebron Peatlands Subwatershed

Name	Area (acres)	# of Parcels
Hebron Township	13.8	7
Village of Hebron	33.0	8
Total	**46.8**	

McHenry County Natural Areas Inventory

There are three McHenry County Natural Area Inventory (MCNAI) Sites within the subwatershed, representing about 23% of the entire subwatershed.

Table 15.7 McHenry County Natural Areas Inventory Sites in the Hebron Peatlands Subwatershed

MCNAI Site ID	Name	Area in SW (acres)	Total MCNAI Site Area	Ownership
HEB04	Hidden Marsh	51.5	51.9	Private
HEB09	Vanderpal Prairie	68.6	68.6	Private
HEB03	Hebron Peatlands	744.4	744.4	Private
	TOTAL	**864.5**		

Wetlands

McHenry County completed an Advanced Identification (ADID) Wetland Study in 2003. This study identified a total of 40 wetlands, totaling 771 acres, or 20.6% of the Hebron Peatlands subwatershed. Of these wetlands, 548.6 acres (71%) were determined to be of High Quality.

Table 15.8 Mapped Wetlands in the Hebron Peatlands Subwatershed

ADID Code	Wetland Type	Number of Wetlands	Total Area (acres)
HFV	High Functional Value	5	120.3
HQW	High Quality Wetland	4	548.6
FW	Farmed Wetland	22	44.4
W	Other Wetlands (lower quality)	9	57.7
	TOTAL	**40**	**771.0**

Threatened & Endangered Species

Threatened and Endangered (T&E) species data were extracted from T&E data records documented in the McHenry County Natural Areas Inventory Database. The data were collected by the McHenry County Conservation District during field studies undertaken at subwatershed Natural Area Inventory Sites. The data indicates that there are at least four threatened or endangered animal species living in the subwatershed.

Table 15.9 Threatened and Endangered Species in the Hebron Peatlands Subwatershed

Common Name	Scientific Name	Type	Status	MCNAI Site
Tamarack	Larix laricina	Plant	St Threatened	HEB03
Common Bog Arrow Grass	Triglochin maritima	Plant	St Threatened	HEB03
False Asphedel	Tofieldia glutinosa	Plant	St Threatened	HEB09
Sandhill Crane	Grus Canadensis	Bird	St Threatened	HEB04

Source: McHenry County Natural Areas Inventory Database, 2005

Fishery

No fishery surveys have been conducted on the streams in the Hebron Peatlands subwatershed.

Mussels

No mussel surveys have been conducted on the streams in the Hebron Peatlands subwatershed.

Existing Greenways

There are no formal greenways within the subwatershed. However, the Hebron Trail associated with an abandoned railroad right-of-way, extends east from Hebron, and links up with the Prairie Trail, north of Richmond.

15.2 Analysis of Subwatershed Data and Problem Identification

15.2.1 Water Quality Data & Identified Problems

The Illinois Environmental Protection Agency (IEPA) is tasked with assessing the quality of the surface water resources of Illinois. The IEPA has determined Nippersink Creek's designated uses are:

- Aquatic Life
- Fish Consumption
- Primary Contact
- Secondary Contact
- Aesthetic Quality

The IEPA periodically produces a 303(d) list, which identifies waterways that are not achieving certain designated uses. In the 2006 IEPA 303(d) list, Nippersink Creek is identified as being in Full Support of its Aquatic Life Designated Use, which is notable for a stream in northeastern Illinois.

However, Nippersink Creek was also determined to be Non-supporting of its Primary Contact Designated Use, due to excessive levels of fecal coliform. This pollutant, associated with human and animal waste, was listed as coming from an unknown source. The IEPA also identified fish consumption, secondary contact and aesthetic quality as designated uses for Nippersink Creek, although the ratings for these uses were classified as "not assessed".

There is no published information regarding the water quality or biological health of streams in the Hebron Peatlands subwatershed.

15.2.2 Flooding Problems

At the time of this writing, no data were provided by the County or municipalities regarding existing flooding problems. Analysis of available floodplain information suggests that there are no dwellings in the 100 Year Floodplain.

15.2.3 Projected Development & Growth

Development in the Hebron Peatlands subwatershed will likely occur through municipal annexation of residential and to some degree commercial/office development by the Village of Hebron. There is currently about 96 acres of agricultural land zoned as vacant residential or vacant commercial. In addition to this, there is approximately 575 acres of land adjacent to the current village limits that are prime development locations. All totaled, this new development could increase the amount of development in the subwatershed from 8% to more than 25%.

15.2.4 Natural Area Protection / Preservation Issues

McHenry County Natural Area Inventory Sites

In the Hebron Peatlands subwatershed, 0% of the McHenry County Natural Area Inventory Sites (MCNAI) sites are protected through public ownership (MCCD property).

The Hebron Peatlands (MCNAI HEB03) is the largest MCNAI site in the subwatershed. This 544 acre site contains a sedge meadow, a graminoid fen, a forested fen, and a basin marsh. The MCNAI database indicates that the Hebron Peatlands site is currently impaired by water table alterations, brush encroachment, and invasive species (Reed Canary Grass, Cattails), siltation, and bank erosion.

The Vanderpal Prairie (MCNAI HEB09) is a 69 acre site that contains mesic and wet silt loam prairies, graminoid fens, and sedge meadows. The MCNAI database indicates that the site is currently impaired by water table alterations, brush encroachment, encroachment from development, and railroad right of way maintenance.

The Hidden Marsh (MCNAI HEB04) is a 52 acre dry gravel prairie. The MCNAI database indicates that the site is currently impaired by water table alterations and brush encroachment.

15.3 Subwatershed-Specific Recommendations to Protect Water Resources

The following section discusses the Best Management Practices (BMP's) identified for this subwatershed that should be implemented to address existing or potential water quality impairments. The location of each recommended BMP project is presented in Figure 15.8.

Pollutant Loading Modeling, as discussed in Chapter 3, identified current and future pollutant loadings, based upon land use, soils, slopes, etc., and quantified these loadings. The results of this Pollutant Loading modeling were then used to identify the types of BMP's that should be implemented to create a loading reduction of those pollutants. Table 15.10 presents a summary of the recommended BMP projects, as well as the expected pollutant loading reductions expected if the BMP's are implemented, and function as intended.

Table 15.11 presents detailed cost and logistical information on each of the recommended BMP projects. Below is a summary list of recommendations for the subwatershed to help stakeholders and decision makers meet the Goals and Objectives set forth for Nippersink Creek. Background information regarding how each type of recommendation addresses watershed concerns and/or impairments (existing or future) can be found in Chapter 4.

Type:	Education / Outreach; Regulatory; Site Restoration; Monitoring; Permanent Habitat Protection, Water Quality
Target Goals:	Which watershed plan goals the recommendation is intended to address.
Initial Implementation Cost:	The initial cost, in 2007 dollars to initiate the recommended action, if applicable.
Initial Outreach Cost:	The initial cost, in 2007 dollars to initiate the recommended action, if applicable.
Annual Cost:	The long term expected annual cost (in 2007 dollars) to successfully implementation of the recommendation
Responsible Party:	Identifies the LEAD agency, entity, or landowner who will ultimately have to execute the recommendation. SUPPORTING parties, such as government agencies, grant sources, etc. may also be identified here.
Priority:	A ranking of the BMP recommendations, based upon the nature / urgency of the existing / potential impairment; the availability of willing landowners)/ partners; short-term vs. long-term development pressure; and whether the project is a new effort, or a retrofit of an existing practice.

The project cost estimates contained in this report should be considered preliminary, and are only presented to identify the potential magnitude of cost, from a watershed scale perspective. No site-specific investigation, analysis, or design of any recommended project, from which accurate cost information could be obtained, was completed as part of the preparation of the 2008 Nippersink Creek Watershed Plan.

If a watershed stakeholder decides to apply for grant funding assistance to implement any of the recommended projects presented in this report, they should first undertake any additional studies / research needed to determine an updated / accurate project cost. They should not solely rely on the cost estimates presented in the NCWP report as the basis for their grant request.

Note: The following acronyms for responsible parties identified in Table 15.11 are presented below:

NCWPC	Nippersink Creek Watershed Planning Committee
NRCS	Natural Resource Conservation Service
SWCD	McHenry County Soil and Water Conservation District
MCCD	McHenry County Water Conservation District
TLC	The Land Conservancy of McHenry County
IDOT	Illinois Department of Transportation
IEPA	Illinois Environmental Protection Agency
MCDOT	McHenry County Department of Transportation
MCDEF	McHenry County Defenders

Figure 15.8 Hebron Peatlands Subwatershed Site Recommendations Map

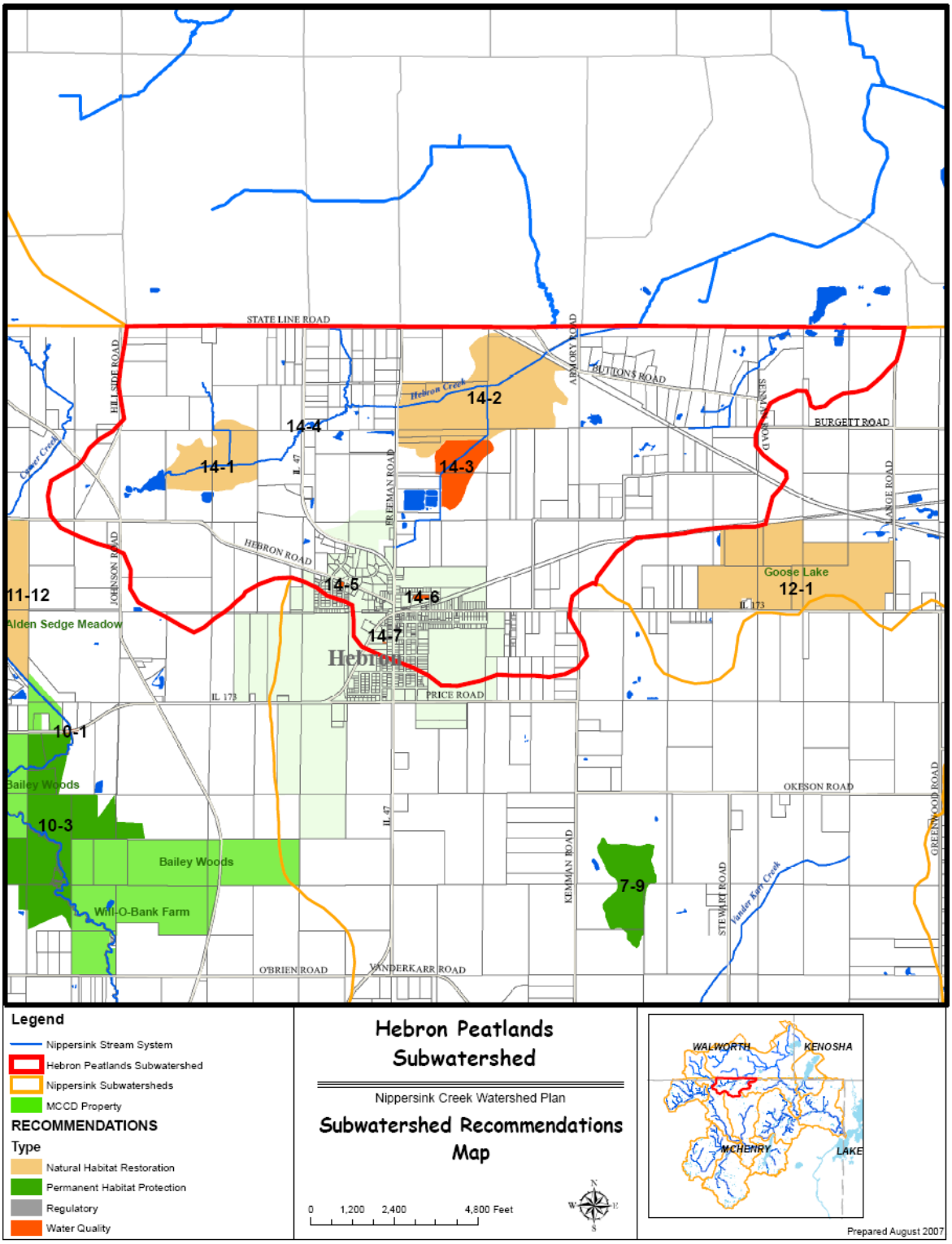


Table 15.10 BMP Selection & Associated Pollutant Load Reduction for the Hebron Peatlands Subwatershed

BMP	Type of BMP	Project Locations**	BMP		Removal Efficiency***			(lbs/year)****			Percentage Reduction		
			Size	Unit	TN	TP	TSS	TN	TP	TSS	TN	TP	TSS
Conservation Development Practices	Site-specific	14-3	46	acres	53%	51%	88%	520	31	33	3.3	3.1	5.4
Stormwater BMPs	Site-specific	14-4	1	lump sum	36%	95%	95%	86	14	9	0.5	1.4	1.4
Detention Basin Retrofit	Site-specific	14-5, 14-6, 14-7	7	acres	32%	55%	68%	48	5	4	0.3	0.5	0.6
Regulatory*	Watershed-Specific	Subwatershed wide	1	Water-shed	5%	5%	5%	800	50	31	5	5	5
Nutrient Management	Watershed-specific	Subwatershed wide	500	acres	70%	28%	-	7,463	185	-	46.7	18.7	-
Wetland Restoration	Site-specific	14-1, 14-2	320	acres	53%	51%	88%	3,616	216	231	22.6	21.8	37.5
Total								12,533	501	307	78.4	50.5	50

*Regulatory programs are assumed to have nominal pollutant reduction rates of 5%.

** Project locations and details are described in the corresponding chapter.

*** TN = total Nitrogen; TP = total Phosphate; TSS = total suspended solids or Sediment.

**** The unit of “TSS” is “Tons/year”.

Table 15.11 Recommended Projects in the Hebron Peatlands Subwatershed

SUB WATERSHED	RECOMMENDATION #	TARGET GOAL	DESCRIPTION	RESPONSIBLE PARTY	ACRES	UNIT COST	INITIAL IMPLEMENTATION COST	INITIAL OUTREACH COST	ANNUAL MAINTENANCE COST	PRIORITY
Hebron Peatlands	14-1	Natural Habitat Restoration	Landowner Outreach to re-establish 90+ acre wetland previously drained for agriculture	NCWPC / NRCS / SWCD	91.1	$2,500	$227,758	$1,000	$9,110	D
Hebron Peatlands	14-2	Natural Habitat Restoration	Landowner Outreach to expand and enhance existing 230 acre High Quality ADID Wetland (N 10) between Armory Road and Freeman Road	NCWPC / TLC / MCDEF	233.8	$1,500	$350,723	$1,500	$23,382	D
Hebron Peatlands	14-3	Water Quality	Government Outreach to provide 46+ acre water quality polishing wetland as part of any future Hebron WWTP expansion	NCWPC / VILLAGE OF HEBRON	46.4	$5,000	$232,160	$1,000	$11,608	E
Hebron Peatlands	14-4	Water Quality	Government Outreach to install Stormwater BMP's to treat roadway runoff at IL 47 prior to discharge into Hebron Creek; non-structural if adjacent land is available; structural BMP devices if no land for basin	NCWPC / IDOT			$50,000	$500	$2,500	E
Hebron Peatlands	14-5	Water Quality	Landowner / Government Outreach to retrofit existing dry bottom detention basin at Hebron Drive and Wildflower Way with native vegetation and minor regrading to increase pollutant removal	NCWPC / VILLAGE OF HEBRON			$11,000	$500	$1,000	E
Hebron Peatlands	14-6	Water Quality	Landowner / Government Outreach to industrial landowner to retrofit existing dry bottom detention basin at Mead & Church Street; minor re-grading and install native vegetation to increase pollutant removal	NCWPC / VILLAGE OF HEBRON			$20,000	$500	$1,000	E

Table 15.11 Recommended Projects in the Hebron Peatlands Subwatershed

SUB WATERSHED	RECOMMENDATION #	TARGET GOAL	DESCRIPTION	RESPONSIBLE PARTY	ACRES	UNIT COST	INITIAL IMPLEMENTATION COST	INITIAL OUTREACH COST	ANNUAL MAINTENANCE COST	PRIORITY	
Hebron Peatlands	14-7	Water Quality	Landowner / Government Outreach to industrial landowner to retrofit existing dry bottom detention basin at 12121 RT 173; minor re-grading and install native vegetation to increase pollutant removal	NCWPC / VILLAGE OF HEBRON				$12,000	$500	$1,000	E
				SW TOTALS	**371.4**			**$903,640**	**$5,500**	**$49,600**	

PRIORITY

- **A Projects that have cooperating partners, can move to implementation quickly. Implementation Timeframe 1 to 3 years**
- **B Projects subject to imminent development pressure, Implementation Timeframe 1 to 2 years**
- **C Projects needed to protect sensitive areas. Timeframe 1 to 2 years**
- **D Restoration projects, Timeframe 1 to 5 years**
- **E Retrofit Projects, Timeframe 1 to 5 years**
- **F Existing Pollution Potential, Timeframe 1 to 2 years**
- **G Policy / Opportunity Review Project, Timeframe 1 to 3 years**

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Chapter 16
Wisconsin Subwatersheds

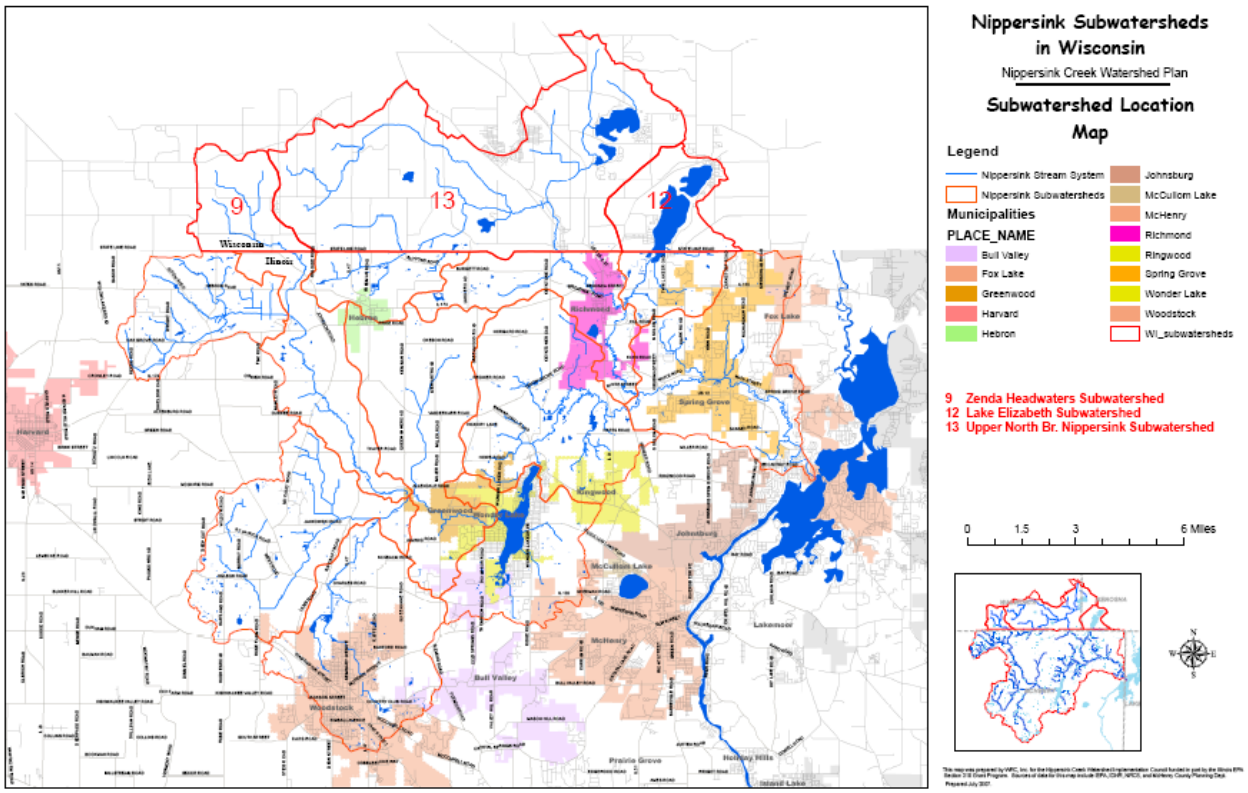
This section presents a summary of the characteristics of the Wisconsin Subwatersheds, as well as specific issues and challenges in these subwatersheds that must be addressed in the Nippersink Creek Watershed Plan, or in future planning efforts conducted on both sides of the Illinois – Wisconsin line.

16.1 Subwatershed Location

Approximately 34,400 acres (53 square miles) of the Nippersink Creek Watershed lie within the State of Wisconsin, as shown in Figure 16.1. This area comprises three separate subwatersheds, including Zenda Headwaters, Upper North Branch Nippersink, and Elizabeth Lake.

The Wisconsin Subwatersheds are located within Linn and Bloomfield Townships of Walworth County, and Randall Township of Kenosha County.

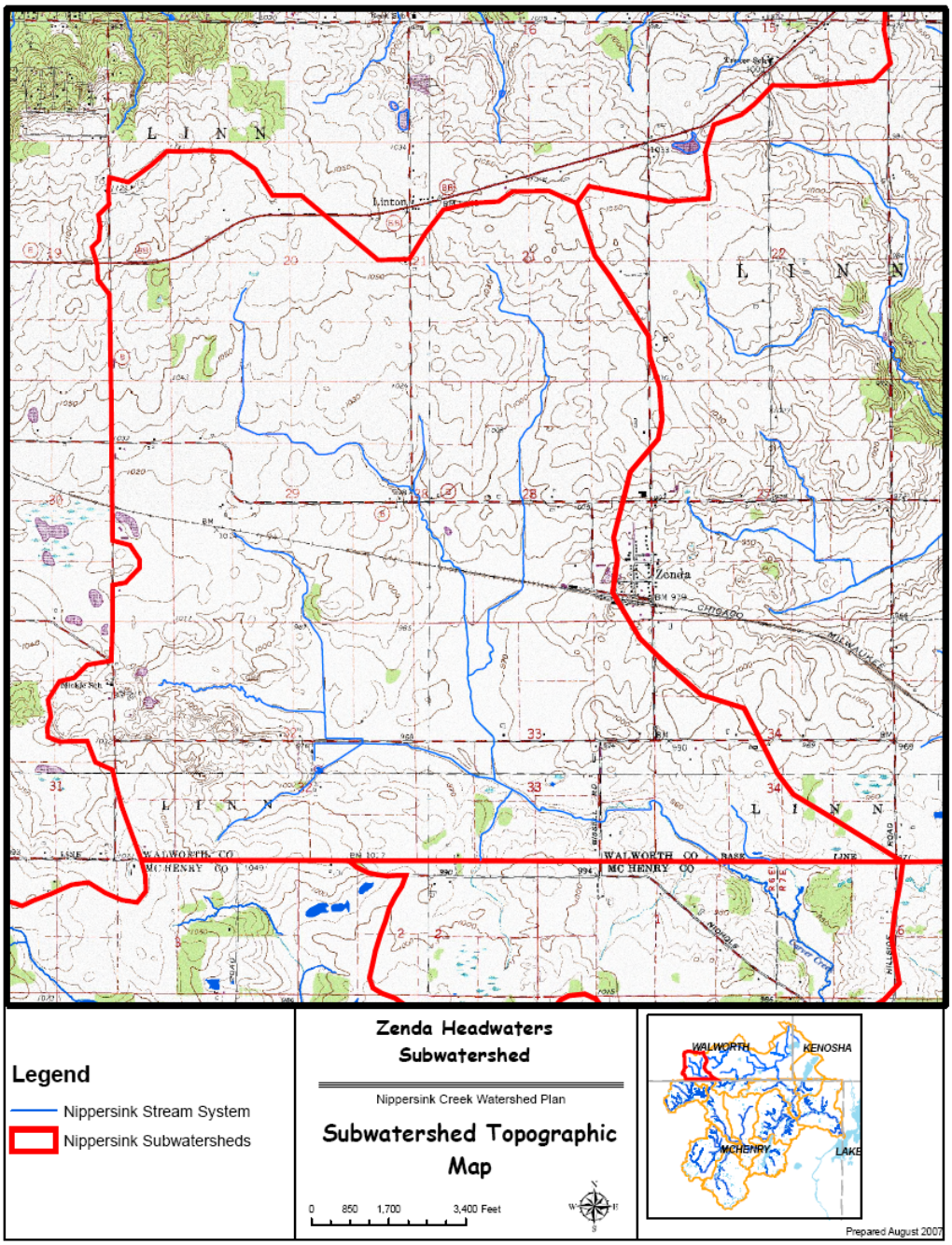
Figure 16.1 Location of Wisconsin Subwatersheds



16.1.1 Zenda Headwaters

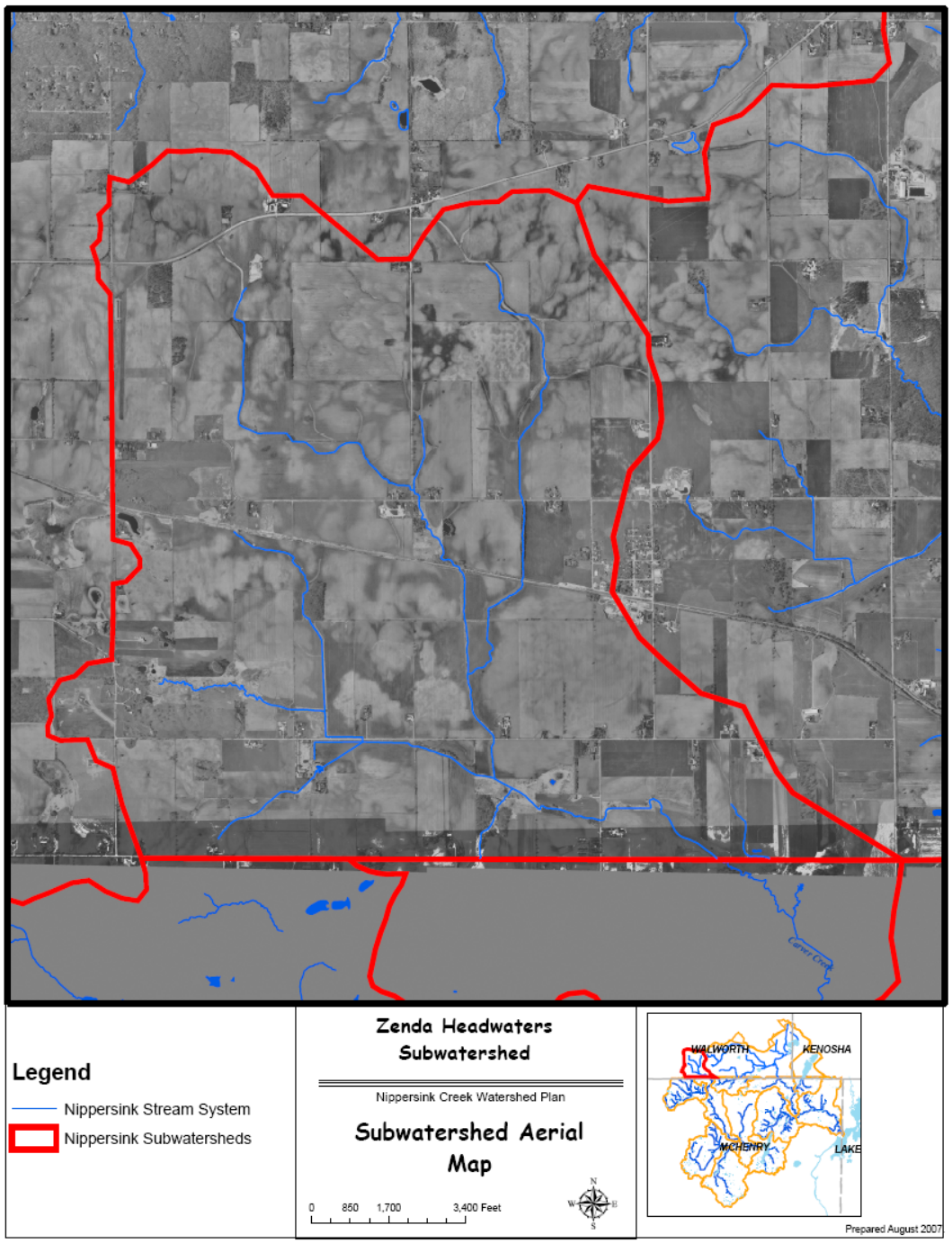
The Zenda Headwaters subwatershed, approximately 4,200 acres in size, is the westernmost of the three Wisconsin subwatersheds. Located entirely within Linn Township of Walworth County, the subwatershed is largely comprised of agricultural land and low density rural residential. As shown in Figure 16.2, the subwatershed is roughly bounded by Highway BB on the north, Highway B on the west, State Line Road on the South, and Zenda Road on the east. The western one-third of the Village of Zenda is located within this subwatershed. This subwatershed drains to Carver Creek in the Nippersink Headwaters subwatershed in Illinois (Chapter 12).

Figure 16.2 USGS Topographic Map for the Zenda Headwaters Subwatershed



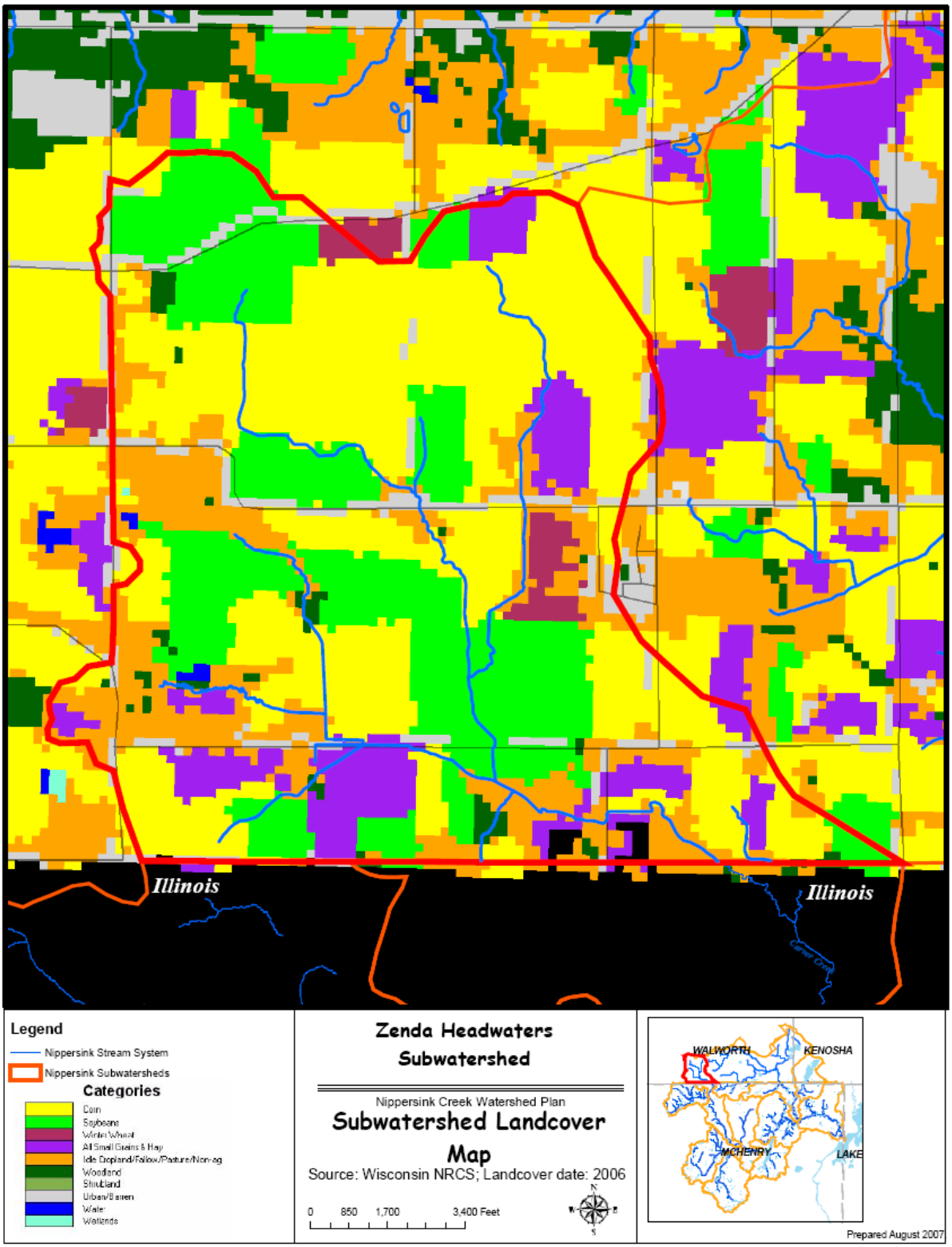
A 2006 aerial photograph of the Zenda Headwaters sub-watershed provides a visual illustration of the predominantly agricultural land use. Most of the subwatershed streams, shown in blue, still feature somewhat sinuous pattern, however, an area in the lower mid-section of this subwatershed features linear stream channels. These linear alignments typically occur where stream channels have been channelized and straightened to facilitate drainage of agricultural fields. The visual presence of somewhat darker hued soils, which can be indicative of highly organic or saturated soils would suggest that a large expanse of wetland was formerly present in this area. These types of areas can often be restored to higher quality wetlands by modifying the existing drainage system.

Figure 16.3 Aerial Photograph of the Zenda Headwaters Subwatershed



The Natural Resource Conservation Service (NRCS) prepared a digital file showing the Land Cover found in Walworth County in 2006. The only color indicative of urban land cover is gray; hues of green shows woodlands or shrub lands; blue hues show water features; all the remaining colors depict different types agricultural crops.

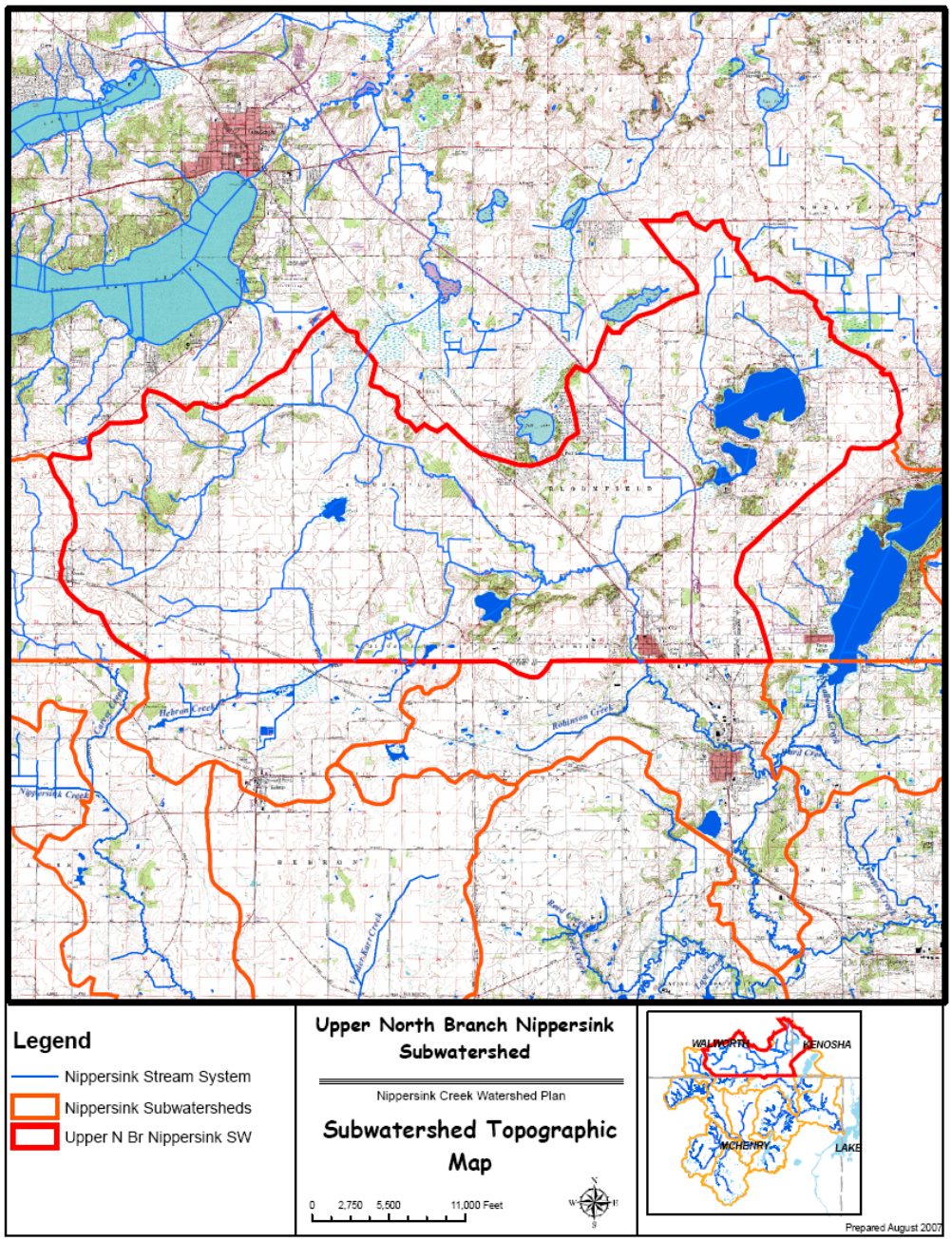
Figure 16.4 NRCS 2006 Land Cover of the Zenda Headwaters Subwatershed



16.1.2 Upper North Branch Nippersink Subwatershed

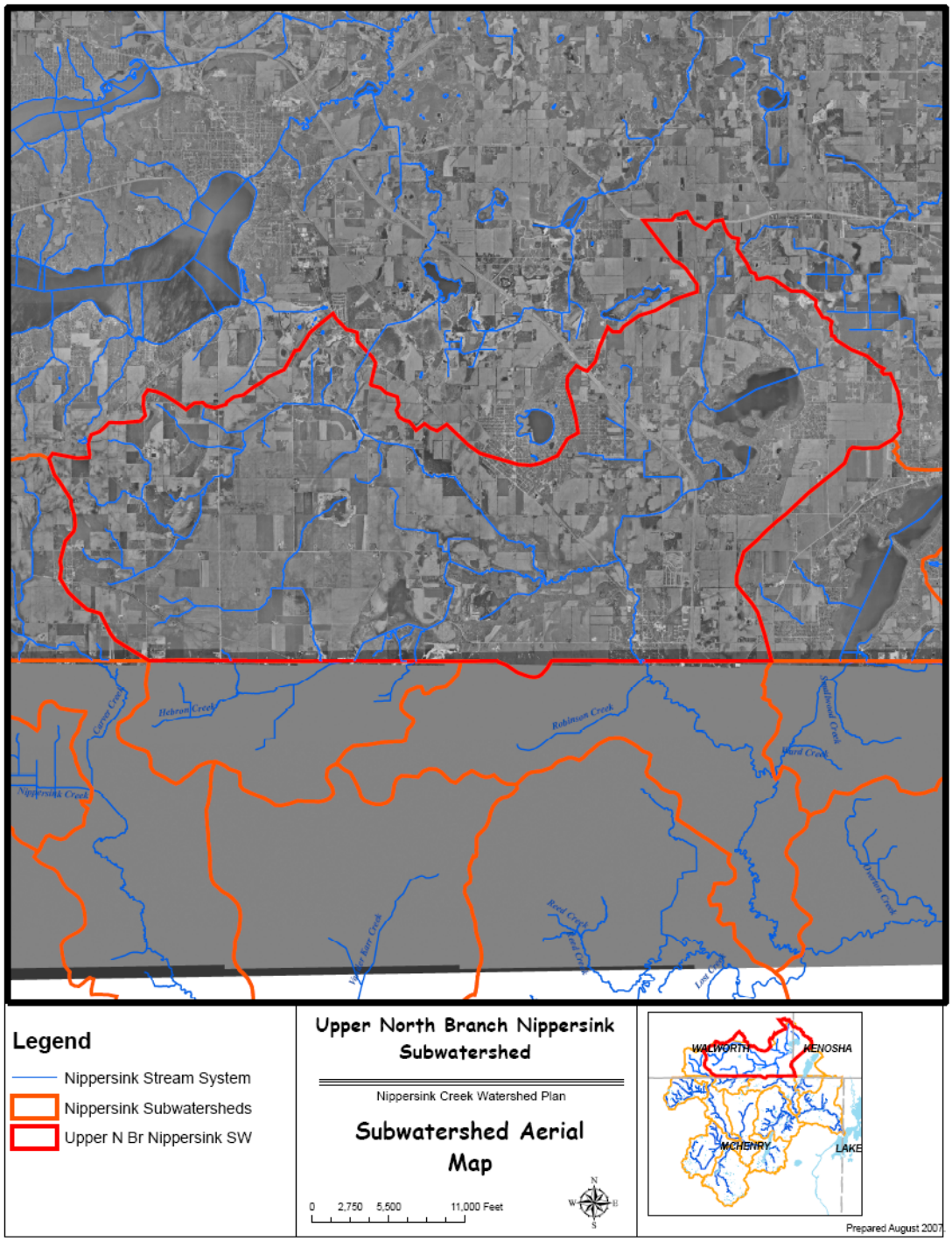
The Upper North Branch Nippersink subwatershed, approximately 25,700 acres in size, is the middle Wisconsin subwatershed. Located within the eastern portion of Linn Township, much of the southern portion of Bloomfield Township, and the western portion of Randall Township, the subwatershed is largely comprised of agricultural land and low density rural residential. Genoa City is located at the downstream (southeast) end of this subwatershed. The Upper North Branch subwatershed receives drainage form the Hebron Peatlands subwatershed in Illinois (Chapter 15). The Upper North Branch subwatershed includes five lakes ranging from 25 to 450 acres in size, that all drain to Nippersink Creek, through the North Branch Nippersink Creek subwatershed in Illinois (Chapter 12).

Figure 16.5 USGS Topographic Map for the Upper North Branch Nippersink Subwatershed



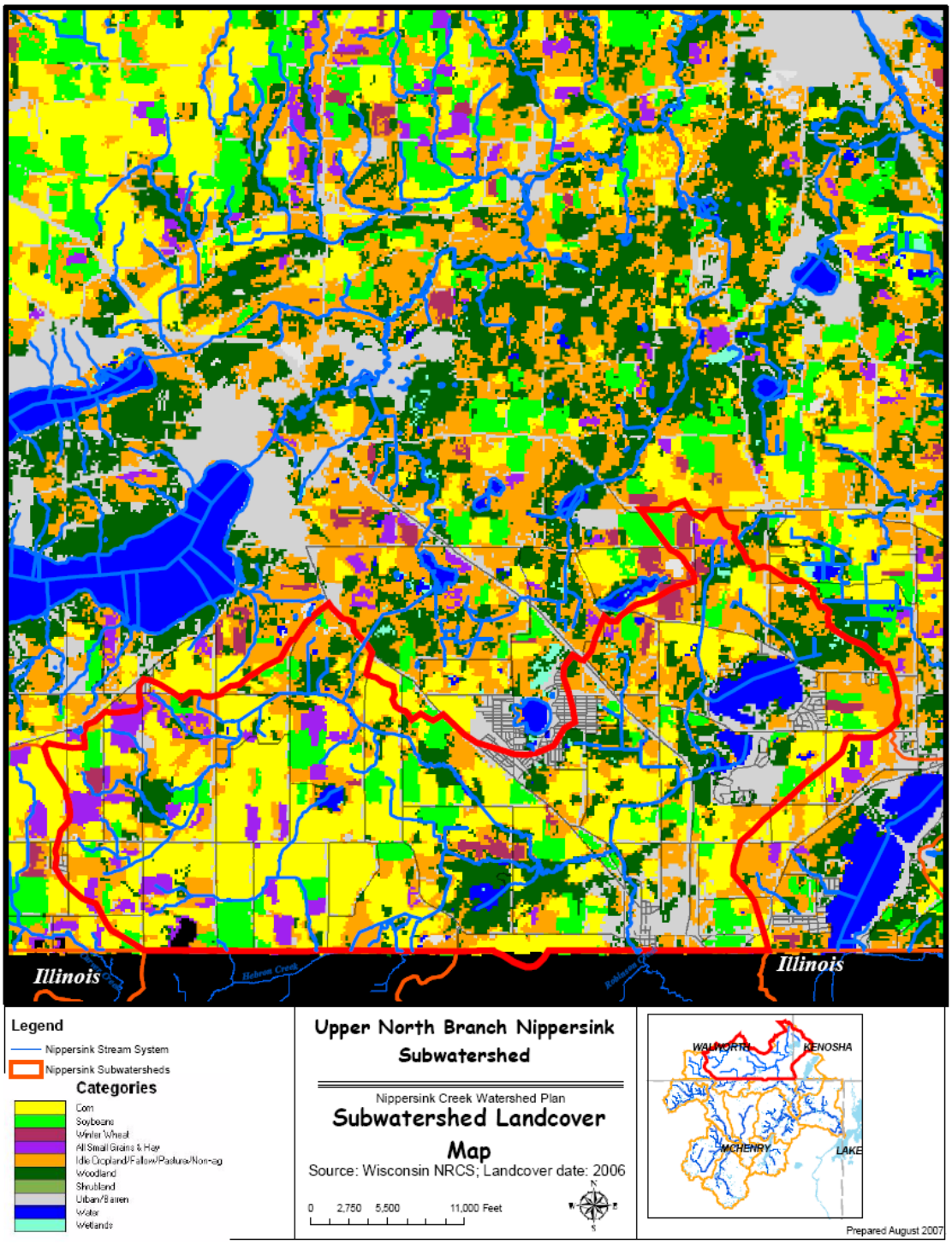
A 2006 aerial photograph of the Upper North Branch Nippersink Creek subwatershed provides a visual illustration of the predominantly agricultural land use. Genoa City and the outskirts of the lake communities of Pell Lake and Powers Lake are the only concentrated urban areas within the subwatershed. However, the subwatershed is bordered on the north by the City of Lake Geneva, and Wisconsin Route 50, a divided highway extending east to the Tri-State Tollway and City of Kenosha. The eastern portion of this subwatershed is also bisected by U.S. Route 12, which in this area is a limited access expressway. The potential for significant future growth exists along these transportation corridors.

Figure 16.6 Aerial Photograph of the Upper North Branch Nippersink Subwatershed



The Natural Resource Conservation Service (NRCS) prepared a digital file showing the Land Cover found in Walworth County and Kenosha County in 2006. The only color indicative of urban land cover is gray; hues of green shows woodlands or shrub lands; blue hues show water features; all the remaining colors depict different types agricultural crops.

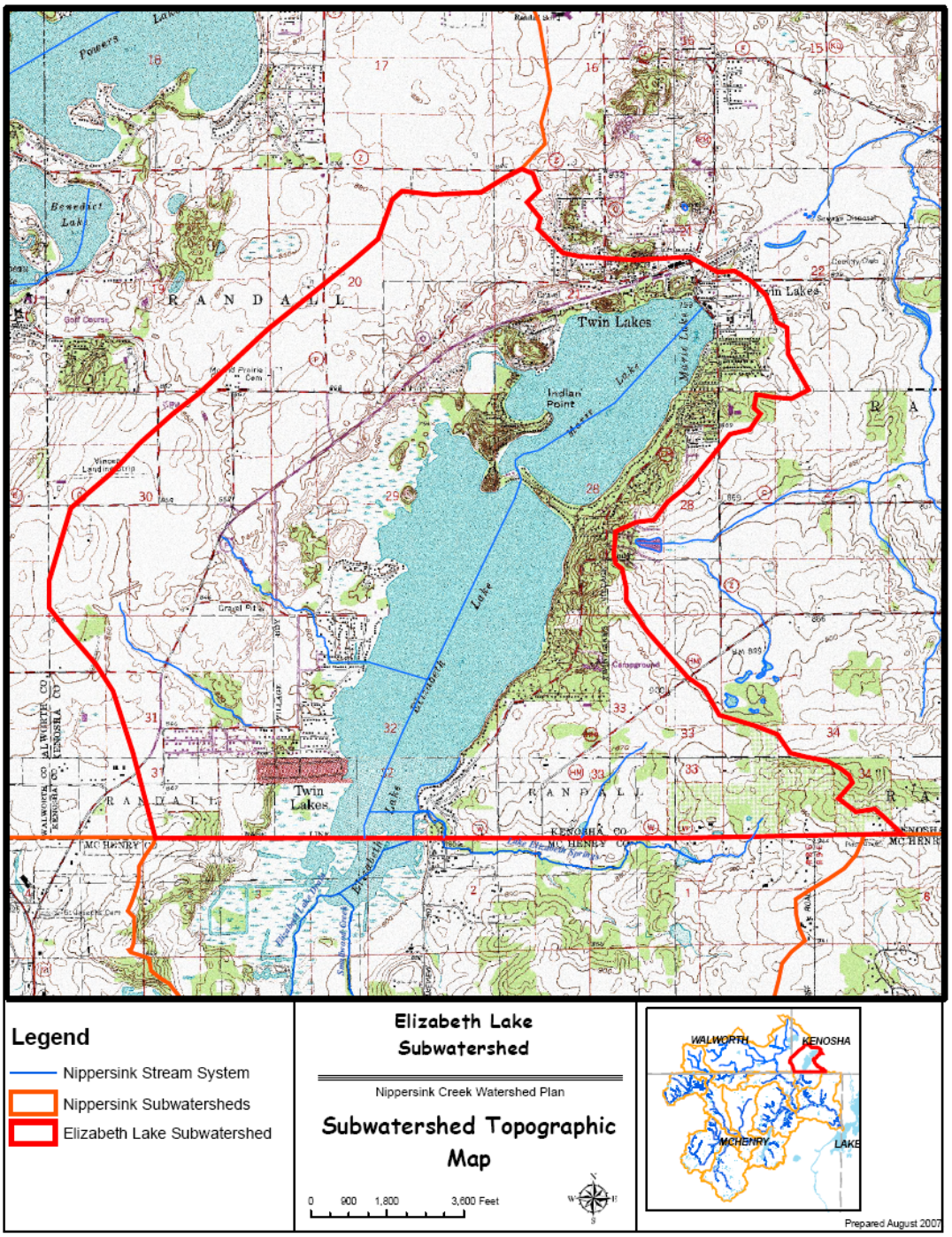
Figure 16.7 NRCS 2006 Land Cover of the Upper North Branch Nippersink Subwatershed



16.1.3 Elizabeth Lake Subwatershed

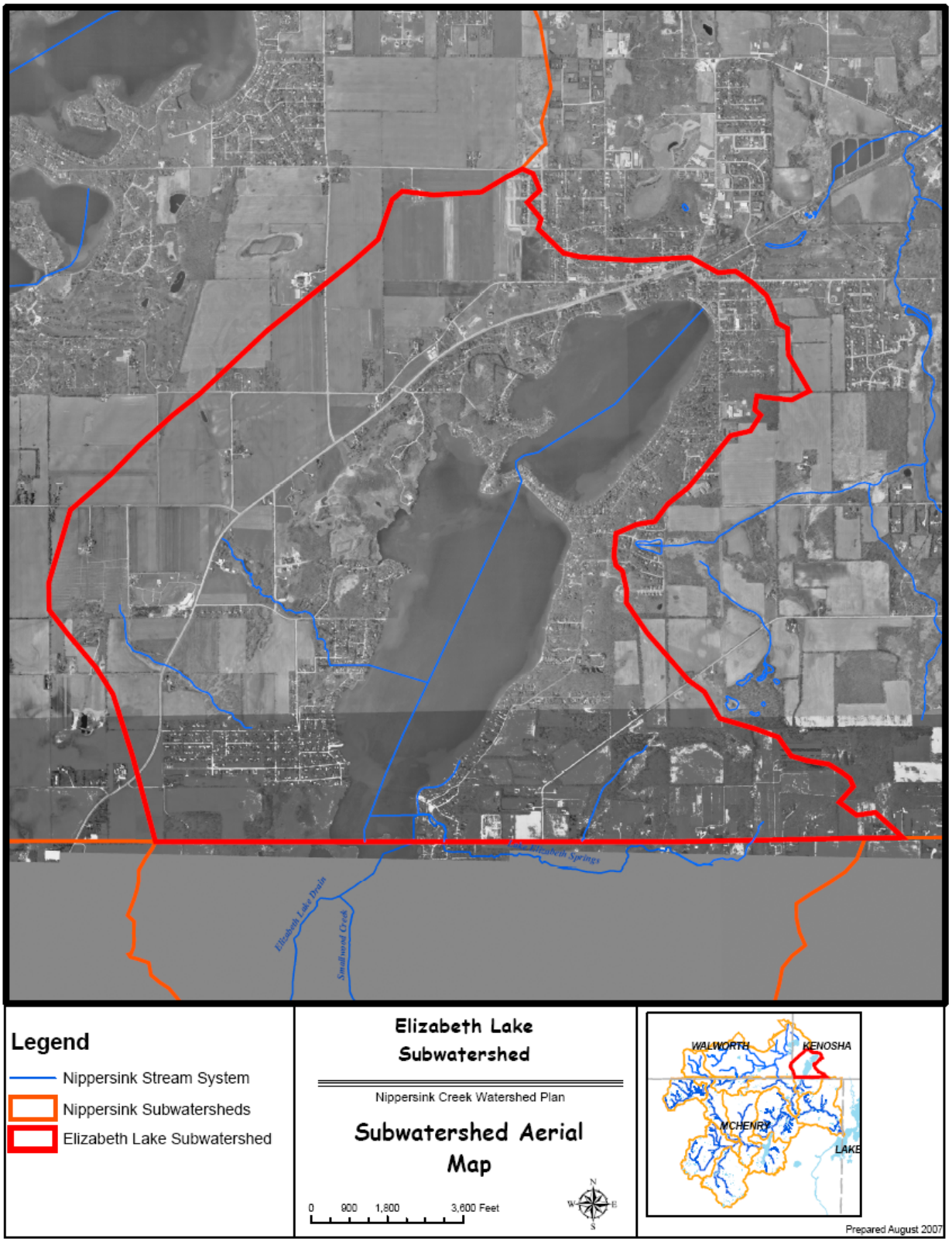
The Elizabeth Lake subwatershed, approximately 4,500 acres in size, is the eastern Wisconsin subwatershed. Located within the eastern portion of Randall Township of Kenosha County, almost 1,000 acres of the subwatershed is comprised of Lake Marie and Lake Elizabeth (Twin Lakes). The remaining balance of the subwatershed shed is comprised of lakeside residential subdivisions and the Village of Twin Lakes and moving farther away from the lakes, agricultural areas and low density residential. Lake Elizabeth drains into the North Branch of Nippersink Creek, through the adjacent Elizabeth Lake Drain subwatershed (Chapter 14).

Figure 16.8 USGS Topographic Map for the Elizabeth Lake Subwatershed



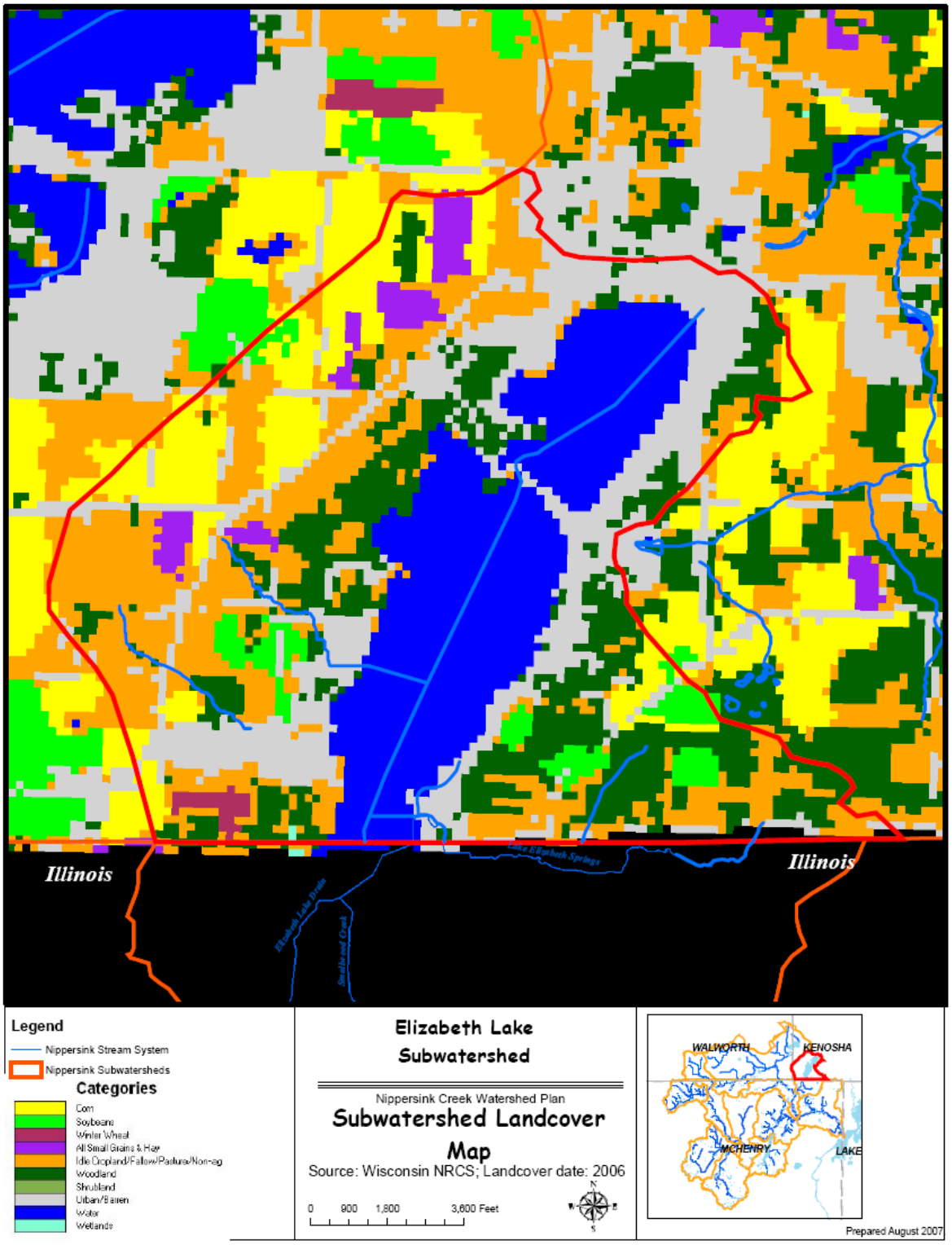
A 2006 aerial photograph of the Elizabeth Lake sub-watershed provides a visual illustration of the predominantly agricultural land use. The Village of Twin Lakes, and the lakeside residential areas are the only concentrated urban areas within the subwatershed.

Figure 16.9 Aerial Photograph of the Elizabeth Lake Subwatershed



The Natural Resource Conservation Service (NRCS) prepared a digital file showing the Land Cover found in Kenosha County in 2006. The only color indicative of urban land cover is gray; hues of green shows woodlands or shrub lands; blue hues show water features; all the remaining colors depict different types agricultural crops.

Figure 16.10 NRCS 2006 Land Cover of the Lake Elizabeth Subwatershed



16.2 Wisconsin Subwatersheds Planning and Growth Issues

While the Wisconsin Subwatersheds were specifically not included in this watershed planning effort, it is still beneficial to determine the trends in land use planning in the Wisconsin portion of the Nippersink Creek watershed.

The following documents were accessed over the internet, and were briefly reviewed to identify any trends in resource protection, land use planning, or regulatory / zoning matters that would impact the Nippersink Creek Watershed.

Generally speaking, all of these documents reflect awareness of, as well as a desire to, protect and enhance water resources, implement smart growth strategies, and protect environmentally sensitive corridors. All of these areas reflect the goals and objectives of the Nippersink Creek Watershed Plan.

One shortcoming of these documents was determined by conducting a search of each document to determine the number of occurrences within the text of the term "Nippersink". In each of these documents, any reference to Nippersink Creek tended to only identify it as a geographical feature, rather than as a specific resource in need of planning. No reference could be found about the need to have "cross-border" collaboration or discussion on future land use issues, water quality protection, or other items critical to comprehensive watershed planning.

The need for this dialogue will become increasingly important as development continues within the Nippersink Creek Watershed, regardless which side of the state line it occurs on.

Figure 16.11 List of Wisconsin Planning Documents Reviewed

"The State of the Southeast Fox River Basin, February, 2002"
Wisconsin Department of Natural Resources Wisconsin DNR PUBL WT-701-2002
http://dnr.wi.gov/org/gmu/foxil/southeastfox_final_202.pdf

"A Park and Open Space Plan for Walworth County"
Southeastern Wisconsin Regional Planning Commission, September 2000
http://www.sewrpc.org/publications/capr/capr-35_2nd_ed_park_plan_walworth_co.pdf

"A Land Use Plan for Walworth County, Wisconsin: 2020"
Southeastern Wisconsin Regional Planning Commission, April 2001
http://www.co.walworth.wi.us/Land%20Management/Website/images/Forms/capr-252_lu_plan_walworth_cty_web.pdf

"Town of Linn Year 2025 Comprehensive Plan"
Foth & Van Dyke, Inc., June 2004
http://townoflinn.com/notices/2025plan.pdf

"Town of Randall and Village of Twin Lakes - Smart Growth Comprehensive Plan: 2005 – 2024"
Mid-America Planning Services, Inc.,March 2005
http://www.villageoftwinlakes.net/compplan.cfm

16.2.1 Point Source Discharges

There is one point source discharge in the Wisconsin subwatersheds; the Village of Genoa City maintains a municipal waste water treatment plant which discharges into the North Branch of Nippersink Creek.

Table 16.1 NPDES Point Source Discharges within the Wisconsin Subwatersheds

Name	Average Discharge (mgd)	Receiving Stream	Wisconsin Permit Number
Genoa WWTP	0.216	North Branch Nippersink	WI0021083

Water quality and discharge information for Genoa City WWTP can be found on the EPA's website at: **http://oaspub.epa.gov/enviro/pcs_det_reports.detail_report?npdesid=IL0026433**

16.3 Subwatershed-Specific Recommendations to Protect Water Resources

The following section discusses the Best Management Practices (BMP's) identified for this subwatershed that should be implemented to address existing or potential water quality impairments.

Pollutant Loading Modeling, as discussed in Chapter 3, identified current and future pollutant loadings, based upon land use, soils, slopes, etc., and quantified these loadings. The results of this Pollutant Loading modeling were then used to identify the types of BMP's that should be implemented to create a loading reduction of those pollutants. Table 16.2 presents a summary of the recommended BMP projects, as well as the expected pollutant loading reductions expected if the BMP's are implemented, and function as intended.

Table 16.3 presents detailed cost and logistical information on each of the recommended BMP projects. Below is a summary list of recommendations for the subwatershed to help stakeholders and decision makers meet the Goals and Objectives set forth for Nippersink Creek. Background information regarding how each type of recommendation addresses watershed concerns and/or impairments (existing or future) can be found in Chapter 4.

Type:	Education / Outreach; Regulatory; Site Restoration; Monitoring; Permanent Habitat Protection, Water Quality
Target Goals:	Which watershed plan goals the recommendation is intended to address.
Initial Implementation Cost:	The initial cost, in 2007 dollars to initiate the recommended action, if applicable.
Initial Outreach Cost:	The initial cost, in 2007 dollars to initiate the recommended action, if applicable.
Annual Cost:	The long term expected annual cost (in 2007 dollars) to successfully implementation of the recommendation
Responsible Party:	Identifies the LEAD agency, entity, or landowner who will ultimately have to execute the recommendation. SUPPORTING parties, such as government agencies, grant sources, etc. may also be identified here.
Priority:	A ranking of the BMP recommendations, based upon the nature / urgency of the existing / potential impairment; the availability of willing landowners)/ partners; short-term vs. long-term development pressure; and whether the project is a new effort, or a retrofit of an existing practice.

The project cost estimates contained in this report should be considered preliminary, and are only presented to identify the potential magnitude of cost, from a watershed scale perspective. No site-specific investigation, analysis, or design of any recommended project, from which accurate cost information could be obtained, was completed as part of the preparation of the 2008 Nippersink Creek Watershed Plan.

If a watershed stakeholder decides to apply for grant funding assistance to implement any of the recommended projects presented in this report, they should first undertake any additional studies / research needed to determine an updated / accurate project cost. They should not solely rely on the cost estimates presented in the NCWP report as the basis for their grant request.

Note: The following acronyms for responsible parties potentially identified in Table 16.3 are presented below:

NCWPC	Nippersink Creek Watershed Planning Committee
NRCS	Natural Resource Conservation Service
USFWS	U.S. Fish and Wildlife Service
NPS	National Park Service

Table 16.2 BMP Selection & Associated Pollutant Load Reduction for the Wisconsin Subwatersheds

BMP	Type of BMP	Project Locations**	BMP		Removal Efficiency***			****			Percentage Reduction		
			Size	Unit	TN	TP	TSS	TN	TP	TSS	TN	TP	TSS
WWTP Effluent Improvements	Site-specific	15-1	1	lump sum	10%	10%	10%	6,548	680	458	10	10	10
Permanent Habitat Protection	Site-specific	15-2	100	acres	53%	51%	88%	707	71	82	1.1	1	1.8
Regulatory*	Watershed-Specific	Subwatershed wide	1	Water-shed	5%	5%	5%	3,274	340	229	5	5	5
Nutrient Management	Watershed-specific	Subwatershed wide	750	acres	70%	28%	-	7,005	291	-	10.7	4.3	-
Total								17,534	1,382	770	26.8	20.3	16.8

*Regulatory programs are assumed to have nominal pollutant reduction rates of 5%.

**Project locations and details are described in the corresponding chapter.

*** TN = total Nitrogen; TP = total Phosphate; TSS = total suspended solids or Sediment.

**** The unit of "TSS" is "Tons/year".

Table 16.3 Recommended Projects within the Wisconsin Subwatersheds

SUB WATERSHED	RECOMMENDATION #	TARGET GOAL	DESCRIPTION	RESPONSIBLE PARTY	ACRES	UNIT COST	INITIAL IMPLEMENTATION COST	INITIAL OUTREACH COST	ANNUAL MAINTENANCE COST	PRIORITY
Upper North Branch Nippersink Creek	15-1	Water Quality	Government Outreach to Investigate feasibility of increasing pollutant removal standards at Genoa City WWTP	NCWPC / GENOA CITY				$5,000		G
Upper North Branch Nippersink Creek	15-2	Permanent Habitat Protection	Possible land acquisition for proposed Hack-ma-Tack National Wildlife Refuge & Nippersink Trail on abandoned Rail ROW	USFWS, NPS						G
				SW TOTALS	**0.0**		**$0**	**$5,000**	**$0**	

PRIORITY

- **A** **Projects that have cooperating partners, can move to implementation quickly. Implementation Timeframe 1 to 3 years**
- **B** **Projects subject to imminent development pressure, Implementation Timeframe 1 to 2 years**
- **C** **Projects needed to protect sensitive areas. Timeframe 1 to 2 years**
- **D** **Restoration projects, Timeframe 1 to 5 years**
- **E** **Retrofit Projects, Timeframe 1 to 5 years**
- **F** **Existing Pollution Potential, Timeframe 1 to 2 years**
- **G** **Policy / Opportunity Review Project, Timeframe 1 to 3 years**

Chapter 17
Protecting the Nippersink Creek's Green Infrastructure

17.1 What is a Green Infrastructure Plan?

The infrastructure of a community is often defined as the network of roads, power, communications, water and sewer systems, integral to maintaining a standard of living and economic vitality.

Green Infrastructure is the interconnected network of both publicly and privately owned open spaces and natural areas, such as greenways, stream corridors, wetlands, woodlands, grasslands, parks, conservation district lands, and remnant / restored native plant communities. Collectively, these natural features support native flora and fauna, maintain natural ecological processes which can protect and improve water quality, sustain air and water resources, provide areas essential to groundwater recharge, convey and store stormwater runoff, and reduce flooding risk and damage.

Quite simply, Green Infrastructure significantly contributes to the health and quality of life of the people who live, work, and recreate in the watershed. As many of these benefits arise from having clean water, it is not surprising that water resources, both surface and subsurface, form the framework of a Green Infrastructure Plan. By protecting our streams, ponds, and wetlands, surface water quality is protected. By protecting areas where groundwater resources can be replenished from surface infiltration and shallow groundwater resources can discharge cool, clear water into our streams, major components of the hydrologic cycle benefit. These water resources also sustain our biological resources as well, including native wildlife species, as well as diverse native plant communities.

The purpose of a Green Infrastructure Plan is to clearly define those areas that must be preserved, protected, re-connected, and integrated into our developed landscapes, whether they are agricultural farm fields, pastures, or suburban development.

It is known that land disturbances, such as agriculture, land development, and mining can all generate pollutants that are washed off the landscape and into our streams, lakes, and wetlands. The creation of traditional stormwater detention basins with manicured turfgrass edges, can provide preferred habitat for large flocks of waterfowl, and result in large increase in fecal coliform levels resulting from waterfowl droppings. Stormwater Best Management Practices that involve the creation of dense stands of native vegetation, to provide filtering and nutrient uptake benefits, can alleviate many of these potential water quality impairments.

The increase in stormwater runoff that comes from the new pavement and roof tops generated by land development, even when first detained to comply with stormwater regulations, can also create highly unstable conditions in the receiving streams. The overall increase in the volume of stormwater runoff can lead to stream channels downcutting and widening, leading to accelerated stream bank erosion, and sediment delivery. These impacts contribute to the sediment pollution in streams, threaten public infrastructure such as bridges and culverts, cause safety concerns for adjacent property owners, and are aesthetically unappealing.

However, natural systems such as wetlands, floodplain forests, and prairies are extremely capable of reducing the volume of stormwater runoff through infiltration and evapotranspiration. These natural systems are also very efficient at removing pollutants from the runoff that passes through them.

A Green Infrastructure Plan is divided into two components – the first is the protection of existing high-quality natural areas. The second is the preservation and expansion of natural landscape systems to buffer the high quality natural areas from future development.

17.2 Need for a Green Infrastructure Plan

While existing government regulations involving wetlands, floodplains, land use, and stormwater management can collectively provide a measure of protection against direct impacts to surface water resources, regulations protecting woodlands, native prairie remnants, lowland soils, or wildlife habitat are often inadequate or non-existent.

To provide a more comprehensive level of protection, it is necessary to consider the benefits these areas collectively provide, and determine how to integrate a reasonable, higher level of protection.

From a watershed perspective, the landscape feature that ties everything together is the mosaic of soils deposited by the glacial advances. These soil associations have the most significant influence on land development. For example, a gravel pit will only be sited where there are sufficient reserves of gravel available, and ideally a sanitary landfill would be sited in an area of thick, impermeable clays. Similarly, early farmers recognized the tremendous productivity of prairie soils, and only needed to develop a plow to cut through the dense root systems, or install drainage improvements to allow hydric soils to be cultivated.

Within the Illinois portion of the Nippersink Creek watershed, approximately 23,700 acres of land (24% of the Illinois watershed area) is comprised of hydric soils, which in pre-European settlement times, were comprised of wetlands, wet prairies, or shallow drainage swales. Most of these hydric soil areas were converted to cropland by the installation of subsurface drain tiles, construction of drainage ditches, or the channelization of streams.

While now suitable for agricultural purposes, and not necessarily considered regulatory wetlands, these converted hydric soils were not a location where you would want to build a home, or expect to have a functioning septic system.

The soils in the low-lying areas remain undisturbed, and they still provide significant groundwater recharge and flood storage benefits. Some communities, such as the Village of Long Grove, Illinois, have recognized the limitations, as well as benefits, associated with these low-lying areas, and have adopted a "Lowland Conservancy" ordinance.

If residential development in the Nippersink Creek watershed were only comprised of single lot projects, individually developed, there would be a natural tendency for those landowners to avoid the wetter parts of their property. In contrast, when it comes to large-scale urban development projects, the existing soil characteristics become less and less of a factor, as site engineering and large grading equipment moving and rearranging huge volumes of soil can transform areas with significant natural soil limitations into just another development site. Unfortunately, this approach totally ignores the natural benefits of the multi-horizoned organic and mineral soils.

In a natural, undeveloped state, these soils provide tremendous filtering and storage benefits for precipitation. The microscopic void spaces between soil particles can collectively store and gradually release large volumes of water.

If as part of land development activities, these undisturbed soils were subject to compaction (not excavation) from the operation of construction activity, these benefits in the upper soil horizon would be impaired for a period of time, but would naturally return as a result of freeze-thaw cycles, earthworm activity, and other natural processes. However, the typical scenario in large scale development is to strip off the existing organic soil horizons, often two to three feet in depth, and stockpile it. The exposed clay is then graded, formed, and compacted to create the future landscape. Four to six inches of stockpiled topsoil is then respread over the compacted clay to allow a vegetative cover (turfgrass) to be established. The balance of the topsoil is then sold, and leaves the site, and the filter / storage benefits are lost forever.

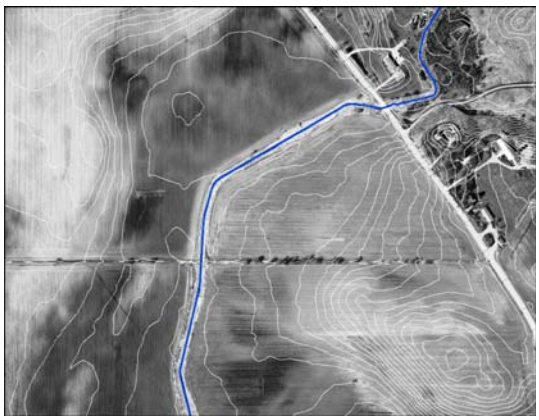
In reality, these mass graded areas can often exhibit a significant degree of imperviousness due to this compaction, but because they are subsequently planted to turfgrass, they are not included in stormwater detention calculations. More importantly, the natural storage capacity of the pre-disturbance soil horizon has been lost, and not accounted for in stormwater detention calculations. While natural processes may eventually restore some infiltration capacity to the compacted hardpan, it will likely take many decades.

By preserving undisturbed corridors of hydric soils, larger wetlands that remain in the landscape can also be functionally connected to local stream corridors.

Figure 17.1 Green Infrastructure Corridor

Preservation of the existing stream corridor along Nippersink Creek and its major tributaries is a step in the right direction; however, protecting these narrow corridors alone will not adequately protect the ecological integrity or water quality of Nippersink Creek. If development of these areas proceeds according to existing development and stormwater ordinances, there is concern that the remaining green infrastructure left over will be too small, too disturbed, and to fragmented to provide any of the ecological or water quality benefits that are necessary to protect and enhance Nippersink Creek.

Figure 17.2 Typical Residential Development Scenario



"Pre-Development" photo illustrating agricultural land use. Stream is channelized and stream corridor is very narrow, but could be expanded easily by simply altering agricultural practices

"Post-Development" photo illustrating how stream corridor has now been permanently lost, due to encroachment by residential development and its required stormwater drainage system

The photographs above demonstrate how green infrastructure is often permanently lost when agricultural land is converted to development. In the pre-development photo on the right, the topography and hydric soils (those dark areas on the photo) suggest that the green infrastructure, prior to agricultural development was probably a very wide, flat wetland that drained to the upper right of the photo. To increase agricultural productivity, the wetlands and saturated (hydric) soils were drained by excavating a ditch and installing drain tiles so that row crops could be planted to the very edge of the constructed stream channel. While this had negative impacts to the water quality of the downstream receiving stream (sediment, nutrients from fertilizers, etc.), it still was a "reversible" condition. The problem occurs when these agricultural parcels are planned for development, the development design fails to recognize the water quality and habitat benefits that the landscape had prior to the agricultural land use, and only the narrow agricultural channel is preserved. Stormwater basins are excavated within the green infrastructure area and designed to discharge as point sources directly into the stream system. This type of development layout does not take advantage of the filtering capabilities of the natural soils and historic wetlands and does not preserve or restore the natural habitat that makes the watershed a sustainable place for its residents to live, work and recreate.

17.3 Delineating the Green Infrastructure Boundary

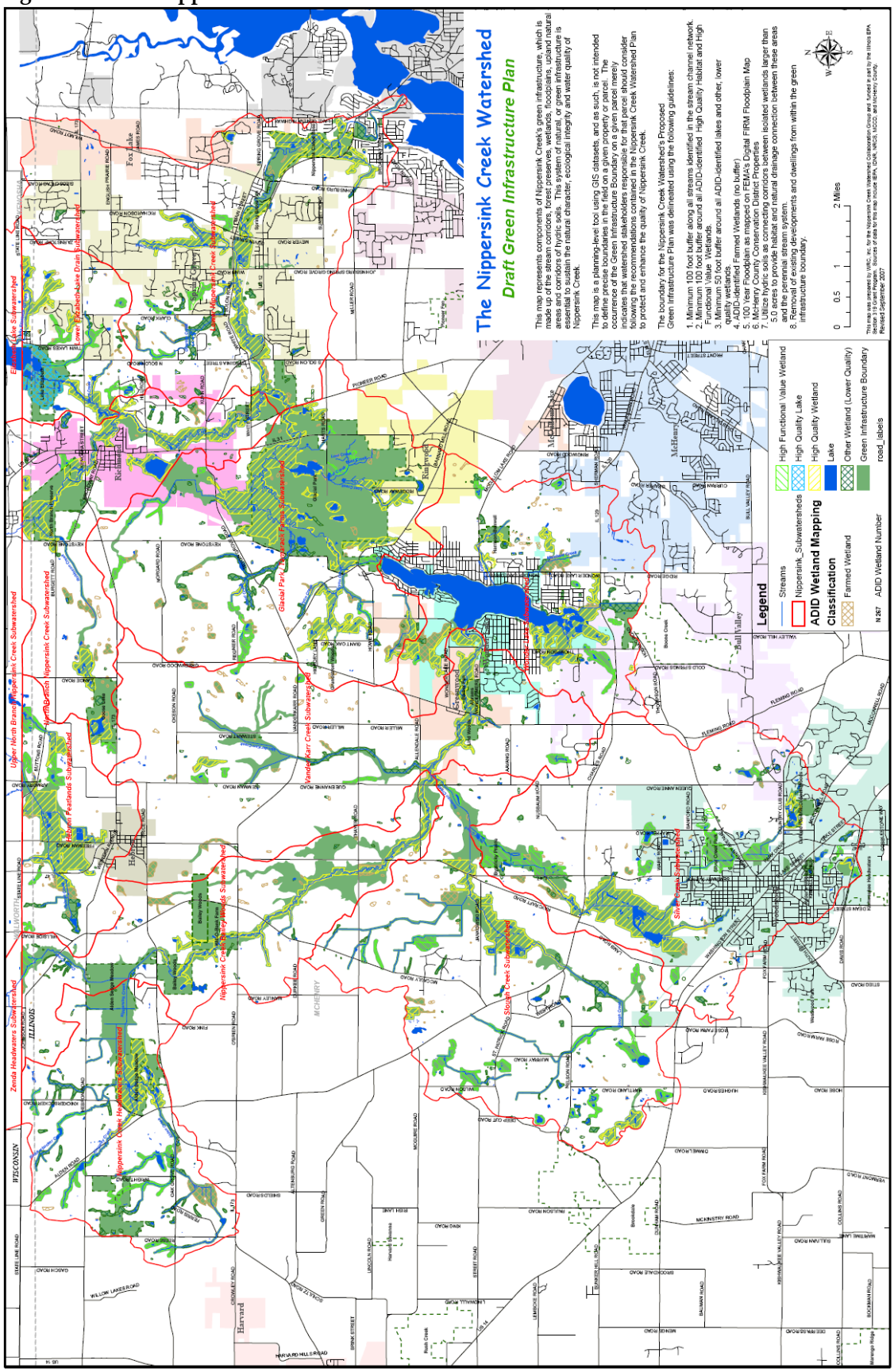
The establishment of Green Infrastructure boundaries in the Nippersink Creek Watershed was accomplished by determining appropriate setback guidelines for specific natural features (such as high quality wetlands) and overlaying available GIS datasets on top of one another. These combined data layers of natural resource information created "linkages" of geographic areas.

The boundary for the Nippersink Creek Watershed's Green Infrastructure Plan was delineated using the following guidelines:

- All McHenry County Conservation District Properties (Figure 17.4)
- A 100 foot wide buffer along each side of all streams identified in the stream channel network (Figure 17.4)
- 100-Year Floodplain, as mapped on FEMA's Digital Flood Insurance Rate Map (FIRM) Floodplain Map (Figure 17.5)
- A 100 foot buffer width around all Advanced Identification (ADID) study identified High Quality Habitat (HQH) Wetlands and High Quality (HQ) Lakes (Figure 17.6)
- A 100 foot buffer around all Advanced Identification (ADID) study identified High Functional Value (HFV) and other, lower quality wetlands (Figure 17.6)
- All Advanced Identification (ADID) study identified Farmed Wetlands one acre or larger in size (with no additional buffer) (Figure 17.7)
- Areas mapped as hydric (wetland) soils that can serve as connecting corridors between isolated wetlands larger than five acres to provide habitat and natural drainage connection between the wetlands and the perennial stream system (Figure 17.8)
- The map was then edited to ensure that existing buildings or developed areas were not included within the green infrastructure boundary (Figure 17.8)

The final Nippersink Creek Green Infrastructure Map is presented in Exhibit 17.3, in a reduced scale. **The Nippersink Creek Green Infrastructure Map can be viewed, and downloaded as a scalable PDF file, at www.nippersink.org.**

Figure 17.3 Nippersink Creek Green Infrastructure Plan



The maps in figures 17.4 – 17.8 illustrate several of the incremental steps using the guidelines above to delineate the boundary of the Green Infrastructure Plan. Priority areas included publicly owned natural open space parcels, stream corridors, and high quality wetlands. The Green Infrastructure Plan recognizes that it is not feasible or practical to protect and connect each and every isolated wetland, regardless of quality, to the integrated green infrastructure network of the watershed. Therefore, only isolated wetlands larger than five acres in size are included in the boundary. This would allow future development the potential leeway to incorporate and reconfigure smaller, low quality wetlands within proposed development areas into their proposed stormwater system, if it is not feasible to preserve them without disturbing their underlying soils.

Figure 17.4 MCCD properties and streams buffered 100 feet

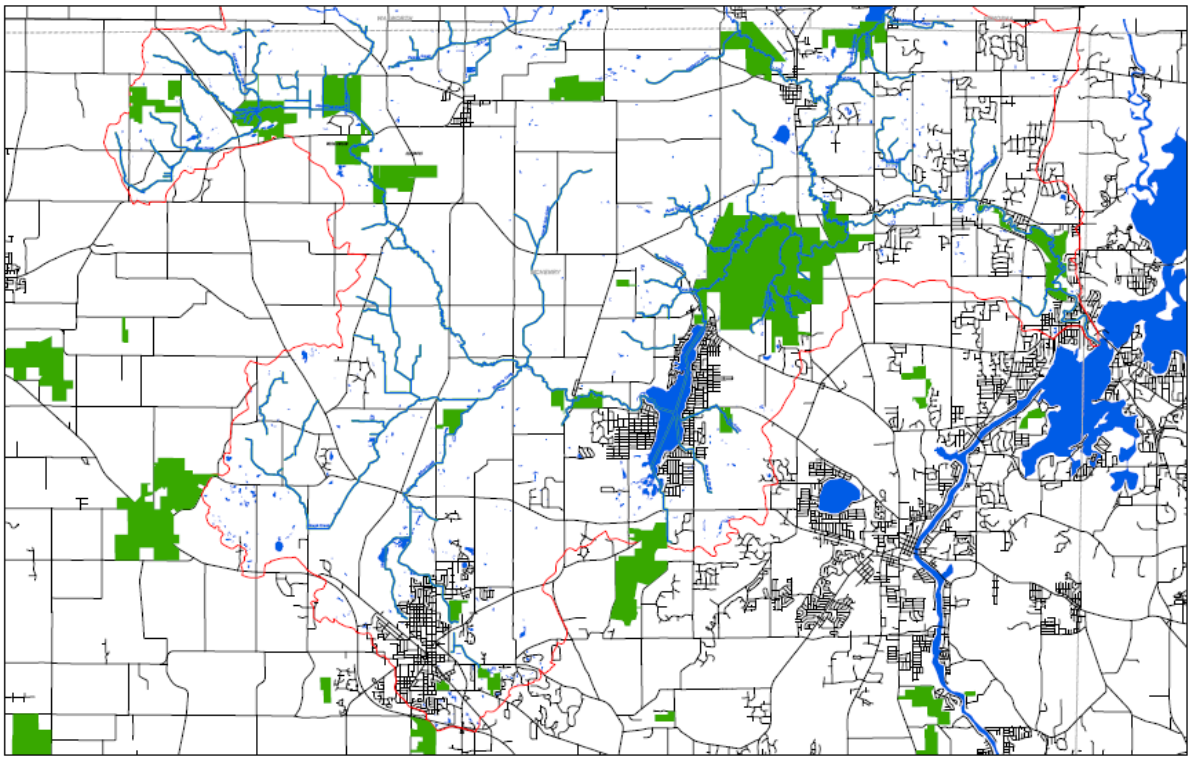


Figure 17.5 Figure 17.4 with FEMA 100-Year Floodplain (mapped + Zone A floodplains)

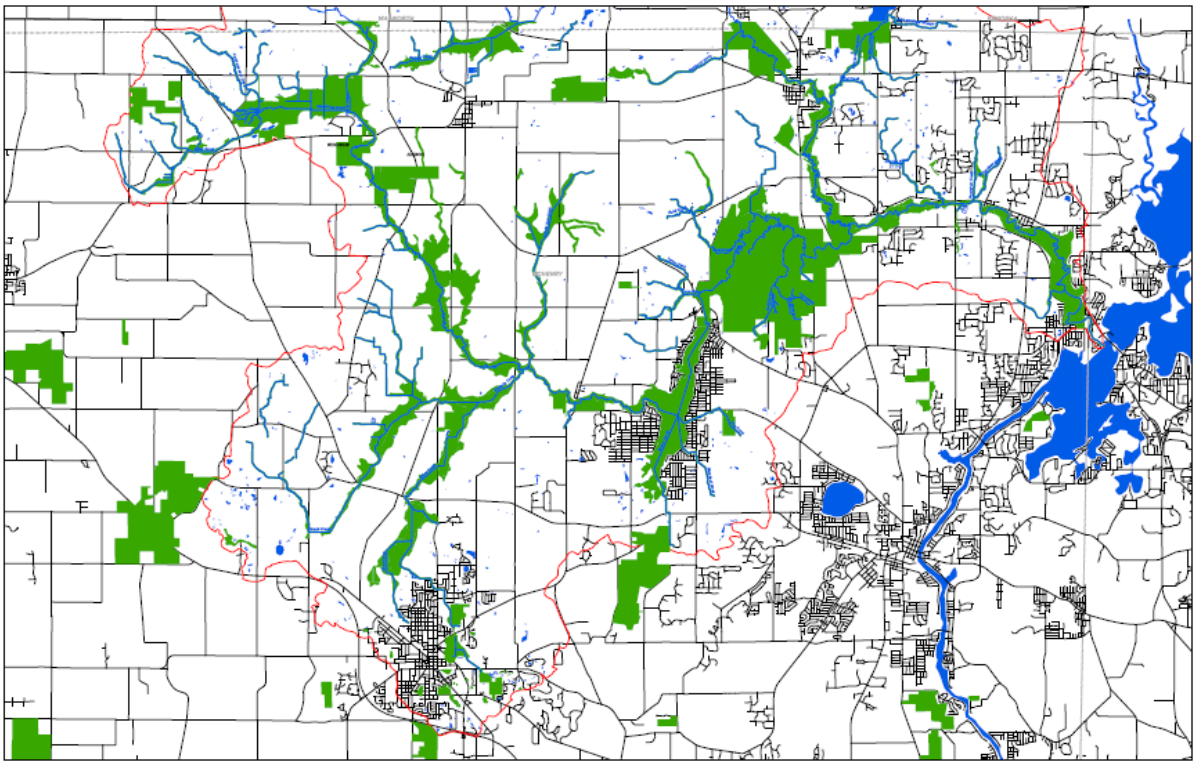


Figure 17.6 Figure 17.5 with HQH & HFV Wetlands and HQ Lakes buffered 100 feet

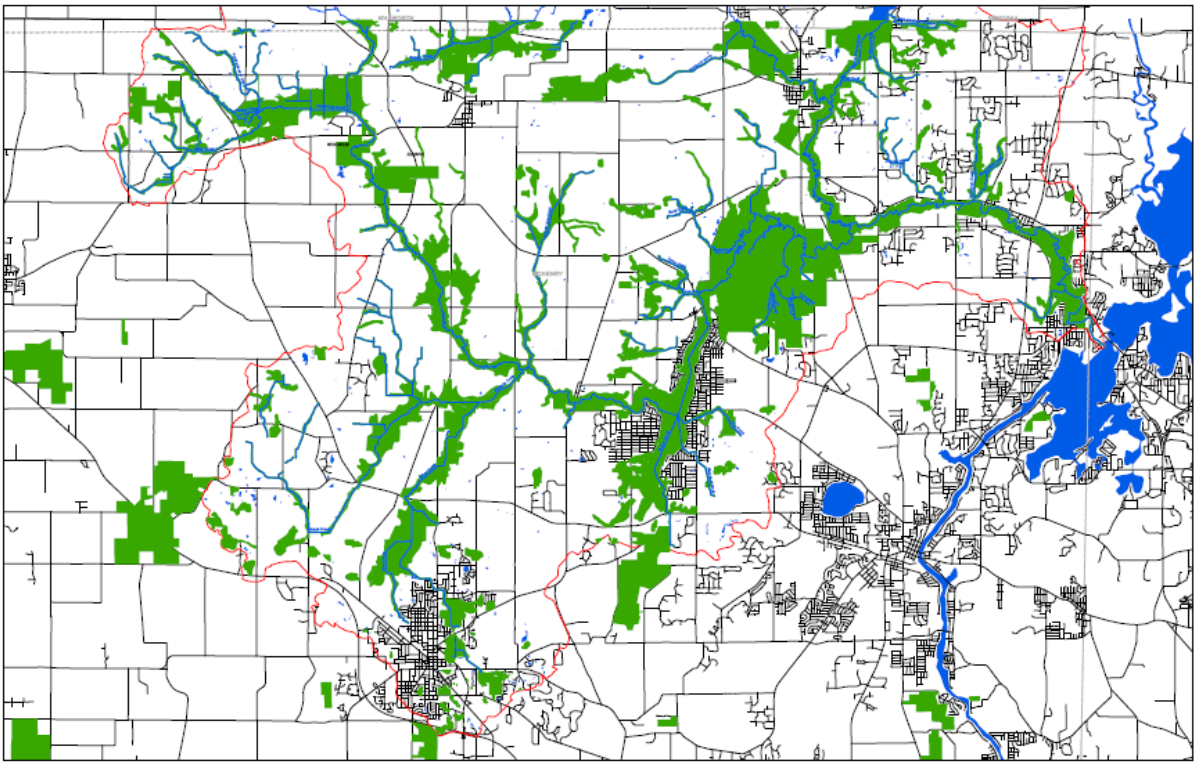


Figure 17.7 Figure 17.6 with remaining ADID identified wetlands larger than one acre.

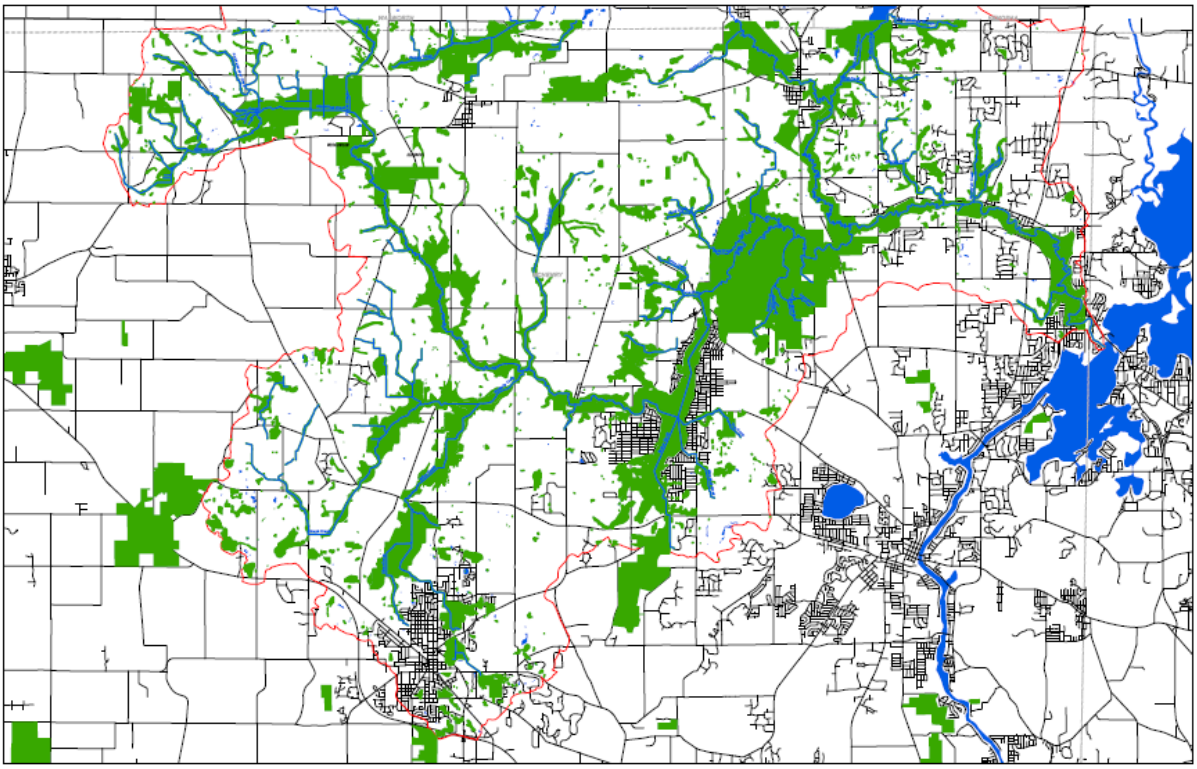
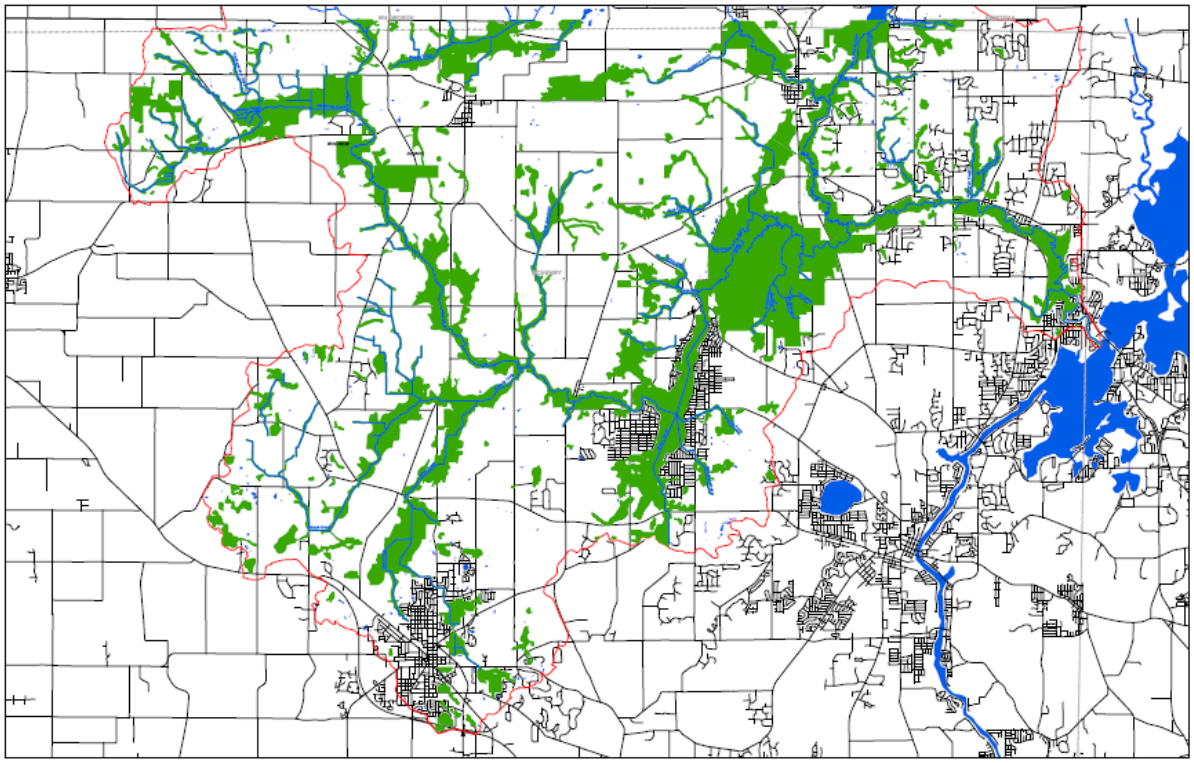


Figure 17.8 Proposed Green Infrastructure Boundary created from composite GIS datasets.



17.4 Guidelines for Interfacing with and Utilizing Nippersink Creek's Green Infrastructure

Where development has already occurred in or immediately adjacent to existing natural areas or the stream corridor, the Green Infrastructure Plan can be used as a guide to promote the installation of modest sized buffers to protect those sensitive areas. More importantly, the presence of GIP areas on or adjacent to a particular parcel can make any proposed buffer creation / enhancement project more attractive to outside funding sources.

On parcels in which development is proposed for future construction, the Green Infrastructure Plan indicates the areas where the existing land features should be preserved and perhaps enhanced to receive and transport runoff much as it did in its natural, pre-development / pre-agricultural state.

17.5 Implementing the Green Infrastructure Plan

To help achieve the goals of the Nippersink Creek Watershed Plan, watershed units of government should review the Green Infrastructure Plan (GIP) criteria presented in this chapter and adopt their own GIP that their staff and prospective developers can use to design new developments that meet the goals and objectives of the Nippersink Creek Watershed Plan. **Because the green infrastructure boundaries presented in this plan were derived only from digital data layers and not site specific field data, they are intended to only depict the <u>approximate</u> boundary of GIP areas on any given parcel.**

The exact GIP boundary would need to be determined during the site planning process. However, the GIP is still extremely useful at this resolution to:

- inform prospective land buyers of areas on a given parcel that will likely be unavailable for development, allowing them to perhaps negotiate a more realistic purchase price,
- assist land planners and engineers during the concept planning stage of development to help locate areas within the proposed development which should remain undisturbed or require additional stormwater treatment to protect high quality sensitive areas.

The exact boundaries of the green infrastructure on a parcel planned for development should be determined early on during the development design stage using wetland and soil field investigations, and mapping of the true 100-Year floodplain (not Zone A approximations) on the project site using one foot contour interval topography. Wherever possible, isolated depressional areas (such as farmed wetlands) should be preserved and connected to the green infrastructure network using relatively undisturbed overland flow corridors.

17.5.1 Suggested Ordinance & Zoning Revisions

The following restrictions and requirements should be considered by the municipalities to incorporate the green infrastructure concepts into their ordinances and zoning designations:

- Review existing subdivision and zoning ordinances to determine if building densities could be offered to developers in exchange for them providing Green Infrastructure Plan elements in their proposed plans.
- Require developers to submit a delineated Green Infrastructure Boundary (GIB) on their development plans and provide a brief explanation of how existing green infrastructure will be protected or how the green infrastructure will be restored to provide enhanced ecological, water quality, and aesthetic benefits to the watershed.
- Restrict encroachment and disturbances in the Green Infrastructure Boundary (GIB) by new development. Allow disturbances only if they are absolutely necessary and in those cases enforce strict guidelines as to the amount of disturbance allowed and degree of site restoration required (along the lines of "put it back to a condition better than you found it").
- Require stormwater facilities be constructed outside of the green infrastructure boundary and all stormwater discharges to the GIB occur via outlet systems designed to release runoff as sheet flow rather than concentrated point discharges from traditional storm sewer outfalls.
- If new development infrastructure, such as stormwater facilities, must be constructed within the GIB, then such facilities must be designed to maximize habitat and replicate the geometries of natural wetlands (shallow side slopes, native wetland vegetation, etc.)
- Where new development occurs near channelized stream corridors or isolated low quality wetlands, the development should be required to restore or enhance these features to replicate their pre-disturbed vegetative quality and hydrologic function
- Review existing landscape ordinances to ensure that property owners who maintain a GIP buffer are not cited for weed nuisance laws
- Review existing ordinances to ensure that prohibitions on landscape waste or pet waste disposal in GIP buffers exist, and can be enforced.

17.5.2 Landowner Outreach & Education on Green Infrastructure

Outreach and education on the components of and benefits associated with the watershed's green infrastructure should occur at two levels.

17.5.2.1 Developers

The Green Infrastructure Plan should be adopted by the municipal leaders and presented to developers as a guide to illustrate which existing landscapes the municipality values and desires to see them preserved or enhanced as part of development on a given parcel. The GIP should be made available to developers as soon as possible in the concept planning stage and developers should be encouraged to contact and coordinate with municipal staff to discuss the how the development will be designed to fit within the framework of the green infrastructure network.

17.5.2.2 Private Landowners

It is recognized that existing buildings and manicured landscapes have already encroached into the Nippersink Creek's green infrastructure zone. Even in these areas, however, it is still possible for these landowners to implement Best Management Practices to help protect and enhance Nippersink Creek. Simple actions, such as not mowing lawn up to the edge of a stream or wetland, not disposing of yard waste on streambanks, or limiting fertilizer applications, can have beneficial water quality impacts. Going a step beyond and creating a buffer strip of native prairie grasses and wildflowers can provide increased benefits, as can creating rain gardens to capture stormwater runoff and allow it to infiltrate into the ground. Generally speaking, the wider the buffer strip is, the greater the potential water quality / wildlife habitat benefits. Buffer strip widths of 25 to 100 feet are often recommended, which may be feasible on larger parcels. However, even on a small residential lot, a buffer strip of maintained native vegetation, three to five feet in width, can be beneficial. Regardless of the buffer width, footpaths can be provided across the buffer to allow access to the stream or wetland.

Chapter 18
Public Outreach and Education Programs

18.1 Summary of Existing Programs

An early awareness of the unique natural resources of McHenry County resulted in the creation of a number of environmental organizations dedicated to promoting, protecting, and enhancing the environmental quality of the County. Internet links to many of these groups are found in Chapter 20 of this report.

18.1.1 Nippersink Creek Watershed Planning Committee

The Nippersink Creek Watershed Planning Committee (NCWPC) mission is "To protect, preserve, and enhance the natural resources in the Nippersink Creek Watershed." The group is a subcommittee of the McHenry County Soil and Water Conservation District. The committee was first created to develop a watershed plan for the watershed in the late 1990's. Since that time, the NCWPC continues to educate watershed residents and community leaders about the quality resources of Nippersink Creek and to foster projects that will enhance the natural resources of the watershed.

More importantly, the NCWPC was the group directly responsible for the preparation of this updated Nippersink Creek Watershed Plan, and met on a monthly basis during the plan preparation phase. Looking to the future, the NCWPC anticipates being the lead entity working to move the Watershed Plan to implementation.

18.1.2 McHenry County Defenders

The McHenry County Defenders (MCDEF) is a citizen organization dedicated to the preservation and improvement of the environment. Their mission is a commitment to building sound ecological relationships between people and the natural world that supports all life. To achieve the aim of environmental preservation and improvement, the Defenders provide the community with educational programs and volunteer action on pollution prevention, sustainable land use and energy and natural resource conservation. MCDEF advocates policies which protect drinking water supplies and conserve land for open space and agriculture. They demonstrate waste reduction through recycling drives and reuse centers. They also encourage natural resource protection through native landscaping and stream protection programs.

MCDEF sponsors the *Friends of Nippersink Creek* effort which has produced a number of educational materials about Nippersink Creek.

These include:

- *Welcome to Your Watershed* brochure with *Your Watershed is Nippersink Creek* insert (produced in conjunction with Friends of the Fox River with funding from the McHenry Co. Conservation Foundation)
- *Nippersink Creek - Opportunities for Enhancement* booklet which describes assistance and funding sources for restoration efforts in the Nippersink watershed. (funded by the Nippersink Creek Watershed Planning Committee)

The Defenders also hold creek cleanups, watershed tours and informs the public about the quality and resources of the Nippersink Creek watershed at community outreach events.

18.1.3 McHenry County Soil & Water Conservation District

The purpose of the McHenry County Soil & Water Conservation District (MCSWCD) is to serve McHenry County, Illinois residents and businesses and assist in conserving and protecting the land, water, air, and other resources. The District provides a variety of educational and natural resource information programs. Educational programs include:

- "The Greatest Show of Earth" is a hands-on education trailer available to McHenry County schools and youth groups free of charge. This handicapped accessible trailer contains a variety of stations where students work through a series of questions on soil texture, soil organisms, sedimentation, plant decomposition, soil life, soil profiles, roots, soil mapping, and erosion. The trailer's target audience is 4th through 6th grade, with 5th grade being ideal.
- "Envirothon" is a way for high school students to learn about the environment. It combines in-class curriculum with hands-on field experiences, while demonstrating the role people have in important environmental issues, such as forestry and wildlife management, water quality, and soil erosion. At the completion of the year-long learning process, the Envirothon conducts a series of competitions where students are tested on five subjects: soil, aquatics, wildlife, forestry and a specific environmental issue, which changes from year to year.

The District also offer services which residents and communities in the Nippersink watershed can utilize in making natural resources management decisions. These include:

- Digital map service - the SWCD will provide the general public with digital maps displaying natural resources such as drainage and soils, floodplains and wetlands, development potential of land and other natural resource concerns for a small fee.
- Erosion & sediment control plans - in partnership with the Army Corps of Engineers and the Illinois EPA, the SWCD provides guidance to land developers on the stormwater pollution prevention plans and erosion and sediment control practices required by every development disturbing more than one acre of land.
- Natural Resource Information (NRI) reports - the SWCD furnishes natural resource information to officials of local governments for decisions concerning variations, amendments, or relief of local zoning ordinances as well as decisions on proposed subdivision of vacant or agricultural lands and the development of these lands. This report is required under 94 Act Ill Complied Statues, Chapter 70 Paragraph 405/1 Et Seq. and Ill Revised Statues, Chapter 5 Paragraph 106 Et Seq.

18.1.4 The Land Conservancy of McHenry County

The Land Conservancy of McHenry County (TLC) is a member-supported, non-profit organization, recognized by the IRS and the State of Illinois as an organization qualified to hold conservation easements. The mission of TLC is to preserve open, natural and agricultural lands in McHenry County by working with private landowners, communities and developers.

Since 1991, The Land Conservancy has helped protect over 1300 acres of McHenry County's prairies, wetlands and woodlands by working with private landowners, communities and developers. TLC does this by direct acquisition of property (through purchase or donation), or the establishment of conservation easements. The intention is that this land will be protected on behalf of the community, in perpetuity.
The Conservancy has a number of programs which can be utilized to protect the resources of the Nippersink Creek watershed. These include:

- TLC accept conservation easements from willing landowners to voluntarily place permanent restrictions on future use of the land, thereby protecting its particular natural attributes. This legal agreement provides for TLC to hold the easement and enforce the restrictions. Examples of such in the Nippersink Creek watershed include:
  - **The Village of Wonder Lake:**
    Meadows of West Bay Subdivision/Wonder Lake Sedge Meadow
    - 28 acre natural area and buffer
    - TLC holds conservation easement and has perpetual management agreement paid through HOA with back-up SSA
    - Up-front endowment provided by developer to cover monitoring and legal expenses in perpetuity
  - **The Village of Spring Grove:**
    1000 Oaks Subdivision / Horsefair Springs Natural Area
    - 9 acre creek, wetland and buffer
    - Donation of land to TLC with 25-50 foot buffer on private home sites and perpetual management agreement paid through HOA with back-up SSA
    - Up-front endowment provided by developer to cover monitoring and legal expenses in perpetuity
  - **Alden Township:**
    Nippersink Creek Headwaters
    - One existing conservation easement on the mainstem of Nippersink Creek, immediately upstream of Alden Sedge Meadow.
    - Three pending conservation easements on headwater tributaries to Nippersink Creek in the area designated as the Alden High Point Area of Conservation Concern by the McHenry County Natural Area Inventory (MCNAI). Approximately 25 acres of privately owned land, contiguous to the McHenry County Conservation District High Point unit, will be protected.

- **Most Vulnerable Natural Areas Program** outreaches to landowners at vulnerable sites including the Nippersink Headwaters area in Alden Township.
- **Land Heritage Registry Program** recognizes landowners who are interested in conserving and stewarding their land. Through a "handshake" agreement, the landowner agrees to conserve his or her land to the best of their ability.
- The aim of the **McHenry County Farmland Preservation Alliance** is to establish a countywide Farmland Protection Ordinance which would allow purchase of development rights on county farmland
- **Oaks Conservation Program** is an effort to preserve and restore oaks in McHenry County through education and awareness, ordinances, planting programs, and community involvement.

18.1.5 McHenry County Conservation District

The McHenry County Conservation District (MCCD), in addition to its land acquisition and management programs, conduct numerous educational outreach programs throughout the year. Programs include nature walks, workshops, and educational classes geared towards children, teenagers, adults and families. Extremely popular conservation camps held during the summer months are a major component of the MCCD outreach.

MCCD also has an extensive volunteer program for those interested in working on restoration programs. Each major MCCD land holding has a volunteer steward, who organizes workdays on their MCCD site. A new expansion of the steward program is an ***Ecological Restoration Certificate Program*** where participants will attend sixteen one-day classes on various aspects of ecological restoration.

18.1.6 Friends of the Fox River

The mission of the Friends of the Fox River is to preserve, restore and protect the Fox River Watershed's resources by connecting people with nature through education, research, restoration and advocacy. Friends of the Fox River (FOFR) is a non-profit organization made up of citizens and organizations taking action to protect and maintain the quality of the Fox River and its tributaries.

Through their programs and activities, FOFR encourages both adults and students to become involved in protecting the river and its watershed. Each year, FOFR administers programs for watershed stakeholders that include a watershed-wide monitoring program (FOFR's Fox River Watershed Monitoring Network), river and stream cleanups, river habitat improvement projects, and water quality education events. Hundreds of concerned citizens, teachers, and youth group leaders are members of the FOFR's Watershed Monitoring Network. Members volunteer to collect water quality data, assist at education events, and/or offer their individual expertise or talents.

Watershed stakeholders are encouraged to become FOFR members and more importantly, become active stewards of the Fox River Watershed. The hallmark of the Fox River Watershed Monitoring Network is the water quality monitoring program. Once a year, Network volunteers monitor the water quality of the Fox River and its tributaries at stream monitoring sites throughout the watershed. They collect physical, chemical, and biological data used to assess water quality trends. This data can be the first warning sign of problems in the watershed. FOFR also sponsors continuing education and community outreach events through special seminars on stream ecology and speaking at public hearings on issues that potentially impact the quality of the Fox River or its tributaries.

With assistance from McHenry County Defenders, Friends of the Fox River has produced the ***Welcome to Your Watershed*** brochure series which includes a ***Your Watershed is Nippersink Creek*** insert.

18.1.7 Fox River Ecosystem Partnership

The Fox River Ecosystem Partnership (FREP) was formed in 1996 after the Illinois Department of Natural Resources (IDNR) designated a core of high-quality ecological resources in the northern-most watershed as a "Resource Rich Area". Portions of eleven counties, including Lake, McHenry, Kane, Kendall and LaSalle, form the Fox River watershed, which is home to 11% of the state's population. The watershed contains the Fox Chain O'Lakes (one of the nation's busiest inland waterways), many high quality Natural Areas, and suburban areas with some of the highest growth rates in the state. The Partnership is a diverse group, made up of landowners, businesses, nonprofit organizations, agencies and governments within the Fox River Watershed region.

In 1998, FREP began a comprehensive planning process, identifying 16 critical factors and 6 areas of concern. The result was the ***Integrated Management Plan for the Fox River Watershed in Illinois*** that makes 35 recommendations for action. The Fox River Ecosystem Partnership is a 501(c)3 not for profit organization.

FREP is open to all watershed stakeholders and interested persons wishing to participate in watershed protection activities or simply wanting to get more information about the Fox River Watershed and the challenges and solutions that people are working on to protect the watershed. General meetings are held every other month and usually include a short presentation about a particular watershed protection activity or program.

On “off months” the Fox River Ecosystem Partnership hosts a Noon Network Program, where anyone interested can attend a lunchtime gathering in which a guest speaker is invited to present information about a particular watershed protection or restoration project they are involved in. The goal of the Noon Networks is to share information with other stakeholders and create an opportunity for stakeholders to “network” and learn more about programs and actions they can implement in their region of the Fox Watershed.

18.1.8 McHenry County

Public education and outreach from McHenry County is offered mainly through the McHenry County Department of Planning & Development. This department is charged with administering the County NPDES Phase II Permit issued by the Illinois EPA and insuring that the County is meeting the six Minimum Control Measures.

18.2 Summary of Outreach During the Watershed Plan Update

The Nippersink Creek Watershed Planning Committee (NCWPC) is the group that directed this update of the Nippersink Creek Watershed Plan. As discussed in Section 18.1.1, the NCWPC has held monthly meetings, which have included discussion of the watershed plan update since May 2005. The NCWPC has maintained a website www.nippersink.org to facilitate information exchange, outreach, and awareness. The minutes of the NCWPC meetings held during the plan update period are presented in Appendix 21.3.

Updates on the planning efforts have also been a regular part of the agenda of the McHenry County Defenders Water Resources Protection Committee during the same period of time.

In addition, input from other agencies and organizations were solicited at NCWPC organized meetings in September 2006 and July 2007. Representatives from the Land Conservancy of McHenry County, the Natural Resource Conservation Service, the McHenry County Conservation District, the McHenry County Soil and Water Conservation District, Fox River Ecosystem Partnership, the Sierra Club, and Illinois Department of Natural Resources attended these working meetings.

During Summer and Fall 2007, presentations were made to local government entities in the Nippersink Creek watershed to inform them of the progress on the update of the watershed plan and to solicit their input on the implementation plan. These included City of Woodstock Environmental Commission, Richmond Village Board, Spring Grove Village Board, Greenwood Township Planning Commission, the Richmond Township Planning Commission and the McHenry County Regional Planning Commission.

In addition, information on the plan update was provided to the public at the Nippersink Creek Fest in June 2007, and at the Fox River Summit organized by FREP in October 2007.

18.3 Education & Outreach Recommendations

There are several education and outreach programs already active and working in parts of the Nippersink Creek Watershed and throughout the entire Fox River Watershed. It is difficult to quantify just how effective these individual programs are at reaching the public at large and effecting psychological / cultural changes as to how citizens implement watershed resource protection in their everyday life.

However, the fact that McHenry County voters have now approved the last two McHenry County Conservation District (MCCD) bond referendums ($ 68.5 million in 2001 & $ 73 million in 2007), allowing MCCD to acquire additional lands, can only be viewed as a very positive sign.

In order to maximize the effectiveness of the individual education & outreach programs, it is recommended that these organizations set up an annual "education & outreach conference" where all of the organizations could come together and learn about the success each entity has had with its efforts in the Nippersink Creek watershed, identify critical areas of outreach that are missing and determine which organization or organizations could position themselves to address those critical outreach concerns. This conference could also be organized with environmental education & outreach stakeholders working throughout McHenry County, and the conference could be structured to provide a session or discussion period on the efforts being done in a specific subwatershed, such as Nippersink Creek.

The NCWPC should continue to maintain the Nippersink Creek watershed website at www.nippersink.org as a tool to keep watershed residents informed about activities in the watershed.

The NCWPC, together with the other organizations working on environmental programs in the watershed, should develop a plan for continued outreach and interaction with the municipalities in the watershed in order to cooperatively implement the recommendations of the plan.

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Chapter 19
Measuring Watershed Plan Success

19.1 Evaluating Plan Performance

In order to justify the expenditure of funds involved with implementing a watershed management plan, as well as to add to the collective knowledge of the relative success or failure of specific project components, it is necessary to establish a framework by which these types of evaluations can be made. This framework typically involves establishing "milestones", target dates or thresholds which document whether certain recommended management practices or other control actions are being implemented and /or achieved.

For watershed planning, milestones are usually organized into three relative time scales:

- Short-term Milestones (1-2 years)
- Mid-term Milestones (2-5 years)
- Long-term Milestones (5+ years)

The milestone selected for any given watershed plan recommendation will obviously be dependent on the nature of the recommendation. Short-term projects may involve an educational or outreach type of effort that can be implemented fairly quickly, assuming that a person is available to implement that recommendation.

Mid-term projects may involve restoration projects with cooperating project partners, such as the McHenry County Conservation District and the Land Conservancy of McHenry County, who already own or manage the project site location, have an eagerness to implement projects, and have staff dedicated towards managing and enhancing these lands.

Long-term projects will likely involve recommendations that involve construction, retrofits, or acquisition / easements, as these can require a much longer timeframe to implement, and require a larger commitment of upfront personnel time and funding. For example, if a watershed plan recommendation is to conduct minor grading / scraping work to restore a three acre degraded wetland along a stream corridor, a number of steps must first occur.

1) Approach landowner / Gain approval
2) Conduct data / information for design, wetland determination study, etc.
3) Finalize project design / plans / cost estimate
4) Identify source of 40% local cost share match. If from local governmental source coordinate with budget cycle / account for potential project funding lag.
5) Apply for regulatory permits / clearances
6) Select contractor / complete necessary contractual paperwork
7) Receive regulatory permits / begin work

In a region such as northeastern Illinois, where there are a multitude of regulatory programs, accomplishing the project tasks listed above could easily take 12 to 18 months, not including seasonal considerations for construction, or coordination with the USEPA Section 319 funding cycle to provide the remaining 60% of the project budget. More importantly, the amount of effort and upfront funding required to accomplish tasks 1 through 7 can also be considerable.

Unfortunately, there is often an expectation in watershed planning that these tasks can be performed by existing governmental staff. The reality is that any staff time and funding is almost always consumed by the need for day to day operation and maintenance of the traditional municipal infrastructure (the "gray infrastructure" – roads, sewers, etc.)

The same holds true for natural resource agencies and non-for-profit groups working for resource protection and enhancement, where staffs have their hands full simply trying to keep up with their existing workload, and again, surplus funds are a rarity.

Given that there are over 150 recommended projects in the Nippersink Creek Watershed Plan, the only way the implementation phase of this plan will achieve a critical mass is to have a watershed manager in place. It is anticipated that seeking and acquiring funding to hire a part-time Nippersink Creek watershed manager will jump-start this process, but still will still anticipate a one to two year lag time before project funding coordination and implementation reaches critical mass. The watershed manager could make the initial contact / outreach with landowners or units of governments included in subwatershed project recommendation areas, prepare project designs, permit applications, and grant applications, and oversee implementation of the project.

Moving the implementation phase towards a critical mass will allow much more detailed and accurate milestones to be determined.

As a result, given the overall size of the Nippersink Creek watershed, and the large number of recommended projects, a longer implementation timeframe will be required. An adapted milestone timeframe schedule for Nippersink Creek watershed is presented below:

Table 19.1 Nippersink Creek Watershed Plan Milestone Timeframes

- Short-term Milestones (1 to 3 years)
- Mid-term Milestones (2 to 7 years)
- Long-term Milestones (5 to 12 years)

19.2 Measuring Success

The most commonly used measure of success in watershed implementation projects is to quantify a predicted Pollutant Loading Reduction (PLR) resulting from the installation and appropriate maintenance of a particular Best Management Practice (BMP). In the watershed planning phase, the existing condition pollutant loading for a particular watershed is calculated by spreadsheet or computer modeled to determine the current pollutant loading rate. Based upon these predicted loading rates, specific BMP's, most appropriate for dealing with the pollutant of concern are identified, and recommended for implementation in the watershed plan. A subsequent calculation is made to predict the degree of success that will be achieved if some or all of the recommended BMP's are installed.

The actual measurement of the exact PLR does not usually result from in-situ water quality testing of the installed BMP. Instead, for many of the most commonly utilized BMP's, academic research has determined specific pollutant loading reductions expected for target pollutants, such as Total Suspended Solids, nutrients, or fecal coliform, to name but a few. These loadings are correlated to size of the BMP, such as the reduction in phosphorus expected from a "wet-basin" stormwater detention basin. For example, by plugging in the phosphorus PLR number and multiplying it by the "size" of the wet-basin BMP, a PLR can be calculated.

These PLR calculations are done for all of the BMP's installed in a given portion of the watershed, and a cumulative pollutant loading reduction can be generated. When this number is compared to the pre-project pollutant loading rate that was determined to be occurring within that area, the difference is the degree of PLR success achieved.

However, it should also be noted that in watershed plans developed for more heavily urbanized watersheds, the primary emphasis is often on "retro-fit" Best Management Practices, such as streambank stabilization, or naturalizing stormwater detention ponds, which can be easily quantified in terms of linear feet, or acres, respectively, of BMP practice proposed. Milestones can then be measured by the quantities of these practices implemented over a given period of time.

In contrast, in a still largely rural watershed, such as Nippersink Creek, numerous opportunities still exist to guide future urban development away from sensitive natural areas, or to protect and manage them through acquisition or the use of conservation easements before land prices escalate.

For this reason, the Nippersink Creek Watershed Plan focuses predominantly on agricultural / rural "preventative" practices, with far fewer "urban retrofit" practices. However, if the units of government in the watershed fail to adequately protect the remaining natural areas, or sensibly incorporate them into proposed development activities, the long-term trend will shift to "urban retrofit" practices.

For these reasons, for the Nippersink Creek watershed, it is recommended that a number of means be used to gauge the success of the implementation phase, rather than strict reliance on the Pollutant Loading Reduction approach.

1) **Pollutant Loading Reductions**

   Track the implementation of recommended water quality Best Management Practices, and maintain a running total of expected pollutant loading reductions throughout the duration of the watershed plan implementation. Where feasible, update the predicted Pollutant Loading Rates calculated within Chapter 3 of this report, to reflect large scale changes in land use in critical subwatersheds; acquisition / permanent protection of environmentally sensitive land; or the implementation of water quality BMP's not identified in this plan.

2) **Nutrient Management Planning**

   The Environmental Quality Incentive Program (EQIP) is a voluntary U.S. Department of Agriculture conservation program that provides assistance to farmers who face threats to soil, water, air, and related natural resources on their land. Through EQIP, the Natural Resources Conservation Service (NRCS) provides assistance to agricultural producers in a manner that will promote agricultural production and environmental quality as compatible goals, optimize environmental benefits, and help farmers to meet Federal, State, Tribal, and local environmental requirements. EQIP offers financial and technical help to assist eligible participants install or implement structural and management practices on eligible agricultural land. A major element of the EQIP effort is Nutrient Management Planning, as discussed in Chapter 4. Tracking the enrollment of watershed land owners in the EQIP program, as well as the pollutant loading reductions resulting from implementation EQIP plans, should be considered a key indicator in measuring success.

3) **Expanded Water Quality Monitoring / Stream Gauging**

   Implement an expanded water quality monitoring program throughout the watershed to increase the baseline water quality data, which will allow comparisons to be made during and after watershed plan implementation. Also reestablish USGS stream gauging stations to allow the effects of BMP implementation on reducing peak flow discharges during frequent interval storms to be measured, and in turn, allowing another means of determining Pollutant Loading reductions.

4) **Community Assessment**

   Work closely with town governments and residents to enhance the natural resource-based 'quality of life' and to encourage behaviors that are supportive of a healthy watershed (determined by water quality measures, control of non-point source pollution, and community satisfaction with the ecological health of the watershed)

This will be accomplished through a three stage community assessment effort that will include the following activities:

1. Initial survey of Nippersink Creek watershed residents to determine baseline information on values, attitudes, knowledge, and behaviors of watershed residents.
2. Utilization of these findings and additional expert knowledge to assist in the implementation of the watershed plan as well as the design and delivery of education and outreach programs designed to maintain water quality. Programs may include (but are not limited to) such things as technical seminars related to land use management, natural resource protection and water quality; involvement of local schools in water monitoring programs; and additional educational and outreach activities to engage and educate residents of the Nippersink Creek watershed. Outreach activities will also be designed to increase a "sense of place" and attachment among stakeholders and residents within the watershed.
3. Follow-up scientific survey of Nippersink Creek watershed residents to determine the effects of the educational programs and outreach on their values for the watershed, understanding of stewardship principles, changes in residents' use of environmentally responsible behaviors, and changes in residents' perceived barriers to and benefits of adopting environmentally responsible behaviors.

19.3 Suggested Milestones

The following section describes project milestones that should be pursued to help ensure a logical progression of Watershed Plan implementation, and to help ensure that the objectives of the Plan are met. This information includes a proposed timeframe, the recommended action, and where applicable, the corresponding General Watershed Recommendation (GWR), as discussed in Chapter 4.

19.3.1 Plan Implementation

Short-term Milestones (Plan Implementation Year 1):

- Apply for Section 319 or other funding to allow the hiring of a part-time watershed manager to begin the outreach / management component of watershed plan implementation. Meets General Watershed Recommendation (GWR-9).
- Apply for Section 319 or other funding to initiate expanded water quality to begin collection of water quality samples at designated locations throughout the watershed to create a baseline of data, and to augment existing data sources. Meets General Watershed Recommendation (GWR-1).

- Apply for Section 319 or other funding to initiate first phase of social science research of watershed stakeholder views of the Nippersink. Meets General Watershed Recommendation (GWR-10).
- Apply for Section 319 or other funding to initiate acquisition / database creation of existing Nutrient Management Planning information from USDA/NRCS files. Meets General Watershed Recommendation (GWR-2).
- Coordinate with project partners McHenry County Conservation District and the Land Conservancy of McHenry County on applying for Section 319 or other funding to implement one or more subwatershed specific recommended BMP project on land that they own or manage. Each year, at least one Habitat Restoration project should be completed by each responsible party. Meets General Watershed Recommendation (GWR-3).
- Through watershed plan implementation period, continue regular meetings of the Nippersink Creek Watershed Planning Committee, and maintain the www.nippersink.org webpage with current information on stakeholder participation opportunities, and watershed plan documents as appropriate updates / revisions are completed. Meets General Watershed Recommendation (GWR-8).

Mid-term Milestone (Plan Implementation Year 2 – Completion):

- NCWPC / watershed manager will assist in the preparation and submittal of grant applications for projects that advance the objectives of the Nippersink Creek Watershed Plan. For each Plan Implementation Year (starting at Year 2), the Goal is to have a minimum of one Nippersink Creek Watershed Plan recommendation project for each subwatershed in progress for Section 319 funding, regulatory permits, etc. by the Section 319 funding cycle deadline of each Plan Implementation Year.
- NCWPC / watershed manager will conduct educational outreach to watershed units of government to encourage ordinance adoption / revision to incorporate Conservation Design / Green Infrastructure concepts. Meets General Watershed Recommendation (GWR-4).
- NCWPC / watershed manager will contact private landowners identified as potential participants in site Restoration projects and provide them with information on technical guidance and possible funding sources to assist them with management of their privately owned natural areas along the stream corridor. Meets General Watershed Recommendation (GWR-3)
- NCWPC / watershed manager will conduct discussions with units of government within both the Illinois and Wisconsin portions of the watershed about requiring additional water quality enhancements as part of the construction or expansion of any wastewater treatment plants discharging to Nippersink Creek. Meets General Watershed Recommendation (GWR-6).

- NCWPC / watershed manager will conduct discussions with units of government within the Wisconsin portion of the watershed on jointly developing, funding, and implementing watershed protection / enhancement projects.
- July, 2010: City of Woodstock submits IEPA 319 grant application for funding assistance to install two or more structural BMP devices to capture pollutants from medium to large storm sewer networks in the Silver Creek Subwatershed.
- July, 2010: City of Spring Grove submits IEPA 319 grant application for funding assistance to install two or more structural BMP devices to capture pollutants from medium to large storm sewer networks in the Lower Nippersink Creek Subwatershed.
- July, 2010: McHenry County submits IEPA 319 grant application for retrofit of two stormwater detention basins located at the County complex
- July, 2010: Village of Wonder Lake and Village of Richmond submit IEPA 319 grant application for funding assistance to have each entity install two or more rain gardens on their municipal properties.
- Spring 2011: NCWPC begins process of securing funding and implementing a watershed pollutant loading model update based upon the presumed completion of the McHenry County Year 2030 Land Use Plan, as well as the work completed by the Fox River Study Group, Inc. and the Illinois State Water Survey.
- Spring 2012: Complete watershed loading model project and revise plan recommendation strategies and development guidelines to achieve desired water quality and stream stability goals.

Governmental

- As soon as possible, municipalities will begin working with prospective land developers to incorporate Conservation Design / Green Infrastructure Plan elements into future developments in the watershed.
- By 2nd quarter 2009, McHenry County, and each watershed municipality will pass a resolution adopting the practices and principles of the Nippersink Creek Watershed Plan and pledge to implement the recommendations specified therein as funding for projects becomes available.
- By 1st quarter 2010, McHenry County and local units of governments will adopt and implement a McHenry County Stormwater Ordinance (MCSWO) enforcement audit / review process to help maximize the effectiveness of the portions of the MCSWO that require riparian / wetland buffers, conservation easements, and stormwater Best Management Practices.
- By 1st quarter 2010, each watershed unit of government will adopt a Green Infrastructure Plan.

- By 1st quarter 2011, McHenry County and municipalities agree to contribute to a funding mechanism to allow cost-share of habitat / water quality restoration projects on private lands located within the boundaries of the Nippersink Creek Green Infrastructure Plan, with a higher cost-share ratio provided for landowners that agree to place the restored area into a conservation easement.
- By 1st quarter 2011, IDOT and MCDOT agree to incorporate the design, funding, and implementation of structural or non-structural stormwater quality Best Management Practices as part of the reconstruction of any County or State highway bridges over the Nippersink or its tributaries.
- By 1st quarter 2012, each watershed units of government will update and strengthen existing stormwater, zoning, land use, and/or subdivision ordinances to allow these documents to integrate seamlessly, creating a streamlined process for developers pursuing Conservation Design projects.

Habitat Restoration

- Establish a funding mechanism to allow the legal / survey work fees, and long-term endowment donation associated in establishing a conservation easement to be paid, so that there is little or no out-of-pocket expense to private conservation easement donors.
- Encourage the McHenry County Conservation District and the Land Conservancy of McHenry County to expand their stewardship and management programs on parcels under their control.
- Work with watershed units of governments to have ADID wetlands, oak-hickory woodlands, and MCNAI sites permanently protected and enhanced as part of any proposed site development work on parcels on which they are found.
- Support of any grant initiatives that will allow MCCD to further leverage their land acquisition funds.

Long-Term Milestones (Upon Plan Implementation Completion):

- All Habitat Restoration projects completed by 2019
- All Water Quality projects completed by 2021

Chapter 20
References

20.1 Watershed Plan References

"Nippersink Creek Watershed Plan"
Nippersink Creek Watershed Planning Committee — September 1998

"McHenry County Land Use Plan Year 2010 Update
McHenry County — October 20, 1993

"Village of Ringwood 2030 Comprehensive Land Use Plan"
Village of Ringwood, Illinois — March 27, 2006

"Village of Richmond Comprehensive Plan"
Village of Richmond, Illinois — November 4, 1997

"Village of Spring Grove Comprehensive Plan"
Village of Spring Grove, Illinois — May 8, 2007

"Woodstock Comprehensive Plan 2002"
City of Woodstock, Illinois — May 7th, 2002

"Alden Township Land Use Plan"
Alden Township Plan Commission — April 6, 2005

"Natural Areas Protection Guide"
McHenry County Conservation District — Spring 2007

"2005 McHenry County Natural Areas Inventory"
McHenry County Conservation District — May 2005

"McHenry County Stormwater Management Ordinance"
McHenry County — January 20, 2004

"Illinois Integrated Water Quality Report and Section 303(d) List"
Illinois Environmental Protection Agency – Bureau of Water — April, 2006

"Water Quality of Nippersink Creek and Wonder Lake, McHenry County, Illinois, 1994-2001" United States Geological Survey. USGS Scientific Investigations Report 2004-5085
http://il.water.usgs.gov/pubs/sir2004-5085.pdf

"Physical, Chemical, and Biological Responses to Urbanization in the Fox and Des Plaines River Basins of Northeastern Illinois and Southeastern Wisconsin"
United States Geological Survey. USGS Scientific Investigations Report 2005-5218
http://il.water.usgs.gov/pubs/sir2005-5218.pdf

20.2 Watershed Protection References & Resources

20.2.1 Organization & Agencies

U.S. Environmental Protection Agency
http://www.epa.gov/owow/nps/

The Land Conservancy of McHenry County
http://www.conservemc.org/

The McHenry County Conservation District
http://www.mccdistrict.org/

McHenry County Soil & Water Conservation District
http://www.mchenryswcd.org/

McHenry County Defenders
http://www.mcdef.org/

Alden Township Plan Commission
http://www.aldenplan.org/

Friends of the Fox River
http://www.friendsofthefoxriver.org/

Fox River Ecosystem Partnership
http://www.foxriverecosystem.org/

Fox River Study Group, Inc.
http://foxriverstudygroup.org/

The Center for Watershed Protection
http://www.cwp.org/

McHenry County 2030 Comprehensive Plan
http://www.mchenrycounty2030plan.com/

20.2.2 Publications

"Blackberry Creek Watershed Alternatives Futures Analysis"
Conservation Design Forum 2003.

"Naturalization of headwater streams in Illinois: challenges and possibilities"
Rhoads BL, Herricks EE. 1996. In *River Channel Restoration: Guiding Principles for Sustainable Projects*, Brookes A, Shields Jr FD (eds). Wiley: New York; 331–367.

"Human-induced geomorphic change in low-energy agricultural streams: an example from East-central Illinois" Rhoads BL, Urban MA. 1997. In *Proceedings of the Conference on Management of Landscapes Disturbed by Channel Incision*

20.2.3 Internet-based References

"Guidance for Developing Watershed Action Plans in Illinois"
Chicago Metropolitan Agency for Planning May 2007
http://www.chicagoareaplanning.org/watershed/watershed_guide_FINAL.pdf

"Draft Handbook for Developing Watershed Plans to Restore and Protect Our Waters".
2005. United States Environmental Protection Agency. EPA document 841-B-05-005.
http://www.epa.gov/nps/watershed_handbook/

"The Practice of Watershed Protection", 2000. Editors Thomas R. Schueler and Heather K. Holland, Center for Watershed Protection
www.stormwatercenter.net

"Stormwater Magazine"
http://www.stormh2o.com/sw.html

20.2.4 Resources Used in Preparation of GIS Data Layers

- McHenry County Mapping
  - 2010 Land Use Plan
  - Parcel Maps
  - ADID Wetlands
  - Public Open Space / Protected Land
- Village of Wonder Lake
  - Comprehensive Land Use Plan
  - Facility Planning Area Boundary
- City of Woodstock
  - Comprehensive Land Use Plan
  - Facility Planning Area Boundary
- Village of Richmond
  - Comprehensive Plan
  - Facility Planning Area Boundary
  - WWTP Anti-degradation Study
- Village of Ringwood
  - 2030 Comprehensive Land Use Plan
- Village of Hebron
  - Facility Planning Area Boundary
  - WWTP Anti-degradation Study
- Illinois Natural History Survey
  - Biological Data (Fish/Mussels/T&E)
- Natural Resource Conservation Service
  - Soils (Hydric/Permeability/Aquifer Sensitivity, etc.)
- Friends of the Fox River
  - Fox River Watershed Monitoring Network Sampling Data
- McHenry County Conservation District
  - Protected Land / Public Open Space
  - Biological Inventories
- NIPC
  - 2030 Population Projections

20.2.5 Resources Used in Preparation of Pollutant Loading Modeling

"**An Approach for Using Load Duration Curves in the Development of TMDL's."** Environmental Protection Agency (EPA)-2007.
Report EPA 841-B-07-006 available at http://www.epa.gov/owow/tmdl/techsupp.html

"Integrated Water Quality Report and Section 303(d) List – 2006"
Illinois Environmental Protection Agency (IEPA)
http://www.epa.state.il.us/water/water-quality/report-2006/2006-report.pdf

"Stormwater Manager's Resource Center, Pollution Prevention Fact Sheet: Animal Waste" Collection Center for Watershed Protection (CWP),.
http://www.stormwatercenter.net/Pollution_Prevention_Factsheets/AnimalWasteCollection.htm

"Microbes and Urban Watersheds: Concentrations, Sources, & Pathways"
Center for Watershed Protection, Article 17, Vol. 3(1): 554-565.

"Nutrient Movement from the Lawn to the Stream"
The Practice of Watershed Protection, Article 4. Vol. 2(1): 239-246

"Storm Water Pollution Control: Municipal, Industrial, and Construction NPDES Compliance, 2nd Ed"
Dodson, Roy D. 1999, McGraw-Hill Professional Pollution Control Industry, 448 pages.

"Are management-based regulations effective? Evidence from state pollution prevention programs." Lori Snyder Bennear. 2007. Journal of Policy Analysis and Management, Volume 26, Issue 2, Pages 327-348

"The Poplar Creek Watershed Action Plan,"
Chicago Metropolitan Agency for Planning (CMAP). 2006.

"Soil Survey of McHenry County, Illinois Part I and II." 1995
United States Department of Agriculture (USDA), Natural Resource Conservation Service (NRCS).
The reports can be accessed at:
http://soildatamart.nrcs.usda.gov/Manuscripts/IL111/0/McHenry_IL.pdf

"Analysis of Treatment System Performance, International Stormwater Best Management Practices (BMP) Database [1999-2007]"
Water Environment Research Foundation (WERF): October 2007.
http://www.bmpdatabase.org/BMPPerformance.htm

21.1 Assignment of Land Use Categories for GWLF Analysis

IDNR Land Cover Description	GWLF Land Cover Description
Shallow Marsh-Emergent Wetland	1.Wetland
Deep Marsh- Emergent Wetland	
Seasonal/Temporary flooded Wetland	
Shallow Water Wetland	
Floodplain Forest	2.Forest
Partial Forest/Savannah Upland	
Upland Forest	
Coniferous Forest	
Other Small Grains and Hay	3.Hay/Pasture
Rural Grassland	
Corn	4.Row Crops
Soybeans	
Winter Wheat	
Low Density Urban	5.Low Density Development (< 1unit per 1.2 acres)
Medium Density Urban	6.High Density Development (≥ 1unit per 1.2 acres)
High Density Urban	
Barren and Exposed Land	7.Transitional/Quarries
Urban Grassland	8.Turfgrass/Golf Course
Open Water	9.Water

21.2 Detailed Pollutant Loads

The Lower Nippersink Creek Subwatershed

Existing Loading Estimates by Source						Future loading Estimates			
Source	Area Acres	Sediment Ton	Total N Lbs	Total P Lbs		Area Acres	Sediment Ton	Total N Lbs	Total P Lbs
Wetland	143.3	0.1	13.8	0.6		135.9	0.1	13.1	0.5
Hay/Pasture	207.6	3.7	90.2	9.2		121.1	14.0	52.6	5.4
High-Density Development	113.7	2.0	9.7	1.1		1141.6	21.3	1070.7	118.7
Low-Density Development	704.2	13.8	30.6	4.1		3966.0	78.8	986.3	131.5
Forest	2485.9	2.9	60.6	5.4		1868.1	2.1	45.3	4.0
Row Crops	3795.5	1027.5	8958.2	1598.1		1289.9	335.8	2971.7	524.9
Transitional	205.1	116.3	974.7	181.8		150.7	88.6	733.3	137.8
Turfgrass/Golf Course	4712.3	92.1	1448.4	125.4		3704.1	72.9	1141.4	99.2
Water	58.4					48.6			
Stream bank	-	425.9	42.6	18.7			1050.3	105.0	46.2
Groundwater	-	-	37743.2	377.4				31688.2	316.9
Total	12426.0	1684.3	49372	2321.8		12426.0	1663.9	38807.6	1385.2

The Glacial Park/Tamarack Farms Subwatershed

Existing Loading Estimates by Source						Future loading Estimates			
Source	Area Acres	Sediment Ton	Total N Lbs	Total P Lbs		Area Acres	Sediment Ton	Total N Lbs	Total P Lbs
Wetland	195.2	0.1	34.3	1.2		190.3	0.1	33.4	1.2
Hay/Pasture	301.5	5.6	132.1	13.7		261.9	31.2	114.5	11.8
High-Density Development	12.4	0.2	0.1	0.0		34.6	0.4	0.6	0.1
Low-Density Development	227.3	4.5	3.2	0.4		914.3	19.5	56.2	7.5
Forest	1892.8	2.0	44.9	3.8		1843.4	1.9	43.8	3.7
Row Crops	5001.4	1393.5	12019.3	2159.5		4546.7	1251.4	10842.9	1942.3
Transitional	54.4	27.2	238.4	43.2		51.9	25.9	227.6	41.2
Turfgrass/Golf Course	4877.9	88.1	1459.8	119.9		4722.2	85.2	1413.0	116.0
Water	20.3					17.9			
Stream bank	-	267.2	26.7	11.8			362.7	36.3	16.0
Groundwater	-	-	37707.1	377.1				36379.6	363.8
Total	12583.2	1788.4	51665.9	2730.6		12583.2	1778.4	49147.8	2503.5

Note: The Existing / Future Loading Estimates in these tables are for the future condition without BMP implementation.

The Wonder Lake Subwatershed

Source	Existing Loading Estimates by Source: Area Acres	Sediment Ton	Total N Lbs	Total P Lbs		Future loading Estimates: Area Acres	Sediment Ton	Total N Lbs	Total P Lbs
Wetland	101.3	0.1	9.7	0.4		93.9	0.1	9.0	0.4
Hay/Pasture	39.5	0.7	17.2	1.8		32.1	3.2	13.9	1.4
High-Density Development	9.9	0.2	0.1	0.0		49.4	1.1	2.4	0.3
Low-Density Development	570.8	18.5	33.4	4.5		2478.5	60.1	470.6	62.7
Forest	1791.5	2.5	45.9	4.4		1687.7	2.4	43.6	4.2
Row Crops	2807.1	978.8	7816.6	1479.7		1107.0	361.5	2949.1	550.2
Transitional	180.4	68.0	670.9	113.3		177.9	66.5	658.5	111.0
Turfgrass/Golf Course	1598.8	40.9	543.9	55.6		1472.7	37.2	498.2	50.6
Water	781.3					781.4			
Stream bank	-	83.5	8.4	3.7			165.8	16.6	7.3
Groundwater	-	-	12786.2	127.9				10804.0	108.0
Total	7880.6	1193.2	21932.3	1791.3		7880.6	697.8	15465.9	896.0

The Vander Karr Creek Subwatershed

Source	Existing Loading Estimates by Source: Area Acres	Sediment Ton	Total N Lbs	Total P Lbs		Future loading Estimates: Area Acres	Sediment Ton	Total N Lbs	Total P Lbs
Wetland	71.7	0.1	12.6	0.5		71.7	0.1	12.6	0.5
Hay/Pasture	291.6	5.3	127.3	13.1		291.6	34.3	127.3	13.1
High-Density Development	7.4	0.1	0.0	0.0		7.4	0.1	0.0	0.0
Low-Density Development	180.4	3.5	2.0	0.3		222.4	4.4	3.1	0.4
Forest	704.2	0.7	16.6	1.4		701.8	0.7	16.5	1.4
Row Crops	8255.8	2092.0	18707.3	3281.5		8231.1	2085.8	18651.3	3271.7
Transitional	9.9	6.4	51.5	9.9		9.9	6.4	51.5	9.9
Turfgrass/Golf Course	2698.4	50.1	815.1	68.2		2686.0	49.9	811.4	67.9
Water	7					4.5			
Stream bank	-	236.9	23.7	10.4			241.8	24.2	10.7
Groundwater	-	-	25812.7	258.1				25675.8	256.8
Total	12226.4	2395.1	45568.8	3643.4		12226.4	2423.5	45373.8	3632.2

Note: The Existing / Future Loading Estimates in these tables are for the future condition without BMP implementation.

The Silver Creek Subwatershed

	Existing Loading Estimates by Source					Future loading Estimates			
Source	Area Acres	Sediment Ton	Total N Lbs	Total P Lbs		Area Acres	Sediment Ton	Total N Lbs	Total P Lbs
Wetland	271.8	0.1	25.6	1.0		271.8	0.1	25.6	1.0
Hay/Pasture	133.4	2.3	57.5	5.8		133.4	14.6	57.5	5.8
High-Density Development	338.5	7.2	107.9	12.0		338.5	7.2	107.9	12.0
Low-Density Development	1467.8	31.5	146.0	19.5		1467.8	31.5	146.0	19.5
Forest	1450.5	1.5	34.4	2.9		1450.5	1.5	34.4	2.9
Row Crops	4524.5	1193.0	10505.5	1861.7		4524.5	1193.0	10505.5	1861.7
Transitional	7.4	5.1	40.1	7.8		7.4	5.1	40.1	7.8
Turfgrass/Golf Course	3746.1	69.3	1130.3	94.4		3746.1	69.3	1130.3	94.4
Water	65.4					65.4			
Stream bank	-	413.3	41.3	18.2			413.3	41.3	18.2
Groundwater	-	-	29639.6	296.4				29639.6	296.4
Total	12005.4	1723.3	41728.2	2319.7		12005.4	1735.7	41728.2	2319.5

The Slough Creek Subwatershed

	Existing Loading Estimates by Source					Future loading Estimates			
Source	Area Acres	Sediment Ton	Total N Lbs	Total P Lbs		Area Acres	Sediment Ton	Total N Lbs	Total P Lbs
Wetland	180.4	0.2	17.5	0.8		180.4	0.2	17.5	0.8
Hay/Pasture	257.0	4.7	112.3	11.6		257.0	30.1	112.3	11.6
High-Density Development	4.9	0.1	0.0	0.0		4.9	0.1	0.0	0.0
Low-Density Development	182.9	3.7	2.1	0.3		182.9	3.7	2.1	0.3
Forest	795.7	0.9	19.0	1.6		795.7	0.9	19.0	1.6
Row Crops	7020.3	1901.4	16574.0	2957.0		7020.3	1901.4	16574.0	2957.0
Transitional	7.4	5.0	39.8	7.7		7.4	5.0	39.8	7.7
Turfgrass/Golf Course	3387.8	68.9	1055.8	93.7		3387.8	68.9	1055.8	93.7
Water	35					35.0			
Stream bank	-	200.1	20.0	8.8			200.1	20.0	8.8
Groundwater	-	-	28928.9	289.3				28928.9	289.3
Total	11871.4	2185	46769.4	3370.8		11871.4	2210.4	46769.5	3370.8

Note: The Existing / Future Loading Estimates in these tables are for the future condition <u>without</u> BMP implementation.

The Bailey Woods Creek Subwatershed

Existing Loading Estimates by Source						Future loading Estimates			
Source	Area Acres	Sediment Ton	Total N Lbs	Total P Lbs		Area Acres	Sediment Ton	Total N Lbs	Total P Lbs
Wetland	27.2	0.0	2.7	0.1		27.2	0.0	2.7	0.1
Hay/Pasture	197.7	4.6	91.4	10.2		197.7	25.6	91.4	10.2
High-Density Development									
Low-Density Development	98.8	2.2	0.7	0.1		98.8	2.2	0.7	0.1
Forest	538.7	0.8	13.9	1.3		538.7	0.8	13.9	1.3
Row Crops	4497.3	1392.2	14735.2	2319.9		4497.3	1392.2	14735.2	2319.9
Transitional	2.5	2.1	15.6	3.2		2.5	2.1	15.6	3.2
Turfgrass/Golf Course	1905.2	43.7	620.9	59.5		1905.2	43.7	620.9	59.5
Water	13.2					13.2			
Stream bank	-	154.1	15.4	6.8			154.1	15.4	6.8
Groundwater	-	-	16075.0	160.7				16075.0	160.7
Total	7280.6	1599.7	31570.8	2561.8		7280.6	1620.8	31570.7	2561.8

The Nippersink Creek Headwaters Subwatershed

Existing Loading Estimates by Source						Future loading Estimates			
Source	Area Acres	Sediment Ton	Total N Lbs	Total P Lbs		Area Acres	Sediment Ton	Total N Lbs	Total P Lbs
Wetland	71.7	0.1	6.9	0.3		71.7	0.1	6.9	0.3
Hay/Pasture	301.5	8.4	147.4	17.5		301.5	46.5	147.4	17.5
High-Density Development									
Low-Density Development	64.2	1.6	0.3	0.0		64.2	1.6	0.3	0.0
Forest	1005.7	1.9	28.6	3.2		1005.7	1.9	28.6	3.2
Row Crops	2429.0	768.0	6334.0	1173.0		2429.0	768.0	6334.0	1173.0
Transitional	4.9	4.0	30.2	6.1		4.9	4.0	30.2	6.1
Turfgrass/Golf Course	2693.4	67.1	906.7	91.3		2693.4	67.1	906.7	91.3
Water	23.8					23.8			
Stream bank	-	65.0	6.5	2.9			65.0	6.5	2.9
Groundwater	-	-	20163.5	201.6				20163.5	201.6
Total	6594.2	916.1	27624.1	1495.9		6594.2	954.2	27624.2	1495.9

Note: The Existing / Future Loading Estimates in these tables are for the future condition <u>without</u> BMP implementation.

The North Branch Nippersink Creek Subwatershed

Source	Existing Loading Estimates by Source: Area Acres	Sediment Ton	Total N Lbs	Total P Lbs		Future loading Estimates: Area Acres	Sediment Ton	Total N Lbs	Total P Lbs
Wetland	195.2	0.1	18.5	0.7		158.1	0.1	15.0	0.6
Hay/Pasture	106.3	2.3	48.3	5.3		91.4	10.8	41.4	4.5
High-Density Development	56.8	1.0	2.4	0.3		511.5	9.0	202.4	22.4
Low-Density Development	331.1	6.7	7.0	0.9		699.3	18.4	40.5	5.4
Forest	966.2	1.1	23.2	2.0		753.7	0.8	17.8	1.5
Row Crops	3316.1	965.3	8194.3	1488.1		2999.9	868.8	7388.6	1340.1
Transitional	14.8	7.0	77.2	12.3		9.9	6.7	53.1	10.3
Turfgrass/Golf Course	1744.6	34.5	538.5	47.0		1507.3	29.6	463.9	40.3
Water	22.6					22.6			
Stream bank	-	124.9	12.5	5.5			210.5	21.1	9.3
Groundwater	-	-	15092.7	150.9				14495.5	145.0
Total	6753.7	1142.9	24014.6	1713		6753.7	1154.6	22739.3	1579.3

The Lower Elizabeth Lake Drain Subwatershed

Source	Existing Loading Estimates by Source: Area Acres	Sediment Ton	Total N Lbs	Total P Lbs		Future loading Estimates: Area Acres	Sediment Ton	Total N Lbs	Total P Lbs
Wetland	123.6	0.0	4.7	0.2		121.1	0.0	4.7	0.2
Hay/Pasture	17.3	0.4	7.9	0.9		9.9	1.0	4.4	0.5
High-Density Development	4.9	0.1	0.0	0.0		98.8	2.4	10.3	1.2
Low-Density Development	42.0	1.1	0.1	0.0		995.8	28.7	90.3	12.0
Forest	810.5	1.1	20.6	1.9		560.9	0.7	14.0	1.3
Row Crops	1032.9	410.9	3152.4	613.5		462.1	175.7	1365.9	263.4
Transitional	2.5	2.2	15.8	3.2		2.5	2.1	15.5	3.1
Turfgrass/Golf Course	1003.2	25.0	337.6	34.0		790.7	19.4	264.3	26.4
Water	41.2					36.3			
Stream bank	-	22.1	2.2	1.0			67.8	6.8	3.0
Groundwater	-	-	7843.0	78.4				6202.9	62.0
Total	3078.1	462.9	11384.3	733.1		3078.1	297.7	7978.9	373.0

Note: The Existing / Future Loading Estimates in these tables are for the future condition without BMP implementation.

The Hebron Peatlands Subwatershed

Existing Loading Estimates by Source						Future loading Estimates			
Source	Area Acres	Sediment Ton	Total N Lbs	Total P Lbs		Area Acres	Sediment Ton	Total N Lbs	Total P Lbs
Wetland	59.3	0.0	10.4	0.4		59.3	0.0	10.4	0.4
Hay/Pasture	170.5	3.7	77.4	8.4		170.5	18.6	77.4	8.4
High-Density Development	22.2	0.6	0.5	0.1		22.2	0.6	0.5	0.1
Low-Density Development	108.7	2.6	0.9	0.1		108.7	2.6	0.9	0.1
Forest	284.2	0.3	6.8	0.6		284.2	0.3	6.8	0.6
Row Crops	1593.8	549.6	4404.6	831.8		1593.8	549.6	4404.6	831.8
Transitional	2.5	2.1	15.4	3.1		2.5	2.1	15.4	3.1
Turfgrass/Golf Course	1492.5	26.8	445.7	36.4		1492.5	26.8	445.7	36.4
Water	16.1					16.1			
Stream bank	-	29.0	2.9	1.3			29.0	2.9	1.3
Groundwater	-	-	11027.2	110.3				11027.2	110.3
Total	3749.8	614.7	15991.8	992.5		3749.8	629.5	15991.7	992.4

The Elizabeth Lake Subwatershed (Wisconsin)

Existing Loading Estimates by Source						Future loading Estimates			
Source	Area Acres	Sediment Ton	Total N Lbs	Total P Lbs		Area Acres	Sediment Ton	Total N Lbs	Total P Lbs
Wetland	252.0	0.1	44.0	1.5		252.0	0.1	44.0	1.5
Hay/Pasture	514.0	11.1	233.6	25.4		514.0	57.7	233.6	25.4
High-Density Development	113.7	3.3	16.6	1.9		113.7	3.3	16.6	1.9
Low-Density Development	76.6	1.6	0.4	0.0		79.1	1.6	0.4	0.0
Forest	761.1	2.4	26.7	3.7		761.1	2.4	26.7	3.7
Row Crops	1151.5	417.2	3291.8	628.3		1151.5	417.2	3291.8	628.3
Transitional	81.5	69.4	513.5	103.8		81.5	69.4	513.5	103.8
Turfgrass/Golf Course	481.9	14.3	174.8	19.5		481.9	14.3	174.8	19.5
Water	1060.2					1057.7			
Stream bank	-	21.6	2.2	1.0			21.7	2.2	1.0
Groundwater	-	-	3358.5	33.6				3359.6	33.6
Total	4492.5	541	7662.1	818.7		4492.5	587.7	7663.2	818.7

Note: The Existing / Future Loading Estimates in these tables are for the future condition <u>without</u> BMP implementation.

The Upper North Branch Nippersink Creek Subwatershed (Wisconsin)

Source	Existing Loading Estimates by Source					Future loading Estimates			
	Area Acres	Sediment Ton	Total N Lbs	Total P Lbs		Area Acres	Sediment Ton	Total N Lbs	Total P Lbs
Wetland	2525.4	0.9	439.4	14.9		2525.4	0.9	439.4	14.9
Hay/Pasture	3476.8	59.3	1495.4	150.8		3476.8	468.0	1495.4	150.8
High-Density Development	145.8	2.1	13.2	1.5		145.8	2.1	13.2	1.5
Low-Density Development	153.2	2.1	1.0	0.1		153.2	2.1	1.0	0.1
Forest	1984.3	2.0	46.5	3.8		1984.3	2.0	46.5	3.8
Row Crops	12130.4	2972.5	26935.4	4683.7		12130.4	2972.5	26935.4	4683.7
Transitional	1373.9	1066.2	8092.9	1608.7		1373.9	1066.2	8092.9	1608.7
Turfgrass/Golf Course	1994.1	31.2	570.4	42.4		1994.1	31.2	570.4	42.4
Water	755.8					755.8			
Stream bank	-	446.0	44.6	19.6			446.0	44.6	19.6
Groundwater	-	-	27843.8	278.4				27843.8	278.4
Total	24539.7	4582.3	65482.6	6803.9		24539.7	4990.9	65482.7	6803.9

The Zenda Headwaters Subwatershed (Wisconsin)

Source	Existing Loading Estimates by Source					Future loading Estimates			
	Area Acres	Sediment Ton	Total N Lbs	Total P Lbs		Area Acres	Sediment Ton	Total N Lbs	Total P Lbs
Wetland	177.9	0.2	42.8	1.6		177.9	0.2	42.8	1.6
Hay/Pasture	422.5	10.1	197.6	22.3		422.5	52.5	197.6	22.3
High-Density Development						0.0	0.0	0.0	0.0
Low-Density Development	2.5	0.1	0.0	0.0		2.5	0.1	0.0	0.0
Forest	56.8	0.1	3.5	0.2		56.8	0.1	3.5	0.2
Row Crops	2599.5	1126.3	8435.3	1669.5		2599.5	1126.3	8435.3	1669.5
Transitional	936.5	1310.6	8694.4	1891.0		936.5	1310.6	8694.4	1891.0
Turfgrass/Golf Course	118.6	3.3	86.9	4.5		118.6	3.3	86.9	4.5
Water	1.0					1.0			
Stream bank	-	44.4	4.4	2.0			44.4	4.4	2.0
Groundwater	-	-	5583.6	55.8				5583.6	55.8
Total	4315.3	2495.1	23048.5	3646.9		4315.3	2537.5	23048.5	3646.9

Note: The Existing / Future Loading Estimates in these tables are for the future condition without BMP implementation.

NIPPERSINK CREEK WATERSHED PLANNING COMMITTEE
P.O. Box 168
Woodstock, IL 60098
Phone: (815)-338-0049 FAX: (815)-338-7731

Minutes

Minutes of the meeting of the Nippersink Creek Watershed Planning Committee of June 3, 2004 at 7:00 pm, to be held at the McHenry County Soil & Water Conservation District office, 1143 Seminary Ave., Woodstock, IL.

Committee members in attendance: Randy Stowe, Orrin Bangert, Cindy Skrukrud, Dick Hilton

I Approval of Minutes – No action taken
II Treasurers Report – No report
III Public Comments - None
IV Unfinished Business:

a. McHenry County Stormwater Ordinance**-a suggestion was made that the committee consider revising the *Standards for Development* to bring them into compliance with the new county document.**

b. Groundwater Study Status (Report on meeting of June 3 at county government center).**- No report**

c. Development Status – Wonder Lake – West Bay **– Hilton reported that the proposed development is on hold pending resolution of the appeal to the White Oaks Bay (WOB) subdivision annexation and the petition by a group in WOB proposing annexation to the Village of Greenwood by a forced annexation of a portion of the West Bay property proposed for development and annexed into the Village of Wonder Lake.**

d. Watershed wide implementation plan to support our published plan document.**- Randy to review previous NCWPC grants & suggest revisions to comply with the NIPC 319 funding of watershed planning efforts. Cindy to check with Jeff Wickenkamp to obtain clarification & explanation of the "Implementation Mechanism" and how it applies to our effort.**

e. A Policy to respond to development proposals submitted for consideration to county, townships & municipalities involving properties in the watershed.**- Hilton to draft letter for distribution to planning commissions and committees within the watershed.**

f. Encourage more active participation in planning by watershed residents (expanding membership)**- No action taken.**

V New Business

a. Identifying projects and seeking funding sources and/or assisting property owners to address water quality issues.**- No action taken**

VI Next Meeting – July 3, 2004
VII Adjournment

NIPPERSINK CREEK WATERSHED PLANNING COMMITTEE
P.O. Box 168
Woodstock, IL 60098
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Minutes

Minutes of the meeting of the Nippersink Creek Watershed Planning Committee of December 2, 2004 at 7:00 pm, held at the McHenry County Soil & Water Conservation District office, 1143 Seminary Ave., Woodstock, IL.

Committee Members present: **Orrin Bangert, Cindy Skrukrud, Randy Stowe, and Dick Hilton**

I Approval of Minutes of November 4 approved on a motion by Randy Stowe, with second by Orrin Bangert.

II Treasurers Report – No Report

III Public Comments - None

IV Unfinished Business

a. Grant application – update of watershed plan. **The committee reviewed the grant application. Discussion centered on the need to establish a time-line to provide guidance to completion if the grant is awarded. We also discussed the need for outreach to the municipalities for stakeholder input, volunteer workers, municipal staffs and the "Green Team" at Woodstock High School for monitoring activities. It was decided to commit the January 6, 2005 meeting to the establishment of a time-line and assignment of activities necessary to accomplish the various elements covered in the application. Randy Stowe & Rob Linke will complete the time-line once we have confirmation that the grant is awarded. Lenore Beyer Clowe will be asked to attend and to bring her notes covering the breakout of groups and their commitments to specific duties related to the grant.**

V New Business

b. Identifying projects and seeking funding sources and/or assisting property owners to address water quality issues. **The committee discussed keeping our eyes open for potential projects that could be partially funded through the FRE C-2000 (probably suspended because of budget constraints at the State level), 319 (May ? deadline) & HRP (March ? deadline) program funds**

c. Nippersink Creek website – **Brief discussion concerning the establishment of skeleton elements of our grant application, Time line and work schedule on a web page if the grant is awarded. Hilton will discuss with Ed W. & Jim Rospopo.**

VI Next Meeting – January 6, 2005 at the SWCD office at 7:00 p.m.
VII Adjournment – Motion by Orrin Bangert, at 8:00 p.m.

NIPPERSINK CREEK WATERSHED PLANNING COMMITTEE
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Minutes

Minutes of the meeting of the Nippersink Creek Watershed Planning Committee of July 1, 2004 at 7:00 pm, to be held at the McHenry County Soil & Water Conservation District office, 1143 Seminary Ave., Woodstock, IL.

Committee Members present: Lucy Piechota, Cindy Skrukrud, Orrin Bangert, Chuck Beard & Dick Hilton

I Approval of Minutes – No action taken

II Treasurers Report – No report

III Public Comments - None

IV Unfinished Business:

e. McHenry County Stormwater Ordinance – **the SWCD & MCCD are working with the County to administer the ordinance. SWCD will act on erosion control activities and MCCD on wetland issues.**

f. Watershed wide implementation plan to support our published plan document. **- we are currently waiting on NIPC to submit requests for proposals – Cindy & Randy will review and discuss previous NCWPC grant proposals. Cindy reported that she attended the Woodstock Plan Commission meeting on the Raffel Rd. & Queen Anne Road proposed developments and presented a copy of the NIPC checklist to the Plan Commission.**

c. A Policy to respond to development proposals submitted for consideration to county, townships & municipalities involving properties in the watershed. (See draft of letter to planning commissions) **– Hilton presented draft of letter and Cindy will review and forward electronic copy Nippersink Creek Letterhead so that letter can be distributed.**

V New Business

d. Identifying projects and seeking funding sources and/or assisting property owners to address water quality issues. **– No action taken**

e. Enhancement & Conservation easement, Woodstock fair grounds wetlands. (Lisa H. ?) **– No report**

f. **Addition to agenda – June meeting, Nippersink Creek Collaboration group – Cindy reported that the group will be working on a Nippersink Creek clean up day and also a "Bioblitz". The next meeting will be at 1:00 p.m. at the MCCD Research Station on September 24, 2004.**

VI Next Meeting – September 2 at the SWCD office at 7:00 p.m.
VII Adjournment – Motion by Chuck Beard at 8:35 p.m.

NIPPERSINK CREEK WATERSHED PLANNING COMMITTEE

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MINUTES

Meeting of the Nippersink Creek Watershed Planning Committee of September 2, 2004 at 7:00 pm, to be held at the McHenry County Soil & Water Conservation District office, 1143 Seminary Ave., Woodstock, IL.

Committee members present: Randy Stowe, Cindy Skrukrud, Dan Wilson, Joan Mansfield, Chuck Beard and Dick Hilton.

I **Approval of Minutes:** Minutes of July 1 & June 3 unanimously approved.

II **Treasurers Report:** The balance in the Nippersink account is $14,105.18.

III **Public Comments - None**

IV **Unfinished Business:**

g. Watershed wide implementation plan to support our published plan document. **During discussion the issue of grant possibilities to fund an update to our existing watershed plan was brought to the attention of the committee by Cindy Skrukrud. Such an update could include how an implementation plan might be developed and at the same time, enable us to address existing deficiencies in the plan. The Nippersink Creek Collaboration Group will address this idea at its Sept. 24 meeting to be held at the MCCD Resource Center. Jeff Wickenkamp from NIPC will be in attendance to discuss the grant criteria and answer our questions. The committee identified local units of government to contact for support of such a grant application: Cindy Skrukrud will contact Richmond, Fox Waterway Agency, Hebron and talk to Ed Collins @ MCCD. Hilton will contact Amy Walkenbach @ IL EPA, the MPOA, Village of Wonder Lake, SWCD, and McHenry County P & D. Dan Wilson will talk to MCCD Trustees and Randy Stowe will contact Hebron & Alden Townships.**

Randy Stowe will draft a letter requesting support and also a suggested letter to communicate support by various groups and forward it to Ed Weskerna for review and distribution.

A committee will meet at 9:00 a.m., 9/30 at SWCD to work out the details related to the grant application. (Lisa H., L. B. Clow, Cindy S., Randy S., Rob L., Ed W. & Dick H. are invited)

c. A Policy to respond to development proposals submitted for consideration to county, townships & municipalities involving properties in the watershed. (see attached Draft of letter to planning commissions) **Committee authorized distribution of the letter.**

V **New Business**

g. Identifying projects and seeking funding sources and/or assisting property owners to address water quality issues. **Grants are available to assist in activities related to streambank stabilization, wetland restoration, stormwater outfall failures.**

b. Nippersink Creek website – **No action taken**

VI **Next Meeting: Oct. 11, 2004**

VII **Adjournment: 8:35 p.m. on motio by Chuck Beard**

NIPPERSINK CREEK WATERSHED PLANNING COMMITTEE
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Minutes

Minutes of the meeting of the Nippersink Creek Watershed Planning Committee of October 11, 2004 at 7:00 pm, held at the McHenry County Soil & Water Conservation District office, 1143 Seminary Ave., Woodstock, IL.

Committee Members present: **Cindy Skrukrud, Orrin Bangert, Dan Wilson, Joan Mansfield and Dick Hilton**

I Approval of Minutes of Sept. 2 deferred to November 4 meeting

II Treasurers Report – Balance in Nippersink account $14,105

III Public Comments - None

IV Unfinished Business:

h. Watershed wide implementation plan to support our published plan document. **– Committee decided to drop this item from future agendas, as it is a part of item b, below.**

b. Grant application – update of watershed plan. **Following discussion, Cindy Skrukrud moved and Dan Wilson seconded to designate $5000 of funds in the committee's interest and local grants accounts for local match and financial support of the grant application to fund a watershed plan update. Also, on a motion by Joan Mansfield, second by Cindy Skrukrud, the committee authorized the Chair to forward a letter of support for the grant application, to include a commitment of the funds approved by committee action. Both motions received a unanimous vote of approval. Cindy & Dick also updated the committee on the preparation of the grant, outreach for support and participants in the writing of the grant.**

V New Business

h. Identifying projects and seeking funding sources and/or assisting property owners to address water quality issues. **– No action taken**

i. Nippersink Creek website – **No action taken**

VI Next Meeting – November 4, 2004 at the SWCD office at 7:00 p.m.

VII Adjournment – Motion by Cindy Skrukrud, second by Orrin Bangert at 8:30 p.m.

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Minutes

Minutes of the meeting of the Nippersink Creek Watershed Planning Committee of November 4, 2004 at 7:00 pm, held at the McHenry County Soil & Water Conservation District office, 1143 Seminary Ave., Woodstock, IL.

Committee Members present: **Orrin Bangert, Dan Wilson, Randy Stowe, Lucy Piechota and Dick Hilton**

I Approval of Minutes of Sept. 2 and October 11 approved on a motion by , with second by .

II Treasurers Report – No Report

III Public Comments - None

IV Unfinished Business

a. Grant application – update of watershed plan. **The committee reviewed the grant application and Randy Stowe explained some of the details related to the consultants work loads, schedule of activities and reduction in hourly rate to assist in establishing a greater contribution towards the required 25% local match. The goal is to complete a draft of the application by November 12 and finalize it for submittal to meet the required November 17 deadline. The total project cost is $71,641. The local match is $22,351 (31% of total) resulting in a request for funds through the grant in the amount of $49,290 (69% of total).**

V New Business

j. Identifying projects and seeking funding sources and/or assisting property owners to address water quality issues. **– No action taken**

k. Nippersink Creek website – **No action taken**

VI Next Meeting – December 2, 2004 at the SWCD office at 7:00 p.m.

VII Adjournment – Motion by Dan Wilson, second by Orrin Bangert at 8:20 p.m.

NIPPERSINK CREEK WATERSHED PLANNING COMMITTEE
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Minutes

Meeting of the Nippersink Creek Watershed Planning Committee of January 10, 2008, at 7:00 pm, to be held at the Alden Township office, 8515 Alden Road, Harvard, IL at 7:00 P.M.

Members Present: Cindy Skrukrud, Orrin Bangert, Dick Hilton, Randy Stowe, Dan Wilson, Lucy Piechota
Visitors Present: None

I Approval of Minutes: Suspended to next committee meeting

II Treasurers Report: No Report

III Public Comments: NONE

IV Unfinished Business:

A. Status of Invoice payments for services rendered. Cindy Skrukrud will check with the MCD on the status of the 9/30/07 invoice from WRC and advise Randy.

B. Establish time table for final reimbursements on deliverables. WRC will review status of work to be completed and advise at the February meeting.

C. Hackmatack update (Cindy Skrukrud) No Report

D. WI portion of Nipper watershed

1. Geneva Lakes Conservancy Projects

a. Trail Systems Cindy reported that the National Park Service is providing assistant to the effort for establishing a trail system between Lake Geneva and Genoa City linking it with the existing MCCD trail in IL.

b. Land Acquisitions Cindy Skrukrud reported on the effort by Friends of Big Foot Beach State Park to prevent development of 750 acres adjacent to existing park facility by seeking funds to acquire it and link it to the park.

V New Business

A. Discussion – Resolution of CMAP & IL EPA comments to Draft Update of Plan: Randy Stowe presented a summary of comments and reported on the effort to resolve them with the appropriate parties. Formatting issues have been resolved & maps will be revised to comply with recommendations. Following discussion, committee made suggestions to address "pollutant loading", Areas of projects & elements of a 5 year plan. Cindy Skrukrud will work on Chapt. 18 revisions.

VI Next Meeting February 7, 2008

VII Adjournment Motion by Orrin Bangert, Second by Cindy Skrukrud at 9:00 P.M.

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Minutes

Minutes of the meeting of the Nippersink Creek Watershed Planning Committee of January 6, 2005 at 7:00 pm, held at the McHenry County Soil & Water Conservation District office, 1143 Seminary Ave., Woodstock, IL.

Committee Members present: **Orrin Bangert, Cindy Skrukrud, Randy Stowe, Dan Wilson, Rob Linke, Lenore Byer Clowe, and Dick Hilton**

I Approval of Minutes of December 2, 2004 approved on a motion by Cindy Skrukrud, with second by Orrin Bangert.

II Treasurers Report – No Report

III Public Comments - None

IV Unfinished Business

a. Grant application – update of watershed plan. **Following discussion of the type of material available and needed, Lenore agreed to contact Nancy Williamson to see if the Land Use Evaluation Model LUEM, is available for use in our planning effort. Cindy agreed to contact Holly Hudson to see if the Nippersink data collected by interns in 2002 has been digitized and available. Rob agreed to provide to the committee and to Lenore a detailed list of data needs. Hilton will gather the USGS data that is available on disk and bring to the next meeting.**

b. Potential projects to address water quality issues. **Hilton will check to see if the City of Woodstock is still interested in working on the "fair grounds" wetland issues, Cindy – Spring Grove & Hebron, Randy – Alden Township, Lenore – City of Woodstock.**

V New Business

a. Nippersink Website. **The committee discussed the types of information that should be considered for posting. Hilton will check with Paige, NRCS to see if the Executive Summary of our plan is in an electronic file and available. Rob will talk to Ed Weskerna on the mechanics of getting it up and running.**

b. Additional items:

1. **<u>Grant updates</u>. Cindy Skrukrud explained that C-2000 applications through FREP are being encouraged & that Hey & Assoc. was putting in a grant to fund monitoring activities on the N. Branch of the Nippersink. She will talk to Wayne Schennuum (sp) to see about coordinating the activity with the update efforts.**
2. **<u>Proposed Development – East of E. Wonder Lake Rd.</u> Hilton provided an overview of the proposed 500+ acre development that will be submitted to the County Staff Review committee on 1/19/05.**
3. **<u>IL Scenic River Bill</u> - Cindy provided a brief overview and the committee agreed to allow for the Nippersink (from Glacier Pk. Canoe Landing to the Chain O Lakes) to be included.**
4. **<u>Collaboration Group</u> Meeting will be at 1:00p.m., 1/14**

VI Next Meeting – February 3, 2005 at the SWCD office at 7:00 p.m.

VII Adjournment – Motion by Orrin Bangert, at 9:10 p.m.

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Minutes

Minutes of the meeting of the Nippersink Creek Watershed Planning Committee of February 3, 2005 at 7:00 pm, held at the McHenry County Soil & Water Conservation District office, 1143 Seminary Ave., Woodstock, IL.

Committee Members present: **Randy Stowe, Dan Wilson, Rob Linke Lenore Beyer-Clowe, Tom Cooper, Lucy Piechota, Chuck Beard and Dick Hilton**

I **Approval of Minutes of January 6, 2005 approved on a motion by Tom Cooper, second by Dan Wilson**

II **Treasurers Report – No Report**

III **Public Comments - None**

IV **Unfinished Business**

a. Grant application – update of watershed plan. **Rob Linke presented a list of data needs necessary to complete the plan activities, Randy Stowe presented a summary of data available at the McHenry Co. SWCD office and Lenore presented information on the LUEM that she received from Nancy Williamson. After discussion Lenore agrees to follow up with Nancy for additional information and several people present volunteered to gather data and/or contact the necessary parties and request that available data be made available to Rob. This includes Hilton contacting Suzanne Ehardt to request a list of MAPS & data available for review AT county P & D. Rob Linke will advise Hilton via email of the data needed from IEPA related to NPDES permitted discharges.**
(See attached schedule)

b. Potential projects to address water quality issues. **Hilton reported that there was presently no effort by the City of Woodstock to address water quality issues related to the wetland area near the old fair grounds. It was a consensus that no potential projects appear to be on the near horizon.**

V **New Business**

a. Nippersink Website. **Hilton will check with Paige, NRCS to see if the Executive Summary of our plan is in an electronic file and available. The committee discussed the types of information that should be considered for posting. Following a report from Hilton on the favorable support by the SWCD Board to have a Nippersink Creek page as a part of their website, the committee discussed the possibility of establishing its own domain name and site. On a motion by Tom Cooper, 2nd by Dan Wilson, the committee authorized an expenditure of $500, payable to Becky Hoag (FREP) to establish a domain for our own site. Rob Linke was authorized to contact Becky and request that she see what domain may be available (nippersink, nippersinkcreek), and to begin constructing a site. Hilton will forward watershed pictures to Rob.**

b. Items for next agenda:
   1. Committee member report on progress to accomplish tasks outlined in IV a. above.

2. Review of contract covering 319 grant funding the Plan Update.
3. Review and comment on progress of constructing the web site.

VI Next Meeting – March 3, 2005 at the SWCD office at 7:00 p.m.
VII Adjournment – Motion by Tom Cooper, at 8:15 p.m.

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Minutes

Minutes of the meeting of the Nippersink Creek Watershed Planning Committee of April 7, 2005 at 7:00 pm, held at the McHenry County Soil & Water Conservation District office, 1143 Seminary Ave., Woodstock, IL.

Committee Members present: **Randy Stowe, Orrin Bangert, Dan Wilson, Tom Cooper, Lucy Piechota, Chuck Beard, Joan Mansfield, Cindy Skrukrud and Dick Hilton**

I Approval of Minutes of February 3, 2005 approved on a motion by Tom Cooper, second by Dan Wilson

II Treasurers Report – No Report

III Public Comments - None

IV Unfinished Business

a. Review of Grant Contract – update of watershed plan. **Discussion continued relative to the $50,000 Clean Water Act 319 funds awarded in December, 2004 to update plan in accordance with IL EPA guidelines and establish an implementation plan to address identified natural resource issues. A draft of the contract has been received by the McHenry County Defenders, Grant Administrator, but review of the contract tabled to next meeting. Hilton & Skrukrud will contact Defenders staff for status of the contract and report back to the committee. It was mentioned that the committee needs to remind those organizations of their financial commitment to the cost share on the grant as bills should begin arriving for payment.**

b. Potential projects to address water quality issues. **1) Hilton reported on an approximate 500 acre planned development (housing) on property adjoining the West Bay of Wonder Lake that includes stream corridor and wetland enhancement and protection. This project has the potential to qualify for 319 Program funding through FREP and might also include possible in-lake activities to address water quality. 2) Changes in Woodstock resulting from the election may provide opportunities for the city to consider applying for grant assistance for projects to address stormwater and water quality issues. Hilton will ask Dave Brandt (NRCS) and Ed Weskerna (MCSWCD) to keep this possibility in mind and to start making a list of potential projects.**

c. Nippersink Creek website. **Discussion on the new site (www.nippersink.org) was very positive. It was recommended that the site include past and present projects to address resource issues in the watershed. Projects to be considered include the re-meander by MCCD, the Barber Fen project in Greenwood Village, MCCD land acquisition and enhancement of properties, IDNR 2004 Fish Survey of Wonder Lake, aquatic plant study – Wonder Lake, MCCD watershed information on natural areas and biological data, USGS stream monitoring and NAWQA project data on the upper Nippersink and Wonder Lake, current watershed plan, "Funding Opportunities to Address Water Quality in the Nippersink" published by the Planning Committee and "Welcome to Your Watershed-Nippersink Creek" publication by the Defenders. Hilton is checking for an electronic copy of our plan.**

d. Review and Update of work schedule related to the grant. **1) Hilton delivered electronic copies of the Village of Wonder Lake Comprehensive plan, Wonder Lake Watershed stormwater data, and reported on the watershed information provided by the McHenry County Planning & Development Department. 2) Randy Stowe and Rob Linke have scheduled a meeting with MCCD staff to gather data. 3) Status of Defenders' tasks will be presented to committee at the next meeting.**

V New Business

a. Timetable to complete commitments in grant contract. **The consultants are on schedule and are assembling the data necessary for evaluation, consideration and recommendation to update the watershed plan and bring it into compliance with the IL EPA standards.** The committee members also reviewed the upcoming activities scheduled by FREP

VI Next Meeting – May 5, 2005 at the SWCD office at 7:00 p.m.

VII Adjournment – Motion by Tom Cooper, second by Chuck Beard at 8:13 p.m.

NIPPERSINK CREEK WATERSHED PLANNING COMMITTEE
P.O. Box 168
Woodstock, IL 60098
Phone: (815)-338-0049 FAX: (815)-338-7731

Minutes

Minutes of the meeting of the Nippersink Creek Watershed Planning Committee of May 5, 2005 at 7:00 pm, held at the McHenry County Soil & Water Conservation District office, 1143 Seminary Ave., Woodstock, IL.

Committee Members present: **Randy Stowe, Orrin Bangert, Dan Wilson, Tom Cooper, Lenore Beyer-Clowe, Cindy Skrukrud and Dick Hilton**

I **Approval of Minutes of April 7, 2005 approved on a motion by Tom Cooper, second by Lenore Beyer-Clowe**

II **Treasurers Report – No Report**

III **Public Comments - None**

IV **Unfinished Business**

a. Review of Grant Contract – update of watershed plan. **Lenore presented signed copy of contract between MCD and NIPC effective 4/13/05. Randy Stowe and Rob Linke are working on the contract with the Defenders to cover their scope of work related to the grant. Grant has an effective date of 4/13/05 and all work and reports are to be completed by 6/30/05**

b. Potential projects to address water quality issues. **(1) Randy Stowe reported that the County has approved the proposed Nichols development in Alden Township but that there will be deed restrictions that will allow the county to supervise activities in the wetlands and Nippersink stream corridor. (2) Randy also brought to the attention of the committee violations involving drainage of a pond in Alden Township.**

c. Nippersink Creek website. **Discussion on the new site (www.nippersink.org) - committee was reminded that a $500 payment was due to Becky Hogue for setup and maintenance of sight. Hilton left a note for Phyllis (MCSWCD) to cut a check and Randy Stowe is to advise Phyllis on where the check should be sent. There was discussion about having a clearing house for data going on the website and this will be on the agenda for discussion in June.**

d. Review and Update of work schedule related to the grant. **1) Hilton delivered electronic copies of the Village of Wonder Lake Comprehensive plan, Wonder Lake Watershed stormwater data, and reported on the watershed information provided by the McHenry County Planning & Development Department. 2) Randy Stowe and Rob Linke have scheduled a meeting with MCCD staff to gather data. 3) Status of Defenders' tasks will be presented to committee at the next meeting.**

V **New Business**

a. Construction – Valley Hi Nursing Home. **Hilton relayed information from Ed Weskerna related to the construction activities, excessive groundwater reported on sight and activities to address this issue. At this time, Ed did not feel as there were any violations.**

b. Future committee meeting site. **Hilton explained that the committee will need to think about where future meeting will be held as SWCD is relocating its office. Orrin Bangert reported that the SWCD will still be at its present location for our July meeting. This will be on the June agenda.**
Cindy requested that the Spring Grove Hatchery be on the June agenda.

VI **Next Meeting – June 2, 2005 at the SWCD office at 7:00 p.m.**

VII **Adjournment – Motion by Tom Cooper, second by Cindy Skrukrud at 9:00 p.m.**

NIPPERSINK CREEK WATERSHED PLANNING COMMITTEE
P.O. Box 168
Woodstock, IL 60098
Phone: (815)-338-0049 FAX: (815)-338-7731

Minutes

Minutes of the meeting of the Nippersink Creek Watershed Planning Committee of June 2, 2005 at 7:00 pm, held at the McHenry County Soil & Water Conservation District office, 1143 Seminary Ave., Woodstock, IL.

Committee Members present: **Randy Stowe, Joan Mansfield, Tom Cooper, Rob Linke and Dick Hilton**

I Approval of Minutes of May 5, 2005 approved on a motion by Tom Cooper, second by Joan Mansfield

II Treasurers Report – No Report

III Public Comments - None

IV Unfinished Business

a. Review of Grant Contract – update of watershed plan. **1st progress report due in July, consultants will have draft available for committee review at the July meeting.**

b. Potential projects to address water quality issues. **1) No new projects submitted to the committee for review. 2) Randy provided an update to the committee on the violations involving drainage of a pond in Alden Township located on the northwest corner at the intersection of Alden & Hebron Roads.**

c. Future meeting site. **SWCD will still be in the present location through the July meeting.**

d. Nippersink Creek website. **Rob Linke reported that the front page of the site will be revised and they are looking for positive pictures to post.**

e. Review and Update of work schedule related to the grant. **1) Rob Linke presented information related to the issue of dividing the watershed into sub watersheds as a necessary element for developing implementation plans. The ciommittee, on Rob's recommendation approved the designation of not more than 8 IL sub watershed to be base on IDNR's Hydrologic Unit Catalog (HUC 1C) 2) Randy Stowe and Rob Linke have scheduled a meeting with MCCD staff to gather data. 3) Info related to Wonder Lake's current boundaries and a digital copy of their comprehensive plan are still needed. Rob was advised that NIPC's population figures for the Wonder Lake area may not be accurate and that a special census would be conducted in June. NEEDS Subwatershed boundaries and digital copies of comp. Plans.**

V New Business

a. Spring Grove Fish Hatchery. **No update – will be on the July agenda.**

b. Village of Wonder Lake FPA Application. **Hilton provided an update on the application – at the May 26 NIPC Water Quality Committee meeting the application received a recommendation for approval by the Executive Board, subject to adjustments on their boundary to remove recent Village of Greenwood annexations. Hilton also advised that the Village of Wonder Lake Planning Commission was reviewing changes to their zoning ordinance in order to accommodate the Conservation Design elements supported by NIPC and other organizations.**

VI Next Meeting – July 7, 2005 at the SWCD office at 7:00 p.m.

VII Adjournment – Motion by Tom Cooper, second by Joan Mansfield at 8:50 p.m.

NIPPERSINK CREEK WATERSHED PLANNING COMMITTEE
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Woodstock, IL 60098
Phone: (815)-338-0049 FAX: (815)-338-7731

Minutes

Minutes of the meeting of the Nippersink Creek Watershed Planning Committee of July 7, 2005 at 7:00 pm, held at the McHenry County Soil & Water Conservation District office, 1143 Seminary Ave., Woodstock, IL.

Committee Members present: **Randy Stowe, Joan Mansfield, Tom Cooper, Cindy Skrukrud, Dan Wilson, Lucy Piechota, Orrin Bangert and Dick Hilton**

I Approval of Minutes of June 2, 2005 approved on a motion by Tom Cooper, second by Joan Mansfield

II Treasurers Report – No Report

III Public Comments - None

IV Unfinished Business

a. Identify projects to address water quality issues for future consideration.
No new projects submitted to the committee for review. Cindy Skrukrud stated that she will prepare a list for the next meeting.

b. Nippersink Creek Website (http://nippersink.org). **Randy reminded the committee that we still need positive pictures for posting on the site.**

c. Future meeting site. **Following discussion, the committee decided to continue to meet at the new location of the SWCD office but to also reserve the Alden Township office as a backup in the event we have to find another location.**

d. Review and Update of work schedule related to the grant. **1) Randy Stowe presented a memo from Rob Linke that provided information on the status of gathering data. 1) Randy & Rob met with the MCCD staff and the District should be able to provide the needed watershed "natural areas" and other data by mid July. 2) The watershed will be broken down into 11 subwatersheds. Rob will be distributing info via email to committee members about naming the subwatersheds and unnamed tributary creeks and also contacting Ed Collins for information on stream names. 3) Randy will be meeting with Spring @ SWCD to further discuss the need for additional data.**

e. Spring Grove Fish Hatchery. **Cindy Skrukrud will provide an update at the next meeting but for now, the transfer of the hatchery to the Village of Spring Grove appears to be on hold.**

V New Business

c. Village of Wonder Lake FPA Application. **Hilton advised committee that the application has been approved by NIPC and will be forwarded to the IL EPA in Springfield sometime this month. Following receipt the IL EPA will review and start their clock on the required public review process.**

d. Signage – "Entering the Watershed". **The committee discussed the need to get these signs onto the major state highways. Randy Stowe & Orrin Bangert will check on the kind of posts needed and Hilton will check with Mike Verlot, an official with IDOT who lives in Wonder Lake.**

e. Annexation and Development of the "Pappas" property to the Village of Greenwood – Added to agenda at beginning of meeting. **Following discussion, Cindy Skrukrud motioned to request that Dave Brandt attend and represent the interests of the committee at the Village of Greenwood Planning Commission Hearing scheduled for 7:00 p.m. at the Greenwood Township Hall on July 12, 2005. Motion second by**

Tom Cooper and approved by a unanimous vote of the committee. Randy Stowe will contact Spring @ SWCD about producing maps to detail the environmental issues related to the development of this property. Randy will also contact Ed Collins (MCCD) and the U.S. Army Corps of Engineers and express our concerns with them. Hilton will contact Sue Ehardt to request that County be present to address concerns related to enforcement of the McHenry County Watershed Development Ordinance. Cindy brought up the letter that was generated last year, designed to assist municipalities in evaluating development plans. (See copy below). Committee agreed that the letter should be reviewed and materials gathered to be sent to all municipalities in the watershed.

This report evolved into a committee discussion concerning the effort of the committee to advise and work with municipalities and property owners to further develop awareness of our watershed plan by incorporating its recommendations on development into the SWCD NRI review process. This issue will be on the agenda for the next committee meeting.

VI Next Meeting – September 1, 2005 at the SWCD office at 7:00 p.m.

VII Adjournment – Motion by Dan Wilson, second by Tom Cooper at 8:50 p.m.

DRAFT OF LETTER MENTIONED IN V-e ABOVE

To: All municipal, county and township planning & zoning commissions in the Nippersink Creek watershed

From: Nippersink Creek Watershed Planning Committee

The Nippersink Creek Watershed Planning Committee is committed to assisting local governing bodies in evaluating development proposals in the Nippersink Creek watershed and their ability to address natural resource issues. We would like you to utilize the enclosed information by including it in your packet for developers. After your review, we are suggesting that you request that each developer complete one or both questionnaires for the purpose of evaluating the ability of the proposed development to address natural resource issues in the watershed.

We have enclosed a copy of a Codes and Ordinances Worksheet developed by the Center for Watershed Protection and Appendix E: CeDES System as found in the *Conservation Design Resource Manual: Language and Guidelines for Updating Local Ordinances* recently developed by the Northeastern Illinois Planning Commission. One or both documents can be completed by developers and submitted to you as a part of your development review process. Both documents will enable local governing bodies to assess the impact of the design on the Nippersink Creek watershed and to evaluate the ability of the developer to address environmentally sensitive areas specific to the proposed development site.

These documents can be found on the internet. They are designed for use by local governing bodies interested in evaluating the ability of their zoning laws to address natural resource issues. In the event you are considering such a review, additional information and resource material is available at both www.cwp.org and www.nipc.org. The full text of the NIPC/Chicago Wilderness Conservation Design Resource Manual can be found at http://www.nipc.cog.il.us/new-pubs.htm#Conservation%20Design.

The Nippersink Creek Watershed Planning Committee is providing this information in response to the increased development pressures within the Nippersink Creek Watershed. We encourage you to use these documents as tools to protect and enhance both the quality of our highly valued watershed and our quality of life.

NIPPERSINK CREEK WATERSHED PLANNING COMMITTEE
P.O. Box 168
Woodstock, IL 60098
Phone: (815)-338-0049 FAX: (815)-338-7731

Minutes

Minutes of the meeting of the Nippersink Creek Watershed Planning Committee of September 8, 2005 at 7:00 pm, held at the Alden Township Hall, 8515 Alden Road, Harvard, IL.

Committee Members present: **Randy Stowe, Chuck Beard, Dan Wilson, Lucy Piechota, Orrin Bangert and Dick Hilton**

I Approval of Minutes of July 7, 2005 approved on a motion by Orrin Bangert, second by Dan Wilson

II Treasurers Report – Balance of $13,894.32

III Public Comments - None

IV Unfinished Business

a. Nippersink Creek Website (http://nippersink.org). **Committee decided to arrange with administrator to have minutes, agenda and grant updates posted on the site.**

b. Future meeting site. **Following discussion, the committee authorized the Chair to submit a letter to Mary Hook, FSA requesting an explanation of the policy that prohibits the committee from meeting in the FSA/SWCD location unless staff is present.**

c. Review and Update of work schedule related to the grant. **Randy advised that all comprehensive plan documents have been received except for the one from McHenry County. Hilton was requested to contact County P & D about receiving an electronic copy of their "draft plan"**

d. Signage – "Entering Watershed" **Hilton is working to determine who in IDOT would be responsible party to authorize placement of the "Entering Watershed" signs.**

V New Business

a. Village of Wonder Lake FPA Application. **Hilton advised committee that IL EPA in Springfield has approved the FPA designation. The NPDES Permit application is now under review by the IL EPA. Once completed a draft permit will be issued and it will be followed by a 45 day public review period.**

b. Linking Watersheds Conference. **Hilton represented the planning committee at the 1-day conference. Heavily attended by area-wide watershed planning representatives. Lots of information regarding activities and techniques to address watershed natural resource issues.**

c. Neumann Homes Development/Wonder Lake **Hilton advised committee on development progress. They are currently working to obtain a permit from USACOE to replace a culvert on Galt Creek and create a greater radius of the "dead-man's curve" on W. Wonder Lake Road. They are working to complete construction of the wastewater treatment and stormwater detention areas.**

VI Next Meeting – October 6, 2005 at the Alden Township Hall at 7:00 p.m.

VII Adjournment – Motion by Chuck Beard, second by Orrin Bangert at 8:40 p.m.

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Minutes

Minutes of the meeting of the Nippersink Creek Watershed Planning Committee of September 8, 2005 at 7:00 pm, held at the Alden Township Hall, 8515 Alden Road, Harvard, IL.

Committee Members present: **Randy Stowe, Chris, Dan Wilson, Lucy Piechota, Tim Loftus, Cindy Skrukrud and Dick Hilton**

I Approval of Minutes of September 8, 2005 approved on a motion by Lucy Piechota, second by Dan Wilson

II Treasurers Report – No Report

III Public Comments - None

IV Unfinished Business

a. Nippersink Creek Website (http://nippersink.org). **Committee discussed the need for more pictures and some volunteered by Dick Hilton & Cindy.**

b. Planning Committee meeting site. **Chair presented copy of the letter submitted to Mary Hook, FSA requesting an explanation of the policy that prohibits the committee from meeting in the FSA/SWCD location unless staff is present. As of 11/3 there has been no response but letter presented from USDA Office of External Affairs in response to a FOI request submitted by email to the national FSA office through there website. USDA response indicates that our meeting request may fall under the jurisdiction of the Government Services Administration and they forwarded the Chair's FOI request to them to handle. To date there has been no response.**

c. Status & Review of update to plan-Quarterly Report. **Rob Linke advised that quarterly report was completed and copies to the committee are somewhere in cyberspace. He will resend. Hilton advised that the County Land Use plan was still in "draft" form and would not be available electronically until passed by the McHenry County Board. More hearings on the draft plan will be required before presented to the McHenry County Board for review and a vote. Cindy will forward an electronic copy of the draft to Rob Linke, Chris will talk to TESKA about a copy of the 2010 Plan. If available, ARCVIEW is the preferred version but autocad will work also. NIPC Stream Inventory may have been included in watershed engineer data now in MCCD's hands – Tim Loftus will try to check on data with NIPC staff. Cindy will draft letter to municipalities asking for brdge abutment and culvert degradation and Tim Loftus will contact IL EPA for municipal stormwater outfall data along with a general letter of request for info related to planning needs. Rob Linke will create questions to include in the letter. Rob will provide subwatershed maps to accompany the correspondence.**

d. Signage – "Entering Watershed" **Hilton Will contact Jack Franks to see if he can help to determine who in IDOT would authorize placement of the "Entering Watershed" signs. Cindy will contact the County Highway Department about placement of stream signs.**

e. Neumann Homes/Village of Wonder Lake development. **Hilton updated committee on activities.**

f. Pappas annexation - Greenwood. **Hilton represented the planning committee at the 1-day conference. Heavily attended by area-wide watershed planning representatives. Lots of information regarding activities and techniques to address watershed natural resource issues.**

V New Business

d. Wonder Lake NPDES Permit application. **Hilton advised committee that the Wonder Lake Permit application is undergoing a staff review by the IL EPA in Springfield.**

VI Next Meeting – October 6, 2005 at the Alden Township Hall at 7:00 p.m.

VII Adjournment – Motion by Dan, second by Randy at 8:50 p.m.

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Minutes

Minutes of the meeting of the Nippersink Creek Watershed Planning Committee of November 5, 2005 at 7:00 pm, held at the Alden Township Hall, 8515 Alden Road, Harvard, IL.

Committee Members present: **Randy Stowe, Chris Paluch, Dan Wilson, Rob Linke, Orrin Bangert, and Dick Hilton**

I Approval of Minutes of October 6, 2005 approved on a motion by Dan Wilson, second by Orrin Bangert

II Treasurers Report – No Report

III Public Comments - None

IV Unfinished Business

a. Planning Committee meeting site. **Having had no response from Mary Hoop at FSA, the committee authorized the Chair to send a follow-up request for information.**

b. Status & Review of update to plan-Quarterly Report. **Rob Linke provided a computer presentation of the sub watershed boundaries proposed for the Illinois portion of the watershed. Discussion focused on the names for some of the sub watersheds and information that would be available on the various layers. Rob indicated that he would probably be able to produce sub watershed maps with land use information for the next meeting.**

c. NIPC Stream Inventory (Tim Loftus) – **No Report**

d. Signage – "Entering Watershed" **Hilton Will contact Jack Franks to see if he can help to determine who in IDOT would authorize placement of the "Entering Watershed" signs. Cindy will contact the County Highway Department about placement of stream identification signs.**

e. Neumann Homes/Village of Wonder Lake development. **Hilton updated committee on activities.**

f. Pappas annexation - Greenwood. **Hilton informed committee that the Village of Greenwood officially annexed the property and approved the preliminary plat that includes property lines running through the flood plains, wetlands and the centerline of the Nippersink Creek.**

g. Wonder Lake NPDES Permit application. **Hilton advised committee that the Wonder Lake Permit application is still undergoing a staff review by the IL EPA in Springfield**.

V New Business

a. Village of Bull Valley (VBV) annexations on Rte 120 (Hilton) **The committee was advised of a VBV effort to annex properties along Rte 120 between Thompson Rd. and E. Wonder Lake Rd. that would require a forced annexation of 5 separate properties.**

b. **<u>Addition to Agenda.</u> (Watershed photos) Rob Linke would like to have photos that can be used in power point presentations and for the website.**

VI Next Meeting – December 1, 2005 at the Alden Township Hall at 7:00 p.m.

VII Adjournment – Motion by Dan, second by Randy at 8:40 p.m.

NIPPERSINK CREEK WATERSHED PLANNING COMMITTEE
P.O. Box 168
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Minutes

Meeting of the Nippersink Creek Watershed Planning Committee of January 5, 2006, at 7:00 pm, held at the Alden Township Office, 8515 Alden Road, Harvard, IL.

Members Present: Dan Wilson, Chris Paluch, Cindy Skrukrud, Randy Stowe, Rob Linke, Orrin Bangert, Lucy Piechota & Dick Hilton

I Approval of Minutes (November 3, 2005) **On a motion by and second by, the committee approved the minutes of the meeting of November 3, 2005**

II Treasurers Report – No Report

III Public Comments - None

IV Unfinished Business:

a. Planning Committee meeting site. (Hilton)
   1. Review of correspondence received from FSA. **The committee discussed and voted to refer the matter to the SWCD Board of Directors for review and possible resolution.**

b. Status & Review of update to plan.
   1. Review of Sub-watershed maps (Rob Linke) **(a) Rob presented a draft of the ssubwatershed maps in both hard copy and electronic format on cd and presented them to the committee for review & discussion. Copies were sent to Ed Collins at MCCD with request for review, edification and comment. Discussion followed on the need for identifying areas of concern within subwatersheds which prompted further discussion on the need to clearly identify and work to protect the smaller environmentally sensitive areas located within each subwatershed. By consensus, the committee agrees on the importance of protecting these areas and not allowing them to get lost in the bigger picture as we proceed with our efforts to update the plan and develop implementation schedules. The uniqueness of the Tryon Creek subwatershed was used as an example and Lucy Piechota agreed to communicate with both Randy Stowe and Rob and to share the narratives on this area that were developed by a group of concerned residents committed to protecting the natural resources therein. (b) The committee then reviewed the funding of our efforts and Chris Paluch agreed to invoice NIPC the week of 1/10 and on a motion by Cindy Skrukrud and second by Dan Wilson, the committee unanimously agreed to forward their $5,000 cost share commitment to the grant to the McHenry County Defenders. (c) The committee reviewed with Rob Linke the need for an electronic copy of the McHenry County Comprehensive Land use Plan. Rob will communicate our needs to Cindy Skrukrud who will then work**

with the Director of the McHenry County Planning & Development Department. Hilton will contact the SWCD Board and discuss the feasibility of using the intergovernmental agreement that that they have with McHenry County to assist the committee (a subcommittee of the SWCD) to obtain "parcel" maps in an electronic format. (d) There was a brief discussion on the development of an outreach program and it will be on the February meeting agenda.

c. NIPC Stream Inventory (Tim Loftus) **No report – Cindy Skrukrud is working with Tim Loftus to see what information is available.**

d. Signage – "Entering Watershed" (Hilton)

1. IDOT Contact, (State Highway ("Watershed sign") Hilton **is waiting to hear from Jack Frank's office staff on who to contact at IDOT.**

2. County contact, (Nippersink ID sign) Cindy **Skrukrud agreed to contact the McHenry County Highway Dept.**

e. Pappas property update **A letter from the U.S. Army Corps of Eng. To the developer of this property was distributed to the committee for review. The committee authorized the Chair to communicate with the USACOE, our willingness to assist where needed in monitoring this project.**

f. Wonder Lake NPDES Permit application update (Hilton) **Hilton advised that the "draft" permit is scheduled to go out for public review in early February of this year.**

g. Bull Valley annexations on Rte 120 (Hilton) **The proposed annexation of properties to the north & south of Route 120 between Thompson Road and E. Wonder Lake Road, to include a portion of Wonder Lake was reviewed by the committee.**

V New Business

a. Review of McHenry County Draft Land Use Plan **Following a brief discussion the committee decided to remain neutral on the support for the drafts that are being considered by McHenry County's Planning & Development committee.**

b. McHenry County Groundwater Issues **Information printed in the NW Herald was presented to the committee for review.**

c. Hay & Associates C-2000 grant application through FREP **The application seeking funds to support monitoring activities above and below wastewater treatment plants located on the North Branch of the Nippersink was discussed and the committee authorized Cindy Skrukrud to develop a letter of support for the grant and submit it to the Chair for signature and submittal.**

VI Next Meeting - February 2, 2006 at the Alden Township Hall

VII Adjournment - On a motion by Lucy Piechota and second by Dan Wilson, the meeting was adjourned at 9:05 p.m.

NIPPERSINK CREEK WATERSHED PLANNING COMMITTEE
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Minutes

Meeting of the Nippersink Creek Watershed Planning Committee_of February 2, 2006, at 7:00 pm, held at the Alden Township Office, 8515 Alden Road, Harvard, IL.

Members Present: Dan Wilson, Chuck Beard, Cindy Skrukrud, Randy Stowe, Tom Cooper, Lucy Piechota & Dick Hilton

I Approval of Minutes: On a motion by Tom Cooper and second by Cindy Skrukrud, the committee approved the minutes of the meeting of January 5, 2006.

II Treasurers Report – No Report

III Public Comments - None

IV Unfinished Business:

a. Planning Committee meeting site. (Hilton)
   1. Review of correspondence received from FSA. **The committee discussed and voted to refer the matter to the SWCD Board of Directors for review and possible resolution.**

b. Status & Review of update to plan.
   1. Review of Sub-watershed maps (Rob Linke) **(a) The committee discussed the possibility of digitizing the county's current land use map. (b) The plan is for each sub watershed to have a summary report of land uses and existing land cover that will go out for review by local community interest groups prior to final report. (c) Alden Township is naming all of its oak groves and will make the information available for Rob to include in the maps. (d) The plan is to post the watershed maps on the Nippersink web site. Randy indicated that he would try to get copies of the Tryon Creek maps to Lucy the week of 2/6 and Lucy provided information on Tryon Creek to Randy.**

c. NIPC Stream Inventory (Tim Loftus) **Cindy Skrukrud discussed with Tim & Rob and info may or may not be useful. Skrukrud & Hilton will attempt to meet with MCCD to discuss availability of info that they have digitized that may be relevant.**

d. Signage – "Entering Watershed" (Hilton)
   1. IDOT Contact, (State Highway ("Watershed sign") Hilton **is waiting to hear from Jack Frank's office staff on who to contact at IDOT.**
   2. County contact, (Nippersink ID sign) **No Report.**

e. Pappas property update **A letter from IDNR To the President of the Village of Greenwood was distributed to the committee for review.**

f. Wonder Lake NPDES Permit application update (Hilton) **Hilton confirmed that the "draft" permit is scheduled to go out for public review in early February of this year.**

g. Bull Valley annexations on Rte 120 (Hilton) **The proposed annexation of properties to the north & south of Route 120 between Thompson Road and E. Wonder Lake Road, to include a portion of Wonder Lake that was reviewed by the committee at the January meeting has been completed and the properties are now within the Village of Bull Valley.**

V New Business

a. History of Plan Committee **tabled to the March meeting.**

VI Next Meeting - February 2, 2006 at the Alden Township Hall

VII Adjournment - On a motion by Lucy Piechota and second by Dan Wilson, the meeting was adjourned at 8:45 p.m.

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Minutes

Meeting of the Nippersink Creek Watershed Planning Committee of March 2, 2006, at 7:00 pm, held at the Alden Township Office, 8515 Alden Road, Harvard, IL.

Members Present: Dan Wilson, Randy Stowe, Tom Cooper, Orrin Bangart, Rob Linke, & Dick Hilton

I Approval of Minutes: On a motion by Tom Cooper and second by Dan Wilson, the committee tabled approval of the Feb. 2, 2006 minutes, pending completion.

II Treasurers Report – No Report

III Public Comments - None

IV Unfinished Business:

A. Status & Review of update to plan.

1. Review of Sub-watershed maps (Rob Linke) **(a) Rob stated that he was preparing compact disks for presentation to committee members. The cd's will contain the maps of the sub watersheds. The committee will be requested to review the data. The committee should also watch the web site for newly posted data and advise him of any needed changes or revisions. We need to make sure we identify by name, the creeks and natural areas and mislabeled information. (b) The outreach programs are continuing to be assembled. (c) there is still a need for the county plat maps from the County Assessors office. There is also a need for existing land-use and land-cover data to go with the parcel map data. To date the 2020 Plan is not available.**

B. NIPC Stream Inventory (Tim Loftus) **Cindy Skrukrud & Randy Stowe are working with NIPC staff to locate these files.**

C. Signage – "Entering Watershed" (Hilton)

1. IDOT Contact, (State Highway("Watershed sign") Hilton **No Report**
2. County contact, (Nippersink ID sign) **No Report.**

D. Pappas property update **The committee voted to direct correspondence to the IL DNR pointing out the importance of this property to the upstream watershed and requesting that they consider reopening their consultation review of the property.**

E. Wonder Lake NPDES Permit application update (Hilton) **The application is under review by the IL EPA.**

F. Review of McHenry County Draft Land Use Plan status. **The 2020 Land Use Plan has not been approved.**

G. History of committee

V New Business

VI Next Meeting – April 6, 2006 at the Alden Township Hall at 7:00 p.m.

VII Adjournment - On a motion by Tom Cooper and second by Dan Wilson, the meeting was adjourned at 8:50 p.m.

NIPPERSINK CREEK WATERSHED PLANNING COMMITTEE

P.O. Box 168
Woodstock, IL 60098
Phone: (815)-338-0049 FAX: (815)-338-7731

Minutes

Meeting of the Nippersink Creek Watershed Planning Committee of April 6, 2006, at 7:00 pm, held at the Alden Township Office, 8515 Alden Road, Harvard, IL.

Members Present: Dan Wilson, Chuck Beard, Cindy Skrukrud, Randy Stowe, Tom Cooper, Chris Paluch, Rob Linke, & Dick Hilton

I Approval of Minutes: On a motion by Tom Cooper and second by Cindy Skrukrud, the committee tabled approval of the March 2, 2005 minutes, pending completion.

II Treasurers Report – No Report

III Public Comments - None

IV Unfinished Business:

A. Status & Review of update to plan.

1. Review of Sub-watershed maps (Rob Linke) **(a) Rob presented the committee with compact disks containing the maps of the sub watersheds and after reviewing a visual display, requesting that committee members review the data and also the data on the web site and advise him of any needed changes or revisions. Especially review for missing names of creeks and natural areas and mislabeled information. (b) The outreach programs are close to being completed for review prior to presentation to interested parties in the sub watershed regions. (c) Following discussion of the plat maps provided by the McHenry County Assessors office the committee requested that Dick Hilton attempt to set up a short meeting with the Director of the McHenry County Planning & Development Dept. for the purpose of demonstrating the need for zoning information on parcels in the watershed. It was hoped that a meeting could be set for 4/12, 13, 14, or 18. Rob would be available to present information focusing on our needs. We are looking to fill the need for existing land-use and land-cover data to go with the parcel map data.**

B. NIPC Stream Inventory (Tim Loftus) **Cindy Skrukrud & Randy Stowe agrees to follow up with NIPC staff and evaluate the data to see if it is suitable to our needs.**

C. Signage – "Entering Watershed" (Hilton)

1.IDOT Contact,(State Highway "Watershed sign")Hilton **No Report**

2. County contact, (Nippersink ID sign) **No Report.**

D. Pappas property update **Correspondence was directed to the IL DNR pointing out the importance of this property to the upstream watershed and requesting that they consider reopening their consultation review of the property. There has not been a response to this correspondence to date.**

E. Wonder Lake NPDES Permit application update (Hilton) **Revisions to the application have been made and are under review by the IL EPA. The draft permit should be released for public review in April.**

F. Review of McHenry County Draft Land Use Plan status. **A new planning commission is being formed to begin the process of developing a 2030 land use plan for the county.**

V New Business

A. Bull Valley annexations on Greenwood Road (Hilton) **Petitioner/owners of less than 11 acres of land have filed a petition to forcibly annex almost 160 acres of land so that they might annex their properties to the Village of Bull Valley. A hearing is scheduled for April 10.**

B. Dredging Wonder Lake – potential for grants. **Hilton advised that the MPOA and Village of Wonder Lake are working on a plan to begin a dredging project to remove sediments in Wonder Lake beginning in the spring of 2008. The expense of dredging could ultimately benefit the entire watershed if an implementation plan is established that would qualify for funding through the Clean Water Act 319 program.**

C. Shoreline Stabilization – Dam Maintenance. **Hilton also brought to the committee's attention the effort by the Village of Wonder Lake and the MPOA to assist lakefront property owners to obtain permits for shoreline stabilization activities by working with the U.S. Army Corpse of Engineers to simplify the permit process. This would also apply to upstream dam restoration efforts.**

D. IL EPA 2006 303-D List. **Cindy Skrukrud brought to the attention of the committee that the Impaired Waters Report is now available on the IL EPA website and that the Nippersink is included.**

VI Next Meeting – May 4, 2006 at the Alden Township Hall at 7:00 p.m.

VII Adjournment - On a motion by Tom Cooper and second by Dan Wilson, the meeting was adjourned at 8:40 p.m.

NIPPERSINK CREEK WATERSHED PLANNING COMMITTEE
P.O. Box 168
Woodstock, IL 60098
Phone: (815)-338-0049 FAX: (815)-338-7731

Minutes

Meeting of the Nippersink Creek Watershed Planning Committee of May 4, 2006, at 7:00 pm, held at the Alden Township Office, 8515 Alden Road, Harvard, IL.

Members Present: Dan Wilson, Randy Stowe, Tom Cooper & Dick Hilton

I Approval of Minutes: On a motion by Tom Cooper and second by Dan Wilson, the committee tabled approval of the April 6, 2006 minutes, pending completion.

II Treasurers Report – No Report

III Public Comments - None

IV Unfinished Business:

A. Status & Review of update to plan.

1. Review of Sub-watershed maps (Rob Linke) **(a) Randy reported that the new county-wide aerial base map will be Completed and available from USGS in May.**
2. Outreach-**No Report**
3. Plan update-**Everything has been received from McHenry County Planning & Development, Rob is now coordinating the digital layers with the USGS aerial maps.**

Web site review-**Subwatershed reports will be posted on the site soon.**

B. NIPC Stream Inventory (Tim Loftus) **No Report**

C. Signage – "Entering Watershed" (Hilton)

1. IDOT Contact, (State Highway ("Watershed sign") Hilton **No Report**
2. County contact, (Nippersink ID sign) **No Report.**

D. Pappas property update **The Village of Greenwood Planning & Zoning Commission has approved the Pappas Preliminary Plat and passed it on to the V of G Board for approval.**

E. Wonder Lake NPDES Permit application update (Hilton) **Revisions to the application havebeen made to increase the capacity and it is currently under review by the IL EPA.**

F. Dredging Wonder Lake **Hilton announced that the MPOA's Lake Maintenance Commission has recommended entering into a contract to update the organizations 1996 dredging Feasibility Study in anticipation of a dredging program to begin in 2008.**

V New Business

A. McHenry County Groundwater Workshop **No Report**

B. Municipal Outreach schedule **No Report**

VI Next Meeting – June 1, 2006 at the Alden Township Hall at 7:00 p.m.

VII Adjournment - On a motion by Tom Cooper and second by Dan Wilson, the meeting was adjourned at 8:15 p.m.

NIPPERSINK CREEK WATERSHED PLANNING COMMITTEE

P.O. Box 168
Woodstock, IL 60098
Phone: (815)-338-0049 FAX: (815)-338-7731

Minutes

Meeting of the Nippersink Creek Watershed Planning Committee of June 1, 2006, at 7:00 pm, held at the Alden Township Office, 8515 Alden Road, Harvard, IL.

Members Present: Dan Wilson, Randy Stowe, Tom Cooper Orrin Bangert, & Dick Hilton

I Approval of Minutes: On a motion by Tom Cooper and second by Dan Wilson, the Committee approved the May 4, 2006 minutes.

II Treasurers Report – No Report

III Public Comments - None

IV Unfinished Business:

A. Status & Review of update to plan.

1. Review of Sub-watershed maps (Rob Linke) **(a) Rob reviews the various layers of data available on sub watershed maps and briefly reviewed designation of potential areas of concern and how they were identified. The committee agreed to meet with Rob at the SWCD offices to go over the sub watershed maps in greater detail and further identify areas of concern as a lead in to the development of implementation plans to address natural resource issues.**

2. Outreach-**No Report – will be an item on the meeting mentioned in 1 above.**

3. Plan update- **Rob pointed out that NOT everything has been received from McHenry County Planning & Development, Hilton will direct an email to Sue Ehardt.**

Web site review-**Sub watershed reports will be posted on the site soon.**

B. NIPC Stream Inventory (Tim Loftus) **No Report**

C. Signage – "Entering Watershed" (Hilton)

1. IDOT Contact, (State Highway ("Watershed sign") Hilton **No Report**

2. County contact, (Nippersink ID sign) **No Report.**

D. Pappas property update **The Village of Greenwood Planning & Zoning Commission has approved the Pappas Preliminary Plat and passed it on to the V of G Board for approval. No additional information available. No activity on property.**

E. Wonder Lake NPDES Permit application update (Hilton) **Revisions to the application have been made to increase the capacity and it is currently under review by the IL EPA.**

F. Dredging Wonder Lake **Hilton announced that the MPOA's Board of Directors has approved a contract to update the organizations 1996 dredging Feasibility Study in anticipation of a dredging program to begin in 2008. The consultants Scope of Work includes preliminary design of a proposed sediment storage area and an inventory of potential shoreline improvements.**

V New Business

A. McHenry County Groundwater Workshop **No Report**

B. Municipal Outreach schedule **See IV, 2 in Unfinished Business**

C. Thatcher Meadows – Wonder Lake. **Hilton reported that a developing plan for development of 1450 acres of land located between Wonder Lake and McHenry is currently under review and refinement to address environmental issues based on input from various USACOE, county, and local consultant input**

D. Shoreline Protection/restoration **See item F in unfinished Business**

VI Next Meeting – July 6, 2006 at the Alden Township Hall at 7:00 p.m.

VII Adjournment - On a motion by Tom Cooper and second by Orrin Bangert, the meeting was adjourned at 8:30 p.m.

NIPPERSINK CREEK WATERSHED PLANNING COMMITTEE

P.O. Box 168
Woodstock, IL 60098
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Minutes

Meeting of the Nippersink Creek Watershed Planning Committee of August 3, 2006, at 7:00 pm, held at the Alden Township Office, 8515 Alden Road, Harvard, IL.

Members Present: Dan Wilson, Randy Stowe, Orrin Bangert, Rob Linke & Dick Hilton

I Approval of Minutes: On a motion by Orrin Bangert and second by Dan Wilson, the Committee approved the June 1, 2006 and June 7, 2006 minutes & notes.

II Treasurers Report – No Report

III Public Comments - None

IV Unfinished Business:

A. Status & Review of update to plan.

1. Review of Sub-watershed maps (Rob Linke) **(a) Rob reported that he was able to obtain information on the Wisconsin portion of the watershed and will incorporate into a more sophisticated system – "Generalized Watershed Loading Function Model which will enable us to take existing conditions and project them into the future.**

2. Outreach-**No Report – will be an item on the meeting mentioned in 1 above.**

3. Plan update- **Rob pointed out that NOT everything has been received from McHenry County Planning & Development. Rob will contact Sue Ehardt at McHenry Co. OP & D direct for the promised info. Rob requested that another daytime planning session be arranged at SWCD the week of 8/14 or 8/21 to further develop the subwatershed implementation plans.**

B. Signage – "Entering Watershed" (Hilton)

1. IDOT Contact, (State Highway ("Watershed sign") Hilton **No Report**

2. County contact, (Nippersink ID sign) **waiting for additional information.**

C. Pappas property update **No activity on property.**

D. Wonder Lake NPDES Permit application update (Hilton) **NPDES permit has been issued for 2 mgd treatment plant to serve new development and existing population.**

E. Dredging Wonder Lake **Hilton announced that shoreline inventory has been completed and map of various methods used to prevent and retard erosion is under construction.**

V New Business

A. Municipal Outreach schedule **See IV, 2 in Unfinished Business**

B. Thatcher Meadows – Wonder Lake. **Hilton reported that the concept plan for development of 1450 acres of land located between Wonder Lake and McHenry is under continuing review and refinement to address environmental issues based on input from various USACOE, county, and local consultant input. The Village of Wonder Lake is also updating their zoning ordinance, incorporating environmental issues and planned unit development concepts into the document.**

VI Next Meeting – September 7 at the Alden Township Hall at 7:00 p.m.

VII Adjournment - On a motion by Dan Wilson and second by Orrin Bangert, the meeting was adjourned at 8:20 p.m.

NIPPERSINK CREEK WATERSHED PLANNING COMMITTEE
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Minutes

Meeting of the Nippersink Creek Watershed Planning Committee of September 7, 2006, at 7:00 pm, held at the Alden Township Office, 8515 Alden Road, Harvard, IL.

Members Present: Lucy Piechota, Dan Wilson, Randy Stowe, Orrin Bangert, Chuck Beard, Cindy Skrukrud & Dick Hilton

I Approval of Minutes **– Motion to approve by Orrin Bangert, 2nd by Dan Wilson – Motion passed**

II Treasurers Report **– No Report**

III Public Comments **– None**

IV Unfinished Business:

a. Status & Review of update to plan.

1. Review of Sub-watershed maps & info **– Rob Linke is working with McHenry County P & D to obtain the new 2' topo maps and layers for sub watersheds – goal is to identify sub watersheds that have potential for degradation and enhancement. Randy used laptop computer to project examples of a sub watersheds, identifying % of channelized stream, hydric soils, land-use info, wetland acreage, % of high quality wetlands, remnant communities of woodlands, grasslands, challenges/stresses in sub watershed – asset to the Nippersink watershed**

2. Watershed Outreach Program **– No Report**

3. Additional information for plan update **– See a. (1) above.**

4. Review of info - Web Site **– Once obtained and integrated into existing info the 2' topo maps will be posted web site.**

b. Signage – "Entering Watershed" (Hilton)

1. IDOT Contact, (State Highway ("Watershed sign") **– No Report**

2. County contact, (Nippersink ID sign) **– No Report**

c. Pappas property update **– Hilton reported that SSA to fund work on site has been published in the NW Herald but that there is no additional information.**

d. Thatcher Meadows – Wonder Lake **– W. Wonder Lake will be closed for approximately 6 weeks for purpose of reconstruction and placement of a box culvert on Galt Creek. Village amending their zoning ordinance to address**

e. Dredging & Shoreline work - Wonder Lake (Hilton) **– No Report**

f. Municipal Outreach Schedule **– No Report**

V New Business

a. Sub watershed Working Meeting (Added at meeting) **– Hilton agreed to coordinate a meeting to identify natural resource issues by sub watershed. Invitees to include committee members, Rob Linke, Randy Stowe, Dave Brandt, Ed Weskerna, Lisa Haderlein, Sue Ehardt, Ed Collins, Elizabeth Kessler, Exec. Dir./Defenders, Brad Semel, Keith Wozniak, Kate Bliss**

VI Next Meeting **- October 5, 2006**

VII Adjournment **– 8: 40 p.m. - Motion by Dan Wilson, 2nd by Chuck Beard**

NIPPERSINK CREEK WATERSHED PLANNING COMMITTEE
P.O. Box 168
Woodstock, IL 60098
Phone: (815)-338-0049 FAX: (815)-338-7731

Minutes

Meeting of the Nippersink Creek Watershed Planning Committee_of October 5, 2006, at 7:00 pm, held at the Alden Township Office, 8515 Alden Road, Harvard, IL.

Members Present: Lucy Piechota, Dan Wilson, Randy Stowe, Orrin Bangert, Cindy Skrukrud & Dick Hilton

I Approval of Minutes **– Motion to approve by Cindy Skrukrud, 2nd by Lucy Piechota – Motion passed**

II Treasurers Report **– No Report**

III Public Comments **– None**

IV Unfinished Business:

a. Status & Review of update to plan.

1. Review of Sub-watershed maps & info **– Rob Linke has received the new 2' topo maps and layers for sub watersheds from McHenry County–Randy used laptop computer to project layers for 2 of the sub watersheds, (Bailey's Woods & Nippersink Creek Headwaters). The map layers depict general & population data, stream characteristics, Wetland & hydric soils, natural areas, historic vegetative cover (prairies, grasslands, woodlands, wetlands), watershed development, water quality data, existing issues, opportunities for improvement, protection goals and implementation recommendations. The template that will be used to identify areas of need for each sub watershed is under construction.**

2. Watershed Outreach Program **– No Report**

3. Additional information for plan update **– The data is now all in house and under Review, to be categorized by sub watershed.**

4. Review of info - Web Site **– updates continue as sub watershed data is finalized.**

b. Signage – "Entering Watershed" (Hilton)

1. IDOT Contact, (State Highway ("Watershed sign") **– No Report**

2. County contact, (Nippersink ID sign) **– No Report**

c. Pappas property update **– No Report**

d. Thatcher Meadows – Wonder Lake **– Village of Wonder Lake continues to work on text amendments to their zoning ordinance**

e. Dredging & Shoreline work - Wonder Lake (Hilton) **– No Report**

f. Municipal Outreach Schedule **– No Report**

V New Business

a. Format to ID High Quality Natural Areas **(See item IV a, 1 above)**

b. Prioritizing HQ sites **No Report**

c. YSI Probe **Cindy Skrukrud reported on possible WQ monitoring device – will report further at November meeting.**

VI Next Meeting **– November 2, 2006**

VII Adjournment **– 8: 40 p.m. - Motion by Dan Wilson, 2nd by Orrin Bangert**

NIPPERSINK CREEK WATERSHED PLANNING COMMITTEE
P.O. Box 168
Woodstock, IL 60098
Phone: (815)-338-0049 FAX: (815)-338-7731

Minutes

Meeting of the Nippersink Creek Watershed Planning Committee of November 2, 2006, at 7:00 pm, held at the Alden Township Office, 8515 Alden Road, Harvard, IL.

Members Present: Dan Wilson, Randy Stowe, Orrin Bangert, Rob Linke & Dick Hilton

I Approval of Minutes **– Tabled to the December meeting**

II Treasurers Report **– No Report**

III Public Comments **– None**

IV Unfinished Business:

a. Status & Review of update to plan.

1. Review of Sub-watershed maps & info **– Rob Linke Reported that he now has all data necessary to begin developing the various layers of information. The map layers will depict each of the sub watersheds general & population data, stream characteristics, Wetland & hydric soils, natural areas, historic vegetative cover (prairies, grasslands, woodlands, wetlands), watershed development, water quality data, existing issues, opportunities for improvement, protection goals and implementation recommendations. A review of the draft template that will be used to identify areas of need for each sub watershed was conducted by the committee.**

2. Watershed Outreach Program **– The committee discussed the timetable for beginning the development of the program and agreed that the data in number 1 above needs to first be finalized.**

3. Additional information for plan update **– Rob Linke will contact the various organizations if additional information is required to complete.**

4. Review of info - Web Site **– updates continue as sub watershed data is finalized. Should there be a minimum size for wetland depiction on maps?**

b. Signage – "Entering Watershed" (Hilton)

1. IDOT Contact, (State Highway ("Watershed sign") **– No Report**

2. County contact, (Nippersink ID sign) **– No Report**

c. Pappas property update **– No Report**

d. Thatcher Meadows – Wonder Lake **– Village of Wonder Lake continues to work on text amendments to their zoning ordinance and wilol probably approve them during November. Once approved, ther developer plans to submit a proposed development plan and annexation petitions to the Village of Wonder Lake.**

e. Dredging & Shoreline work - Wonder Lake (Hilton) **– No Report**

f..YSI Probe **– No Report**

g. Review of invitation to McHenry County P & D – **On December Agenda**

V New Business

VI Next Meeting **– December 7, 2006**

VII Adjournment **– 8: 40 p.m. - Motion by Dan Wilson, 2nd by Orrin Bangert**

NIPPERSINK CREEK WATERSHED PLANNING COMMITTEE
P.O. Box 168
Woodstock, IL 60098
Phone: (815)-338-0049 FAX: (815)-338-7731

Minutes

Meeting of the Nippersink Creek Watershed Planning Committee of December 7, 2006, at 7:00 pm, held at the Alden Township Office, 8515 Alden Road, Harvard, IL.

Members Present: Dan Wilson, Randy Stowe, Tom Cooper, Lucy Piechota & Dick Hilton

I Approval of Minutes of 10/5 & 11/2 – **Motion by Tom Cooper & 2nd by Lucy Piechota – motion passed**

II Treasurers Report **– No Report, Status will be reported in January**

III Public Comments **– None**

IV Unfinished Business:

a. Status & Review of plan update.

1. Review of Sub-watershed maps & info **– Randy Stowe reported a slight set back in the work production of the engineer as a result of an injury sustained in a sporting event but the team is continuing to refine the product for each of the subwatershed plans.**
2. Watershed Outreach Program **– The committee has set December 15, 2006 for deadline date to mail requests for time on agendas to present outreach programs to municipal & township planning organizations located within the watershed. Hilton will contact Executive director of the McHenry County Defenders and request that they provide contact services as a part of their cost share commitment. Rob Linke and Randy Stowe will draft letter of request. The program will be focused on the Alden Headwaters and one other sub watershed. Program length will be geared to a 10-15 minute presentation designed to strike a balance between problems and solutions and solicitation of input on problem/high quality natural areas.**
3. Additional information for plan update **– No additional data required**
4. Review of info - Web Site **– updates continue as sub watershed data is finalized.**

b. Signage – "Entering Watershed" (Hilton)

1. IDOT Contact, (State Highway ("Watershed sign") **– No Report**
2. County contact, (Nippersink ID sign) **– No Report**

c. Pappas property update **– It appears as though property has been surveyed, lot line markers appear to be in place.**

d. Thatcher Meadows – Wonder Lake **– The developer has submitted a concept plan for the development to the Village of Wonder Lake Board of Directors. The plan has been referred to the village's Planning & Zoning Commission. The first series of workshops was held on November 28 and included a presentation of the general concepts of the development, surface water movement, wetlands and open space and collector road configurations.**

e. Dredging & Shoreline work - Wonder Lake (Hilton) **– No Report**

f..YSI Probe **– No Report**

g. Review of invitation to McHenry County P & D – **Letter will be used as format for letters to be sent out on 12/15.**

V New Business

A. Kishwaukee River Valley Water Authority – **Hilton and Stowe briefed thecommittee on the development and purpose of the formation of the authority. A hearing is set for December 21 to validate petitions and begin the process of placing the matter on the April, 2007 ballot. The proposed boundary consists of all of Boone, DeKalb and western McHenry Counties and excludes all property within municipal boundaries as of November 17, 2006.**

VI Next Meeting **– January 4, 2007**

VII Adjournment **– 7:55 p.m. - Motion by Tom Cooper, 2nd by Lucy Piechota**

NIPPERSINK CREEK WATERSHED PLANNING COMMITTEE

P.O. Box 168
Woodstock, IL 60098
Phone: (815)-338-0049 FAX: (815)-338-7731

Minutes

Meeting of the Nippersink Creek Watershed Planning Committee_of March 1, 2007, at 7:00 pm, held at the Alden Township Office, 8515 Alden Road, Harvard, IL.

Members Present: Dan Wilson, Cindy Skrukrud, & Randy Stowe

I **Approval of Minutes** (February 8th, 2007) **No Action Taken**

II **Treasurers Report – No Report**

III **Public Comments - None**

IV **Unfinished Business:**

a. Status & Review of update to plan.
Randy Stowe presented an updated copy of the project recommendations, explaining that the Alden Headwaters subwatershed is being focused on at this point to refine a template that will then be used for the remaining subwatersheds. Committee members were asked to provide any comments on additions or changes needed to the draft recommendations. Randy also indicated that attempts to obtain a digital version of the new FEMA floodplain mapping from McHenry County were unsuccessful, but that WRC was looking at other possible means of acquiring that info.
b. Review of Sub-watershed data, maps,
Randy Stowe provided a brief overview on the status of wetland mapping and the aerial photography used to help identify future potential project areas.
c. Identification of Natural Areas by Subwatershed **No report presented**
d. Watershed Outreach Program **No report presented**
e. Review of info - Web Site **No report presented**
f. Criteria-Prioritizing Natural Area sites **No report presented**

V **New Business**
1. Approval of WRC Invoice
An invoice for $ 13,895 for consulting services on the Watershed Plan Update was reviewed and approved. The invoice will be forwarded to the McHenry County Defenders for processing and payment.
2. National Rivers Month Creekfest
MCCD is hosting this event at Keystone Landing on Sat. June 30, Noon – 4 pm. There will be a variety of activities. MCCD has invited the Defenders Friends of Nippersink Creek to participate with information on the Nippersink Creek and its watershed, as well as what neighboring landowners can do to help the Nippersink. Defenders asked the Nippersink Creek Watershed Planning Committee to also participate and provide info on the watershed plan update.

VI **Next Meeting – April 5th, 2007 at the Alden Township Hall**

VII **Adjournment - On a motion by Dan Wilson and second by Cindy Skrukrud, the meeting was adjourned at 8:30 p.m.**

NIPPERSINK CREEK WATERSHED PLANNING COMMITTEE

P.O. Box 168
Woodstock, IL 60098
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MINUTES

Meeting of the Nippersink Creek Watershed Planning Committee_of April 12, 2007, at 7:00 p.m. at the Alden Township Office, 8515 Alden Road, Harvard, IL.

Members Present: Randy Stowe, Cindy Skrukrud, Tom Cooper, Dan Wilson, Orrin Bangart, Lucy Piechota, Dick Hilton, Rob Linke

I **Approval of Minutes** The March 1, 2007 minutes were approved on a motion by Dan Wilson, Second by Cindy Skrukrud.

II **Treasurers Report** No Repot. Motion by Tom Cooper to appoint Cindy Skrukrud as Treasurer, with second by Dan Wilson, unanimously approved.

III **Public Comments** NONE

IV **Unfinished Business:**

Status & Review of update to plan. Review of Sub-watershed data, maps, Identification of Natural Areas by Sub watershed.
The committee reviewed the draft of the Plan Outline and the data on the Bailey Woods Subwatershed as it relates to the Draft that is under review. Committee suggested consolidating some of the land-cover descriptions, especially as it relates to Ag activities. The committee was presented with maps and requested to identify subwatershed problem areas that they may be aware of and report bact at the next meeting.

Watershed Outreach Program The committee will consider a special meeting to schedule outreach to watershed planning committees. The format is to present a global overview of watershed recommendations and also request the County and municipalities to use a GIS format that includes shared intergovernmental planning efforts.

Review of info - Web Site, Criteria-Prioritizing Natural Area sites Fema Floodplain maps will be included in determining the Green Infrastructure Plan that will be produced to reflect buffer recommendations and the interconnected waterways network. The Natural Areas Inventory (NAI) sites will be included in the Infrastructure Plan and Rob will summarize data in an electronic file.

Plan Time-line Draft Plan to committee by May 10, 2007 – final document by July 9, 2007

Pappas property update No Report

Thatcher Meadows – Wonder Lake No Report

Status WRC Invoice Cindy Skrukrud will meet with MCD and review

National Rivers Month (June 30 - Creekfest) Discussed participation.

V **New Business**

Alden Rd. Bridge replacement On a motion by Cindy Skrukrud, second by Tom Cooper, committee approved communication directed to McHenry County Highway Dept. detailing concerns related to bridge replacement plans.

VI **Next Meeting May 3, 2007 – 7:00 p.m., Alden Township Hall**

VII **Adjournment** 9:30 p.m. on motion by Tom Cooper, second by Dan Wilson

NIPPERSINK CREEK WATERSHED PLANNING COMMITTEE

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MINUTES

Meeting of the Nippersink Creek Watershed Planning Committee_of May 3, 2007, at 7:00 p.m. at the Alden Township Office, 8515 Alden Road, Harvard, IL.

Members Present: Randy Stowe, Cindy Skrukrud, Lucy Piechota, Dan Wilson, Orrin Bangart, Dick Hilton

I **Approval of Minutes** The April 5, 2007 minutes were approved on a motion by Cindy Skrukrud, Second by Lucy Piechota.

II **Treasurers Report** Total Assets $9,227.35, Int. earned $385.22
Cindy Skrukrud
submitted her resignation of the position of Treasurer.
Resignation accepted by committee. Orrin Bangert then volunteered to serve as Treasurer. with second by Dan Wilson, unanimously approved.

III **Public Comments** NONE

IV **Unfinished Business:**

Status & Review of update to plan. Review of Sub-watershed data, maps, Identification of Natural Areas by Sub watershed.
The committee reviewed the outline prepared to serve as the format for the Plan document and reviewed the data on the Bailey Woods Subwatershed as it relates to the proposed outline. It was agreed that mention of the Wisconsin portion of the watershed would be included in the plan in hopes that it would be a part of future planning efforts. Randy will collect data layers from the SWCD related to acquifer sensitivity soils, green infrastructure mapping and pre settlement land cover. Randy & Rob are presently waiting the "loading" analysis to be completed. The plan's original goals and objectives will be referenced with the three new updated goals ands objectives.

Watershed Outreach Program The developing program presentation will include a global overview of the watershed plan, the green infrastructure map and specific recommendations for each of the subwatersheds.

Pappas property update No Report

Thatcher Meadows – Wonder Lake No Report

Status WRC Invoice Cindy Skrukrud will meet with MCD and review

National Rivers Month (June 30 - Creekfest) Discussed participation.

V **New Business**
Randy Stowe submitted the quarterly report to CMAP.

VI **Next Meeting May 3, 2007 – 7:00 p.m., Alden Township Hall**

VII **Adjournment** 9:20 p.m. on motion by Cindy Skrukrud, second by Lucy Piechota

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MINUTES

Meeting of the Nippersink Creek Watershed Planning Committee of June 7, 2007, at 7:00 p.m. at the Alden Township Office, 8515 Alden Road, Harvard, IL.

Members Present: Randy Stowe, Cindy Skrukrud, Dan Wilson, Orrin Bangart, Tom Cooper, Dick Hilton

I **Approval of Minutes** Approval of the May 3, 2007 minutes was tabled.

II **Treasurers Report** Total Assets $9,266.48
Cindy Skrukrud submitted her resignation of the position of Treasurer. Resignation accepted by committee. Orrin Bangert then volunteered to serve as Treasurer

III **Public Comments** NONE

IV **Unfinished Business:**
Status & Review of update to plan. Review of Sub-watershed data, maps, Identification of Natural Areas by Sub watershed.
The committee continued its review of the draft of the Plan Outline, using the completed data on the Bailey Woods Subwatershed as its frame of reference.
In effort to assure consistency between updated plan and the McHenry County P&D Inspection Dept. committee unanimously approved directing correspondence to request status on suspected ordinance violations reported to same. Motion by Cooper, second Skrukrud.
Watershed Outreach Program Tentative schedule for presentations includes village of Wonder Lake on 6/12, Woodstock Environmental Committee on 6/13 and McHenry County Regional Planning Commission on 6/27.
Consultant's invoices Cindy Skrukrud moved & Tom Cooper seconded motion to approve for payment the 6/7/07 invoice in the amount of $6,980.

V **New Business**
Hack-ma-tack National Wildlife Refuge (Native American-Algonquin-for Tamarack) Following discussion, motion by Tom Cooper, second by Cindy Skrukrud to sign on to support and to recommend that SWCD Board also sign on to support federal designation of "Tamarack Farms" property as a national wildlife refuge.

Update Work Session Hilton to try to initiate participation in work session for mid to late July with Dave Brandt, Ed Weskerna, Ed Collins, Gabe Paul, Lisa Haderlein, Rob Linke Randy Stowe, Brad Semel, Sandy Salgado, Sue Draffkorn & Mary McCann.

VI **Next Meeting July 5, 2007 – 7:00 p.m., Alden Township Hall**

VII **Adjournment** 9:30 p.m. on motion by Tom Cooper, second by Dan Wilson

NIPPERSINK CREEK WATERSHED PLANNING COMMITTEE
P.O. Box 168
Woodstock, IL 60098
Phone: (815)-338-0049 FAX: (815)-338-7731

MINUTES

Meeting of the Nippersink Creek Watershed Planning Committee of August 9, 2007, at 7:00 p.m. at the Alden Township Office, 8515 Alden Road, Harvard, IL.

Members Present: Randy Stowe, Tom Cooper, Orrin Bang art, Dan Wilson, Dick Hilton,

Visitors Present: Preston Reye, Greenwood Township Supervisor

I **Approval of Minutes** Approval of the May 3, & July 5, 2007 minutes were approved on a motion by Tom Cooper, second by Orrin Bangert

II **Treasurers Report** Current balance as of 7/31/07 is $9,344.78

III **Public Comments** NONE

IV **Unfinished Business:**

A. **Work Session to assist in completing draft of of plan update.** The committee continued its review of the draft of the Plan Outline, reviewed completed map overlays and discussed improvements to the website.

B. **Hackmatack update (Cindy Skrukrud & see attached)** Committee reviewed a draft of a proposed brochure highlighting the effort to create a National Wildlife refuge within the watershed.

V **New Business**

A. **Review & Approve Quarterly Report (see attached)** Following discussion the committee approved the quarter5ly report on the grant on a motion by Tom Cooper, second by Orrin Bangart

B. **Report-National Rivers Month Event** – No Report

VI **Next Meeting , 2007 – 7:00 p.m., Alden Township Hall**

VII **Adjournment** 9:15 p.m. on motion by Orrin Bangart, second by Cindy Skrukrud

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Minutes

Meeting of the Nippersink Creek Watershed Planning Committee of October 9, 2007, at 7:00 pm, to be held at the McHenry County Soil & Water Conservation Office, Woodstock, IL.

Members Present: Cindy Skrukrud, Orrin Bangart, Dick Hilton, Randy Stowe
Visitors Present: Tim Loftus, CMAP

I Approval of Minutes: Suspended to next committee meeting

II Treasurers Report: Balance $9,421.94

III Public Comments: NONE

IV Unfinished Business:

A. Establish time table for feedback necessary to finalize watershed reports. Following discussion it was determined that CMAP will completed their "draft" comments and forward them to IL EPA by 10/31/07. It is projected that CMAP would then receive IL EPA "draft" comments by mid November. Following receipt by CMAP, comments would be reconciled and forwarded to Hilton & Skrukrud for further action. Targeted date for final report is 1/1/08.

B. Establish time table for final reimbursements on deliverables. All outstanding invoices covering deliverables to be processed by CMAP by 10/31/07. Outstanding invoice will be partially paid out of committee funds with reimbursement from Defenders when payment received from CMAP. Motion by Cindy Skrukrud to pay $6,790 to WRC out of NCWPC funds with understanding that reimbursement to committee would be made by the McHenry County Defenders upon receipt of funds from CMAP. Second by Orrin Bangart. Motion passed without objection and Hilton to notify SWCD to process payment at earliest possible date.

C. Hackmatack update (Cindy Skrukrud) No Report

V New Business

A. Discussion – Future Planning Committee Meeting Schedule. It was decided to meet following the receipt of reconciled reviews from CMAP.

B. WI portion of Nipper watershed

1. Geneva Lakes Conservancy Projects

a. Trail Systems

b. Land Acquisitions

Cindy Skrukrud indicated that she would attempt to get information on these matters and report back at the next meeting. It was also suggested that there should be some mention of this portion of the watershed, even though the plan is funded through IL EPA.

C. Follow up with Municipalities Regarding Plan Updates: Spring Grove and Richmond are on the schedule for presentations.

VI Next Meeting TBA

VII Adjournment Motion by Orrin Bangart, Second by Cindy Skrukrud

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Minutes

Meeting of the Nippersink Creek Watershed Planning Committee of January 10, 2008, at 7:00 pm, to be held at the Alden Township office, 8515 Alden Road, Harvard, IL at 7:00 P.M.

Members Present: Cindy Skrukrud, Dick Hilton, Randy Stowe, Dan Wilson, Orrin Bangert, Lucy Piechota
Visitors Present: None

I Approval of Minutes: Suspended to next committee meeting

II Treasurers Report: No Report

III Public Comments: NONE

IV Unfinished Business:

A. Status of Invoice payments for services rendered. Cindy Skrukrud will check with the MCD on the status of the 9/30/07 invoice from WRC and advise Randy.

B. Establish time table for final reimbursements on deliverables. WRC will review status of work to be completed and advise at the February meeting.

C. Hackmatack update (Cindy Skrukrud) No Report

D. WI portion of Nipper watershed

1. Geneva Lakes Conservancy Projects

a. Trail Systems Cindy reported that the National Park Service is providing assistant to the effort for establishing a trail system between Lake Geneva and Genoa City linking it with the existing MCCD trail in IL.

b. Land Acquisitions Cindy Skrukrud reported on the effort by Friends of Big Foot Beach State Park to prevent development of 750 acres adjacent to existing park facility by seeking funds to acquire it and link it to the park.

V New Business

A. Discussion – Resolution of CMAP & IL EPA comments to Draft Update of Plan: Randy Stowe presented a summary of comments and reported on the effort to resolve them with the appropriate parties. Formatting issues have been resolved & maps will be revised to comply with recommendations. Following discussion, committee made suggestions to address "pollutant loading", Areas of projects & elements of a 5 year plan. Cindy Skrukrud will work on Chapt. 18 revisions.

VI Next Meeting February 7, 2008

VII Adjournment Motion by Orrin Bangert, Second by Cindy Skrukrud at 9:00 P.M.